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INDIVIDUAL DIFFERENCES AND MEDICATION-MEDIATION IN CHRONIC ILLNESS CONDITIONS: A MIXED METHODS APPROACH TO THE DEVELOPMENT OF A NOVEL, CONCEPTUAL FRAMEWORK

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Glossary of abbreviations

BAS	Behavioural Approach System
BCE	Before Christian Era
BFI	Big Five Inventory
BIS	Behavioural Inhibition System
BMQ	Beliefs about Medication Questionnaire
BSI	Brief Symptom Inventory
CCS	Chernyshenko Conscientiousness Scales
CE	Christian Era
CHD	Coronary Heart Disease
CHF	Chronic Heart Failure
COPD	Chronic Obstructive Pulmonary Disease
COSMIN	COnsensus-based Standards for the selection of health Measurement INstruments
EPQR-A	Eysenck Personality Questionnaire – Revised Abbreviated Form
FFM	Five Factor Model
GP	General Practitioner
HAQ	Health Anxiety Questionnaire
HCP	Health-care Practitioner/Professional/Provider

HIV/Aids	Human Immunodeficiency Virus infection/ Acquired Immune Deficiency syndrome
IBD	Irritable Bowel Syndrome
IndEx-MediC	Individual/External Medication-mediation In Chronic illness
IndEx-MediR	Individual/External Medication-mediation In Respiratory illness
INR	The International Normalised Ratio
ISPOR	International Society of Pharmacoeconomics and Outcomes Research
MARs	Medication Adherence Rating Scale
MEMS	Medication Event Monitoring System
MRI	Magnetic Resonance Imaging
NA	Negative Affect
NCD	Non-communicable Chronic Diseases
NEO-FFI	Five Factor Inventory
NICE	National Institute for Health and Clinical Excellence
NEO-PI-R	Revised NEO Personality Inventory
PEN	Psychoticism, Extraversion, and Neuroticism
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RCT	Random Control Trial
SI	Social Inhibition
TaxoMA	Taxonomical Framework of Medication Adherence
TDF	Theoretical Domains Framework

WHO	World Health Organisation

Preface

This thesis, entitled INDIVIDUAL DIFFERENCES AND MEDICATION-MEDIATION IN CHRONIC ILLNESS CONDITIONS: A MIXED METHODS APPROACH TO THE DEVELOPMENT OF A NOVEL, CONCEPTUAL FRAMEWORK and the research and writing presented in it, are entirely the author's own. This work was done wholly while in candidature for a research degree at the University of Derby, which granted ethical approval for the research.

All the research in this thesis is original, but where the work of others has been consulted this is always clearly attributed within the text or by references.

Abstract

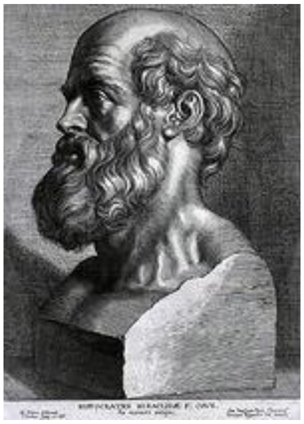
Chronic illness is prevalent; adherence to pharmaceutical therapy facilitates an optimal outcome and is the single most influential affect in the individual's illness trajectory. Hence, a prerequisite of efficacy is that medication is taken as prescribed. Adherence levels are, however, sub-optimal, with rates to pharmacological interventions as low as 17%; this represents a significant challenge to the effectiveness of therapy, undermining the benefits of clinical care. The reasons for nonadherence are various and complex, incorporating demographic factors, such as age and gender, cognitive variables including forgetfulness, as well as illness and treatment concerns, such as disagreeable symptoms and side effects. An underexplored factor, however, is the influence of personality factors on health behaviour, even though individual differences have been noted as central in health psychology.

The ambit of this thesis is to explore the determinants of, and barriers to, pharmacological adherence in chronic illness, with a particular emphasis on personality affects; the overarching aims of the research are to develop a taxonomical framework of adherence factors and, further, a conceptual model demonstrating various influences of medication-taking.

Two literature reviews were undertaken to establish what is currently known in extant literature; the first review, an expansive historical timeline, encompassed an appraisal of published literature in order to secure an overall understanding of topics that have been considered in relation to the phenomenon of medication adherence, and revealed the foci of adherence studies over the past few decades. This historical timeline evidenced that the biomedical stance is habitually used by researchers at the exclusion of patient's perspectives, and highlighted a gaping lacuna in terms of individual differences; furthermore, the review formed a novel basis on which to contextualise the second systematic literature review and meta-analysis, which honed in on personality and its causal affects on medication adherence in chronic illness conditions. To substantiate quantitative data attained from the reviews and to expound the core dimensions underlying medication adherence, phenomenological investigation was performed. Emergent themes of experiential notions of adherence, informed by interviews with thirty-one participants, were thematically analysed; motifs included challenges with self-management in chronic illness, coping with an alteration in the self and notions of 'normality', together with psychosocial

negotiation of the illness itself. Prior to interviews participants also completed psychometric assessments in order to ascertain adherence rates (the Medication Adherence Rating scale) and identify influential personality traits (the Five Factor Model).

Data were synthesised to construct a comprehensive taxonomical framework of the diverse determinants of adherence, which deepens our understanding, facilitates an entry-point into adherence research and has significant utility as a research-informed theoretical structure. Additionally, the novel IndEx-MediC conceptual model of adherence was developed, predicated on findings that medication-taking is a mediational process influenced temporally, experientially, and contextually, determined by individual and external factors. The model presents a novel description of patients' experiences of adherence to pharmaceutical therapy in chronic illness and serves as a foundation to develop a predictive measure to identify individuals potentially at risk of nonadherence, from which tailored interventional strategies may be devised.



"*It is far more important to know what person the disease has than what disease the person has*."

- **Hippocrates**

1 Overview

1 Overview

1.1 General Introduction

Pharmacological treatments have burgeoned in contemporary medicine; health care delivery in the UK, along with other developed economies, is predicated on a biomedical paradigm as a result of the '*therapeutic revolution*' (Rosenberg, 1977, p.485), and prescriptions are the most commonplace medical intervention. In fact, it has been reported that medication adherence trebles the prospect of favourable outcomes (DiMatteo, Giordani, Lepper & Croghan, 2002). A major focus of medical research is therefore patient compliance with pharmaceutical regimens, to the extent that the World Health Organisation (WHO) argues '*increasing the effectiveness of adherence interventions may have a far greater impact on the health of the population than any improvement in specific medical treatments*' (Sabate & Sabate, 2003, p.23), or in the laconic words of Dr C Everett Koop, (former US Surgeon General), '*drugs don't work in patients who don't take them*' (Osterberg & Blaschke, 2005, p.487). Consequently, in recent decades there has been increased focus on strategies to improve adherence, not only to optimise therapeutic regimes but also to reduce costs. NHS drug expenditure in England alone rose by 8% to £15bn in 2014-2015 (Andalo, The Pharmaceutical Journal, 2015), whereas pharmacological adherence reduces support costs in real terms (Desai & Choudhry, 2013). The WHO reported that only 50% of individuals adhere to their pharmaceutical regimen in chronic conditions (Sabate & Sabate); nonadherence to prescribed medication therefore represents a serious challenge, not least because expected treatment outcomes are not manifested, disease control is rendered ineffectual and evaluation of therapeutic effectiveness is more problematical (e.g., Ho, et al., 2008a). Divergence from prescribed pharmaceutical therapy results in negative consequences; premature deaths estimated to be in the region of 200,000 per annum, and concomitant annual financial burden of 125 billion euros (European Council Policy-makers Debate. An EU response to medication non-adherence. Brussels, 2010, in Kelly, McCarthy & Sahm, 2014). Nonadherence has a profound impact on individuals with chronic illness resulting in sub-optimal outcomes in terms of disease progression, increased prevalence of hospitalisation or emergency department visits, complications, and experience of recurrent episodes, as well as avoidable healthcare expenditure (Jha, Wang & Wang, 2012). Thus, medication adherence '*represents a field of research with increasing importance for patient outcomes and healthcare costs*' (Laufs, 2011, p.153).

The approach to patient care is subject to the prevailing conceptual model on which it is predicated; the most dominant model in Western medicine is the biomedical model, borne out of the therapeutic revolution. The biomedical model elucidates mechanisms of disease by means of biochemical science and considers that pathogenesis is a result of deviations from the norm of measurable, diagnostic somatic variables, and consequently resolved by biochemical palliation. The model is a reductionist approach that concentrates on the molecular level in isolation to the exclusion of spiritual or psychological factors. The concept has been challenged over the past four decades (e.g., Engel, 1977; Higgs, 1997; Weil, 2012); furthermore, adherence rates have not significantly improved during this period, lending credence to such indictments and intimating the necessity for an alternative explanation, other than the drug efficacy. The strength of a model lies in its ability to generate and test hypothetical knowledge; when this is no longer achievable models are modified or discarded, though dogmatic models, such as the biomedical paradigm, retain their standing by virtue of tradition and authority (George & Engel, 1980). For that reason, Engel proposed the development of an integrative conceptual model to take account of the interactions between psychological, social, and behavioural factors in association with biomedical affects, thus transcending limitations of the Cartesian dualism in which mind and body are considered separately, fundamental to the biomedical model. By evaluating all contributory factors the patient may be assured of the most appropriate intervention to support medication adherence. Nonadherence is considered a significant problem within the healthcare system and yet, despite half a century of research resulting in extensive studies, remains unresolved. Indeed, the WHO directive that the focus should turn to the optimisation of drug delivery and uptake as opposed to the design of novel drugs, is pivotal to the resolution of the problem. There is an abundance of reported factors that impact on the management of medication and relate to the patient, healthcare system or provider, treatment, or condition, as well as socio-economics and demographics; this profusion and intricacy of factors is recognised in the conceptualisation of the biopsychosocial approach, which acknowledges complex interactions in addition to solely physiological components, embracing psychological (e.g., Kaplan & Simon, 1990) and socio-economic (e.g., Peyrot, McMurray & Kruger, 1999) variables, which are influential in terms of disease aetiology and outcome.

It has been argued that pharmaceutical companies and the medical profession promote positivist biomedicalism (Goldacre & Smith, 2014), focussing on aetiology, as the means by which adherence is studied. Goldacre argues that '*drugs are tested by the people who manufacture them, in poorly designed trials, on hopelessly small numbers of weird, unrepresentative patients, and analysed using techniques which are flawed by design'* (Goldacre, 2012, p.xi). This, Goldacre argues, results in an exaggeration of the benefits of pharmaceutical therapy in favour of the manufacturer. Given challenges such as these, the prudence of developing alternative explanatory theories to advance our understanding of the adherence phenomenon is apparent. Sociological phenomenology diverts from the biomedical method and, by adjusting emphasis to the individual, attempts to understand the construction of adherence to pharmacological therapy from the lived realities of the individual's perspective (Whyte, van der Geest & Hardon, 2002). The interactional perceptions of pharmaceuticals and the symbolism of social meaning imbued in the illness condition are contextualised (Cohen, Janicki-Deverts, Crittenden, & Sneed 2012) and the experience of the lived 'reality' is illustrated by the protagonists. Despite their apparent utility however, psychosocial approaches have received limited acceptance in biomedical disciplines, primarily due to a reluctance to conceptually diverge from traditional clinical research methods; this author proposes that psychosocial methods form an essential component of adherence investigations and attempts to redress the disparity in research methodology for this thesis.

This thesis is a mandate to understand adherence to pharmacological therapies in chronic illness, notably taking into consideration the impact of individual differences; the current investigation identifies a gaping lacuna in the literature regarding influences on medication compliance. Whilst there is copious extant research on the phenomenon of adherence, a paucity of studies direct consideration specifically to factors other than demographics and illness-related concerns; health research is '*obsessed with* [rates of] '*compliance*'' (Whitmarsh, 2009, p.447) rather than the reasons *for* variance. The main aim of the present research therefore, is to identify the influences of individual differences, issues and challenges, and inter-relational affects of diagnostics of medication-taking for patients in the context of chronic illness. A reflexive attitude is adopted to consider the mutable rubrics of adherence, susceptible to the foibles of the human condition. This thesis progresses the conventional conceptualisation of medication adherence from a purely biomedical approach; the positing of adherence in a more extensive contextualisation is redux. It is argued that biomedicine ‘medicalises’ and seeks rationality for what is, in effect, a psychosocial utility of therapies.

A re-positioning of adherence, from the traditional accountability of a singular global factor and the binary corollary of adherence/nonadherence, would be constructive; an alternative philosophy to the positivist paradigm to guide research has the utility to recognise an individual’s interpretation of the illness process and medication-taking. Adherence has been conceptualised in terms of attitude to follow a prescription and expressed as cognitively motivated behaviour to perform that intention (Ellis, Petrie, Cameron, Buick & Weinman, 2001). Health scientists recognise the association between individual differences and health (Friedman & Martin, 2001) which are ‘*central to health psychology*’ … in terms of ‘*medicine and health*’ (Ferguson, 2013, p.S32). Personality theory, for example, (where personality traits, which are relatively consistent over time, are phenotypic dimensions of genetic and environmental influences and, as such, represent a potential mediating influence on medication adherence), encapsulates not only the variability of each individuals’ prognosis and treatment but also the mechanisms by which an individual approaches the process. In chronic illnesses individuals are often required to make substantial lifestyle changes in order to control the condition, but exploring the impact on an individual’s life, and how that in turn affects adherence, is rarely explored. This study focusses on the way in which individuals give meaning to the illness and medication-taking processes as expressed in their behaviour, based on beliefs, expectations, and motivations.

The lack of sustainable fulfilment of adherence (Haynes, 2001; Nieuwlaat, et al., 2014) or significant improvement in clinical outcomes and patient satisfaction (Stephenson, Rowe, Haynes, Macharia & Leon, 2008) suggest that current interventions have not captured the somatic experiences and salient factors responsible to ensure pharmacological adherence and, therefore, further work needs to be undertaken in order to direct future development. In terms of this doctoral research, it is not the effectiveness of the treatment that is questionable, rather the unexpected or moderated outcomes resulting from nonadherence. Targeting a single factor may prove ineffectual in terms of interventions as the influential direction of that element may be subject to contextual variations, for example research has suggested that polypharmacy, prevalent in conditions such as multiple sclerosis, is a predictor of nonadherence due to the complexity and burden of the administration of multiple products, however, recent studies have indicated that polypharmacy may induce a habit-forming mechanism which is an aid to adherence (Chen, Tseng & Cheng, 2013; Bryant, et al., 2013). This is one exemplar of the complications that are encountered when factors in specific contexts are applied globally. It is critical to engage all stakeholders, whether health care professional, policymaker, or patients themselves, in the debate, to embed a culture of patient awareness and responsibility, and further, design holistic interventions to empower patients' effective management; a dialogue between relevant parties to convey illness beliefs and treatment decisions is strategically expedient.

Findings from extant research suggest a diverse and dynamic experience, resulting in conflicts between the self and the need to fulfil the treatment regimen for the chronic illness. An individual balances autonomous control of the condition with the positioning of disease in a clinical and social contextualisation, integrated with everyday life. This current research explores the person's perceptions of illness management, the negotiations undertaken on individual bases, and the influences which enable adherence or represent challenges. In this thesis extant empirical knowledge is synergised with novel data based on authentic dialogues to create a novel perspective of insight; as a result, a taxonomical framework of current influences was designed, together with a conceptual model of medication-taking influences. These directly address the WHO's advocacy to improve adherence and has implications in terms of patient health, effective use of resources, clinical assessment of efficacy of treatment (WHO, 2003), together with utility in facilitating future research and interventional strategies.

1.1.1 Objectives of the thesis

Adherence to pharmacological therapy is universally suboptimal and is a major barrier in the achievement of clinical targets in chronic illness conditions; consequently, there is a requisite to isolate factors of adherence, distinguish their inter-relationships and contextual interactions, to identify individuals at risk of nonadherence and support treatment-management more effectively to ensure improved outcomes. Three primary deficits to understanding adherence in existing literature are evident:

- current classification of medication adherence is partial,
- predictive factors lack clarification, and
- variables may differ and are modifiable across illness conditions and in correlation with additional other factors.

The main objective of this thesis is, therefore, to explore the experience of managing a long-term illness, with particular focus on adherence to prescribed medication to ameliorate symptoms of the condition. Integral to this is the notion of individuals' illness and medication perceptions, socially contextualised beliefs, and relationships with health care providers.

In addressing shortcomings in extant literature, and in a bid to further understand and characterise the concept of adherence, the overarching aims of this thesis are:

Aim I - to complete an historical overview of medication adherence, to ascertain our current understanding, and review research directions,

Aim II - to undertake a systematic literature review and meta-analysis of personality factors and medication adherence in chronic illness to establish where the 'gaps' are,

Aim III - to develop a taxonomical framework of factors to identify and contextualise the most significant elements, based on current research, and

Aim IV - to construct a conceptual, factorial model of medication adherence in two separate illness-condition contexts: a general chronic conditions group and a sub-category focussing on respiratory conditions. Extant and novel data will be synergised to advance a state-of-the-art facsimile of the issue.

The following research questions will also be addressed as part of the research:

Research question 1: *what is currently known regarding the factors of medication adherence and how has the focus of research changed over the years?*

Research question 2: *what is known about the nature of personality in the context of medication adherence?*

Research question 3: *what barriers and facilitators to medication adherence exist, and how do individual differences influence these factors?*

Research question 4: *what is the nature of medication adherence in the context of the illness process?*

Research question 5: *might a sense of the interrelation between factors of adherence be developed and reframed?*

Stages of data collection and analysis are shown in Figure 1.1 and consist of the following phases:

Stages 1 and 2 – historical literature review of medication adherence, and systematic literature review and meta-analysis of personality affects on medication adherence in chronic illness.

Stages 3, 4 and 5 – collection of novel demographic data, completion of psychometric scales, and qualitative data collection.

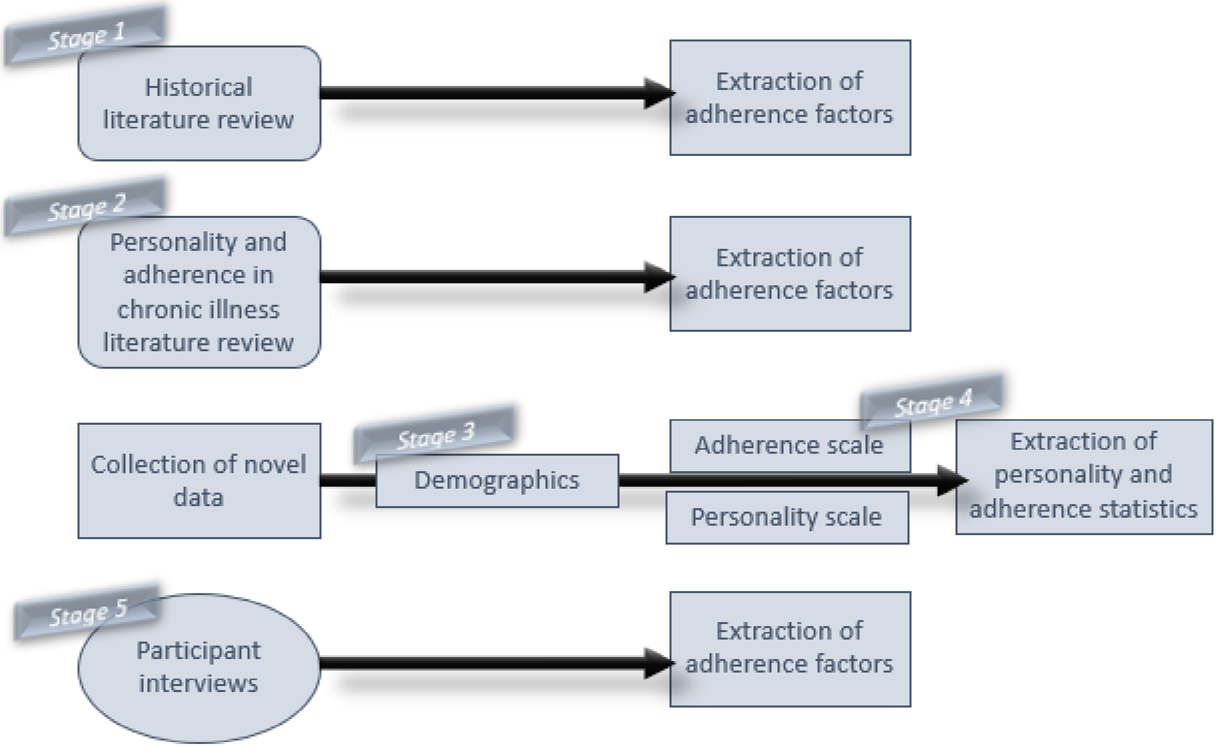


Figure 1.1 Process of data collection.

The thesis will contribute a novel taxonomical framework and two conceptual models, informed by ontological and epistemological approaches; the research therefore adds to existent literature by identifying specific aspects of influences of adherence in chronic illness, organising and representing them within a theoretical framework.

2 Contextualising medication-taking

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2.1 Significance of the study – what is adherence, and why does it matter?

Hippocrates (400 BCE) first cautioned to '*keep a watch … on the faults of the patients, which often make them lie about the taking of things prescribed. For though not taking disagreeable drinks, purgative or other, they sometimes die*' (in Brown & Bussell, 2011, p.304). More than two millennia later scientific studies continue to be absorbed with this warning; advances in medical technology are juxtaposed with the challenge of maximising therapeutic benefit by ensuring effective self-management of chronic illnesses. Nonadherence has profound implications; ineffective management of a pharmacological regime may result in deterioration in health, increased hospital admissions and additional costs. Nonadherence to medication has been acknowledged as a significant barrier to efficacy with adherence rates as low as 13% in cardiovascular disease (Fuller, et al., 2018), a 72% rate of low adherence in people with asthma (Jeffery, Shah, Karaca-Mandic, Ross & Rank, 2018) whilst only 5%-20% of HIV patients achieve optimal rates (Kangethe, Polson, Todd, Evangelatos & Oglesby, 2019).

Several challenges prevail in current adherence literature; there are disparities in methodologies, approaches are heterogeneous, and no gold standard of measurement exists (Vik, Maxwell & Hogan, 2004). A theoretical approach to the configuration of adherence-predictors is beneficial in terms of rationalising understanding from which to inform the generation of a novel taxonomical framework, and by doing so, support the development of personalised therapeutic interventions which could assist health care practitioners in the delivery of optimal therapy. Whilst therapeutic optimisation is the fundamental significance of improving adherence, a further benefit is the reduction in healthcare costs. Various interventions to improve medication adherence have been proposed but have largely been ineffective, since benefits fail to endure (Chacko, Newcorn, Feirsen & Uderman, 2010). Along with the prospect that research has, to date, neglected to capture the full range of influences, the limited success of interventions might also be attributable to the lack of unified methodological approach, restricting the development of tailored interventions for unique populations. Purely descriptive studies may have added incrementally to the knowledge base exclusive of providing any critical novel information to develop clinical application (Dew, et al., 2007) and it is imperative therefore to consider auxiliary factors that are thought to influence adherence behaviour.

The biomedical sphere may appear to be merely a physiological process however, this is a fallacious notion as adherence comprises a synergy of biological and psychosocial elements; it would therefore be imprudent to draw such a distinction when considering influential factors of pharmaceutic adherence. There are copious features which shape an individual's psyche; we are complex beings constituted from both physiological and psychological components, reflected in our idiosyncratic behaviour; it is therefore a spurious assumption to construe a biopsychological process in solely biomedical terms. Ignoring that '*medication is a social science in its very bone and marrow*' (Rather, 1957, p.1007) is to disregard the ramifications of discounting the various and diverse psychosocial factors that impact on therapeutic regime compliance. This thesis will identify underlying psychosocial and behavioural influences and predictors of medication adherence and nonadherence, which will consequently inform the development of a novel taxonomical framework.

Several terms, including adherence, compliance, and concordance, have been used in literature to describe the concept of discharging a prescribed drug regimen. The terms are habitually employed interchangeably, however distinctive connotations are implied by each idiom and reflect continual conceptual refinements to definitions; semantic variations are driven by ontological complications. 'Compliance' has been defined as '*the action or fact of complying with a wish or command*' (Oxford Dictionaries), and as an adjective it implies excessive acquiescence. Haynes (1979, p.1) contextualised compliance as '*the extent to which a person's behaviour (in terms of taking medications, following diets, or executing lifestyle changes) coincides with medical or health advice*'. However, it connotes a correspondingly negative implication suggesting submission, disobedience, and complaisance; the patient, lacking in autonomy, is subservient to the paternalism of the medical professional and must be compliant to it (e.g., Goldberg & Katz, 2007). Indeed, an editorial in the BMJ (Editor's choice, 1997, p.314) suggested that it is a phrase with inferences of punishment acquiescence. This situates patients as compliant consumers, passive consentors, or active refusers, of medication whereby adherence is influenced by acceptance and knowledge of the illness condition and trust in the practitioner

(Dowell & Hudson, 1997). Compliance assumes a submissive agreement of the health care professionals' (HCPs) directives and removes the possibility of collaboration and responsibility of care; a patient low in compliance may become stigmatised by physicians and denied therapies as a result (Malik, 2006). Over the past decade a recognition has evolved concerning the judgmental connotations associated with the terms 'compliant' and 'non-compliant' and attempts have been made to devise a non-pejorative term to dispel the notion of deviance. Furthermore, compliance is a definition oriented purely on statistical measurement of the process (in contrast to an outcome-oriented focus) of correct dosage (Roberson, 1992); the inherent implication, therefore, is that medical advice is incontrovertibly appropriate, correct and necessitates exact conformity. The classification of compliance was reconceptualised in concurrence with the decline of medical paternalism, in recognition that 'compliance' was a less than satisfactory proposition which failed to consider the patients' active role in health care (Evangelista, 1999).

The aim of the 'concordance' model was '*to optimise health gain from the best use of medicines, compatible with what the patient desires and is capable of achieving*' (Marinker, 1997a, p.12). The intention was to balance patient-practitioner roles (Marinker, 1997b) positioning the practitioner as empathetic to the individual as a decision-maker; semantically, concordance infers harmonious agreement or consistency. This is a fundamental departure from the traditional compliance model; to this juncture, the patient was rarely considered in the context of an active participant and little credence was given to the benefits of a solid doctor-patient relationship.

Contemporary terminology embraces the notion of adherence rather than compliance or concordance; the WHO modified Haynes' (1979) definition, taking into consideration the nuances of psychological, behavioural, and environmental dimensions which impact on its success; '*adherence is the extent to which a person's behaviour – taking medication, following a diet, and/or executing lifestyle changes – corresponds with agreed recommendations from a health care provider'* (WHO, 2003). The definition was further honed by Balkrishnan (2005, p.517) who advocated that '*adherence is the extent to which a patient participates in a treatment regimen after he or she agrees to that regimen*'. A considerable predicament in adherence research, however, is the absence of a universal operational definition of medication adherence (Morrison & Wertheimer, 2004). Studies vary substantially in definitional clarity and specificity (e.g., Vik, et al., 2004), which represents '*a limitation in the delivery of healthcare*' (Nunes, et al., 2009).

The contemporary concept of adherence (and its antithesis, nonadherence, which conversely is the extent to which an individual's therapy is not taken in accordance with clinical recommendation), signifies the reduction of the notional 'power' of the practitioner, it implies the contractual nature of the patient-practitioner relationship and emphasises the necessity of negotiation in the association (Horne, 2006). 'Adherence' attempts to avoid subjective assumptions implied by the asymmetry of the relationship, specifically that the practitioner is intrinsically placed as the expert holding the power conferred by the position. This recognises the inherent significance of the roles of language (Stone, Bronkesh, Gerbarg & Wood, 1998) and the patient-provider relationship (e.g., Tilson, 2004), insinuating a shift from a biomedical-centric model, with implications for medication behaviour as a social paradigm (Lutfey & Wishner, 1999).

The expressions 'compliance', 'concordance' and 'adherence' are frequently used interchangeably as synonyms in the literature, which may consequently result in conceptual confusion. Furthermore, the translation of these terms into alternative languages has proved problematic and may therefore exacerbate the impediment of comparison in scientific research. The notions of adherence and nonadherence are nonetheless promulgated from the perspective of clinical researchers rather than the individuals themselves and symbolise an inconsistency in the ontology of this phenomenon; from a taxonomical perspective the terms 'compliance' and 'adherence' imply quantifiable parameters of pharmacotherapy whilst 'concordance', 'agreement', and 'co-operation' suggest a tractable therapeutic alliance between the stakeholders (e.g., Kyngas, Duffy & Kroll, 2000). This is reflective of the distinctive scientific and medical fields in which they are used. Cramer, et al., (2008) proposed a definitional nuance to quantify the prescribed medication-taking process, composed of initiation, implementation of the regimen (in which adherence is the extent to which an individual corresponds to the prescribed amounts) and discontinuation, (which marks the end of therapy). This precept developed from the ABC taxonomy of Vrijens, et al., (2012), a European working party addressing adherence, that endeavoured to encapsulate known classifications to consolidate and simplify the concept of adherence. The terms ‘adherence’ and ‘nonadherence’ are widely accepted in psychological, sociological, and pharmacological literature and connote accordance with prescribed dosing of a therapeutic regimen and shall be used in this thesis, except when an alternative synonym is required for historical accuracy. ‘Adherence’ is conceptualised as the dosage necessary to achieve aspired treatment aims correlating with the spectrum of care from the perspective of the prescriber in conjunction with the patient’s response; conversely therefore, nonadherence is defined as the negative difference between prescriber expectation and individual performance.

Definitions represent the first step to clinically meaningful categorisations; however, whilst ‘adherence’ is a good definition, it may not be good enough, a point which is critically addressed in this thesis. Just as Lutfey and Wishner questioned what is beyond ‘*the shift from compliance to adherence*’ (1999, p.637), it is pertinent to ask what lies beyond adherence; to this end this thesis introduces a significant novel conceptual interpretation, ‘medication-mediation’. This term reflects the behavioural and situationally contextual influences that bear on an individual in the illness and medication-taking processes and, as a result, eschews the binary misnomer of ‘adherence’ or ‘nonadherence’. With the shift from an experimental science in search of absolute empirical laws (Geertz, 1973), and the removal of the imposition of one set of criteria, comes appreciation of interpretative meaning and systemic relationships that individuals attribute to their lived experiences may be embraced. The application of the term ‘medication-mediation’ supports the notion that medication-taking is a complex ministration subject to multiple behavioural, motivational, and contextual influences.

A further debate concerns the precise determination of ‘adherent’ in terms of compliance with a prescribed medication regime. For instance, near-perfect adherence to antiretroviral (ARV) therapy is necessary to successfully suppress HIV viral load in HIV/Aids (Paterson, et al., 2000), improve immunologic response (Chesney, Ickovics, Hechts, Sikipa & Rabkin, 1999), decrease HIV-associated morbidity and mortality (Blower, Aschenbach, Gershengorn & Kahn, 2001), and reduce risk of HIV transmission (Mannheimer, Friedland, Mattes, Child & Chesney, 2002); however, in other conditions (such as eczema, for instance) there is a certain amount of pharmaceutical latitude without decreasing efficacy.

Adherence is a complex and dynamic phenomenon, implicating not only the individual but also health care professionals, as well as broader socio-economic and political contexts; nonadherence represents a public health problem of global significance. The corollaries of attenuated optimum health outcomes in terms of pharmacotherapy tend to be manifested and expressed in terms of clinical and economic indicators, individual and social burdens (e.g., Morris & Schulz, 1992), increased disease progression include negative health impacts incorporating lower quality of life (NICE, 2009), increased morbidity (Matsumura, et al., 2013), hospitalisation (Heaton, et al., 2013) and mortality (Currie, et al., 2013), not to mention a cause of unnecessary vexation to doctors (Melnikow & Kiefe, 1994). Despite therapeutic availability chronic conditions remain poorly controlled globally, inflicting a high disease burden, and resulting in human suffering and economic damages.

An additional financial impact of nonadherence relates to wasted expenditure in terms of pharmaceuticals as well as individual and healthcare/clinical resources (Balkrishnan, et al., 2003; Carls, et al., 2012); 20% of acute hospital visits were associated with failing to adhere to pharmaceutical therapy in the USA (Heaton, et al., 2013). Furthermore, wasted medication accounts for an annual loss of £300 million in the National Health Service, whilst unused prescription medication represents a cost of £90 million in England (York Health Economics Consortium and School of Pharmacy, 2011). Some researchers have claimed that adherence increases expenditure, since more medication is consumed at a cost (e.g., Breitscheidel, et al., 2009), however evidence from a literature review (Foley, Carls & Roberto, 2012) concluded that adherence is correlated with a statistically significant reduction in healthcare costs. This is arguably due to diminished healthcare costs as pharmaceutical intervention reduces the necessity for serious and expensive treatments in advanced stages of disease progression (Balkrishnan, et al.; Egede, et al., 2012; Wild, 2012). Improving adherence therefore has significant economic value.

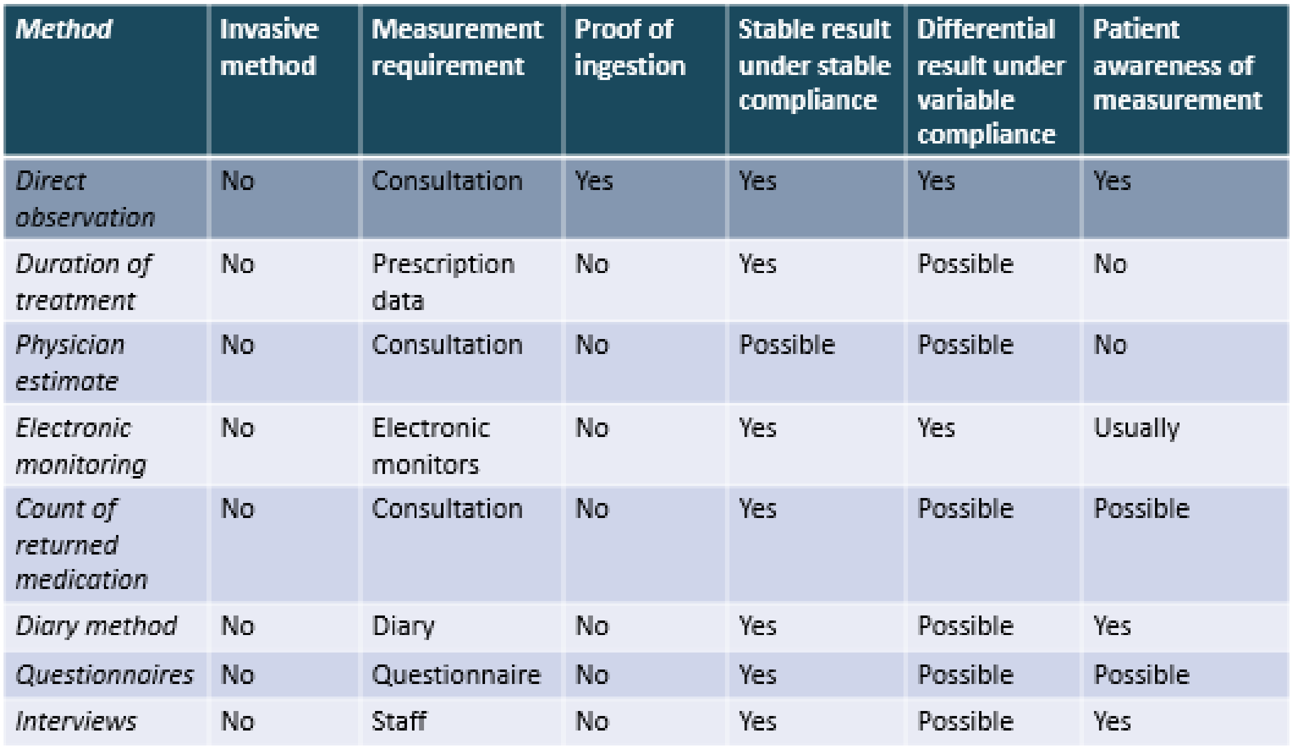
A lack of conceptual and methodological standardisation in adherence research, together with taxonomical and terminological heterogeneity renders quantification, comparison and synthesis of findings challenging and has led to '*conceptual confusion and methodological flaws*' (Khan, Kohn & Aslani, 2018, p.2). It has therefore been difficult to draw comprehensive and meaningful conclusions from research evidence; not only does this limit statistical comparison but also precedes the unnecessary replication of studies with similar aims. A further concern is the confidence of nonadherence resulting from clinical trials for new medications and the reliance on treatment assignment rather than actual dose taken which has led to biased estimates of efficacy (Urquhart, 1996). Moreover, this laborious process hinders the patient; this is not a novel obstacle, and despite decades of research remains a contemporary challenge. Research would benefit from the use of conceptually distinct and concise terminology to facilitate comparative effectiveness of metrics to alleviate the current lack of consistency in methodological quality and outcome which renders comparative study problematical. Challenges have been compounded by the affects of unique aspects pertaining not only to each illness condition but also to the individual participants themselves; a cohort-specific targeted approach provides detailed information anteceding the development of tailored interventions - but only for that population.

Interventions need to consider distinctions between different stages of medication-taking and address the evolving approach employed by patients. It is essential to allow for individual differences and their effect in the mediation process, which is a complex, persistent, multidimensional progression and not a solitary event. The process of decision-making in medication for chronic conditions can be hindered by poor health literacy, limitations of the health care system, and medication regime complexity, further hampered by an individual's negative beliefs and perceptions; behaviour-change theory supports this stance and posits that intervention strategies should be tailored to optimise effect. Furthermore, the response from healthcare professionals needs to be cohesive and systematic to ensure that medication is delivered and maintained most appropriately. A stratified approach is vital; efforts should be concentrated on theoretically grounded methods, adopting a common approach, or a set of common approaches, a consensus, in order to obtain quality evidence. For this to be achieved a paradigm shift is requisite; a move from the focus on biologic drug reliance to the interpolation of behavioural factors and affects of adherence. This hinges on the notion of appreciating and optimising what is known, rather than investing in new treatments, and is consistent with the current climate of economic strategies. Despite an abundance of studies, however, contradictory results have adversely impacted the advancement of our understanding.

2.2 Measuring Adherence

There is no gold standard for the measurement of adherence (Sabate & Sabate, 2003), but it is typically achieved in one of two ways; self-report and direct methods. Self-report data are generally obtained using questionnaires or by interviewing individuals about medication use. They are cost-effective and reports of low adherence have been substantiated as reliable (Shi, et al., 2010a). This method, though, is at risk of social desirability bias (Otsuki, Clerisme-Beaty, Rand, & Riekert, 2008), and recall bias (Levensky, O'Donohue & William, 2006), which may lead to over-estimation reports (Riekert, 2006). Electronic monitoring is a direct method to register the time and date that a medication is dispensed (Farmer, 1999), however it does not measure whether the medication has actually been taken. Biochemical analysis of body liquids pertaining to a specific illness condition in order to detect levels of medication, byproducts or markers is an example of a direct method of measurement; whilst this method provides accurate information on recent pharmaceutical intake it does not necessarily reflect long-term adherence behaviour (Farmer, 1999).

When treating an individual with chronic illness outcome is largely predicated on the effectiveness of the recommended therapy (Garcia, et al., 2016), rationally however, pharmacological treatment is only efficacious when it is taken (Byerly, et al., 2017), and maintaining adherence is challenging (e.g., Leclerc, et al., 2015). Measures have been devised by which to identify and quantify adherence variables, either directly or indirectly, with advantages as well as limitations germane to each approach. Table 2.1 presents different measurement strategies for the primary measurement of adherence. Direct methods include biological assay which incorporates the detection of a physical marker, or metabolite, in a bodily fluid (for instance urine or blood), such as serum levels following kidney transplant. Whilst achieving high levels of accuracy of drug concentration, (though subject to biological variability), appraisal of drug metabolites may be inconvenient for the individual as the approach is invasive and expensive; additionally, direct observation is only practical in single dose, intermittent therapy or when a patient is hospitalised (Gordis, 1979) and not feasible outside a research environment (Vermeire, Hearnshaw, Van Royan & Denekens, 2001). Furthermore, clinical testing is evidential only at an explicit timepoint, allowing for the possibility for patients to deliberately nonadhere on occasions when they realise that testing will not be undertaken, a phenomenon known as ‘white coat adherence’ (e.g., Cramer, 1995; Driscoll, Johnson, Hogan, Gill, Wright & Deeb, 2013). Moreover, the typology of adherence, for example intentional or nonintentional, is not quantified in this method (Vik, et al., 2004). It could be argued that whilst clinical outcomes are realistic measures data may be the product of alternative factors, such as social support and, furthermore, data-collection is not practical outside a clinical setting. Numerous factors correlate with treatment utilisation and adherence to the treatment regimen; influences of adherence are equally as important as nonadherence, and yet the focus is often on negative impediments, such as practical barriers; as much as there are deliberate decisions not to be adherent there are converse decisions to ensure medication is taken as prescribed.



Method	Invasive method	Measurement requirement	Proof of ingestion	Stable result under stable compliance	Differential result under variable compliance	Patient awareness of measurement
Direct observation	No	Consultation	Yes	Yes	Yes	Yes
Duration of treatment	No	Prescription data	No	Yes	Possible	No
Physician estimate	No	Consultation	No	Possible	Possible	No
Electronic monitoring	No	Electronic monitors	No	Yes	Yes	Usually
Count of returned medication	No	Consultation	No	Yes	Possible	Possible
Diary method	No	Diary	No	Yes	Possible	Yes
Questionnaires	No	Questionnaire	No	Yes	Possible	Possible
Interviews	No	Staff	No	Yes	Possible	Yes

Table 2.1 A sample of adherence measurement methods (adapted from de Klerk, 2001).

Due to these limitations indirect adherence measures are most frequently utilised in studies (DiMatteo, 2004) and include methods such as pill counts, pharmacy records, prescription claims, and electronic monitoring. Outcomes may also form part of the review-process, although patients may improve or deteriorate for reasons unrelated to medication. Pill counts provide an objective measurement but tend to overestimate adherence (Aronson & Hardman, 1992); one reason for this is the tendency to refill medications before completion of the current supply, conveying a flawed impression to health care providers and again, this method does not furnish information regarding nonadherence motivation (Vik, et al., 2004). Pharmacy records are accessible and inexpensive (Vik, et al.) but need to be accurate and conclusive to be effectively reliable and valid (Vermeire, et al., 2001). Moreover, actual patient consumption cannot be determined by this method, nor the reasons for nonadherence. Incidentally, technological advancement has led to the development of more accurate methods of measurement such as the medication event monitoring system (MEMS) (Cramer, Mattson, Prevy, Scheyer & Ouellette, 1989), an electronic device which gauges frequency of medication utilisation. The cap on the medication vial contains a microprocessor which records the time and day of opening, with the assumption that the medication is taken when the bottle is opened (Farmer, 1999), clearly, though, this does not necessarily signify that the medication has been administered, why or why not. This prospective method has highlighted ‘drug holidays’ and ‘white-coat adherence’ where compliance is timed to coincide with a consultation with a medical practitioner (Raynor, 1992), and additionally is relatively costly.

There are various alternative techniques, including self-report questionnaires, diaries, and patient interviews. There are limitations to these methods too; they are not validated for the initiation phase of the therapeutic regime, they are subject to self-presentational and recall biases and are prone to adherence inaccuracy (Malik, 2006) by an estimated 20% (Haynes, Taylor, Sackett, Gibson, Bernholz, & Mukherjee, 1980). Additionally, literacy issues could affect validity; under-reporting of missed doses is a major problem, as evidenced by research noting that only 4% missed doses were reported in contrast to monitored records which logged a rate of 33% (Norrell, 1981). Furthermore, they are known to be susceptible to distortion relating to the format, context, and characteristics of the item questions (Schwarz, 1999), and consequently have limited application in terms of intervention development. In a further study, Haynes, Taylor, and Sackett, (1979) indicated concordance between self-report measures and pill counts in nonadherers, but identified inconsistencies between the two measures in adherent patients; since nonadherence is often conceptualised as deviant behaviour by patients this renders self-reports susceptible to ‘socially desirable’ responses and individuals may deliberately manipulate their accounts of adherence. Additionally, rates of adherence may genuinely be forgotten or misconstrued, and individuals may mistakenly believe they are adherent when they are not (DiMatteo, 2004; Ley, 1988). Whilst self-reports are potentially not as accurate as direct methods they are relatively economical and useful, particularly concerning investigations directed exclusively at nonadherers (Haynes, et al.) and although not an exact measure they have the capacity to identify and deliver relative insight into the adherence dimension (Ley & Llewellyn, 1995). Essentially however, self-reporting is the only method to investigate the motivation behind adherence behaviour.

A large proportion of studies are based on electronic health records such as claims databases and prescription records; this has expanded the potential to judge whether patients fulfil their initial prescriptions and assess subsequent treatment behaviours, but do not indicate whether a medication has been taken, or even if dispensed. Furthermore, whilst a large dataset can be effective many countries do not have the resources, and therefore access, to this advanced technology; adherence studies are still novel in some countries, highlighting the importance of clarity of approach and operational definitions to ensure global standardisation.

Frequently, researchers omit justifications for the rationale behind their selection of definitions or metrics, rendering investigative rigour challenging. It is critical to identify valid and reliable measures as a reference for targeted future research in order to develop sustainable interventions that are impactful in the long term. Different adherence measurement methods produce distinctive rates of adherence (e.g., Garber, Nau, Erickson, Aikens & Lawrence, 2004; Shi, et al., 2010b); the study by Hess, Raebel, Connor and Malone, (2006) highlights the ensuing difficulties of methodological research disparity by the application of eleven different measures to the same dataset, resulting in a significant variation in results – ranging from 63.5% to 104.8%. Incongruency in adherence rates have similarly been reported between GPs and their patients; for example, in a study of HIV/Aids patients, physicians incorrectly predicted adherence protease inhibitor therapy for 41% of patients (Paterson, et al., 2000). This is significant since the Department of Health (2010) has recommended that clinicians not only bear the responsibility to identify adherence issues, but also suggested they develop collaborative relationships within the healthcare team to deliver improvements in patient care.

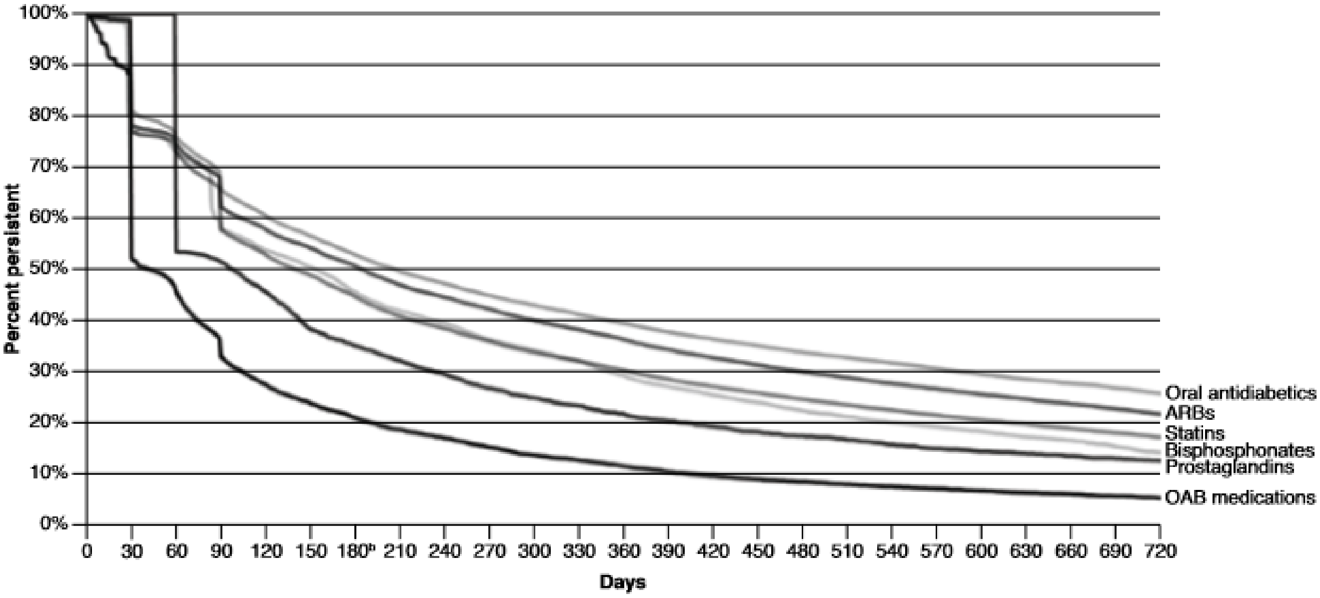
The concept of a meaningful, calculable value gives rise to the pragmatic issue as to the connotation of nonadherence: for instance, missing a dose completely, delaying or deferring, not taking pills with food as instructed, and so on. Clinical research has conventionally focused on positivist paradigms predicated on predefined scales to quantify biomedical variables, rather than the subjective constructions of complex and dynamic experiential data offered by qualitative investigation (Creswell, 2007). Whilst beneficial in terms of classification, the objectification of measurement utilising a nominally stratified scale from minimal to optimum levels may form a disservice as to the reasons when, and how, nonadherence occurs. An ordinal scale in which patients are arbitrarily situated according to pre-determined classifications accedes to the supposition that adherence can be considered objectively as a binary concept, positioning the individual as either adherent or not. This in itself forms a significant impediment to adherence research (e.g., Kruse, 1992). Perhaps the most appropriate measure then, is dependent on the objectives of the study, for example, most measures might quantify adherence, but qualitative methods could identify motives and rationales for nonadherence; there may be distinctions between the domains of perceptions, behaviour, and pharmacokinetics in terms of measurement. It is challenging to assess adherence in daily practice, the subject is complex, and methods can be imprecise; ideally a combination of quantification methods will be used for assessment purposes since in isolation validation may prove problematic. For instance, fulfilling a prescription does not prove adherence, rather, simply the intent of adherence.

Research quality is dependent upon reliable constructs that support validity of evidence; measurement has a central role, and it is therefore imperative that evaluations are effective. The complexity of the subject of adherence has made measurement challenging and, consequently, there is no consensus as to the best methodology or epistemology, nor a gold standard of measurement. Measurement methods have been informed by epistemological positions (Asch, et al., 2011; Bauer, et al., 2013) of academics and policy makers, which compound the constraints in measurement. Methodology should not obfuscate philosophical inquiry since the corollaries for research conclusions will be significant and furthermore, removal of the binary conceptions of adherence-nonadherence together with reconceptualisation of our understanding may allow a better comprehension of the scale of the issue and methods by which it can be improved. This thesis moves the debate forward, eschewing the use of statistical-only biases; in the current study adherence is measured bilaterally, initially by completion of quantitative psychometric scales and supported by qualitative assessment.

2.2.1 Rates of adherence

It seems counterintuitive for an individual to subject themselves to the negative outcomes of pharmaceutical nonadherence but nonetheless that is the reality. Theoretically, the range of adherence falls between 0%-100% (though this discards the notion that some patients will over-consume). Rates of adherence vary depending on a range of factors, however estimated levels largely fall between 30-70% (WHO, 2003). Moreover, satisfactory adherence may differ between condition; for example, an adherence rate exceeding 95% is necessary for viral replication reduction and drug-resistance prevention in antiretroviral therapy for HIV/Aids (Malik, 2006) since the condition requires optimal adherence to achieve the most beneficial effects due to its low therapeutic range; conversely, cholesterol-lowering medication has a higher tolerance rate in terms of therapeutic efficacy of non- or over-adherence (https://www.nhs.uk/medicines/simvastatin/ accessed 20/12/2018). Values have improved little since Greenberg’s review in 1984 which reported rates between 4% and 93% with a median of 55%. Osterberg and Blaschke (2005) estimate that 80% adherence is generally necessary to achieve control; ultimately, the appropriate rate is the level at which the optimum result, of unremitting, continual regulation of the condition, is achieved. Whilst there may be contention regarding the rates and reasons of nonadherence there is at least consensus that adherence is less than optimal.

Prevalence of adherence to therapies range from 60% for instance, for biphosphates, used in osteoporosis, to 35% for overactive bladder medications 35% and 31% for prostaglandin analogs, indicated for glaucoma (Yeaw, Benner, Walt, Sian & Smith, 2009). In addition, rates are not statically constant over the illness course; adherence significantly deteriorates after six months into a medication regime (Osterberg & Blaschke, 2005). For example, although poor compliance is associated with a 40% increase in fracture rate in osteoporosis, less than 52% of patients persist with therapy after twelve months (Brankin, et al., 2006). Figure 2.1 illustrates the persistence rate and time to discontinuation in six chronic therapy conditions.



ARB = angiotensin II receptor blocker; OAB = overactive bladder

Figure 2.1 Time to discontinuation of 6 chronic therapy classes (adapted from Yeaw, et al., 2009).

Endeavours to classify adherence have been persistently attempted and include the widely accepted and relatively straightforward quantification predicated on the percentage of time that medication is taken: adherent (more than 80%), partially nonadherent (20-79%) or nonadherent (less than 20%), (Rudd, 1994). Extant research generally signifies two explicit typologies to classify patients, i.e., adherent and nonadherent. However, this oversimplification disregards auxiliary effects and consequently fails to faithfully capture the actual contexts; forgetfulness, for instance, is often classified as unintentional nonadherence however, research has intimated a belief component which renders categorical typology questionable. In their study of paediatric asthma medications Singh and Kansra (2006) classified nonadherents as ‘erratic’, (due to forgetfulness and demanding lifestyle), or ‘unwitting’, (owing to lack of understanding of the mechanics and necessity of the therapy) and support the notion of ‘intelligent’ nonadherence where the patient assertively elects not to adopt pharmaceutical treatment as prescribed. Alternative studies employ a simple description, such as primary nonadherence, in which the patient neglects to redeem the prescription, invariably as a result of socioeconomic disadvantage, (Wamala, Merlo, Bostrom, Hogstedt, & Agren, 2007). One reason for a wide variation in reported rates across conditions and populations is the corollary of definitional differences; a shortcoming of some studies is that they neither specify adherence classifications nor define or rationalise their choice of assessment metrics, leaving readers to make their own assumptions (Raebel, Schmittdiel, Karter, Konieczny & Steiner, 2013).

A more defined appreciation regarding the identification of extensive predictive components, rather than a single entity of nonadherence, is the first step towards the development of tailored multifaceted interventions. Despite the large corpus of literature there remains no consensus regarding the determinants of medication adherence; to some extent this results from the heterogeneity of research both in terms of population and measurement of adherence determinants and behaviour. An additional explanation relates to psychological variables inherent in human behaviour; individuals are not consistently rational, and behaviour is mutable. The current research questions the efficacy of rigid quantification of adherence by means of factors in isolation, for example, effects of symptomology; diverse behavioural determinants apply at different phases of the adherence process. For instance, newly diagnosed patients will have certain expectations and perceptions about an illness condition and the initiation of their novel medication. Medication may not take effect immediately and during this time the patient will formulate opinions which will affect their adherence behaviour (Townsend, Backman, Adam & Li, 2013); even after initiation, individuals may not be conversant with the importance of their therapeutic regime which may lead to the cessation of therapy.

2.3 Factors influencing Medication Adherence

A recent literature review completed by the author revealed that, to date, over 329,728 studies have been undertaken relating to medication adherence and that more than 200 predictors have been identified, (but not, necessarily, specified) in the literature (Vermeire, et al., 2001). The WHO suggests that medication adherence factors are contingent on the illness-condition, therapy-type, health care team and system, patient, and social/economic factors, as demonstrated in Figure 2.2.

Condition related: nature of disorder

Duration of treatment

Recognisable/distressing symptoms

Patient related: knowledge about medication and condition

Ability to understand instructions

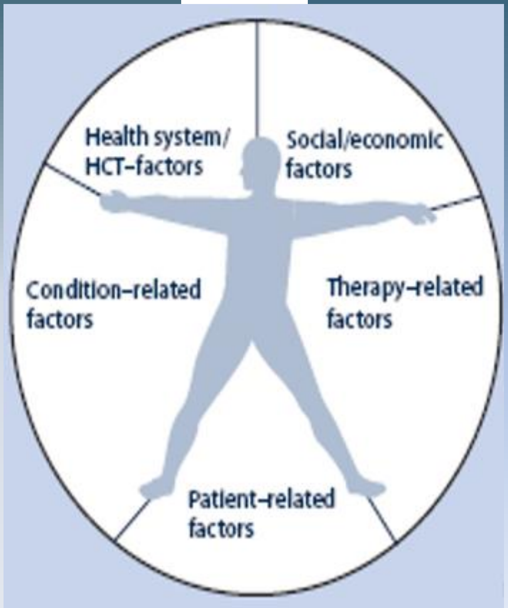
Forgetfulness

Perceptions/beliefs about medication and the condition

Denial of illness

Fears of side effects and symptoms

Socio-economic: Inability to pay



Health care team related: lack of effective instruction

Lack of patient time

Inability to communicate effectively

Lack of co-ordination of care

Multiple prescribers

Multiple pharmacy visits

Attitudes

Operational constraints

Therapy related: complexity of regime

Need to master techniques

Duration of medication

Side effects

Figure 2.2 The five dimensions affecting adherence (derived from WHO, 2003, p.27).

Central to the global pandemic of chronic illness is the understanding that nonadherence is not the consequence of unitary factors in isolation. Considering the condition of hypertension for example, clinicians may be familiar with certain precipitating factors, such as regimen complexity, cost, and side effects of the treatment regime. In addition, depression, cognitive impairment, a patient's skepticism regarding the treatment outcome or lack of understanding of the illness condition itself, may also be significant predictors, but may be less apparent and therefore not receive appropriate consideration. A core debate in the adherence question concerns *where the responsibility to manage an illness lies.* Individuals ought to have a degree of autonomy of management that involves independence and self-determination (Redman, 2005); management of a chronic illness has been identified as the most significant challenge of living with a condition (Callaghan & Williams, 1994) and adherence is actually one construct of chronic illness (e.g., Wellard, 1998). The patient is positioned as the decision-maker (Thorne, et al., 2003), the expert in their care (Thorne & Paterson, 1998), and responsive to modifications in health status, psychosocial aspects of the condition and actively participating in relationships with HCPs (Keeling, Price, Jones & Harding, 1996). However, effective management is a collaborative endeavour to ensure optimum results and caution should be exercised over positioning the patient as decisive, resilient, and competent (Thorne & Paterson). Furthermore, a good patient-practitioner relationship is imperative to achieve optimal outcomes and, returning to the example of hypertension, in the absence of this even the diagnosis of hypertension itself may engender a refutative reaction, particularly if the patient believes that it will result in economic or social expense or reduced sexual potency.

Figure 2.3 represents an overview of compliance exemplifying the complex interplay of factors of medication adherence. This theoretical model results from Kyngas, et al's., (1999) exploration of adolescents' lived experiences of diabetes and demonstrates the variety, and dynamics between, various factors. Influences include the importance of support, motivation, and a sense of normality, as well as collaboration with the practitioner; this supports the factors noted by the WHO (2003) and suggests further nuances in beliefs and experiences that influence behaviour.

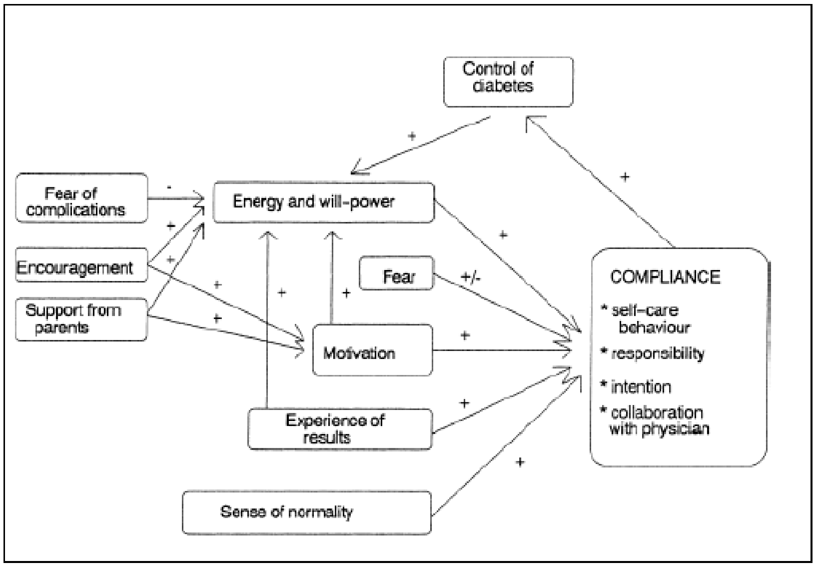


Figure 2.3 An overview of compliance factors in adolescent diabetes (adapted from Kyngas, et al., 1999, p.78).

The intentionality of nonadherence has been alluded to in this introduction, and that unintentional nonadherence differs profoundly from intentional deviation from a medication regime. Wroe (2002) suggested that intentional nonadherence results from perceptual (affective) barriers whilst unintentional nonadherence is a consequence of practical impediments. Unintentional nonadherence occurs when the patient is resolved to adhere to the therapeutic regimen but is precluded from doing so due to hindrances such as running out of a prescription, a lack of access to facilities, being doubtful as to a medication's correct administration or simply forgetting to take it (Vik, et al., 2004). Forgetfulness may appear an innocuous cause however, Foley and Hansen, (2006) demonstrated that medication beliefs were a significant predictor of forgetfulness in a study of cholesterol-lowering treatments. This preposition was supported in a study regarding older adults, which added that carelessness was a further outcome relating to beliefs (John, Farris & Brooks, 2006). Intentional nonadherence implies that the patient is an active decision-maker (Simpson, et al., 2006) and connotes a deliberate resolution to disregard treatment as prescribed. The literature suggests that this represents a significant impediment, particularly in chronic conditions requiring long-term therapy (e.g., Feldman, Bacher, Campbell, Drover & Chockalingam, 1998). The patient may have made an informed decision regarding medication and have considered various factors; nonadherence most commonly results from a lack of apparent need or due to adverse side-effects (Vik, et al.). Additionally, a lack of motivation, or the way in which a medication is perceived, is liable to result in nonadherence (Barber, Foltz, Crits-Christoph & Chittams, 2004). Individuals are more circumspect about taking medication when lacking education regarding the value of treatment, treatment benefits are not immediate, and when the individual finds it difficult to adjust to the patient-role (Elwyn, Edwards & Britten, 2003). A prescription for a chronic illness essentially represents necessity for a lifestyle change requiring behavioural motivation, and patients' success in accomplishing behaviour change will differ, reflecting each individual's ability and enthusiasm.

Temporal effects are relevant. There are many stages in the process of seeking, initiating and managing health care, and within each stage there is the potential for nonadherence, embodied in numerous manifestations: delay in seeking care; non-participation in health programmes, such as screening; failure to follow prescriptions and non-attendance of appointments; neglecting to fulfil a prescription after its receipt; taking an incorrect dose, or at the wrong time; forgetting, stopping prematurely or failing to obtain a repeat prescription. Successful adherence is determined by the individual's choice of intertemporal decision (Berns, Laibson & Loewenstein, 2007); often there is a tension experienced between the active choice mechanism, demanding instant gratification, and logical abstract reasoning necessary for cognition of future consequences. Furthermore, present-bias dictates that the closer we are to a reward the more likely our emotional brain takes over, which is problematic in terms of chronic illness therapy as a result of the hard-wired tendency to prioritise short-term desires ahead of continuing needs.

Paterson (2001b) suggests that managing a chronic illness is dependent on the perceived nexus between wellness and illness, and whichever concept holds dominion, contingent on the individual's beliefs and experiences, that in turn determine the response. Ironside, et al., (2003) consider that the distance between being ill and well is under-considered in research and yet this is the position wherein most individuals are situated, finding balance - a recurrent theme in chronic illness. Individuals with a chronic condition contend with a constant perceived threat (Carpenter, 2005) and seek to be normal within the abnormality (Öhman, Söderberg, & Lundman, 2003) that their condition imposes by '*achieving harmony with oneself*' (Delmar, et al., 2005, p.204) and limiting intrusiveness of illness (Koch, Kralik & Taylor, 2000). This will be accomplished to some extent by developing an expertise (Paterson & Thorne, 2000), attending to perceived vulnerabilities (Weiss & Hutchinson, 2000) and rationalising decisions (Ritholz & Jacobson, 1998).

A prevalent framework used to explain perceptual barriers to adherence is the necessity-concerns framework (Clifford, Barber & Horne, 2008; Horne, 2005). This framework posits that an individual appraises the perceived necessity of the treatment against perceptions of concerns relating to the medication and illness condition. Donyai (2012) describes this as the psychology of the medication and reflects the beginnings of a sociological exploration of medication adherence. The implication is that illness beliefs, or perceptions, affect behaviour, and that nonadherence is likely when patients perceive medication-taking is more of a risk than beneficial (Kucukarslan, 2012); this contrasts with the prediction of adherence whereby participants have high necessity scores and low concern scores (Horne, et al., 2013). This framework is predicated on patients' beliefs, in addition to their aptitude of remembering to utilise medication, thus endorsing the distinction between intentional nonadherence, where an individuals' medication or illness beliefs drives avoidance of taking medication as prescribed, in contrast to unintentional nonadherence where external factors negatively impact on the individual despite the motivation to adhere (Nunes, et al., 2009). This conceptualisation of adherence acknowledges the significance of conjoining factors, such as illness and medication-knowledge in relation to, for example, environmental factors (Wu, Moser, Lennie & Burkhart, 2008), the result of which may be a dissimilarity between facilitators and barriers. The effect of causal relationships has been posited, such as symptoms, the frequency and duration of treatment and social support, but there tends to be an inconsistency in correlations, partly resulting from the inaccuracy of multivariate models, and therefore have limited predictive value.

Factors are chiefly oriented in the dominant critical-theory perspective ideology that interprets nonadherence as irrational behaviour, (Playle & Keeley, 1998), deviating from paternalistic instruction from healthcare professionals (Bournes, 2000). A comprehensive depiction of adherence is one which articulates interacting variables in terms of dimensional, rather than categorical, terms. Not only is the process dynamic and complex, it varies continuously, reflecting patient assessment, and stimuli which have a positive affect on one individual but which may be of negative or negligible consequence to others; this lends credence to the feasibility of researching adherence from an alternative epistemology other than a positivist stance, such as a socially-constructed phenomenon (Fineman, 1991).

2.4 Medication adherence redux

Previous studies have tended to be quantitative, focussing on demographic factors (such as gender, age, education) consistent with medical education per se (Rüsch, et al., 2014); this is to neglect the complex psychosocial behavioural judgements that people make, and is conceivably the reason why research has so far failed to reach consensus as to how to improve adherence (Nieuwlaat, et al., 2014). The biomedical model is just one paradigm of many; there is utility in investigating the lived experiences of individuals to get closer to a resolution. Whyte, et al. (2002) present a medication paradigm transcending the chemical construct by positioning pharmacology as a therapeutic symbol of a mother's love in the administration of a tablet to her sick child; in this context medication is positioned as a social transaction connoting a diligent, in contrast to a negligent, maternal protector, theorised in a constructivist framework. It is essential to acknowledge the objective and subjective properties of medication-meanings socially construed through discourse in order that they may be investigated. The paradigm shift to a phenomenological perspective is '*not a new way of studying reality but the consciousness of a new reality*' (Ferguson, 2006, p.25), capitalising on the utility of a phenomenological approach which transcends pre-existing biases and prejudices (Moustakas, 1994). Moustakas' support of a phenomenological approach to research, such as medication adherence, is expounded by the characteristics of the methodology: the phenomenon is investigated in its entirety, not burdened by biased preconceptions of the natural sciences. Consequently, understandings are constructed based on the content of data, and conceptual judgements are developed through reflection, with the capacity to explicate the properties of the phenomenon. A fundamental component is the interaction between the subjective and objective giving rise to a pluralist consideration of multiple aspects of the phenomenon, neither rigidly positivist nor constructivist. Moustakas considered that a phenomenological approach produces a novel, comprehensive description which enables a better understanding for the spectator. This has the benefit, not only for researchers but also for practitioners and policymakers, to advance understanding of medication adherence from an experiential perspective (van Manen, 2011).

Goffman (1959) posited that our behaviour results from identities that are dynamic and therefore fluid. His seminal work describes the presentation of the self as contextual, and differentiates between negotiated expressions intentionally given by the individual and those that are given off inadvertently. Those articulations are internalised by others who construct their impression, predicated on personal experiences and preconceived expectations, which then become a manifestation of identity. This is subject to stereotypical behaviours of roles and as a result informs the behaviours of those in our communities.

In reaction to the biomedical perspective, social-structural approaches consider the illness experience. Health and illness roles are socially constructed; physical and psychological states are imbued with social and cultural meaning, a dialectical tension between social reality and individual understanding, mediated through linguistic articulations. Individuals with a chronic condition exist in '*the dual kingdoms of the well and the sick*' (Donnelly, 1993, p.6), a persistent and pervasive theme throughout this research. Health narratives enable the representation of symbolic interactionism to inform our notions of sense-making, evaluation and ultimately, the transformation of identity. Both health and illness have their own trajectories within the spectrum they inhabit. The adherence process is closely affiliated with both health and illness processes and as such also rests within a continuum. The social construction of illness is shaped by a multiplicity of social forces together with an individual's understanding and perception of health, illness and the treatment process which confers idiosyncratic recursive meaning. A simplistic process of illness is illustrated in Figure 2.4.

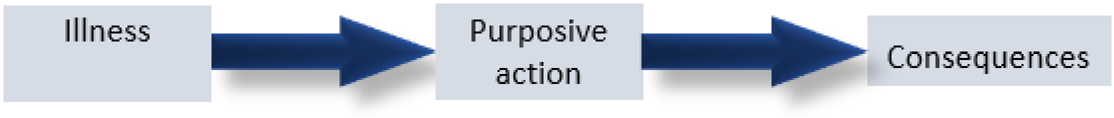


Figure 2.4 Simplified illustration of the illness process.

Coping with chronic illness is a '*phased process*' (Paterson, 2001, p.22), tacitly understood to be predictable and, whilst regressive phases are acknowledged, there is an implication that an achievable goal is reachable and achievable through progressive steps; this is, however, to ignore the fluctuating and variable complexities of the dialectic of the individual. An individuals' degree of perceived wellness is derived from comparison with their understanding of sickness, and vice versa; perceptions result from attitudes, beliefs, expectations, and contextual experience of living with a long-term condition. In turn, this determines the individual's response to the condition, with contrasting outcomes dependent upon temporal and situational affects. It is '*the perception of reality, not the reality itself*' (Paterson, 2001, p.23) that forms the central foundation for individuals to account for and rationalise their illness process and the roles they play within it. Whilst the illness perspective, and the role of sickness, focus on the burden of living with a chronic condition, loss, and suffering, often expressed in the nascency of a new diagnosis as a sense of being overwhelmed, the health outlook (i.e., wellness) views the condition as opportunistic in terms of meaningful change in environmental and social relationships. The health outlook is an attempt to establish consonance between the self and the identity formed as a consequence of illness, contextualised socially by others and situationally in the environment (Fife, 1994). For example, an individual may perceive their health as satisfactory even when their physical condition is less than optimal, although this reflects the repositioning of the individuals 'normal' and a revision of the conceptualisation of 'possible' within the confines of the illness condition (Stuifbergen, Becker & Sands, 1990). The diseased body is objectified, the corollary of which is a separation from the self; this is achieved by the development of awareness, communication and cultivating supportive environments, health and illness literacy, and skills with which to manage the condition and understand the unique pattern of the body's illness-response.

Mediation of the effects of illness is only achievable when the individual perceives that the illness is a component of the body, rather than the body's surrendering to the condition, to enable a transferral from '*a victim of circumstances to creator of circumstances*' (Barroso, 1995, p.44). It seems that when there is a disconnection between the illness and the body the individual is able to focus on alternative positive aspects of living rather than centring attention on the illness

(Paterson, Thorne, Crawford, & Tarko, 1999); Finfgeld (1995) suggests that when a situation requires courage and resolve people are able to adapt to meet that challenge.

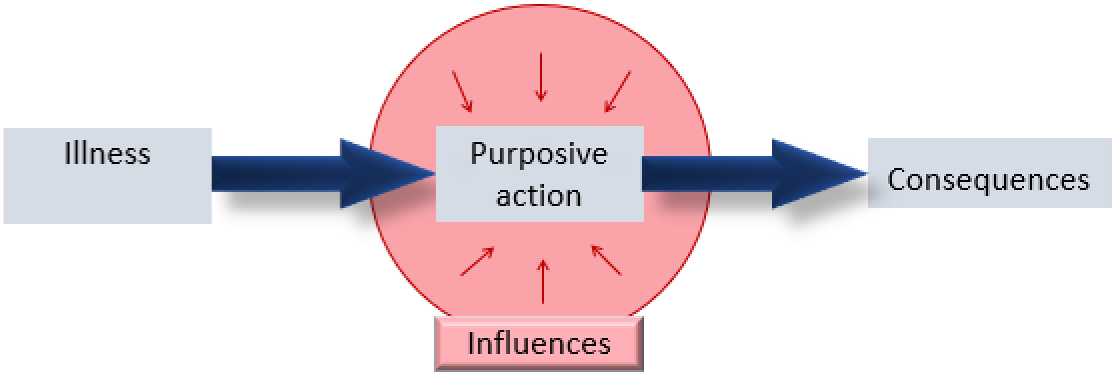


Figure 2.5 Modified illness process demonstrating influences affecting outcomes.

The extended diversity of influences, including individual differences, and the complex interplay which often results in undesired consequences is demonstrated in Figure 2.5, which shows a modified illness process illustrating influences affecting outcomes; illness conceptions and perceptions, together with self-management of medication regimes are embraced in order to achieve restoration of equilibrium that illness destabilises. Within this process there are various affective mechanisms, influencing evaluation and evolution of the condition, however the level of adherence to medication is the single most important component in the prognosis (WHO, 2003).

To date, there is a substantial body of literature that has focused on the consequences, the outcomes, rather than the causes of adherence. Strauss and Corbin (1988) argue that illnesses extending beyond acute receive insufficient attention and that the psychosocial needs, self-management, and self-care practices of chronically ill people are largely ignored. The individual is constantly occupied by a process of evaluation (Pound, et al., 2005), grounded in uncertainty in which ‘*risks and benefits, hopes and fears, positive and negative self-images are all balanced,* *and decisions reached*' (Verbeek-Heida & Mathot, 2006, p.138) regarding the initiation, continuance, and persistence with medication. The health within illness phenomenon (Moch, 1989) is predicated on the assumption that illness is a potential source for transformational growth grounded on awareness and connectedness with, and adaptation to, physiological and psychosocial aspects and their integration into daily life.

The diagnosis of a chronic condition signals the beginning of a clinical process, encompassing treatment and disease progression, compelling the individual to re-evaluate identity and experiential knowledge; beliefs will be compared with information conveyed by healthcare experts (e.g., Nolan & Badger, 2005). Consequential focus will dichotomously emphasise the illness as external or integral to the self; in contrast to individuals who consider that their condition is external patients for whom illness is their focus assume a sick-role congruent to their social identity. In this way the illness assumes a protective function (Whipple, Richards, Tepper & Komisaruk, 1996); this perspective may be a method through which an individual can reflect and come to terms with their illness, and construe a more positive coping strategy and outcome (Carpenter, 2005). Conrad (1985) contends that nonadherence could be due to side effects experienced or may result from an attempt to self-regulate medication and a need for independence, demonstrating proactive behaviour; the patient attempts to assert control over the illness by the regulation of medication and might incorporate modification, or discontinuation, of the therapeutic regimen. Furthermore, Thorne, (1990) emphasised the self-protective motive of nonadherence, of diminished confidence in clinical expertise and placing responsibility in one's own health, as a strategic means to preserve quality of life, and safeguarding oneself from the perceived inappropriateness of clinical decisions; this endorses the necessity of an efficacious patient-practitioner relationship.

For many, the sense of 'normal' is governed by equilibrium within the health-illness continuum; a threat to the control of this 'normal' may result from disease progression, worsening symptoms and a sense of deficiency in self-management skills. The individual will then be vulnerable to the perception that illness governs health, with increased feelings of hopelessness and diminished independence. One function of interventions is to engage appropriate resources in order to shift the focus on health to accommmodate the illness-condition, to reframe the situation and reconcile to the new normal.

A gradual coming to terms may transpire over the course of illness; in chronic conditions with a sustained duration individuals may place '*health in the foreground and illness in the background*' (Loomis & Conco, 1991, p. 170). Support may come from a health care practitioner, someone else who is coping with the same condition or a significant other (Remien, Carballo-Dieguez, & Wagner, 1995), which may help in asserting the view of health rather than illness. The experience between health and illness is transitional (Raleigh, 1992), and a persistent tension endures between the two.

The Shifting Perspectives of chronic illness model (Paterson, 2001) posits that opposites co-exist, such as hopelessness or self-control, within the complex experience of living with long-term illness and therefore the experience is contradictory, not least because in order to manage the illness appropriately, and therefore to feel least effects from it, attention has to be directed *to* it - '*the illness requires attention in order not to have to pay attention to it. The person must recognize the disease as a fact of life while at the same time rejecting the limitations and significance of it*' (Paterson, p.24). Paradoxically, the illness must be acknowledged and reinforced in order to drive it from the forefront. Consequently, even when people are optimistic and position 'wellness in the foreground' they must acknowledge and focus on the illness in order for it to be treated (Larson, 1998). This absorption by ill-health reinforces the illness perspective (Shaul, 1995).

A differentiation should be made between phases in the therapeutic regime process, there may be distinctive priorities or influences for the individual at different periods; this is significant in terms of prospective interventions. In the initiation phase behaviour is being formed and it is easier to modify at this time rather than, say, the implementation stage where individuals are more experienced in their medication taking behaviour, or at an advanced point when conduct has become habituated. Distinguishing the relevant factors in each phase could be critical in enabling clinicians to determine the most effective approach to treatment. This is clearly beneficial from both an individual perspective in optimising treatment-efficacy and economically at both individual and societal levels, since by focussing on those 'at risk' resources may be utilised elsewhere. Conventional exploration has resulted in interpretation within predefined paradigms focusing on a specific barrier or facilitator, rarely observing phenomena globally or with reference to transferability; consequently, results are highly contextualised. However, the significance of individual factors, or the interaction between them, is inconsistent, inconclusive (Levensky, et al., 2006) and prediction of adherence or nonadherence is therefore problematical. Vermeire, et al. (2001) called for an integrative theoretical model to support further research, however nearly two decades later this has yet to be accomplished and the current research aims to address that by presenting a fresh narrative - a biopsychosocial perspective of the lived experiences of the individual. The subject requires further insight into salient motivations that individuals associate with medication-taking, such as the influence of the impulsive process which has been investigated in several behavioural domains (Hofmann, Friese, & Wiers, 2008) and shown to be a potential predictive indicator of motivation in adherence. Impulsive processing is predicated on associations which are activated upon perception of a given stimulus (Strack & Deutsch, 2004) and is influential on behaviour since associations relate to avoidance-tendency or adherence behaviours (Kleppe, Lacroix, Ham & Midden, 2017). Therefore, it follows that more positive affects are associated with superior adherence.

Copious factors impact adherence and any analysis ought to entail behavioural aspects to explore the correlates of adherence to therapeutic regimes; scrutinisation should extend beyond any single component towards a framework - a multi-layered spectrum. The illness process is influenced by distal and proximal triggers including environmental factors (Ader & Cohen, 1982), individual beliefs, perceptions, and social cognitions (Conner & Abraham, 2001), motivating health behaviour intentions. The affect of individual differences is an understudied area and merits further focus. Personality traits influence health outcomes directly (Chapman, et al., 2009) or obliquely, influencing health behaviour, illness-coping or pathogenesis (Roberts, Kuncel, Shiner, Caspi & Goldberg, 2007), in fact, '*it* [personality] *influences all aspects of the illness process*' (Ferguson, 2013, p.833), as demonstrated in Figure 2.6. Personality's integrative role in the illness process is evident, however, it has not been featured prominently in research to date and there is utility in its further consideration.

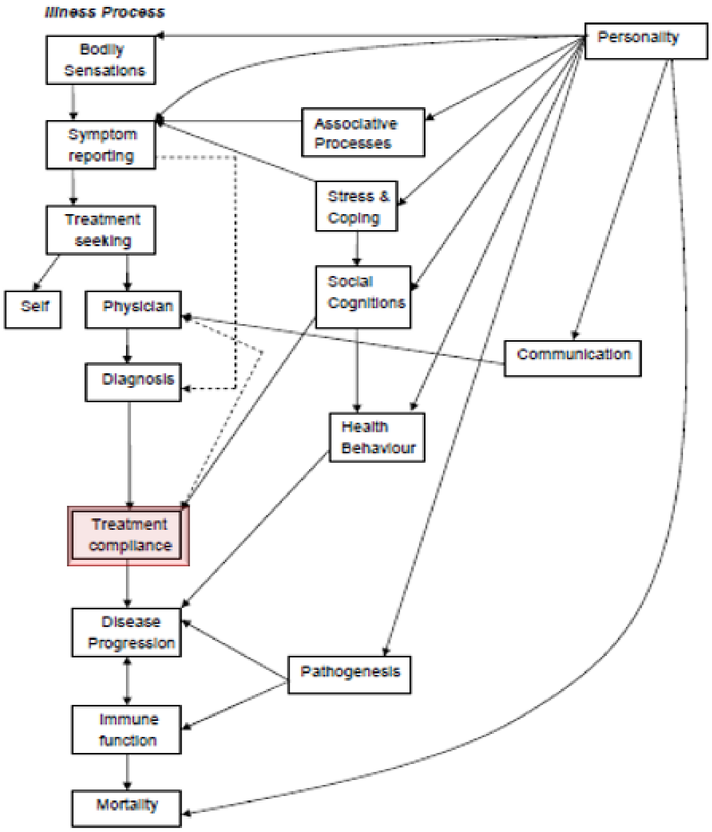


Figure 2.6 Correlations between personality and mechanisms in the illness process, incorporating treatment compliance (adapted from Ferguson, 2013).

2.5 Personality and health behaviour

It is understood that some health-related behaviours, such as smoking, are facet-specific (Terracciano & Costa, 2004). The literature, although sparse, indicates that individual differences, beliefs, and perceptions play a pivotal role in the adherence process however, to date, limited attention has been applied to these influences in research. The influence of individual differences, '*the characteristics or blend of characteristics that make a person unique*' (Weinberg & Gould, 1999, p.27), has increasingly been conceptualised in terms of the utility of mediating variables in health behaviour and health outcomes. Trait theories of personality imply that personality is biologically based, whereas state theories (e.g., Bandura,

1977) emphasise the role of nurture and environmental influence. The psychodynamic theory of personality (Freud, 1959) posits there is an interaction between nature (innate instincts) and nurture (parental influences); this assumes a distinction between relatively stable characteristics and plastic tendencies, environmentally acquired. Allport (1961, p.28) posited that '*personality is the dynamic organization within the individual of those psychophysical systems that determine his characteristics behavior and thought*' allowing substantial consistency in comparability among individuals (Rushton, Jackson & Paunonen, 1981); it is therefore imperative to focus on personality factors as integral aspects of adherence-behaviour. There follows a broad appreciation of personality which is not intended as an absolute historical account, (being too extensive for reproduction here), but is designed to be an informative insight into the topic's development.

In Ancient Greece, Hippocrates (c460-c370 BCE) posited that temperament and health were based on the four bodily humours – blood, black bile, yellow bile, and phlegm (Kagan, 1994). It was believed that when the humours were balanced the body was healthy, however an excess of one particular humour was associated with pain and illness. Galen (129CE-c210CE) named the four humours sanguine, melancholic, choleric, and phlegmatic and believed, somewhat controversially at the time, that there was no distinction between mind and body (Lloyd, 2007). This theory was so influential that it dominated Western science for hundreds of years but was abandoned from scientific literature with the emergence of conceptual developments construed from an empirical stance.

'*The understanding of the synthetic unit which we call the body can only be fully understood from the point of view of the personality, the needs of which are served by all parts of the body in an intelligible coordination*' (Alexander, 1950, p.34). Dunbar (1947) further posited that unexpressed emotions had the propensity to cause psychological impact on somatic diseases and devised the term 'psychosomatic' illness to encapsulate this theory. Asthma, hypertension, and ulcerative colitis were some of the conditions which Alexander and Dunbar considered to be affected by personality factors; subsequently, the instigation of evidence-based psychosomatic research was manifested by Friedman and Rosenman (1959) who suggested that behavioural factors were influential in coronary heart disease which they characterised by 'types':

- type A – typified by a sense of urgency and intensity, a need to compete and achieve but in the absence of gratification, and a tendency to feel anger and hostility,
- type B – the opposite of type A and therefore more relaxed, personified by the absence of determination, competitiveness, and ambition,
- type C – similar to the type B characteristic but comprising a chronic state of anxiety.

Friedman and Rosenman's conclusion that type A behaviour presaged a coronary-prone personality drove research in the direction of personality-related characteristics and type A was further developed to include auxiliary traits, such as hostility, aggression, anxiety, and anger. A review conducted in 1987 by Booth-Kewley and Friedman, concluded that type A was a causal factor of coronary-related outcomes, such as myocardial infarction, angina, and atherosclerosis. The authors also conducted a meta-analysis relating to additional psychosomatic diseases, including asthma; previous studies had suggested that individuals with asthma tended to be anxious, aggressive, and neurotic and Booth-Kewley and Friedman surmised that a person prone to disease is characterised by negative affects such as aggressiveness, anxiety and hostility thereby supporting the preposition of the influence in traits in health-related outcomes.

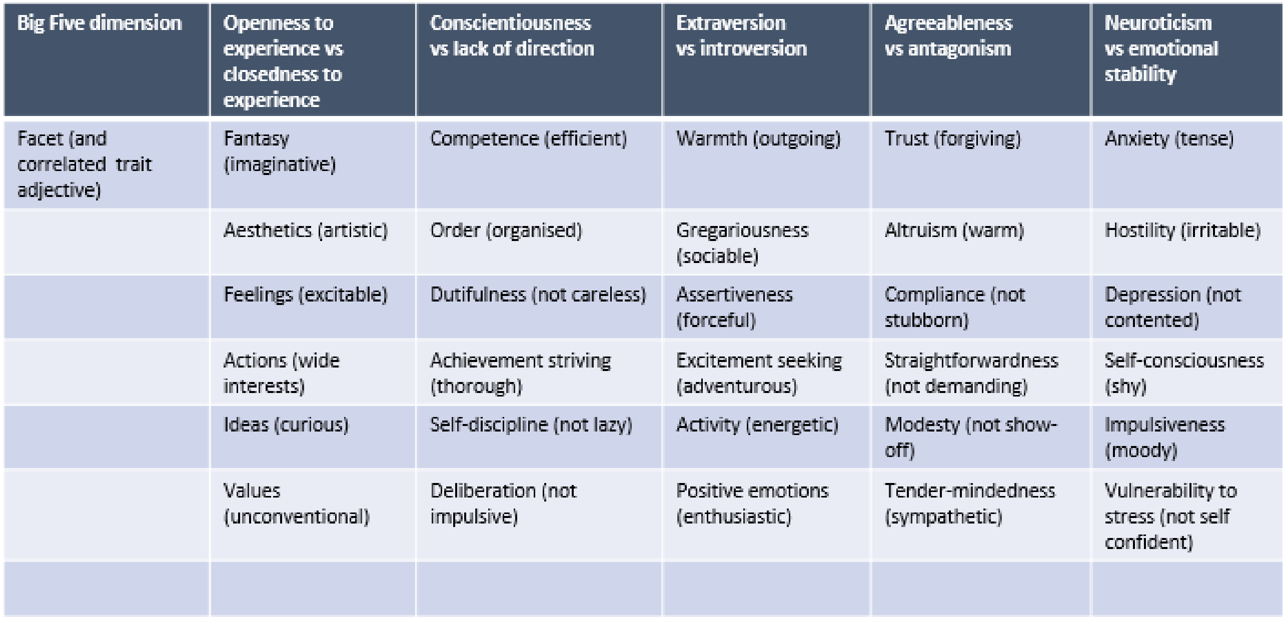
In supplementary investigation endocrinologist Hans Selye (1950) observed a biological adaptative mechanism in response to external psychological stressors to enable restoration and maintenance of homeostasis (internal balance). He developed the General Adaptation Syndrome theory of stress (1976), which features a biological consequence in reaction to a stressor; adverse health outcomes and illness conditions are corollaries of prolonged exposure to stress. It was theorised that stress-activated hormones cause changes in blood pressure undermining resilient blood vessels, whilst further conjecture assumed that the release of lipids triggered atherosclerosis, or else, on sensing stress increased amounts of blood pump through constricted blood vessels, potentially developing lesions and increasing the chance of a heart attack. It was thought that type A personalities tend to compound the likelihood of encountering stress as they pursue competitive situations and generate artifice; higher levels of anger and hostility are experienced and response is more immediate and forceful to stressors seen as threats to their self-control. Subsequent research (e.g., Shekelle, et al., 1985) has questioned the robustness of the type A character and further studies have displaced the type A factor preferring the categorisations of anger, hostility, and aggressiveness to demonstrate the correlation with coronary heart disease (e.g., Eysenck, 1990).

The significance of Selye's research, in terms of this thesis, lies in the recognition that the compensatory process of coping with stress is achieved with both physiologic and psychological components. Selye acknowledged that the impacts of stress differ between individuals and that the unique response may indicate a trait-like tendency (Watson & Pennebaker, 1989) exemplifying the centrality of personality's role in the protective stress mechanism. Traits are therefore possible mediators between psychosocial variables and physiological stress reactions.

Personality research burgeoned in the 20th century; Allport (1947, p.25) defined personality as '*the sum total of the actual or potential behaviour-patterns of the organism, as determined by heredity and environment; it originates and develops through the functional interaction of the four main sectors into which these behaviour-patterns are organized: the cognitive sector (intelligence), the conative sector (character), the affective sector (temperament), and the somatic sector (constitution)*'. A pioneer of trait theory of personality was Hans Eysenck (1916-1997) who was one of the first psychologists to relate physiology to psychology; Eysenck's influential Three Factor Theory (1947;1966) was grounded in biological explanations (1990). By applying factor analysis, he identified three factors of personality, appended the nomenclature of PEN: psychoticism, extraversion, and neuroticism which, according to one critic (Kline, 1993, p.60) has the highest validity of all personality psychometrics. Eysenck (1947, p.246) postulated that neurotic introverts '*show a tendency to develop anxiety and depression symptoms, they are characterized by obsessional tendencies, irritability, apathy, and they suffer from a lability of the autonomic system*', whilst neurotic extraverts (p.247) are inclined *'to develop hysterical conversion symptoms, and a hysterical attitude to their symptoms. Furthermore, they show little energy, narrow interests, have a bad work history, and are hypochondriacal*'. The third personality dimension, psychoticism, relates to aggressiveness and hostility (Eysenck, 1952). Eysenck determined that traits could be categorised into consistent habits or tendencies; furthermore, he noticed that by combining the traits of neuroticism, (the tendency to experience negative emotions), and extraversion, (encapsulating the tendency for pleasure, particularly in a social environment), results resembled Galen's temperament theory, in which bodily dispositions (the humours) are used to determine an individual's susceptibility to disease. Eysenck's theories inspired vigorous discourse and his views are contrasted by subsequent researchers, such as Gray who proposed different structures of fundamental personality. According to Gray (1982), the behavioural inhibition system (BIS) is responsive to secondary aversive stimuli, associated with punishment or frustrative non-reward, resulting in cessation of action, passive avoidance, and interruption of not readily reinforceable behaviours, with the attendant emotion of trait anxiety. The behavioural approach system (BAS), (Gray, 1987) is related to differences in personality and is reactive to incentives, such as reward, involving positive emotions such as hope and happiness and connoted by Gray as impulsivity. This innovative advance in the understanding of the role of personality in terms of behaviour has implications for the theoretical focus of this thesis.

Allport (1937) construed personality as the uniqueness of the individual, being biologically determined but sculpted by environmental experience, and recognised that internal cognitive and motivational processes, such as intelligence and attitudes, are influential in behaviour. Allport and Odbert (1936), drawing on the Lexical Hypothesis proposed by Sir Francis Galton, identified nearly 18,000 adjectives describing personality and behaviour. These were factor analysed, a statistical method first introduced by Charles Spearman (1904), which reduces correlational factors to a smaller number of dimensions that are regarded as the basic variables accountable for the interrelations observed in the data. The utility of elucidating the underlying structure of observed phenomena ensured that factor analysis critically influenced the field of psychology and improved the methodological credence of personality research. Norman (1967) abridged the original register, removing antiquated and obsolete terms, reducing the catalogue to under three thousand descriptors. Cattell, (1943;1946), a pioneer of the factor analytic method, identified sixteen primary and eight second-order personality dimensions; his contemporaries, however, were unable to replicate the complex correlations and argued that five factors were sufficient to illustrate the domain of personality (Fiske, 1949). The five-factor concept has since been recurrently researched (Norman; Tupes & Christal, 1992) and its robustness consistently replicated (Digman, 1990; McCrae & Costa, 1997). It is therefore a credible foundation for research concerning the investigation of personality traits and behavioural intentions such as medication adherence.

The Five Factor Model (FFM) is predicated on the lexical hypothesis and factorially-analyses personality descriptives into synonymous groups of linear clusters (McCrae & John, 1992). The FFM comprises five orthogonal, but correlated, dimensions of personality by which individuals can be characterised: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Each broad dimension encompasses related traits and is further subsumed into facets of specific behaviour patterns (DeYoung, Quilty & Peterson, 2007), encapsulated by the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992). The hierarchical levels, metatraits, and organisational *stability* and *plasticity* (DeYoung, 2006; DeYoung, Peterson & Higgins, 2002), has been the subject of much discussion (e.g., Markon, Krueger, & Watson, 2005; Saucier, 2003), and further analyses of the domains have been undertaken, resulting in conceptually related sub-domains, (Goldberg, 1999; Roberts, Chernyshenko, Stark, & Goldberg, 2005), such as the '*proactive*' trait, embodying the need for achievement and commitment to work, and inhibitive trait, indicating moral scrupulousness and cautiousness, as aspects of conscientiousness, (Costa, McCrae, & Dye, 1991, p.887). The personality dimensions of the FFM and their facet scales, defined by clusters of inter-related traits, are shown in Table 2.2.



Big Five dimension	Openness to experience vs closedness to experience	Conscientiousness vs lack of direction	Extraversion vs introversion	Agreeableness vs antagonism	Neuroticism vs emotional stability
Facet (and correlated trait adjective)	Fantasy (imaginative)	Competence (efficient)	Warmth (outgoing)	Trust (forgiving)	Anxiety (tense)
	Aesthetics (artistic)	Order (organised)	Gregariousness (sociable)	Altruism (warm)	Hostility (irritable)
	Feelings (excitable)	Dutifulness (not careless)	Assertiveness (forceful)	Compliance (not stubborn)	Depression (not contented)
	Actions (wide interests)	Achievement striving (thorough)	Excitement seeking (adventurous)	Straightforwardness (not demanding)	Self-consciousness (shy)
	Ideas (curious)	Self-discipline (not lazy)	Activity (energetic)	Modesty (not show-off)	Impulsiveness (moody)
	Values (unconventional)	Deliberation (not impulsive)	Positive emotions (enthusiastic)	Tender-mindedness (sympathetic)	Vulnerability to stress (not self confident)

Table 2.2 Five-factor personality dimensions of personality, including facet scales (recreated from John & Srivastava, 1999 and Goldberg, 1993).

Openness to experience: denotes an extent of pursuit, creativity, and experiential gratification. High scorers are inclined to have an open disposition, are comfortable expressing their emotions, display curiosity, relish novel concepts and unconventional values, and may exhibit risk-taking behaviour (Booth-Kewley & Vickers, 1994). Women who score highly tend to maintain diminished healthy-behaviour, demonstrated by smoking habits, alcohol consumption and typical dietary behaviour. In contrast, low scorers are apt to be conservative and prefer the comfort of the customary and routine, rather than novel and unfamiliar experiences (Costa & McCrae, 1992).

Conscientiousness: refers to the degree of motivation in goal-directed behaviour. High scorers are methodical, reliable, scrupulous, and punctual but in the extreme are associated with compulsive orderliness and workaholic behaviour. Low scorers tend to have a laissez-faire attitude to goal-achievement to the extent of laziness (Costa & McCrae, 1992). Wellness-behaviour and healthy lifestyle has been correlated with conscientiousness (Bogg & Roberts, 2004) and additionally, longevity (e.g., Terracciano, Lockenhoff, Zonderman, Ferruci, & Costa, 2008).

Extraversion: represents the intensity of interpersonal interactions. High scorers are more talkative, optimistic, and active and are inclined to enjoy social situations (Costa & McCrae, 1992). In contrast, low scorers are reserved, independently disposed and are likely to prefer smaller social settings or solitude. High scores of extraversion have been associated with perceptions of good health, in spite of evidence of clinical symptoms (Goodwin & Engstrom, 2002). Whilst outgoing, sociable, and impulsive, health-behaviour research has correlated high extraversion scorers with moderated practices in relation to smoking, dietary and alcohol habits in women (Lemos-Giraldez & Fidalgo-Aliste, 1997). In fact, higher scores measured in childhood were associated with alcohol use and smoking but increased physical activity in adulthood (Hampson, Goldberg, Vogt & Dubanoski, 2007).

Agreeableness: relates to the quality of interpersonal interaction. High scorers tend to be altruistic, trustworthy, sympathetic, and co-operative, in contrast to low scorers who may be egocentric, competitive, and skeptical regarding the intent of others (Costa & McCrae, 1992).

However, high agreeableness scores have been associated with healthy behaviour (Booth-Kewley & Vickers, 1994) and have been known to serve as a predictor of a healthy lifestyle (Lemos-Giraldez & Fidalgo-Aliste, 1997).

Neuroticism: connotes emotional stability levels and is influential in health perception. Higher scorers are associated with less healthy behaviour (Booth-Kewley & Vickers, 1994), being emotionally unstable and anxious. Neurotic individuals exhibit advanced attention to physical indicators which are, however, liable to be interpreted as signs of illness and therefore a perception of poor health is sensed even in the absence of clinical symptoms (Goodwin & Engstrom, 2002), leading to health care seeking (Rosmalen, Neeleman, Gans & de Jonge, 2007). Emotionally balanced individuals are likely to achieve low scores in neuroticism and are more inclined to be even-tempered and adept at ameliorating stressful situations (Costa & McCrae, 1992). Emotional stability has been correlated with longevity (Terracciano, et al., 2008).

FFM traits appear stable both cross-culturally and in terms of gender; women tend to score higher in openness to feelings, neuroticism, and agreeableness (McCrae, et al., 2004), whilst men score higher on openness to ideas (Costa, Terracciano & McCrae, 2001). Conscientiousness represents organisation and high openness represents intellectance, whilst low openness conveys a tendency to be rigid and conservative. Individuals high in agreeableness tend to be compliant and trusting. High scorers in extraversion tend to be gregarious whilst low scorers are socially diffident; this resembles Eysenck’s extraversion dimension and Gray’s BAS. Neuroticism resembles Eysenck’s notion and Gray’s BIS and represents a tendency to experience negative emotions such as anxiety and depression (Costa & McCrae, 1992; Digman, 1990;1997).

The FFM has drawn its fair share of criticism, as would be envisaged from an influential paradigm (e.g., Saucier, 2003; Lee & Ashton, 2004), nonetheless it has demonstrated its functionality in delivering a paradigm of personality traits and in affording a common language for research. Suggestions were extended for more parsimonious models to explain variation in personality such as the PEN (Eysenck, 1992a) or Digman’s (1997) dualistic higher-order concept of *a* (reflecting processes of socialisation) and *b* (denoting agency and development); DeYoung (2006) contrived these factors as stability and plasticity. Research by Musek (2007) suggested that many factors loaded positively onto one construct which he labeled the ‘big one’ and this led to conceptualisation of a general factor of personality, a construct in which the zenith is classified as ‘*altruistic, emotionally stable, agreeable, conscientious, extraverted, and intellectually open, with high levels of well-being, satisfaction with life, self-esteem and emotional intelligence*’ (Rushton & Irwing, 2009, p.1091), whilst the nadir distinguishes social challenge and personality disorder; the implication is that low scores will be associated with poor health outcomes across all contexts. Recent evaluations have contested the utility of a general factor suggesting it may be a statistical artefact (e.g., Irwing, 2013), prompting more appropriate methods by which to consider personality factors (e.g., Revelle & Wilt, 2013) with the FFM representing the optimum in terms of personality trait description (Watson, 2013).

Research investigating the role of personality in health behaviour has not been without reproach; initial forays led to a saturation of individualised theories which were not empirically embedded, and results were consequently difficult to replicate and generalise. However, the development of statistical analyses sanctioned the advent of conceptual frameworks grounded in scientific methods. Furthermore, research has addressed the possibility of discriminating particular components of personality, such as toxic behavioural tendencies covered by the ‘dark’ triad of abnormal personality (Paulhus & Williams, 2002). Each trait included within this concept, Machiavellianism, narcissism, and subclinical psychopathy, can be found within the negative poles of the Five-Factor Model (Furnham, Richards & Paulhus, 2013) but are distinct as socially aversive personality-types. Further rubrics are being developed, such as the Dark Tetrad (Chabrol, Leeuwen, Rodgers, & Sejourne, 2009; Paulhus & Buckels, 2011), which posits that sadism is a disposition that should be added as a ‘dark’ trait. To date, however, there have been no studies which address ‘dark’ personality affects on medication-taking. It is a contention of this thesis that rather than construing traits as unitary factors an appreciation should be given to the complex correlational effects of traits together with cognitive mediators and situational moderators that are influential in the intrinsically interactive processes of illness and medication adherence. A growing body of research indicates the association between persistent behavioural tendencies and health-related outcomes; the FFM has frequently facilitated correlational personality-health studies (Digman, 1990; McCrae & Costa, 2003). The FFM has enabled the attainment of consistent evidence, implicating traits with outcomes as a result of its wide use in health-related research and now occupies a prominent position within health psychology. Certain aspects of personality are modifiable and therefore useful not just as predictive indicators but have utility in terms of moderating health-behaviour. For example, research into HIV/Aids (e.g., Hutton, & Treisman, 2008) indicates that unstable extroverts, characterised as mercurial, pessimistic, and anxious, are more likely to engage in risky behaviour, preferring the immediacy of sexual satisfaction, or drug experimentation, effecting inattention to potential risk of infection or benefits of adherence to drug regimens. In terms of health behaviour, personality variables are considered the nexus of additional aetiological constructs and the focus has shifted to the context of mediating and moderating affects.

2.5.1 Personality and physical health

Evidence of a causal link between health behaviour, which is contextual and influenced by external stimuli, and personality traits has flourished in the last decade, advancing from the prospect of *whether* traits have an association to *how* traits act as mediators, moderators, or dynamic interactions (Murray & Booth, 2015). The self-concept has been a central theory within social interactionism (Mead, 1934), and concerns the phenomenological identification of the individual in evaluative terms, incorporating contextual and temporal continuity (Turner, 1968;1976); '*the totality of an individual's thoughts and feelings having reference to himself as an object*' (Rosenberg, 1979: p7). Identities are negotiated within a social context, the product of an individual's reflexive process, increasingly evident in theories of attitude and value formation and change (Rokeach 1973, 1979), such as the notion of self-efficacy (Bandura, 1977), which has been acknowledged as pivotal in health behaviour research (e.g., Goffman, 1967; Leganger, Kraft & Roysamb, 1999), in addition to personality.

The relationship between personality and health behaviours can be considered at both the trait and dimensional levels. Causality has been posited between anger, hostility, and aggressiveness (initially constructed as type A behaviour), and inferior outcomes associated with coronary heart conditions; Gray's biopsychological theory of personality (1970) supports this and offers an explanation as to why chronic anxiety could lead to unsatisfactory cardiac health outcomes. Traits of neurotic introverts are associated with negative affect (Suls & Bunde, 2005) and are sensitive to negative stimuli, correlated not only with poorer cardiovascular health (Corr, 2004), but also hypertension, and gastric disorders (Goodwin, Cox, & Clara, 2006). Antagonistic hostility is related to the lower end of the agreeableness dimension and has a moderate association with the higher end of neuroticism (Deary, Weiss, & Batty, 2010; Dembroski & Costa, 1987). Such findings have implications for the treatment of patients.

More recently, a further association has been made with type D personality (Denollet, 2005), characterised by the permutation of social inhibition and negative affect. This personality type has also been linked with increased occurrence of cardiac disease (Deary, et al., 2010; Denollet, Vaes, & Brutsaert, 2000). Studies concerning the type D personality construct have not, however, been without censure; research has been particularly hampered by incomparable measures and perceived conceptual limitations (Coyne & de Voogd, 2012), together with replication difficulties in subsequent investigation (Ioannidis, 2012). Most significantly, the categorical type D variable is not justified statistically due to degradation in statistical power on dichotomising a continuous variable and additionally, cross-tabulation inflates significance to the point of false positives (Coyne & de Voogd); rather, results reflect the interaction between continuous traits of negative affect and social inhibition. The supposition then, that type D is a distinct construct, is rendered questionable and further studies would benefit from the utilisation of other dimensions such as the FFM as personality predictors in cardiovascular conditions.

Research has shown that lower conscientiousness, extraversion, and agreeableness together with higher neuroticism are associated with greater risk of all-cause mortality, (Roberts, et al., 2007). Neuroticism, for example, has been linked to cardiovascular problems as well as lung conditions, such as asthma and COPD (e.g., Huovinen, Kaprio & Koshenvuo, 2001) and immune-system functioning (O’Cleirigh, Ironson, Weiss & Costa, 2007). Research has suggested that neuroticism is a predictor of health outcomes only in multi-morbid conditions (Matthews, Deary, & Whiteman, 2003), which may denote that neuroticism is more a general susceptibility rather than associated with a specific pathology. Although widely researched the exact mechanisms of neuroticism are not yet fully understood, however its significance on health has emerged (Lahey,

2009) with the highest scorers of neuroticism costing the public purse over twelve thousand dollars per capita (Cuijpers, et al., 2010). Openness to experience, covering facets relating to beliefs, aesthetics, and concepts, has also been linked to cardiac mortality (Jonassaint et al., 2007). Neuroticism, characterised by lack of self-discipline and organisation, increases the likelihood of symptom reporting (Costa & McCrae, 1987) and the combination of higher neuroticism and low levels of conscientiousness has been linked to other chronic illnesses including hypertension and diabetes (Goodwin & Friedman, 2006). Diabetes involves complex treatment regimens requiring multi-skills since treatment is predominantly self-management, requiring particular cognitive abilities, such as planning and problem solving, (Primožič, Avbelj, Dernovšek, & Oblak, 2012). Neuroticism-affects vary across studies (Deary, et al., 2010), perhaps as a result of different study populations, and whilst it has been highlighted as a mortality risk factor (e.g., Wilson, et al, 2005) alternative studies have not shown an association (e.g., Maier & Smith, 1999), but have demonstrated that it is a protective factor (e.g., Weiss & Costa, 2005). On the other hand, conscientiousness appears the most significant and constant predictor of health behaviours and mortality, having been consistently replicated in studies (Bogg & Roberts, 2013; Kern & Friedman, 2008), with low scorers more likely to engage in risky behaviour such as smoking, inactivity and substance misuse (Bogg & Roberts, 2004). High scorers in neuroticism are at higher risk of mortality than those high in conscientiousness (Weiss & Costa).

Personality traits have been observed as moderators of further risk factors (Deary, et al., 2010); for example, neuroticism has been related to protective effects, greater vigilance (Costa & McCrae, 1987) and perceived susceptibility to health risks (Vollrath, Knoch, & Cassana, 1999), even though it is commonly reported in association with negative effects (e.g., Goodwin, et al., 2006; Matthews, et al., 2003), elevated risk of mortality (Chapman, Roberts & Duberstein, 2011; Deary et al.), and consequential high public health costs (Cuijpers, et al., 2010). This is exemplified in research which found that high neuroticism and conscientiousness had lower levels of circulating interleukin-6 (implicated in the pathology of a number of chronic inflammatory conditions) than any other trait combination (Turiano, Mroczek, Moynihan, & Chapman, 2013). This may be due to the pursuit of health advice in the early stages of disease development when the condition may be reversed (Friedman, 2000), which may explain why some studies have found that there is a decreased risk of death (e.g., Weiss & Costa, 2005). This outcome may result from the differential mechanisms of neuroticism; when an individual is confronted with an objective illness condition, or subjectively experiences poorer general health, neuroticism may act as a protective factor through vigilance and health concerns. Whilst mechanistic features remain uncertain at present it seems reasonable to assume that differential associations are connected to health outcomes and that variances are situationally sensitive; detrimental aspects of neuroticism, such as depression susceptibility and vulnerability, are associated with negative outcomes, however anxiety could promote protective behaviours as a result of concern over health (Friedman, 2000). Furthermore, the facet-classification categorised by the FFM, may be accountable for certain variations in neuroticism influences, causing confounding effects. The FFM was structured as a conceptual convenience (Strus, Cieciuch & Rowinski, 2014) but there may be commonalities or intersections between specific facets; it has been suggested for example that neuroticism comprises two facets; volatility and withdrawal (DeYoung, et al., 2007). Our understanding of the mechanisms through which facets exert differential influences on health behaviour would benefit from further insight and rationalisation of criteria for assessing causality (Bhopal, 2002).

Previous research has been met with certain scepticism, with an insistence that trait measures '*were not designed with specific knowledge of brain/behavior relationships in mind, and thus have had little direct applicability*' (Nelson, Drebing, Satz & Uchiyama, 1998, p.550); furthermore, the trait-health effect size represents an area of contention which some see as '*so low it has as yet no practical meaning for prevention and prediction purposes*' in medical settings (Myrtek, 2001, p.245), whilst others argue that associations have '*too much face validity*' (Stansfeld, 2002, p.1113) and that results are too quickly accepted as a predictor of health outcomes. Effect-sizes are, however, comparable in scope to other risk factors (e.g., Bogg & Roberts, 2004) and correlations have been posited between negative effect traits, such as neuroticism, and underlying biological mechanisms of the autonomic nervous system, as suggested by Gray, which drives cardiovascular disease (Matthews & Gilliland, 1999). This further supports the biological basis of personality traits and corresponding health outcomes as advocated by Eysenck's (Eysenck & Eysenck, 1971) research endorsing individual differences of personality and health behaviour. Despite his prominence in the field of psychology Eysenck has faced growing criticism concerning his controversial claims regarding the psychogenic causes of cancer; Eysenck postulated that, not only were the effects of smoking exaggerated, the cancer-prone individual was passive to external stressors, in contrast to a healthy personality that is autonomous and in control of their fate. This preposition has recently been refuted (Pelosi, 2019) and appeals made for the scientific audit of the methods used and conclusions made (Marks, 2019). Nonetheless, investigations by contemporary researchers continue; personality traits have been associated with disease precursors such as inflammatory markers (for instance interleukin-6 in diabetes) which are reduced in high scores of conscientiousness and openness (Luchetti, Barkley, Stephan, Terracciano, & Sutin, 2014), and high conscientiousness and neuroticism (Turiano, et al., 2013).

2.5.2 Mechanisms of the influence of personality and health

The association between personality traits and health-related behaviours has been the subject of limited investigation however, attempts have been made to develop theoretical perspectives and the emerging evidence of the relationship is interesting:

Risk factors, such as unhealthy behaviours. Negative emotions may lead to binge-eating, preceding obesity which, in turn, may contribute to diabetes and cardiovascular disease; an indirect cause, therefore, would be those personality traits associated with negative affect. High scorers of neuroticism with low agreeableness and conscientiousness are prone to smoking (Terracciano & Costa, 2004) and alcohol abuse (Malouff, Thorsteinsson, Rooke, & Schutte, 2007), whilst the combination of high extraversion and conscientiousness results in higher levels of physical activity (Rhodes & Pfaeffli, 2012; Wilson & Dishman, 2015). Health care decision-making has been linked with high conscientiousness and openness, and low agreeableness and neuroticism (Flynn & Smith, 2007). Atherton, Robins, Rentfrow and Lamb, (2014) noted that individuals higher in extraversion and low in conscientiousness engage in riskier health behaviours, however modification of behaviour will not necessarily alleviate symptoms (Booth-Kewley & Friedman, 1987) and these individuals particularly may benefit from preventative intervention strategies.

Personality's direct influences on physiological mechanisms. Anger and hostility have been linked with the onset of hypertension, (e.g., Spielberger, Crane, Kearns, Pellegrin, Rickman, & Johnson, 1991), the corresponding physiological response to environmental challenges; it is the risk factors relating to individual differences, rather than causes stemming from the disease itself, which render an individual more or less susceptible to the development of hypertension (Friedman & Booth-Kewley, 1987).

Causal personality models. This concerns derivative biological variables and corresponding disease linked to a particular personality trait; for example, an underlying characteristic may cause anxiety and heart disease, although anxiety would not directly influence cardiovascular disease itself. Additionally, there is a correlation between genetic effects which influence personality traits and function as risk factors for the illness condition, as outlined by theories of introversion/extraversion, corresponding with the strength of the nervous system (Eysenck & Eysenck, 1967). There is a contention that personality facilitates responsiveness between biological variables and consequently modifications in physiological reaction (Friedman & Booth-Kewley, 1987). The FFM traits elaborate the concepts of Eysenck and Gray and offer supplementary explanations of variation resulting from personality, making it a robust methodological framework to consider associative mechanisms of personality and health behaviour.

Illness behaviours. From a psychosocial perspective illness is a socially determined state in which an individual plays a characteristic role (the 'sick-role') with defining perceptions, beliefs, and behaviour (DiMatteo & Friedman, 1982), in contrast to standard medical models. Traits are closely linked with behaviours and subjective health status which may determine perceptions.

The organisational body. It is important to recognise all directions and influences in the translational path of health behaviour; it is improbable that disease would be caused by one factor in isolation, this assumption being a vast oversimplification of the situation, but rather the occurrence of a variety of dynamic causal processes and belief systems, including personality factors. For example, fretfulness could precede increased smoking, triggering changes in heart functioning and the autonomic nervous system, sequentially causing increased anxiety which, in turn, could lead to heart disease. Deary, et al., (2010) classify mechanisms into two distinctive clusters of health behaviours and socioeconomic status, linking the two in a mode corresponding to Friedman and Booth-Kewley (1987). Socioeconomic factors are independent predictors of health outcomes (Frank, Cohen, Yen, Balfour, & Smith, 2003), and personality traits have been correlated with socioeconomic indicators, such as education and income (Deary, et al; Jonassaint, Siegler, Barefoot, Edwards, & Williams, 2011); it is therefore possible that socioeconomic factors could mediate the effects of personality on health outcomes. Furthermore, additional variables such as genetic risk or the patient/practitioner relationship may be modified or moderated by personality and affect overall objective health (Deary, et al.,).

Investigation into the association between personality traits and diabetes (e.g., Digman, 1990; McCrae & Costa, 2003) has found that neuroticism is linked with increased risk of the condition (Goodwin, et al., 2006) and lower levels of openness and conscientiousness; furthermore, higher levels of agreeableness were observed in diabetics than in individuals without the condition (Goodwin & Friedman, 2006). A correlation has also been made between physiological and behavioural risk factors and personality; and a further association (Phillips, et al., 2010; Sutin et al., 2010) between neuroticism and components of the metabolic syndrome (a risk factor for neurological disorders), including obesity, high blood pressure, elevated blood glucose associated with the risk of developing cardiovascular disease and diabetes. Tsenkova, Carr, Coe, and Ryff, (2012) obtained inverse associations, this suggests that either longitudinal relationships differ from cross-sectional ones or result from the effects of alternative covariate causal antecedents. Low scores of neuroticism are associated with unhealthy dietary habits (Mõttus, et al., 2012) and lower levels of physical activity (Rhodes & Smith, 2006). Conversely, higher levels of physical activity and healthier dietary habits have been linked with higher extraversion (Mõttus et al.,).

Exploration of personality traits as risk factors for those threatened by illness has utility in terms of clinical practice; for example, type D personality has been recognised as a categorical risk factor in cardiovascular disease (Denollet, 1998; Denollet, Pedersen, Vrints & Conraads, 2006). Traits can be used as a marker for psychological change, to identify those at risk by means of screening, together with other risk factors (Albus, Jordan, & Hermann-Lingen, 2004; Denollet &

Kupper, 2007), and target psychosocial interventions (Noar, Benac, & Haris, 2007). For instance, alexithymia, linked with negative health behaviours and consequences, has a higher incidence in clinical populations (e.g., Chatzi, et al., 2009) and, therefore identifying alexithymic mechanisms in a patient may assist in delivering the most appropriate and beneficial intervention to address and circumvent attendant negative behaviours and enable optimum health behaviour. Additionally, reverse-causation, that is, the effects of illness-exposure on personality, should be explored, for example the endurance of chronic pain (Lumley, Stettner & Wehmer, 1996) can result in personality modification, such as reduced novelty seeking observed following toxoplasma gondi infection (Skallova, et al., 2005). The complex causalities between personality and disease often overlook the effect of an illness on personality. Modifications may occur as a result of pharmaceutical use, change might derive from clinical response, for instance a haemorrhagic stroke affecting typical brain response patterns, or occur as a result of societal context, such as HIV/Aids stigma. All of these pathways can precipitate alterations and might be operating in isolation or simultaneously however, such associations with behaviour patterns are often overlooked and rarely documented (Friedman, 2008).

Further examination of the association between personality and environmental contexts is useful since cultural differences in personality are reflected in health behaviours (e.g., Sherman & Billing, 1999). Extraversion and openness, associated with avoidance of social interaction and enhanced conformity to conventions, are lower in regions with high pathogen exposure, reflecting territorial differences (Schaller & Murray, 2008). Community response to disease-causing microorganisms will reflect the underlying culture (Hooker, Verosky, Miyakawac, Knight, & Esposito, 2008) together with the individual’s beliefs, attitudes and behaviours relating to health, but those with certain traits (such as introversion, which is known to enhance social learning (Hooker, et al., 2008)) will be more or less receptive and responsive. Two facets of cultural response to disease (e.g., Lafferty, 2006) have been identified; evoked culture (Tooby & Cosmides, 1992) which refers to an adaptive response from evolved behaviours which are environmentally contingent, and transmitted culture (Gangestad, et al., 2006) which reflects the norms, beliefs and behaviours circulated across individuals and groups (Nettle, 2009).

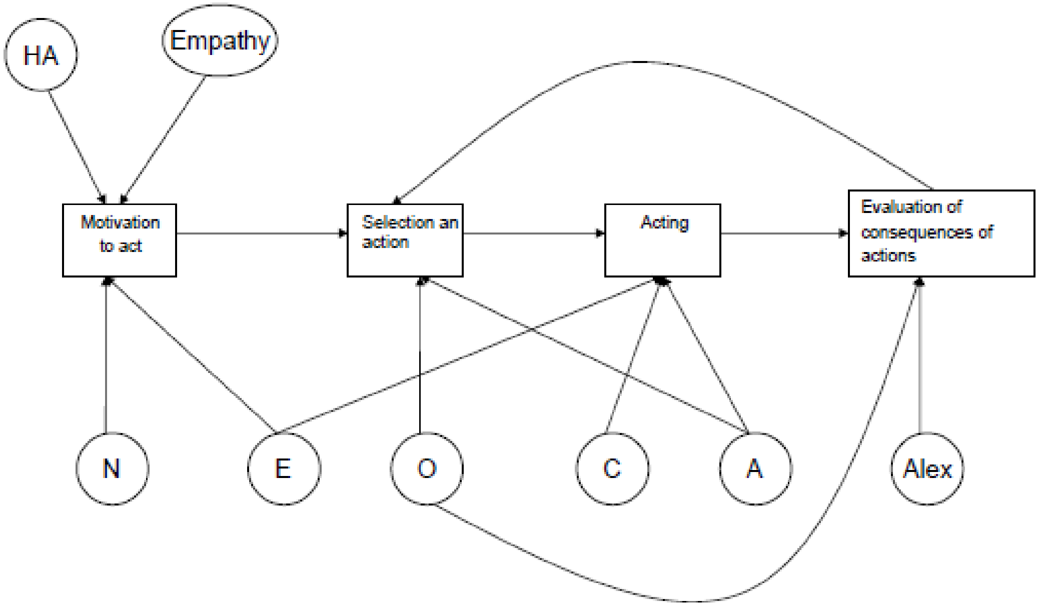
2.5.3 Development of personality perspectives in health behaviour

It is an oversimplification of the role of personality traits to construe them purely in descriptive and deterministic terms (e.g., Denisssen & Penke, 2008). It has been demonstrated (e.g., van Oers, de Jong, van Noordwijk, Kempenaers, & Drent, 2005) that traits are associated with fundamental neurobiological processes and that they are relatively sensitive and reactive to environmental exigencies. Neuro-biological and evolutionary aspects of trait psychology shall now be considered in the context of behavioural response to illness.

Traits from a biological perspective – the sociogenomic approach (Roberts & Jackson, 2008) assumes that genes and evolution exert influence on all behaviour, and that there is cross-species maintenance of genes. Furthermore, Robinson (2004) argues that the nature/nurture dichotomy is rendered superfluous as a result of the dynamic interaction between the environment's affect on biology (Robinson, Grozinger, & Whitfield, 2005) and consequential influence on personality traits which represent '*the conduit between biology and significant life outcomes*' (Roberts & Jackson, p.1534). Persistent modifications, caused by environmental factors, in state levels of beliefs account for alterations in biological systems, thereby causing adaptations in the trait's manifested reaction norms (Penke, Denissen & Miller, 2007). A reaction norm relates to the typical response in a specific context, defined as the '*function relating a phenotypic response of a genotype to a change in the environment*' (Van Oers, et al., 2005, p.1197). For example, a polymorphism in the serotonin transporter gene (genotype) moderates the association between life stress (environment) and depression (phenotype) (Caspi, et al., 2003). This concept was developed to incorporate contextual variability (to determine stability or difference in populations), and plasticity, (i.e., individual differences as a function of context), (Dingmanse, Kazem, Reale, & Wright, 2010) - an approach which presupposes that an individual has a mean trait level. The personality paradox contests that traits are not cross-situationally consistent (Mischel, 1968) but by positioning the context as integral to the dynamic process of personality (Mischel & Shoda, 1995, 1999; Penke, et al., 2007) enables the understanding that a '*person's behavior in a domain will necessarily change from one type of situation to another . . . even when the personality structure remains unchanged*' (Mischel & Shoda, 1999, p.211). Personality remains consistent; however, supervening behaviour is situationally contingent on contextual associations.

As demonstrated using structural MRI to observe variation in regional brain sizes, FFM domains have been neuroscientifically connected with underlying biological processes (DeYoung, Hirsh, Shane, Papademetris, Rajeevan, & Gray, 2010), thus providing a theoretical foundation for assessment of traits in socio-cognitive decision-making. Conscientiousness, for instance, has been associated with impulse control (middle frontal gyrus), extraversion with sensitivity to rewards (medial orbito-frontal cortex), agreeableness connects to altruism, and the perception of other's beliefs (posterior cingulate), and neuroticism to threat punishment sensitivity (dorso-medial prefrontal cortex), whilst openness correlates with working memory and attention, (parietal lobe).

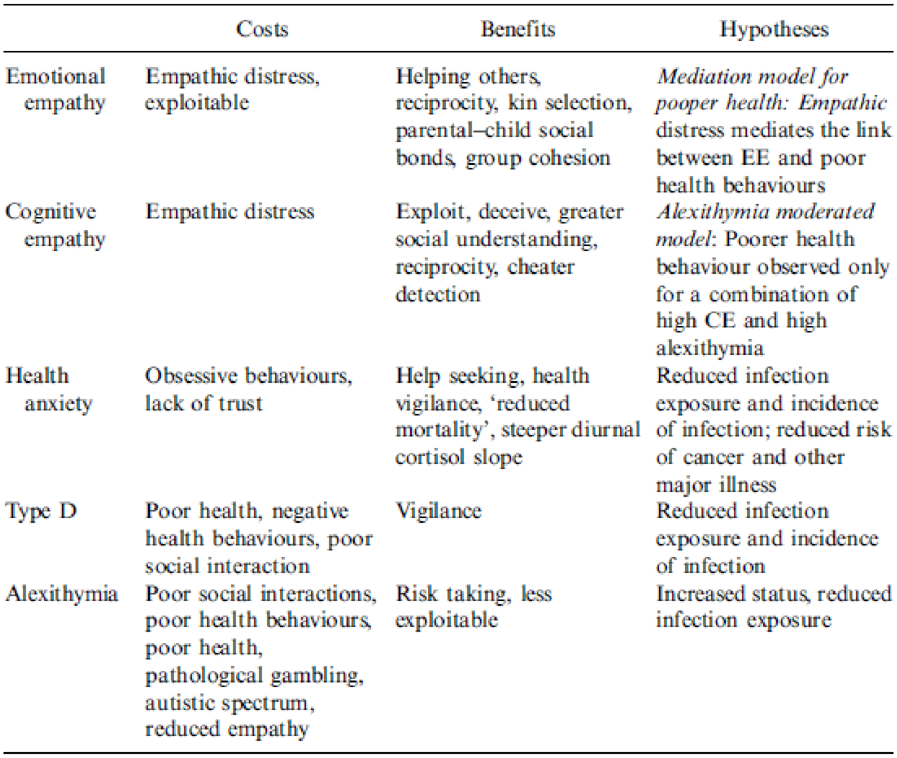
Personality traits are influential in the illness process by targeted, cybernetic management (Van Egeren, 2009) at distinct junctures characterised by motivation, selection and performance of an action (DeYoung, 2010). This supports the theoretical underpinnings of motivation and action stages in decision-making prevalent in health behaviour models (Schwarzer & Fuchs, 1996). Figure 2.7 depicts a theoretical model of personality and social cognition, taking into account DeYoung (2010) and Van Egeren's neuroanatomical theories. Based on this model it is possible to draw some assumptions; neuroticism and extraversion should influence motivation to accomplish a goal, whilst neuroticism also reduces risk of obstruction (Gollwitzer & Sheeran, 2006). Openness is linked to working memory which may therefore be significant in outcome evaluation, creativity in resolution and action choice. Conscientiousness is central in strategy evaluation and organisation whilst agreeableness is important in the consideration of others and motivation for group-action (Ferguson, et al., 2008; Cialdini, Brown, Lewis, Luce & Neuberg, 1997). Alexithymia has also been linked to health behaviour; alexithymics show reduced brain activation relating to loss aversion (Mantani, Okamoto, Shirao, Okada, & Yamawaki, 2005), they may be unable to absorb and consolidate information (Ferguson & Bibby, 2012) and are therefore less likely to learn from mistakes and adapt behaviour.



HA=health anxiety, N=neuroticism, E=extraversion, O=openness, C=conscientiousness, A=agreeableness, Alex=alexithymia.

Figure 2.7 A theoretical model of personality and social cognition (adapted from Ferguson, 2013).

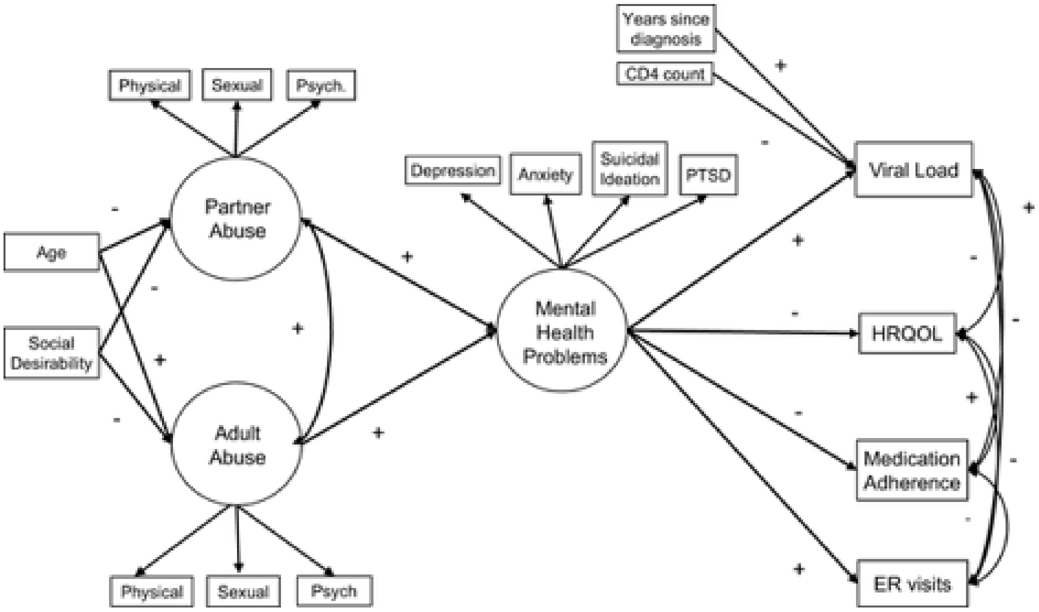
Personality trait evolution – traits are heritable and therefore subject to selection pressures in terms of adaptive differential costs and benefits (Nettle, 2006). Penke, et al., (2007) posited that trait extremes are dependent on a balancing selection mechanism, contingent on a particular situation and predicated on a frequency-dependent model; choice is an adaptive process and therefore, in positive frequency-dependent selection, the fitness of a phenotype increases according to its occurrence in relation to other phenotypes across different conditions. The result of a universal optimal ratio is evolutionary stability (Clarke, 1962); in terms of personality, each trait has evolutionary costs and benefits, (Nettle; Smith & Blumstein, 2008) with an optimum balance contextually dependant. This is exemplified in extraversion, a dimension associated with positive emotion involving variation in dopamine-mediated reward circuits (Depue & Collins, 1999) and is related to social behaviour (Buchanan, Johnson, & Goldberg, 2005) and social support (Franken, Gibson, & Mohan, 1990). However, extraverts also expose themselves to risk and suffer more illness and hospitalisations due to accidents (Field & O’Keefe, 2004; Nettle, 2005); optimal support may therefore be sensitive to the intensity and constant fluctuations in expression of health behaviour of individuals. A dichotomous affect has been observed in individuals high in conscientiousness (O'Connor, Conner, Jones, McMillan, & Ferguson, 2009) whereby control is exerted over fat intake, however caffeine consumption and smoking participation is higher. Organisational facets of conscientiousness, such as self-discipline, order and striving for success, were the strongest predictors of smoking, with self-discipline moderating the association with stress (i.e., smoking increased in stressful times, even in self-disciplined individuals); this exemplifies the environmentally sensitive interaction in the expressed behaviour as a function of variation across contexts. The rationalisation for this unpredicted result was that motivated conscientious individuals increase smoking as a potential coping mechanism (O’Connor, et al.). Table 2.3 depicts an evolutionary cost-benefit analysis for health-related traits.



	Costs	Benefits	Hypotheses
Emotional empathy	Empathic distress, exploitable	Helping others, reciprocity, kin selection, parental–child social bonds, group cohesion	*Mediation model for pooper health: Empathic* distress mediates the link between EE and poor health behaviours
Cognitive empathy	Empathic distress	Exploit, deceive, greater social understanding, reciprocity, cheater detection	*Alexithymia moderated model*: Poorer health behaviour observed only for a combination of high CE and high alexithymia
Health anxiety	Obsessive behaviours, lack of trust	Help seeking, health vigilance, ‘reduced mortality’, steeper diurnal cortisol slope	Reduced infection exposure and incidence of infection; reduced risk of cancer and other major illness
Type D	Poor health, negative health behaviours, poor social interaction	Vigilance	Reduced infection exposure and incidence of infection
Alexithymia	Poor social interactions, poor health behaviours, poor health, pathological gambling, autistic spectrum, reduced empathy	Risk taking, less exploitable	Increased status, reduced infection exposure

Table 2.3 An exemplar theoretical evolutionary cost-benefit analysis for health-related traits.

Poor health behaviours and inhibited social interactions have been associated with alexithymia, health anxiety and type D. Type D personality is characterised by negative affect (NA) correlated with heightened vigilance for health threats and social inhibition (SI) to evade social contact, thus avoiding contagious individuals and contact with infectious environments, with the result that exposure to potential infection may be reduced; in fact, lower symptom reporting is correlated with SI (Smolderen, Vingerhoets, Croon, & Denollet, 2007). Alexithymia and health anxiety are also linked with social isolation and increased vigilance (Lee, Wadsworth, & Hotopf, 2006), and individuals may therefore experience similar benefits. Research has correlated health anxiety with reduced mortality from non-pathological chest pain (Shekelle, Vernon, & Ostfeld, 1991), possibly mediated by increased vigilance in health-seeking behaviour.



PTSD=posttraumatic stress disorder; HRQoL=health related quality of life; ER=emergency room. Positively predicted associations are represented by a plus (+) sign, paths with a negative association with a negative (-) sign.

Figure 2.8 A hypothesised path model demonstrating the association between health behaviour and adherence factors in HIV (adapted from Pantalone, Hessler & Simoni, 2010).

A potential physiological implication of health anxiety has been assessed; a flattened diurnal cortisol slope is associated with increased cancer risk (Abercrombie, et al., 2004) however, a sharper diurnal cortisol slope has been observed in high health-anxiety individuals (Ferguson, 2008), and this therefore appears to be a protective biological function. The effect of the sympathetic nervous system and the hypothalamic-pituitary-adrenal axis have been targeted as an example of a biological mechanism that mediates the relation between general psychosocial factors and health outcomes (Cole, 2008); there is support that behavioural factors are influential in these relations, including nonadherence (Gore-Felton & Koopman, 2008). Pantalone, Hessler and Simoni (2010) examined mental health pathways between interpersonal violence and health-related outcomes in HIV-positive sexual minority men, engaged with medical care. They were able to produce a hypothesised path model demonstrating the associations between psychological factors and health behaviour (as shown in Figure 2.8).

The purpose of this section was to determine the centrality of personality's role in health behaviour, shifting from simple descriptive and deterministic models that dominate health psychology to explore the potential influence of traits from an integrative perspective. Furthermore, to recognise that traits are mechanisms that have evolved, and which consider differential sensitivity to contextual contingencies and situationally-exclusive adaptive responses; there is a link to fundamental biological processes, reflecting the socio-cognitive premise of personality within the health domain.

2.6 Personality and Medication Adherence

It has been argued (Smith & Williams, 1992) that, due to the absence of a distinct cognitive perspective, the FFM is primarily concerned with population-based personality descriptives rather than dynamic personality processes affecting health-behaviour; furthermore, trait-related behaviour may vary between contexts and therefore incongruencies may arise in an individual's scores between distinct situations (Mischel, Shoda & Ayduk, 2008). However, the Big Five was developed to meet the need for an integrative perspective profile on personality effects and health behaviour (McAdams & Pals, 2006). Furthermore, it has been recognised that personality, consisting of '*psychological qualities that contribute to an individual's enduring and distinctive patterns of feeling, thinking and behaving*' (Pervin, John & Cervone, 2008, p.8), that are relatively stable over time, is influential in health behaviour. Personality has been used in health psychology, for example, in research correlating five factor traits in renal dialysis (Christensen & Smith, 1995); the clinical use of using personality traits has been recommended to improve our understanding of individuals' barriers and facilitators of health (Miller, 1991), the delivery of interventions corresponding with specific personality traits to promote better outcomes (Mroczek, 2014) and to predict health-behaviours, such as medication adherence (Axelsson, et al., 2009). It is an understudied area and merits further focus.

2.7 Introductory summary

The main aim of this research is to determine what is known about medication adherence and to investigate the established major influences of adherence, positive or impedimentary, and to support extant literature with novel research; and accordingly, to generate a taxonomical framework classifying recognised factors. Additionally, a novel conceptual model of medication adherence in chronic illness will be designed, demonstrating the intercorrelations of influences; the model is predicted to comprise multiple components reflecting the complexity of the issue. A detailed approach will be utilised in the generation of the framework and model; development will be informed by addressing each of the research questions systematically, and exploiting both existing research and novel data, predicated on personality theory. The stages of construction, development and their rationale will be explicated in detail. The expectation is that the results could potentially inform an interventional tool to aid the adherence process supporting optimal efficacy of treatment.

A key inference from extant literature is that research has been predicated on heterogeneous approaches, underpinned by different ontological conceptions of adherence. It has been highlighted that an essentially biomedical, rather than holistic, framework has been employed to contextualise the phenomenon of adherence, simplifying factors into binary conceptualisations of adherent or nonadherent. The spurious notion that adherence can be reduced to a statistical appendage of good or bad eschews the complexities of the phenomenon; a positivist assumption that there is one immutable '*truth*' (Crotty, 1998) that is essentially modifiable implies that the patient is somehow detached from the illness condition and, therefore, the subjective constructions of adherence behaviour (Wilberg, 2011). Global conclusions are not supported by extant research, reducing opportunities for transformation and optimal treatment regimes. An initiative is necessary in order to assess correlatory influences, in themselves not necessarily reflective of causation, to drive the topic further. Positivism has directed adherence research, however its inability to explicate the lived experience of individuals calls for a paradigm shift in order to expound our understanding of the concept (Playle & Keeley, 1998; Raphael, 2000). The WHO appealed for a systems approach to explore and re-evaluate the topic of adherence, to unite aetiology and qualitative research paradigms with quantitative measurement, which dominates adherence discourse. Phenomenological research is, however, atypical and the topic would benefit from a more significant quantity of analogous research in order to explore the stakeholder's experiential and contextual constructions (Guba & Lincoln, 1994) of living with a chronic condition. Constructions are mutable and multiple inter-related realities are expressed in symbolic language (Schwandt, 1994). The truth, which is dynamic and complex, is accessible through inner subjectivity (Thorne, 1994), and the individual's transaction with the experience (Annells, 1996). Knowledge and meaning are formed, and interpreted, by the individual as they engage with the world through their constructions within the social context (Crotty, 1998), and it is those constructions that the current research attempts to capture.

3 Therapeutic adherence: an historical perspective

3 Therapeutic adherence: an historical perspective

This chapter capitalises on the literature review as a useful device to integrate data from multiple sources; providing an overview of various aspects of medication adherence, including rates, factors, outcomes, illness conditions and interventions that have been investigated since research on the topic was initiated.

Addresses the research question 1: *what is currently known regarding the factors of medication adherence and how has the focus changed over the years?*
Accomplishes Aim I*:* *to complete an historical overview of medication adherence, to ascertain our current understanding, and review research directions*

The ambit of the review

Research into medication adherence has burgeoned in the last five decades, demonstrating the poor observance to prescribed regimens reflected across illness conditions. The subject of adherence first came to prominence in relation to the condition of tuberculosis in the 1800s however, contemporary consideration was rekindled with Haynes' (1979) research; of particular concern was the deviation from prescribed pharmacotherapy resulting in sub-optimal clinical efficacy. Nonadherence is prevalent in chronic illness conditions and is associated with poorer prognosis, reduction in treatment benefits and increased admissions to hospitals and long-term care institutions, increased morbidity and mortality, economic costs and decreased quality of life and health-related quality of life. DiMatteo, et al., (2002) have suggested that improved adherence could enhance outcomes by 26%; consequences are therefore considerable, and it is imperative to understand the complex issues involved in adherence.

Sub-optimal adherence to drug treatment varies between conditions (e.g., Loghman-Adham, 2003; Schwartz & Quigley, 2008), due to a range of factors; nonadherence is performed at the expense of clinical outcomes and even preservation of life (e.g., Ruddy, Mayer & Partridge, 2009; Wu, et al., 2008). The scope of the adherence problem was highlighted by the WHO which, it asserted in its seminal report, is a neglected area of research with critically serious consequences (Sabate & Sabate, 2003). Since the publication of that commentary there has been a proliferation of research that has contributed considerably to the field, resulting not only in recognition of the import of adherence studies, but also in improved accuracy of assessment of pharmacological adherence, by attempts to increase study population size and longer study-phases.

3.1 Historical review of therapeutic adherence

The literature review was performed with the intent of accessing any academic article acknowledging the subject of medication adherence, or nonadherence, from inception of records pertaining to Hippocrates' speculations, to July 2018. The objective was to identify the evolution of conceptual contexts in which medication adherence has been considered; the review aimed to capture the main foci which had concerned researchers. As a result, an historical timeline was constructed and represents (to the author's knowledge) the first of its kind in psychological research; methodological perspectives and philosophical paradigms were considered together with illness conditions, affected populations, socio-economic barriers, and any additional approaches pertinent to the evaluation of medication adherence. A timeline was considered a novel, yet appropriate, conceptual foundation from which to quantify trends in research. A summary of the historical sequence, and accumulative utility of adherence, the review denotes the evolution of perspectives relating to the illness conditions; factors regarding self-management, intervention strategies, as well as inclusions related to scale-measures, rates and prevalence of variables were evaluated.

3.2 Methods

The objective of the historic literature review was to collate all academic references relating to medication adherence. Electronic databases, including CINAHL, the Cochrane Library, EMBASE, MEDLINE, PsycINFO, were used together with online search engines (DuckDuckGo and GoogleScholar) and supplemented with hand-searches for all papers relating to medication adherence. Due to the expansive nature of the search, performance of a systematic review was prohibitive and therefore the intent was not on an exhaustive systematic report, but rather more in the nature of an abbreviated, but expeditious, review to categorically synthesise descriptive summaries of data; nevertheless, the review was based on critical and rigorous appraisal, incorporating exclusion and inclusion selection criteria, with transparent and reproducible search methods (Hartling, et al., 2015). This method is not without its shortcomings: limited textual analysis of literature, non-blinded appraisal, and selection, is potentially subject to bias with only one reviewer and therefore findings should be interpreted with an amount of circumspection (Khangura, Polisena, Clifford, Farrah & Kamel, 2014). Nonetheless, this review offers a consistent classification of the wide focus and a useful comparison method, representing a comprehensive perspective. Data extraction was undertaken to garner statistics on i) year of publication, ii) illness condition, and iii) area of interest (intervention, factor, or method of assessment, for example). The historical timeline was developed from these data. Furthermore, the literature review informed the construction of a taxonomical framework by identifying influential considerations reported in extant studies.

An open search using the string (medica* AND adher*) was undertaken for English-language articles published to July 2018. Database searches took place in November and December 2015 and the search was updated in July 2018. Empirical studies were required to explicitly address the topic of adherence to therapy in illness-conditions, or any other treatment requirements or health behaviour, or factors which contribute to the optimisation of health; therefore, beneficial undertakings, such as attending clinic appointments, inoculations, completing blood draws or clinically-directed exercise or diets, were included. The review’s focus was on medication adherence in illness conditions and therefore smoking cessation, or substance abuse (unless affecting medication adherence) was excluded.

3.2.1 Exclusion criteria

Studies were limited to English-language papers published in peer-reviewed journals. Commentaries, reviews, conference proceedings, letters or editorial material were excluded. Non-western studies were also excluded, together with certain health disorders such as addiction, unless it affected an illness condition, for instance smoking in asthmatic individuals. Preventative measures such as vaccination uptake were reported since they reflect pertinent aspects of health behaviour, such as decision-making, motivation and beliefs.

A note on the perspective of 'western' - it is a challenging proposition to connote a definition of 'western' since the inclusion of countries is contextual. From a cultural and sociological perspective western may be construed as all cultures that are directly derived from, and are influenced by, European cultures, sharing certain fundamental political ideologies and liberal democratic principles and high human development. Nonetheless, whilst ostensibly in the western category, health services in the USA differ substantially from the UK from a financial perspective, which may have a substantial bearing on adherence, and yet, generally, the two countries would be considered as western. For the benefit of the focus of this study the connotation of western is considered in terms of the regions, nations and states influenced by occidental culture and civilisation (as shown in Figure 3.1 below) which corresponds to the United Nations definition of western European and other groups, and consequently all countries construed as western are included (represented by the areas shown in dark blue).

Figure 3.1 countries included in the western world (adapted from Huntington, 1996).

Articles were initially discounted on the title, but if the subject matter was not clear from the heading the abstract was viewed for further clarification to ensure that no pertinent articles were unnecessarily omitted. Articles were further excluded if there was insufficient information in the follow up assessment (for example, in the case where only an abstract was available). 392,728 research articles were retrieved in the preliminary scan, 14,457 were screened for eligibility, resulting in 7,342 studies which met the inclusion criteria. These studies were analysed for predictors or barriers affecting engagement with medication and data-extraction categorisations were created.

3.3 Search results

Figure 3.2 shows the study selection process. Initial searching from scanning the title and abstracts identified 392,728 papers. After extractions for duplicates, irrelevant papers and articles not meeting the inclusion criteria, a total of 14,457 papers remained for consideration.

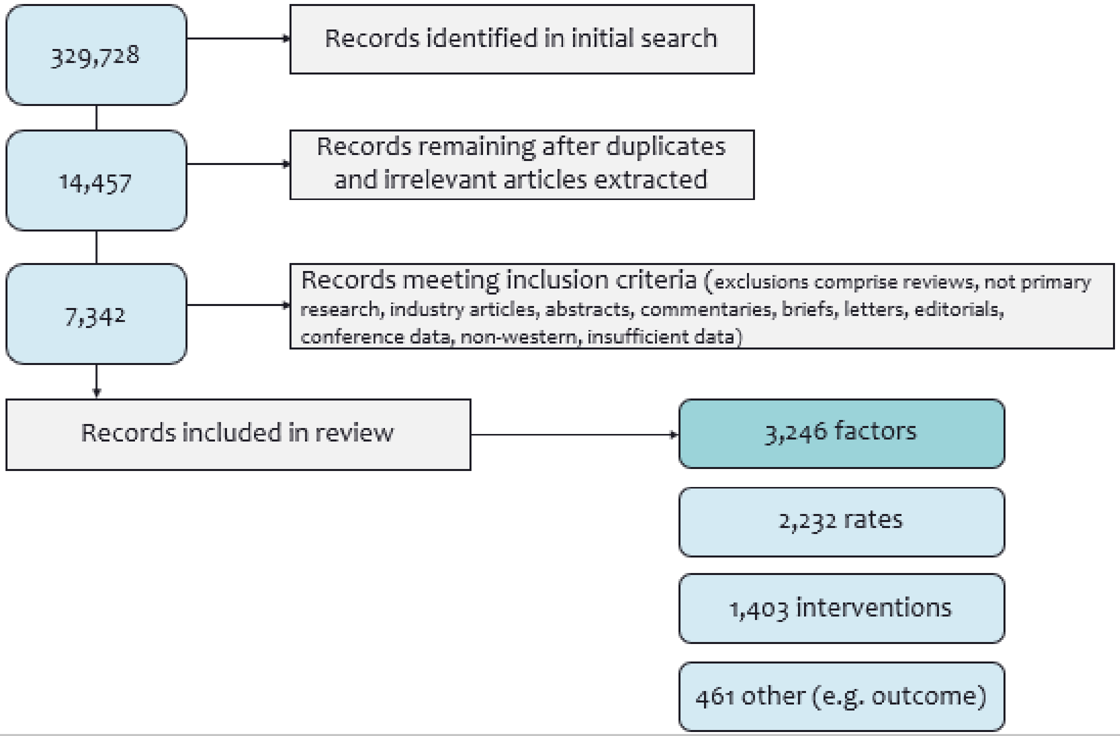


Figure 3.2 Flowchart of the study selection process for medication adherence.

Publication types excluded literature reviews, conference/meeting reports, and letters/replies/commentaries/editorials.

In the final framework factors are not weighted in respect of the quantity of evidence; for example, an adherence factor identified in a solitary study pertaining to esophagitis will be reported analogously as a variable reported 200 times in asthma, and so the magnitude of research does not necessarily indicate its significance. Despite the vast literature on the topic only two per cent of articles which directly address specific adherence factors in treatment merited further review according to the criteria for the historical review. Articles were arranged in the following categories: measurements and scales, interventions, outcomes, and factors.

3.4 Adherence Literature Timeline

The review demonstrated that the perennial enigma of medication adherence has generated thousands of articles. Over time, social and cultural factors have influenced the foci of research but essentially studies have concerned two primary issues; firstly, the identification of the causes of adherence and, secondly, the design of interventions to remedy the problem of nonadherence.

For the purpose of this review research is categorised in the following time periods;

Stage I – the beginning (inception to 1969): the limited range of enquiry originated from Ancient Greece, to tuberculosis research in the United States, prior to

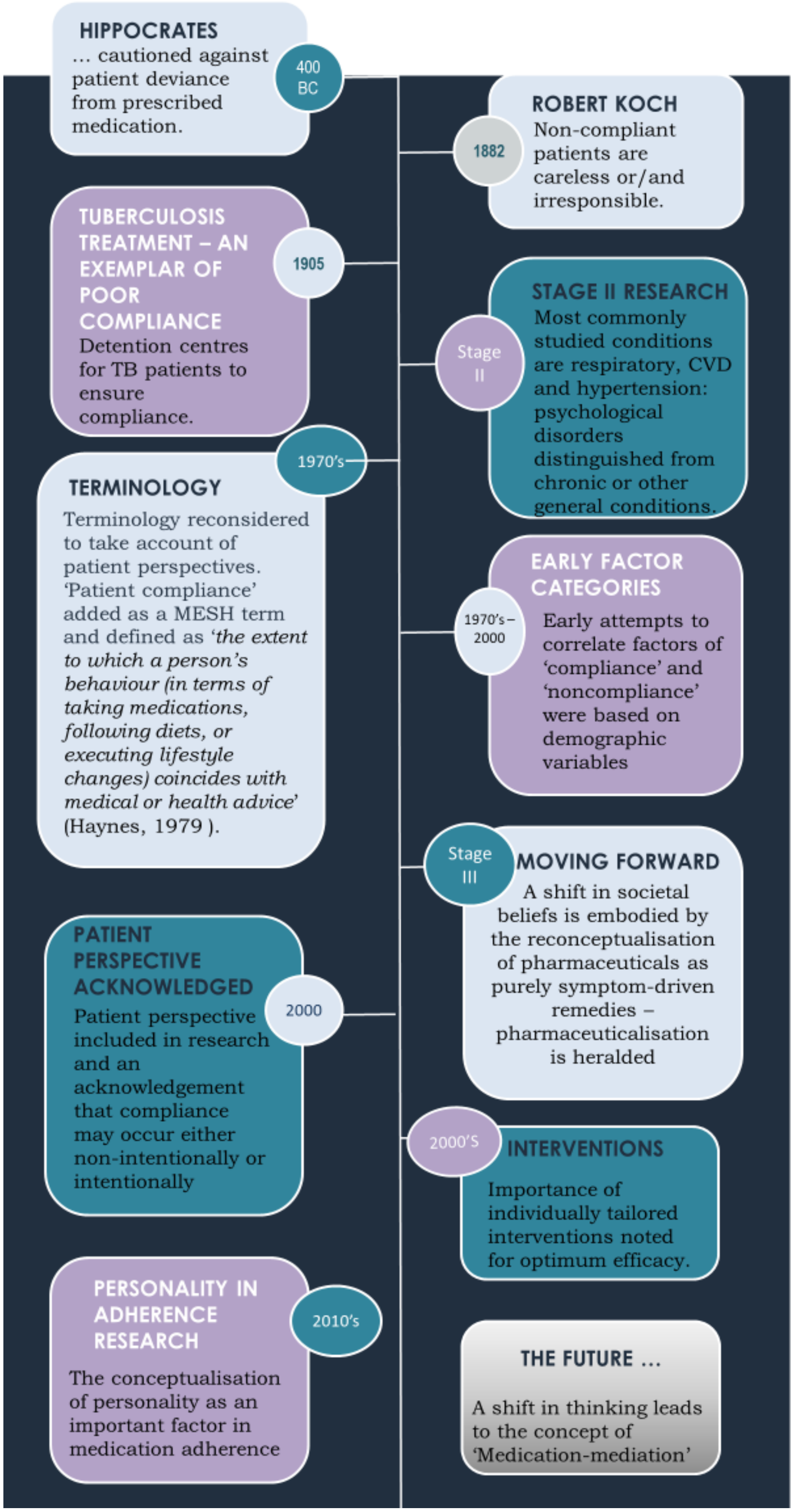
Stage II – early contemporary (1970 – 2000): realisation of the significance of the topic which rekindled research, and finally,

Stage III – current (2000 onwards): research burgeons, and many factors of adherence are investigated.

It can be evidenced that each stage reflects the contemporaneously construed ethos and judgements which influenced the social construction of the concept. The debate surrounding the terminological reference of the nonadherent patient for example, has already been highlighted (refer to chapter 1.1.2). The stages represent a chronological depiction of phases within the psychological research of medication adherence, illustrating gradual shifts between foci of investigation through time. The evolution of adherence is reported, together with the variance between illness conditions and populations; theoretical suppositions preceding empirical studies are connoted.

An overview of the literature review is shown in Figure 3.3, depicting a summary of the historical timeline of medication adherence research.

MEDICATION ADHERENCE TIMELINE



400 BC

HIPPOCRATES
… cautioned against patient deviance from prescribed medication.

1882

ROBERT KOCH
Non-compliant patients are careless or/and irresponsible.

1905

TUBERCULOSIS TREATMENT – AN EXEMPLAR OF POOR COMPLIANCE
Detention centres for TB patients to ensure compliance.

Stage II

STAGE II RESEARCH
Most commonly studied conditions are respiratory, CVD and hypertension: psychological disorders distinguished from chronic or other general conditions.

1970's

TERMINOLOGY
Terminology reconsidered to take account of patient perspectives. 'Patient compliance' added as a MESH term and defined as '*the extent to which a person's behaviour (in terms of taking medications, following diets, or executing lifestyle changes) coincides with medical or health advice*' (Haynes, 1979).

1970's – 2000

EARLY FACTOR CATEGORIES
Early attempts to correlate factors of 'compliance' and 'noncompliance' were based on demographic variables

Stage III

MOVING FORWARD
A shift in societal beliefs is embodied by the reconceptualisation of pharmaceuticals as purely symptom-driven remedies – pharmaceuticalisation is heralded

2000

PATIENT PERSPECTIVE ACKNOWLEDGED
Patient perspective included in research and an acknowledgement that compliance may occur either non-intentionally or intentionally

2000'S

INTERVENTIONS
Importance of individually tailored interventions noted for optimum efficacy.

2010's

PERSONALITY IN ADHERENCE RESEARCH
The conceptualisation of personality as an important factor in medication adherence

THE FUTURE …
A shift in thinking leads to the concept of 'Medication-mediation'

Figure 3.3. An overview of the historical timeline of medication adherence research.

3.4.1 Stage I - The Beginning; an historical perspective (to 1970)

It is a lugubrious reflection that non-adherence to therapy is not a contemporary issue. Hippocrates (c. 460 – c. 370 BCE), the 'father of medicine', originally recognised that when patients criticised treatment-failure the inefficacy was frequently a result of the medication not being taken as prescribed (Haynes, 1979). In fact, it seems that getting the patient to '*follow doctors orders*' is no less of a concern in contemporary society than in the Grecian culture of Hippocrates and consequently remains a fundamental concern (Katz, 1984: p xiv).

Advances in disease aetiology in the 18th and 19th centuries led to a clearer understanding of disease control and prevention, together with a developing comprehension regarding therapeutic intervention. Adherence to medication was first brought into focus by the chronic state of tuberculosis. Once known as the white plague, Hippocrates, the ancient Greek physician, noted that "phthisis" (consumption) was the most widespread and fatal disease of his time. The evolution of approaches to medication adherence may be illustrated by chronicling endeavours to control tuberculosis which was rife in cities (Bates, 1992) at the beginning of the 20th century. The discovery of the contagious nature of the disease, by Robert Koch in 1882, prompted the advocation of hygienic measures to prevent its spread (Teller, 1988). Sanatorium beds were inadequate however, and the monitoring of tuberculosis patients was difficult, particularly in transient populations who, it was felt, were likely to be responsible for proliferation of the disease. In America there was little sympathy for these '*unworthy*' poor (Katz, 1986) and, consequently, this faction was felt to be the '*most dangerous to the community*' (Biggs, 1904; p337). The perception that they were most likely to be non-compliant led to medical authorities to recommend '*detention institutions for ignorant and vicious consumptives*' (Foster, 1905; p333) and forcible isolation was introduced. This pertained less to public health concern than an embodiment of feelings toward poverty during this epoch and, as such, related rather to value-judgments about economically underprivileged individuals, viewed as social outcasts, whose behaviours endangered the community. The introduction of skin testing in 1908 revealed an intriguing conundrum; more people were infected with the tuberculosis bacillus that had contracted the disease (Teller), an incidence that could not be adequately explained by germ theory. The psychosocial approach determined that a complex interaction of biological and psychological factors were responsible for disease; research, however, did not flourish until the

1920s and ‘30s when the new discipline of psychosomatics investigated the relationship between the mind and body (Powell, 1977).

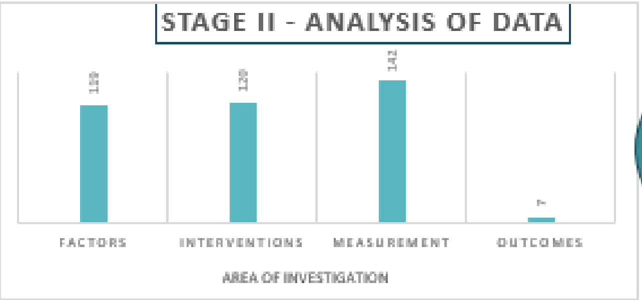
In fact, it was not until the 1940s that efforts to control tuberculosis were renewed. Over 50% of veteran American soldiers who were hospitalised due to tuberculosis discharged themselves and, although these men were no longer thought of as a menace to society, in contrast to the transients, authorities were encouraged to ‘*exercise the control over these men which the public health laws give them*’ (Dublin, 1946: p151.). Health officials were particularly frustrated by the therapeutic opportunities derived from the advent of antibiotics being eschewed as a result of premature cessation of treatment. This evidences the paradox between the proliferation and efficacy of treatments available and the growing awareness of noncompliance.

By the 1950s and 1960s patients who disregarded treatment recommendations were still considered to spurn the authority of the medical profession, but emphasis shifted from considerations such as the patients’ social status to the act of noncompliance itself (Lerner, 1997). Condemnatory terminology, such as ‘recalcitrant’ (Davies, 1954) or ‘uncooperative’ (Taylor, 1956), determined how tuberculosis patients were characterised, in contrast to individuals with other disease conditions or social groups (Charney, et al, 1967; Mohler, et al., 1955). For example, in the 1950s it was reported that only 20% of children completed the treatment for streptococcal pharyngitis. Nonadherence was not characterised as ‘recalcitrance’ for this patient group; on the contrary, benzathine penicillin was developed – a long-acting antibiotic which cured the illness with one injection. This intervention was not only successful in biologic terms but also in terms of the elimination of the necessity of a pharmaceutical regime, with the concomitant risk of missed doses. Subsequently, there was a growing recognition that a uniform response from patients was an unreasonable expectation and that a wide variety of illness behaviours transpired due to individuals’ different ‘clinical realities’ (Lerner).

In longitudinal research it was found that streptococcal bacterial infection did not generally produce illness, symptoms; however, illness was more likely to develop when individuals were stressed (Meyer & Haggerty, 1962). This conceptual biopsychosocial approach was the foundation from which subsequent studies were able to demonstrate psychosocial influences on disease, such as a link between self-reported chronic stress, lack of positive emotional style and an increased risk of upper respiratory infection (Cohen, et al., 1998). The notion of biopsychosocial homeostasis was in its nascency a century before (Bernard, 1880; Cannon, 1932), from which contemporary notions were developed. Conceptual understanding of personality and illness was further progressed by Alexander (1950) and Dunbar (Ackerknecht, 1982) although psychometric assessments frequently lacked empirical substantiation (Friedman & Adler, 2007). A compilation of studies addressing tuberculosis was published in 1956 (edited by PJ Sparer); the comprehensive account was devoted to a broad range of topics, extracted from domains such as physiological and sociological disciplines, together with reports of progress recently made in stress research (Selye, 1985). The book focused on psychological aspects of tuberculosis for which Sparer purported that '*there is no prototype but a broad range of personality structure extending from the 'normal' throughout the continuum of maladjustment represented by the psychoneurotic, psychophysiologic, psychotic and personality disorders … which renders the individual more vulnerable to the disease'.* The selection of radical accounts presented in the book delivered an invaluable insight not only into the illness condition but in terms of individual differences in medication adherence, a topic still in its infancy. However, a decline was experienced in research into tuberculosis, attributable to the success of antibiotic treatment encouraging physicians to apply a strictly biological model, and prospective studies consequently diminished. Nonetheless, rudimentary investigations were undertaken into the affect of psychosocial factors on disease progression. These built on Cannon's concept of homeostasis (1915) and Alexander's psychoanalytical approach, connecting certain personality types with hypertension and ulcerative colitis, examining physiologic response to physical and psychosocial stressors. Selye (1956) demonstrated a standard response to stressful stimuli in the adrenal glands and further conclusions were cautiously construed that emotional state was influential (Clark, Zahn & Holmes, 1954). Methodological flaws relating to bias were apparent in this consignment of research which further inquiry endeavoured to address, together with attempts at quantification; the interrelation between biologic and psychosocial disciplines was established which the 'scientific' medical community received with interest (Lerner, 1996). It would not, however, be until Stage II that a renewed interest in psychometrics would resurface, with the interest in narrative meanings of illness (e.g., Sontag, 1989) and a new emphasis on holistic care.

3.4.2 Stage II – early contemporary; towards the millennium (1970-2000)

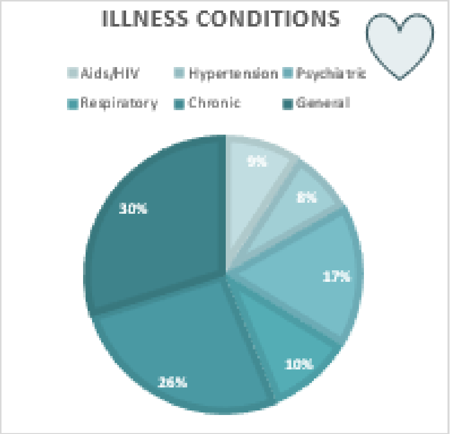
STAGE II – EARLY CONTEMPORARY: TOWARDS THE MILLENNIUM



665 papers reviewed:
277 excluded as inclusion criteria not met

FACTORS INVESTIGATED

- Demographics/sociodemographics: 25
  - Social support/environment/influences 10
- Treatment characteristics: 3
  - Knowledge of treatment: 8
  - Treatment satisfaction, including health care team: 9
  - Physician dialogue/instruction 11
  - Information 2
- Illness characteristics
  - Symptoms/ side effects/perception of side effects 10
  - Comorbidity 2
- Medication management ability 8
  - Neurocognition/ memory/IQ/forgetting 11
  - Health literacy/ Patient education 3
- Psychological/psychosocial 7
- Patient perspectives/perception 12
- Self-efficacy/locus of control 5
- Beliefs 17
- Personality 4
- Quality of life



PSYCHIATRIC DISORDER FACTORS

- Medication guidelines
- Outpatient commitment order
- Patient/clinician agreement
- Attitude to treatment
- Satisfaction with care
- External social control
- Perceived threats
- Substance abuse
- Beliefs
- Side effects
- Risk factors
- Self-determination
- Self-regulatory action
- Insight

Early attempts to correlate factors of ‘compliance’ and ‘noncompliance’ were based on demographic variables (Davis & Eichhorn, 1963; Davis, 1966) but it was not until the 1970s that the foundation was laid for future discourse relating to medication compliance. Drawing on the popular post-war doctrines of Freud, the Health Belief Model (Maiman & Becker, 1974) was developed to explain patients' behaviours contingent on their understanding of the illness condition, locus of control, perception, and consideration of treatment options, all of which may impact upon medication adherence. The components are considered as independent predictors of health behaviour (Armitage & Connor, 2000), not moderated by each other, although there is no indication as to the relationship between them. The theory does not, however, take into account the influence of social relationships or behavioural coping skills; furthermore, the variables are assumed to affect behaviour directly, impervious to behavioural intentions, and additional factors, such as the role of unconscious motivations (habits) such as smoking and socially-determined influences are not incorporated (Rosenstock, 1990; Stroebe & de Wit, 1996).

In the 1970's Sackett and his colleagues (1975) were researching poor responses to treatment of hypertension; one result of their study was that the labeling of patients as hypertensive resulted in increased absenteeism from work. It was plausibly deduced that this resulted from low compliance with medication; the McMaster Workshop/Symposium (1974) brought the issue of compliance to therapeutic regimes to the fore. The sophistication and rigour of research were so successful that the terms 'patient dropouts' and 'patient compliance' were added to Index Medicus topics and the term 'patient compliance' was introduced in 1975 as a MeSH (Medical Subject Heading) search term. 'Pharmionics' was later introduced in 1987 as an idiom to describe the way in which ambulatory patients adhere to prescription drug regimens (Vrijens & Urquhart, 2005). The seminal inquiries of Sackett and Haynes in 1976 and 1979 concerned the biomedical impact of deviation from prescribed medication in clinical trials and focused on the rates of dosage adherence. Furthermore, in terms of interventions, Sackett and Haynes classified therapeutic intercession between those which educated the patient, those which altered the patient-practitioner setting and mediations relating to behaviour change (Dunbar, Marshall & Hovell, 1979). Additionally, they listed the criteria for behaviour change: correct diagnosis was fundamental, therapy should be more beneficial than harmful, and the patient must be positioned as an '*informed, willing partner*' (Sackett & Haynes, 1976; p4). Furthermore, the definition of compliance was seminally clarified as '*the extent to which a person's behaviour (in terms of taking medications, following diets, or executing lifestyle changes) coincides with medical or health advice*' (Haynes, 1979). This is a meaning that still permeates throughout contemporary literature.

Systematic study of the association between behaviour and illness was established, with a particular focus on type A personality characteristics and heart disease (e.g., Rosenman & Chesney, 1985). In an attempt to simplify research and render studies more objective convergent and discriminant validity were eschewed (Campbell & Fiske, 1959); whilst this was a somewhat flawed approach in itself its legacy was to inspire further research, placing concepts into an empirically based and valid scientific framework (Friedman, 2000; Friedman & Booth-Kewley, 1987) and research was directed to multiple predictors, multi-dimensional conceptualisation and rigorous assessment of individual differences and their affect on health outcomes (Smith & Gallo, 2001; Friedman, 2011).

This period established the foundations of serious investigation into clinical compliance, and it became evident by the end of the 1970s that there was only a modest comprehension of behavioural or immunological mediators of adherence due to complexity of causal links simultaneously operating across contexts. Even by the end of the following decade few novel insights into mediating mechanisms between the individual and health behaviour had emerged. Early research neglected to incorporate the perspective of the patient in treatment choice and management; rather, there was an underlying assumption that the health care practitioner's decision was not to be contested. Vermeire, et al., (2001) recognised that two crucial elements were missing from the debate; the perspective of the patient and the practitioner's prescription method. The term 'compliance' was replaced by 'concordance', reflecting the potential difference in view between the patient and medical practitioner (Brockie, 2000); both terms were gradually superseded by the notion of 'adherence' with the collateral result that the patient was no longer expected to be passively obedient to the medical authority but rather played a collaborative role in the patient/practitioner relationship. Driven by physician-led research 'compliance' has been characterised as a scientifically identifiable concern to be rectified by 'authoritative' solutions (Davidoff, Haynes, Sackett & Smith, 1995), with the attendant implication that patients should be complicit. Sackett and Haynes' (1979) research has not been without criticism, largely due to the implicit presumption that a doctor's recommendations should always be followed and that anyone failing to do so is behaving in an irrational manner (Trostle, 1988). In the 1990s the notion of adherence as a behavioural process, subject to environmental influences (Elliott, 2009; Elliott, Shinogle, Peele, Bhoslee & Hughes, 2008), started to evolve (Miller, Hill, Kottke & Ockene, 1997); adherence is contingent upon the patient being equipped with the skills, such as motivation, knowledge, and resources, to actively determine the direction they wish to follow. A corollary of this is the acknowledgement that compliance may occur either non-intentionally or intentionally (Lehane &McCarthy, 2007).

3.4.3 Stage III – 2000 to date: moving forward

STAGE III – 2000 TO DATE – MOVING FORWARD

STAGE III - ANALYSIS OF DATA

13,515 papers reviewed: 6,591 excluded as inclusion criteria not met

FACTORS INVESTIGATED

Focus on three main areas:

Illness; symptomology, perceived severity, comorbidities

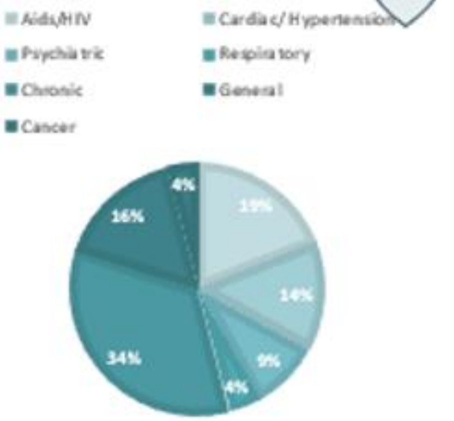
Treatment; regimen complexity, devices and use, treatment type, dosing schedule

Professional interactions; perception of HCP support, satisfaction with relationship, health-care delivery

Also considered:

- Demographics
- Environment
- Cognitive capacity
- Social support
- Consequences
- Behaviour
- Knowledge
- Capabilities/skills
- Beliefs/perceptions
- Intentions

ILLNESS CONDITIONS



Individual Differences FACTORS

The new millennium witnessed a dramatic expansion of the pharmaceutical industry, with an increase of 59% in their marketing personnel in the decade from 1995 (House of Commons Health Committee, 2005), indicative of the magnitude and worth placed in the promotion of pharmacological products. In fact, criticism has been directed at pharmaceutical companies for their fierce marketing campaigns, participation with national-level policy development and aspired capitalist influence over charitable and governmental organisations (Abraham, 2010). The availability and global significance of pharmaceuticals has driven social scientists to consider the expanding medical imperialism termed pharmaceuticalisation (Freidson, 1970; Abraham). Figure 3.4 depicts potential global pharmaceuticalisation, according to Abraham.

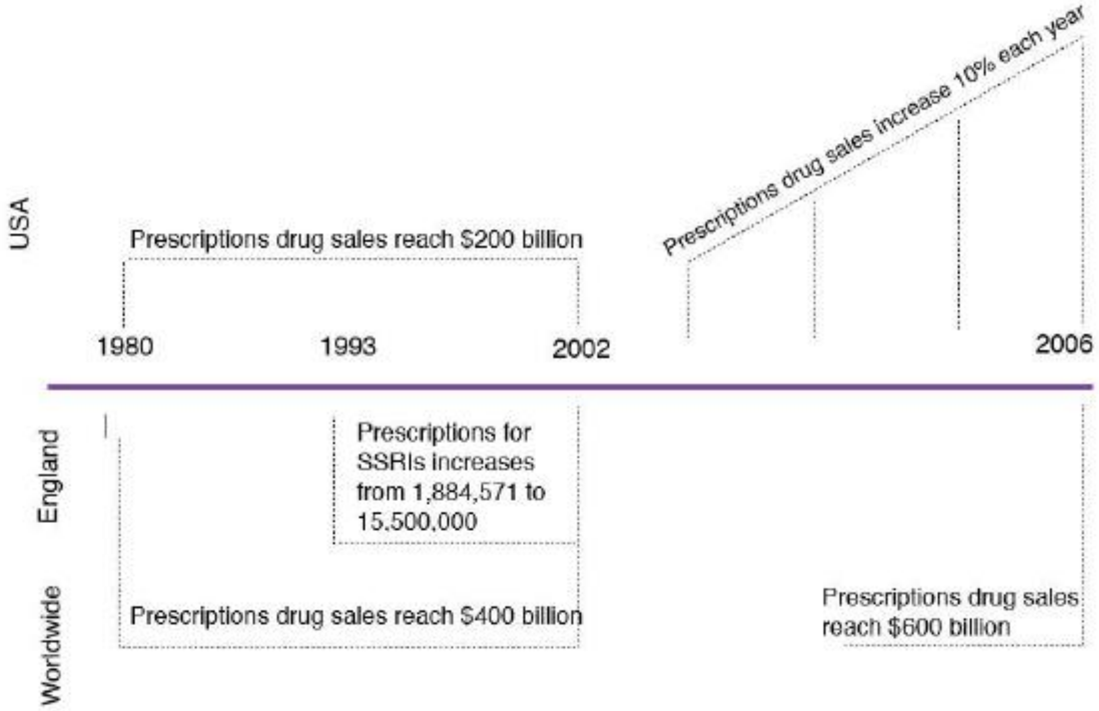


Figure 3.4 Potential global pharmaceuticalisation (adapted from Abraham, 2010).

Pharmaceuticalisation refers to the role that pharmaceuticals have in contemporary society, particularly in relation to public health, and is '*a critical - if not fundamental - transformation of the late twentieth century*' (Bell & Figert, 2012, p.775). With the dénouement of the '*golden age of doctoring*' (McKinley & Marceau, 2002, p.379), where the individual is arguably increasingly positioned more as the consumer rather than the patient, concern has been generated over questionable ethics of pharmaceutical companies' practice to develop societal-level interventions to increase consumption for commercial purposes (Thompson & Farrell, 2013). A shift in collective beliefs is embodied by the reconceptualisation of pharmaceuticals as purely symptom-driven remedies to encompass their contribution in subclinical conditions; medicines are repositioned as not merely symptomatic treatments following a diagnosis, but also as part of an asymptomatic practice. Hypertension for example, was once considered as a risk factor for cardiovascular or cerebrovascular events but is now diagnosed as a condition in its own right. The phenomenon where a risk factor for an illness condition transmutes to a condition itself is termed collision-behaviour (Sholl, 2017); antagonists claim that collision-behaviour is a controversial orchestration of the pharmaceutical industry, exemplified by its assiduous and intensive marketing (e.g., Abraham, 2009). This argument is germane to the topic of medication adherence since symptomatic experience represents only a small part of the construction of beliefs regarding the necessity of pharmacological intervention (González-Moreno, Saborido, & Teira, 2015). Furthermore, the praxis of medicalisation, whereby a nonmedical disorder is defined in clinical terms, misdirectedly necessitating medical remedial intervention, has been condemned as the pharmaceutical 'practice' of affirming a product as necessary within the societal system, normalising the identity of the product, independent of symptoms, whereas, in actuality, it may merely be in the interests of economic opportunity. Nonetheless, proponents distinguish between connotations of implicit obfuscation and commend the practice as scientific progress, (Parens, 2011), and, whilst this might be an issue for opponents, it could be argued that without commercialisation, and the substantial funding pharmaceutical companies invest, biotechnological advances would not be possible.

Pharmaceuticalisation combines '*the biological effect of a chemical on human tissue, … the willingness of consumers to adopt the technology as a 'solution' to a problem in their lives, and the corporate interests of drug companies*' (Fox & Ward, 2008, p.865). Despite aggressive marketing, practitioners remain the gatekeepers of drug dispensation and, furthermore, managed care supports the individual as an arbiter of appropriate medication, which lends credence to this research. This study does not presume to adjudicate on the merit or failings of pharmaceuticalisation in terms of its governance, but focusses on the opportunities that pharmaceutical therapy offers in terms of amelioration of symptoms in chronic illness, which consume the majority of medical care resources in the developed world (Ingersoll & Cohen, 2008).

The prevalence of coronary heart disease (CHD) is a paradigmatic example of the expansionary tendencies of pharmaceutical development and consumption; '*pharmaceuticalisation denotes the translation or transformation of human conditions, capabilities and capacities into opportunities for pharmaceutical intervention*' (Williams, Martin & Gabe, 2011, p.711). CHD drugs have proven successful in terms of the extent, and profitability, of prescriptions; pharmaceutical treatment for CHD consists of '*the blockbuster drug, from thiazides and ß-blockers to statins and platelet inhibitors*' (Pollock & Jones, 2015, p.223). It was reported (National Center for Health Statistics, 2013, p.284) that 12.5% of the American population was in receipt of at least one prescription in the past thirty days for hypercholesterolemia (a condition responsible for an increased risk of CHD). Pharmaceutical intervention is, however, but one element in a broader therapeutic strategy which may include surgery, interventional cardiology, and lifestyle intercessions. Epidemiological research has highlighted the pathological contingency of aging (e.g., Craik & Byrd, 1982) as well as socially determined risk factors, such as smoking and sedentary lifestyle, together with physical and emotional stress triggers. Nonetheless, the introduction of a pharmacological intervention is perceived to be more straightforward than changing behaviour related to long-established habits and activities; it has been said that '*it is easier to satisfy the patients with drugs than with words*' (Geest, White & Hardon, 1996, p.159).

Despite the rapidity with which a pharmaceutical regimen may be implemented, particularly when compared with lifestyle modifications such as dietary adjustment, results may '*be notably unsatisfying*' (Pollock & Jones, p.225) since pharmaceuticals place demands on the individual. The allure of immediacy and conclusiveness tendered by the prospect of pharmaceutical intervention contrasts with the difficulties and exigencies of interventions requiring behaviour change. Research has shown that patients have significantly lower adherence to pharmaceutical therapy after surgery compared with individuals on medication alone (Kulik, Shrank, Levin & Choudry, 2011; Hlatky, et al., 2013), demonstrating that the complexity of pill-taking is greater than their apparent immediacy. It has credibly been shown that social determinants have a fundamental role in the risk of CHD (Stansfeld, Marmot & Wilkinson, 2006; Kreatsoulas & Anand, 2010), whilst lifestyle changes create the greatest impact on the outcome (Capewell, et al., 2009; Ford & Capewell, 2011). The illustration of CHD demonstrates that medication-taking is contextualised along a continuum, and that pharmacological therapy is not, despite its framing as such by pharmaceuticalisation, monopolistic; indeed '*the social produces the biological in a system of constant feedback between body and social experience*' (Fausto-Sterling, 2008, p.658).

The debate concerning pharmaceuticalisation continues; it may be argued that the term 'pharmaceuticalisation' should be a value-neutral term (Williams, et al., 2011) since, despite the power of the pharmaceutical industry, pharmaceuticals are often vital in alleviating human suffering, and self-responsibility. The ambivalence of the patient to pill-taking may be juxtaposed with the practitioner, who forms the nexus with pharmaceutical companies. Additionally, the influence of individual differences in the process of pharmaceuticalisation has not been researched; it is therefore not yet known and remains a challenge for future studies. The dynamics and impact of global dimensions of '*pharmaceutical cultures*' (Dumit & Greenslit, 2006) and the virtue of pharmaceuticalisation (Martin, 2006) therefore remains open to empirical investigation to conclude the critique.

3.5 Interventions to improve medication adherence

Intervention studies formed a large part of the research focus. Hypertension, particularly, is frequently used as an exemplary condition to illustrate the nature of adherence since the illness often requires several pharmaceutical interventions, requiring escalation over time; the condition is commonly poorly managed, adherence is difficult to detect for providers, and consequently coronary heart disease is a recurrent result (Chobanian, et al., 2003). Hypertension research has highlighted the significant number of problems encountered in chronic conditions; providers recognise the issue of nonadherence in less than half of hypertensive patients for whom pharmacy records suggest refill gaps (Meddings, Kerr, Heisler & Hofer, 2012). Furthermore, there is evidence of the acceleration of prescriptions, often without enquiry from the provider concerning a patient’s poor adherence (e.g., Ho, et al., 2008b). It is therefore imperative that adherence issues are addressed; the chief corollary of enhanced understanding of adherence is the capacity to develop tailored interventions for its improvement.

Many interventions, either addressing a combination of factors or isolated variables, have attempted to enhance medication adherence rates. For example, supplementary instructions for patients through oral or written information, increased communication or counselling, automated telephone and computer assisted patient monitoring. Previous attempts at resolving adherence issues include increasing convenience of care, simplifying dosage and provision of treatment at the workplace, self-monitoring (such as blood glucose levels in diabetes), and reminders, including special pill packaging and dose dispensing units.

Successful interventions can achieve positive outcomes; a significant increase in adherence, from 61.2% to 96.9%, was attained as a result of a combination of reminders and pharmacist counselling (Lee, Grace & Taylor, 2006). Indeed, considerable research has focussed on the role of the pharmacist in the delivery and maintenance of medication regimes and has investigated communication of pharmaceutical instruction and patient comprehension. However, verbal instruction from pharmacists or GPs may be limited (Murray, et al., 2004) and patients may have to rely on the medication information sheet accompanying the medication; of course, this gives rise to the prosaic issue of whether the patient requires or is inclined to read any information presented. The alliance between the patient and healthcare providers has been scrutinised as an area which may precede improvement in adherence (Morris & Schulz, 1992); approachability and friendliness, patient-centredness, collaboration and enhancement of healthcare professionals’ communication skills (Donovan, 1995) are features of a robust alliance.

Many interventions are complex, including a combination of intercessions, and their scope of effect on patient outcome is often uncertain; furthermore, measurement of any amelioration is subject to the same constraints as mentioned in chapter 1.2. Some interventions have focussed on overcoming patient barriers such as limitations in memory, dexterity, and vision, by using pill boxes, calendars, and blister packs; patients who have retrospective memory failure are liable not only to forget instructive information regarding the medication but also whether they have taken the correct dose (Murray & Callahan, 2003). Other mediations include behavioural cues to assist, together with the reinforcement of rewards such as partial payment of blood pressure monitoring equipment (McDonald, Garg & Haynes, 2002).

A variance has been demonstrated between interventions in acute and long-term treatment regimes (Haynes, et al., 2005); interventions improved clinical outcome by 80% in the short-term treatment category and 69% in chronic treatment, adherence increased by 55% and 45% respectively. Whilst this demonstrates the potential utility of successful mediations, Haynes, McKibbon and Kanani, (1996), highlighted that interventions are often complex and labour-intensive, inapplicable outside research settings, without benefitting from substantial improvement in adherence and there is a need therefore for innovative, multifaceted, and tailored strategies (e.g., Higgins & Regan, 2004; Van Wjik, Klungel, Heerdink, & De Boer, 2005). Effectiveness in one setting may not replicate in another if the most apposite factor is not targeted.

Success rates of interventions remain low; development of tailored strategies requires knowledge and understanding of the predictors for each type of non-adherence. In a recent Cochrane review (Nieuwlaat, et al., 2014) only 5 out of 182 RCTs improved medication adherence and clinical outcomes, demonstrating that it is essential to understand the reasons for underlying nonadherence in order to design an expiative target. Non-adherence may have numerous causalities, including regimen difficulties (e.g., adverse effects), receipt of limited instructions, poor patient-practitioner relationships, defective patient memory, cost-inhibition, and patient’s challenge of the necessity for treatment. An intercession might be as simple as simplifying dose demands (Kripalani, et al., 2007), and may not necessitate interventions based on socio-psychological behavioural theories, nonetheless, the modest achievements attained to date may be due to the lack of foundation in psychological theory; there is growing recognition of the utility of cognitively-based strategies and promising evidence for effectiveness (e.g., Easthall, Song & Bhattacharya, 2013). Beliefs and perceptions are often overlooked and there is a need for a multi-focused approach to increase success; it is critical that adherence interventions are tailored and targeted to address influential individual factors.

3.6 Historical timeline summary

This review concerned the topic of medication adherence from an historical perspective. The account chronicled the development of the concept, from nascency to contemporary records; the novel review method was found to be a useful way of situating the subject matter, to fully appreciate its development. In the early days of pharmacological treatment it was rather taken for granted that patients would administer medication if, and as, prescribed, however concern was generated in the nineteenth century over the erratic compliance rate of tuberculosis patients. This generated the implementation of measures to ensure that 'recalcitrant' individuals maintain and complete their therapeutic regimen. Strategies ranged from incentivisation to compulsory detention until the advent of the antibiotic-era which heralded a spirit of optimism concerning improved adherence. Regrettably, the nonadherence problem was not resolved by the simple availability of medication.

Medication adherence has long been advocated as a critical component of pharmacological therapy, which currently is considered suboptimal. Estimates of nonadherence to pharmaceutical regimes range from 17-80% (Krueger, Berger & Felkey, 2005), leading to increased morbidity and mortality. Since inception of research studies have targeted reasons for, and influences of, medication adherence, as well as interventional strategies to alleviate nonadherence. Multiple factors have been cited as the reason for difficulties in adherence; social affects include lack of support, of particular relevance in chronic illness conditions. Economic status and lack of education have also been alluded to, in addition to the complexity of the medication regime which dictates that the more involved the regimen the more prevalent nonadherence. Other factors include waiting times for clinical care, lack of continuity of healthcare and level of quality of both clinical environment and health care professional. Studies have endeavoured to measure adherence with various levels of success; assessments are impeded by measures that correlate with each other but rarely produce the same outcomes of adherence (Krueger, Berger & Felkey). It is however accepted that adherence declines in the absence of knowledge relating to effects of medication and its intended use. To counter this, many strategies have been devised to enhance adherence. Such interventions may involve treatment goals and rewards when objectives are achieved. General opinion from extant research dictates that patients should be involved in decision-making and feel that they are part of a collaborative process, whilst it is beneficial that the medication regime is tailored to the person's routine for optimum adherence. However, regimes are frequently complicated and do not produce consistent results. It is perhaps not surprising that adherence mediations are relatively unsuccessful given that the full gamut of influences on adherence remains unknown; and yet much of the literature is dedicated to intervention studies. Past research has focused predominantly on unidimensional aspects which fail to capture potential interactional factors; additional research is necessary to explore the extent of adherence influences in order to capitalise on medication and optimise efficacy. One component of the broader therapeutic response, which is currently under-explored, but which could be pivotal in our understanding of the topic, is that of individual differences; the future of medication adherence research should concern itself with this challenge.

The review represents a substantial investigation into the topic of medication adherence; consideration now turns to the presentation of results. A taxonomical framework was selected as an expedient method of articulating the diversity of empirically identified factors through which the key variables of influence are displayed.

4 Medication mediation: development of a taxonomical framework

4 Medication mediation: development of a taxonomical framework

Nonadherence represents a major health concern - pharmacological use is often divergent from the prescribed intent; the contributory factors for this are a diverse, nebulous, and complex set of interrelated processes. To date, the research focus has concerned statistical constructions relating to measurement and rates of adherence but there has been a shift of attention, taking account of a wider range of illness-management issues; furthermore, the individuals' role is no longer one of passive receiver but an assertive, active participatory function as decisionmaker and manager. As a reflection of this development, the WHO (Chetley, Hardon, Hodgkin, Haaland, & Fresle, 2007) acknowledged the indispensability of empowering environments for the rational use of medication. In reviewing medication adherence literature there appears to be a gaping lacuna; the absence of an organisational conceptual framework from which to identify, describe and categorise adherence factors.

Furthermore, research is not linguistically standardised, there are variations in terminology, and there are inconsistencies in constructs, which are nonetheless referenced interchangeably within literature. The International Society of Pharmacoeconomics and Outcomes Research (ISPOR) is tackling the problem of terminological and definitional standardisation (Cramer, et al., 2008), an issue that has extended nearly three decades (Meichenbaum & Turk, 1987), however, taxonomical heterogeneity remains an impediment to research in terms of synthesis, transferability, and general understanding. Typically, research engages specific foci such as the illness condition, target populations, or rates, for example, which may only be representative of particular cohorts; bracketing research may be valuable to practitioners in particular arenas, such as primary care, but global application is potentially limited as it may be impracticable to extrapolate results for other spheres. Furthermore, many studies are not based on theoretical conceptualisations, making empirical reproduction challenging. This renders the identification of the areas requiring further investigation arduous which, in the case of interventions, may be pivotal in attaining success. In short, '*a conceptual model of and uniform definitions for the adherence continuum* [is] *lacking*' (Raebel, et al., 2013, p.3); the intention of this study was to systematically create an ontological framework of adherence factors which are broadly applicable across future studies. ‘*An ontology is a formal way of organizing information… putting things into categories and relating these categories with each other…ontologies can have any type of relationship between categories*’ (Hoberman, 2008, p.8). A systematic approach was employed to ensure definitional consistency and clarity in creating a comprehensive, empirically derived classification.

Accomplishes Aim III*: to develop a taxonomical framework of factors to identify and contextualise the most significant elements, based on current research.*

The development of an evidential framework is desirable for factor identification, specification, and organisation in a meaningful way to enhance cross-discipline awareness and understanding. ‘*Without the ability to categorize, we could not function at all, either in the physical world or in our social and intellectual lives*’ (Lakoff, in Panchenko, 2012, p.13). The application of a taxonomic organisation to inform medical practice is not a contemporary exercise – Hippocrates symptomatically classified diseases (Balint, Buchanan & Dequeker, 2006), and even at that time classifications tended to be clinical in nature. As a subject becomes more complex successful navigation becomes increasingly challenging, however a conceptually organised taxonomy of contemporaneous evidence renders elucidation less demanding. This has utility not only for the inexperienced in the field but also in terms of general knowledge dissemination and in the design of future research-endeavours (Vincent, et al., 2008). As stated, the subject of medication adherence would benefit from a pragmatic methodology to ascertain and collate the myriad influences on medication-taking and provide a working definition for each dimension, not least to support subsequent design of robust, evidence-based interventions. This chapter describes the development of an empirically derived taxonomical framework which attempts to address the above points.

An extensive literature search was undertaken and emergent themes relating to facilitators of, or hindrances to, adherence were analysed and grouped into categorical clusters (described in chapter 3). The objective was to address research questions 1: *what is currently known regarding the factors of medication adherence and how has the focus of adherence changed over the years,* and 2: *what is known about the nature of personality in the context of medication adherence?* Patients' insights into the influences of initiating and maintaining long-term therapy for chronic illness were gathered and many influences were identified in diverse domains, highlighting that adherence must be approached from a multi-level perspective. Classification of factors was challenging due to their nuanced diversity and complex correlations, dependent upon mediating influences. Furthermore, the debate is often exemplified by the traditional binary dimensions of 'adherent' and 'nonadherent' which represents a significant over-simplification of the complex affects of sociodemographic and behavioural factors and, consequently, is not necessarily reflective of reality.

Results showed that the facets of each observed phenomenon were not, necessarily, mutually exclusive to a specific taxonomic cluster, however this enhanced the framework's utility as results were not prescriptively categorised for the sake of convenience - '*the notion of facets rests on the belief that there is more than one way to view the world, and that even those classifications that are viewed as stable are in fact provisional and dynamic. The challenge is to build classifications that are flexible and can accommodate new phenomena.*' (Kwasnick, 1999, p.39). The methodology by which components of typologies are attained should be clearly defined, unambiguous and lacking in controversy to allow for reconstructions (Sokal, 1962), therefore, the description of the prolific typological categories was a granular, iterative process and variations in abstraction of the characters of the taxa were not weighted in any direction, as this could result in dubious validity (Sokal). A priori weighting is insupportable as it is based on preconceived presumptions of importance of primacy; equal weighting which classifies all elements based on available evidence should exclusively be used for an empirical result. The construction of typologies in this framework is evidentially predicated without the reliance on predetermined hypotheses.

As far as the author is aware this is the first study to explore the capacity and utility of a taxonomical framework for medication adherence. The aim was to propose a unifying set of factors to develop a conceptual framework, providing a consistent foundation for the benefit of future research studies. The literature review enabled a contextual examination of the primary determinants, representative of the complex reality of the topic. This has utility, as an initial incursion, to inform future research, measure the impact of different factors, support enhanced evaluation and interpretation of the adherence process, and assist in the design of targeted, tailored interventions to promote adherence. This chapter explains how the research method was selected and implemented.

4.1 Methods

The aim of this study was to create an intuitive taxonomy, organised by dimensions, to accommodate the classification of multiple, analogous values. This was a challenging task, not merely due to the magnitude of the subject but also because of the scope in demonstrating associations. It has been suggested that one utility of the taxonomical method lies in its aptitude to review different approaches and numerous distinctive perspectives without the prerequisite for an extensive understanding of the phenomena or their associations (Denton, 2009). A systematic approach was taken to develop a taxonomical framework: an exploratory investigation was undertaken to gain insight and inferential understanding of the mechanisms of adherence. Regularities, common properties, patterns, and distinguishing features were represented, and contingent relations assessed; this enabled a descriptive, causal penetration of relata. The framework establishes an overview of medication adherence drawn from extant literature, deepening our understanding, and yielding valuable insights.

Results from the literature review were iteratively analysed to identify recurrent themes reflecting the current evidence; the focus was maintained by the application of the selection criteria to differentiate between factors, whilst maximising breadth and quality. Electronic databases were searched for any relevant papers relating to medication adherence factors; this included any illness conditions, including preventative or precautionary medicine aiding health, such as vaccinations or exercise as part of maintaining wellness in a particular condition (dietary considerations in diabetes, for example). There were no limits on age demographics as the intention was to capture an extensive representation, but the search was limited to articles with a full description of applicable factors and consequently commentaries, editorials, and letters were excluded together with reviews, since primary evidence was required.

Sackett and Haynes (1979) identified 185 articles relating to medication adherence in their seminal inquiry; in contrast, this review identified a total of 392,728 articles relating to medication-taking. Reviews, abstracts, and any articles without a clearly defined empirical basis, were removed, together with any article not directly concerned with medication-taking factors, leaving 7,342 items which were scanned for primary determinants of medication adherence. Factors were initially classified into meta-characteristics of the Theoretical Domains Framework (TDF) (Michie, et al., 2005) and refined in iterative passes; firstly, employing an empirical-to-conceptual approach, which derived dimensions and characteristics from extant research, and finally a conceptual-to-empirical iteration which refines characteristics through a comparison of current schema within the framework (Nickerson, Varshney & Munteman, 2013). The final iteration renders the framework concise and meaningful, robust, and explanatory; furthermore, it is extendible since supplementary categories and dimensions can be added if further research necessitates. The evidence was organised into categories of adherence factors, comprising a range of variables grouped in common conceptualisations; weighting of the identified determinants was not undertaken due to variance in methodologies and different study populations. Factors were not constrained by a singular condition, population, or setting; recurring themes, whether impediments or facilitators of adherence, formed the content of the framework.

Data-abstraction was an iterative process; factors were identified and firstly categorised using the lexicon of the article from which they were retrieved. Following positioning on the TDF framework, factors were then modified in the interest of linguistic homogeneity to indicate the similarity of items referred to by separate authors but reflecting the same conceptual meaning and, finally, were synthesised into classificatory categories to which labels were then appended. Analysis of the academic papers identified 16 factorial domains and comprised further domain-related spheres, capturing the multidirectional range of influences on adherence. Figure 4.1 illustrates the stages in the development of the conceptual taxonomic framework of adherence.

Results are reported by means of classification, that is to say, in the final framework factors are not weighted in respect of the quantity of evidence; for example, an adherence factor identified in a solitary study pertaining to, say, esophagitis will be reported analogously as a variable reported 200 times in asthma, and so the quantity of research does not necessarily indicate its significance.

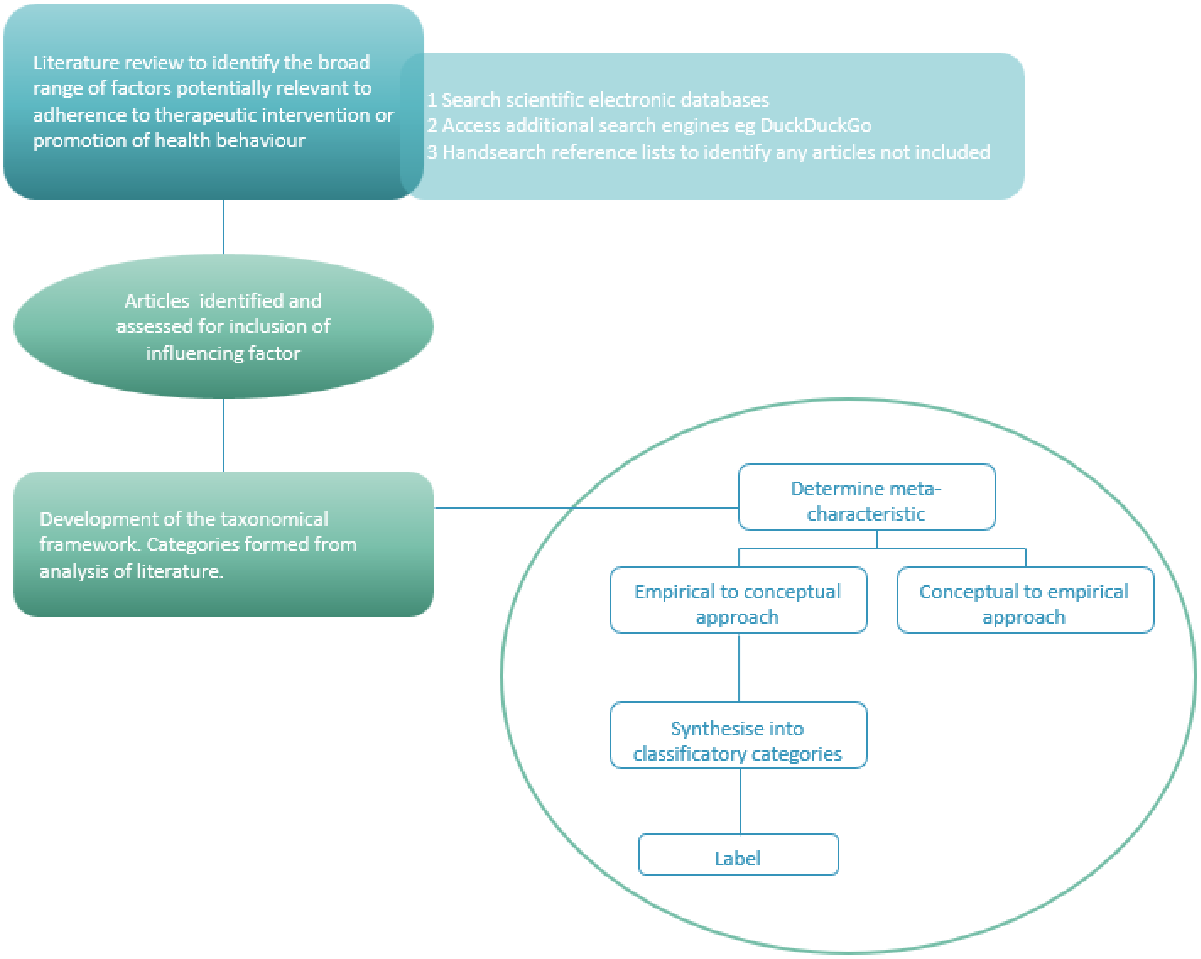


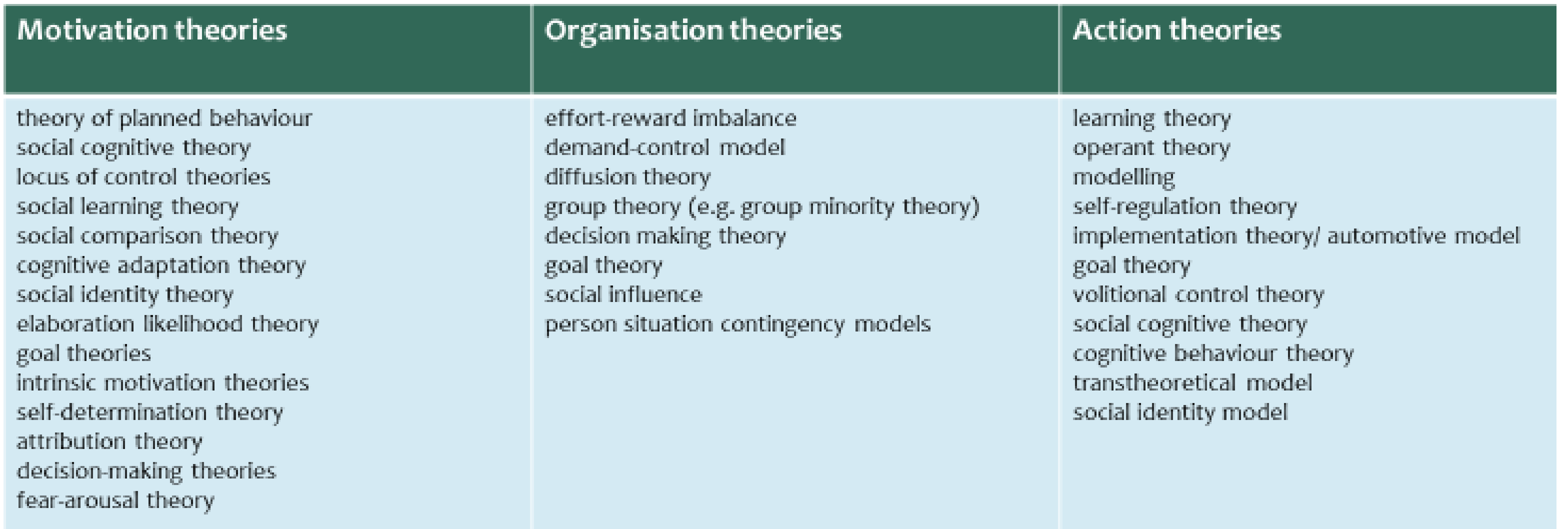
Figure 4.1 Flowchart of the taxonomical development method used in the study.

The framework categorised common characteristics, creating an overview and structuring domain knowledge. The method used was systematic; data were tabulated to demonstrate the illness condition and the particular adherence-component that was investigated, such as measurement, scale, intervention, or outcome and factors which facilitated or impeded adherence were extrapolated. The review aimed to capture the main foci which had concerned researchers to the present-day, and set into representative classifications of the literature.

4.1.1 The Theoretical Domains Framework

The definitional parameters and potential applicability of various behavioural theoretical models, incorporating determinants, such as the influence of knowledge, attitudes, outcome expectations, self-efficacy, and subjective norms relevant to this study were reviewed in order to select the most appropriate method in the current context (refer to chapter 3 for further details concerning methodology).

The Theoretical Domains Framework (Michie, et al., 2005) exemplifies a strategy that attempts to identify, simplify, and summarise key theoretical constructs into a single model. The TDF is an integrative framework, with strong content validity, derived from a synthesis of psychological theories, and provides a concept predicated on organisational and psychological theory pertinent to health behaviour (Francis, O'Connor & Curran, 2012). Table 4.1 shows the psychological theories utilised in the development of the TDF.



Motivation theories	Organisation theories	Action theories
theory of planned behaviour	effort-reward imbalance	learning theory
social cognitive theory	demand-control model	operant theory
locus of control theories	diffusion theory	modelling
social learning theory	group theory (e.g. group minority theory)	self-regulation theory
social comparison theory	decision making theory	implementation theory/ automotive model
cognitive adaptation theory	goal theory	goal theory
social identity theory	social influence	volitional control theory
elaboration likelihood theory	person situation contingency models	social cognitive theory
goal theories		cognitive behaviour theory
intrinsic motivation theories		transtheoretical model
self-determination theory		social identity model
attribution theory		
decision-making theories		
fear-arousal theory		

Table 4.1 Psychological theories identified in the development of the TDF.

Together with 84 constructs, derived from a fusion of concepts into a single framework, the TDF consists of 14 domains: knowledge, skills, social/professional role and identity, beliefs about capabilities, optimism, beliefs about consequences, reinforcement, intentions, goals, memory, attention, and decision processes, environment context and resources, social influences, emotion, and behavioral regulation (Cane, O'Connor & Michie, 2012). Originally devised as an interventional tool, the TDF has the utility to assess behavioural influences (Michie, Atkins & West, 20014), it is suitable for cross-disciplinary application, has been utilised retrospectively for theory-based evaluation (Phillips, et al., 2015) and has been used across a wide range of clinical topics (Cane, et al.), thus addressing many of the shortcomings of behaviour-change theories, previously noted. Three domains are prerequisites for the execution of a behaviour (Fishbein, et al., 2008): an individual must have a firm intention, and possess the necessary skills, to perform the behaviour and there must be no environmental constraints that prohibit that behaviour; in addition, there must be strength of intention. The TDF has utility in defining mechanisms of action, including adherence behaviours, which is apposite in the context of the present research. The execution of adherence to medication is behavioural in essence, and the TDF theoretically articulates the nature of adherence with the specificity of construct domains informing the adherence processes; nonetheless the TDF construct content descriptors were further modified by this author to extend its utility within the current research. The domains in this study coherently encapsulate the key constructs and, to some extent, the causal determinants. Revisions to the TDF, including theoretical domains and component constructs together with interview questions to elicit evidence-based practice, are shown in Table 4.2.

	Domain label	Domain content	Domain constructs
1	Knowledge	An awareness of the existence of something	Knowledge (including illness knowledge) Procedural knowledge Knowledge of task environment Schemas, mindsets, and illness representations Are individuals aware of instructions, what course of action they should take, and why?
2	Skills	An ability or proficiency acquired through practice	Skills Skills development

			Interpersonal skills Competence Ability Skill assessment Practice Coping strategies Do individuals know how to adhere? How easy is it to perform adherent behaviour in their context?
3	Social/Professional role & identity	A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting	Identity Professional identity Social identity Professional boundaries/confidence Leadership Group identity Social/group norms Organisational commitment What do individuals think about the credibility of the organisation? Is it compatible with professional/ethical standards? Do they think it should determine their behaviour, and why?
4	Beliefs about capabilities	Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use	Self confidence Self-efficacy Beliefs Perceived competence Self-confidence/ professional confidence Empowerment Self-esteem Perceived behavioural control Psychological and physical capability What is the impact of external and internal capabilities and constraints? What is the level of support? What is the level of confidence and capability? How well equipped and comfortable does the individual feel initiating and maintaining adherence?
5	Optimism	The confidence that things will happen for the best or that desired goals will be attained	Optimism/pessimism Unrealistic optimism Identity How optimistic does the individual feel about managing their illness? What are the factors that impact on optimism and pessimism?
6	Beliefs about consequences	Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation	Outcome expectancies Anticipated regret Consequents Beliefs Necessity beliefs Avoidance of negative outcomes Characteristics of outcome expectancies – physical, social, and emotional

			What are the short- and long-term consequences? What are the costs of adherence and nonadherence? Do the benefits outweigh the costs? What does the evidence suggest?
7	Reinforcement	Increasing the probability of a response by arranging a dependent relationship or contingency, between the response and a given stimulus	Rewards (proximal/distal, valued/not valued, probable/improbable) Incentives/punishment Consequents/reinforcement Contingencies Sanctions What are significant reinforcers for the patient? How available are they?
8	Intentions	A conscious decision to perform a behaviour or a resolve to act in a certain way	Stability of intentions Stages of change model Transtheoretical model and stages of change What stage of change is the individual? What are their intentions and what influences these?
9	Motivation and goals	The relative priority given to one issue compared to other demands. Mental representations of outcomes or end states that an individual wants to achieve	Implementation intention Goals (autonomous, controlled) Goal/target setting Goal priority Intrinsic motivation Action planning Commitment Distal and proximal goals How much does the individual want to adhere? How much do they feel they need to? Are there other goals which interfere or conflict? Are there incentives?
10	Memory, attention & decision processes	The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives	Memory Attention Attention control Decision making Cognitive overload/tiredness Is this usual behaviour? Will the individual think to act? How much attention will be needed? Will they remember? How? Will a decision be made to not adhere? Why?
11	Environmental context/resources (environmental constraints)	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour.	Resources/material resources (availability and management) Environmental stressors Organisational culture/climate Salient events/critical incidents Person vs environmental interaction Barriers and facilitators

			The availability and extent of physical factors or resources facilitating or hindering adherence. Are tasks or time constraints competing and impeding?
12	Social influences (norms)	Those interpersonal processes that can cause an individual to change their thoughts, feelings, or behaviours	Social pressure Social/group norms Group conformity Social comparisons Social support vs alienation Power Intergroup conflict Group identity Modelling The extent that social influences facilitate or hinder adherence. Observance of others adhering (e.g., role models).
13	Emotion	A complex reaction pattern, involving experiential, behavioural and physiological elements, by which the individual attempts to deal with a personally significant matter or event.	Affect Stress Fear Burn-out Positive/negative affect Anxiety Depression Does adhering evoke an emotional response? To what extent does this facilitate or hinder adherence?
14	Behavioural regulation and nature of the behaviours	Anything aimed at managing or changing objectively observed or measured actions. Some new behaviours are very similar to current behaviour and so are easier to implement than new behaviours that require a dramatic change in ways of life.	Action planning Self-monitoring Breaking habits Review What initial steps are needed? Encouragement? Who needs to do what and when? Is this new behaviour? Are there systems for monitoring long term change?

Table 4.2 The revised TDF, showing theoretical domains, component constructs and supporting comments from participants (n.b. definitions are derived from the American Psychological Association Dictionary of Psychology).

The TDF provided a useful, flexible, and broad perspective from which to assess the idea of adherence from the patients’ perspective; furthermore, analysis using the theoretical underpinnings of the TDF results in increased research rigour and confidence. The transcripts were coded to the relevant TDF domains and key themes emerging in each were identified; potential factors for the model were refined from this.

4.2 Variable domains

Analysis of the academic articles reviewed identified 3,246 notations of factors documented as influencing adherence. Factors were initially meta-characterised on to the revised TDF and subsequent iterations mapped the broad conceptualisation of influences into thematic conceptual categories with classifiable components. Raw statistical results are shown for each Stage within the historical review in Tables 4.3, 4.4 and 4.5; Figure 4.2 summarises the contributing factors in their broad dimensions in the taxonomical framework. In their review Vik, et al., (2004) report the most frequently-cited barriers as adverse medication effects, forgetting, being asymptomatic (and reasoning that the drug is therefore not needed), feeling well without medication, running out of prescription medication, ineffectiveness of the drug, taking too many drugs, being unclear about correct administration, difficulty in swallowing, problems opening containers, ceasing the drug to see whether it is still needed, specific disease or functional conditions, and characteristics of the medication regimen. In contrast, strong social support, good patient/practitioner relationship and low medication concern indicated the likelihood of adherence. However, Vik, et al., further observed that there is no one systematic descriptor and, moreover, that a range of factors were required to predict nonadherence. The corollary of the assertion that nonadherence is due to a single, or limited range, of entities and a lack of differentiation between them, is to fail to capture the entirety of adherence-motives and may, additionally, be responsible for the limited success of interventions (e.g., Elliott, Ross-Degnan, Adams, Safran & Soumerai, 2007). Studies have shown that it is essential to discriminate between the various dynamic and plastic intentions for nonadherence to further understanding (Wroe, 2002), and to produce theoretical, predictive models that identify the several variances in nonadherence which will enable the design of effective corresponding therapeutic interventions to ameliorate nonadherence effects.

The identity of the illness and the patient's acceptance plays a major role in medication adherence (Pound, et al., 2005) and there is even a school of thought that patients choose nonadherence as a way of coping with illness (Conrad, 1985) since acceptance of medication is an indication of illness-acceptance. Indeed, illness perceptions (Leventhal, Leventhal & Schaefer, 1992a; Morrison & Wertheimer, 2004) are pivotal in adherence and are shaped by prior health and illness experiences, previous social communication, interaction with perceived significant others and authoritative sources such as GPs or parents, and cultural knowledge of the illness (e.g., Hagger & Orbell, 2003). Patient's knowledge, ideas and experiences, lay-evaluation of medicines and constraints of everyday life, social factors including positive attitude by others in the community (Vermeire, et al., 2001) and conscientiousness (Christensen & Smith, 1995) in addition to psychosocial variables such as self-efficacy, self-regulation and locus of control are all predictive factors of adherence (O'Leary, 1985). The nature of adherence is complex, and studies have shown that regulation of health behaviours is determined by the patient's motivation to be healthy, perceived control over their health, (e.g., Atkins & Fallowfield, 2006) and perceived support of heath promoting behaviours from significant others (Kanfer, 1986).

4.2.1 Knowledge

Knowledge encompasses understanding of the illness-condition and scientific rationale of treatment (Egan, Lackland & Cutler, 2003), as well as procedural awareness, such as dosage, frequency, and indications of medication. Whilst adequate knowledge can inform decision-making regarding pharmacotherapy, and additional forms of health behaviour, to maintain good control over an illness-condition, deficiencies in knowledge could act as a barrier to self-management (e.g., Murata, et al., 2003). The American Diabetes Association has acknowledged the importance of awareness and comprehension (Mensing, et al., 2006), and advocates the evaluation of an individual's educational needs together with interventions based on improving comprehension, supporting the contention that knowledge provides a critical predictive component in positive health behaviour.

4.2.2 Skills

The skills domain relates to the competence and ability of an individual to apply their therapy in the intended way, (e.g., Hope, Wu, Tu, Young & Murray, 2004). It also refers to the development and practice of skills, procedural knowledge, and interpersonal skills, and may include dexterity, (ability to manipulate medication bottles for instance), literacy (such as capability to read prescription labels and auxiliary instructions), and aptitude in distinguishing tablet or capsule colours (and differentiations between different medications).

4.2.3 Social/professional role and identity

This domain concerns the professionals' role and identity, together with the notion of practice boundaries, positioned within the culture/climate of organisational development. It is imperative that the healthcare professional not only recognises nonadherence in patients, but also acknowledges their contributory role, (e.g., Kripilani, Henderson, Jacobson & Vaccarino, 2008), for example a complex regimen, adverse medication effects, prohibitive drug cost or inadequate explanation of the benefits of a medication are causative factors of nonadherence. Communication barriers are often alluded to in literature and are not only a potential source of clinical errors, reduced medication efficacy and avoidable hospital re-admissions in chronic conditions (e.g., Kripalani, et al., 2007), but ineffective interaction also compromises a patient's understanding of the illness condition, potential complications, and the role and importance of pharmacological intervention (e.g., Steiner & Earnest, 2000). The quality of contact with healthcare professionals, together with the amount of information given to patients, are determinants of '*consistent compliance over time*' (Viller, Guillemin, Briancon, Moum & Suurmeijer, 1999, p.2117).

Central to this domain is the notion of group identity and team working, incorporating management structure and commitment as well as team assets; sufficient resources may not be available and may compromise patient care as needs are unmet. Furthermore, the length of time a healthcare professional is able to dedicate to each patient may be inadequate to effectively engage the individual in discussions about adherence and to assess and understand their patient's perceptions, beliefs and self-management behaviour and discuss strategies for success (Brown & Bussell, 2011). Integral to this concept is corresponding confidence of the healthcare provider, their conception of hierarchy and power, and leadership ability. The power differential in consultations generally favours the healthcare professional, however the National Institute for Health and Clinical Excellence (NICE) clinical guideline is clear that medication nonadherence *'represents a fundamental limitation in the delivery of healthcare, often because of a failure to fully agree the prescription in the first place or to identify and provide the support that patients need later on*' (in Dowell, Williams & Snaddon, 2007, p.80). This may result in a reluctance on the part of the patient to discuss issues for fear of reproach or compromising the relationship, and consequently may adapt treatment, nonadhere or fail to engage in primary care at all. It is therefore a benefit of patient-centred care to involve individuals to encourage and support adherence.

4.2.4 Beliefs about capabilities

Beliefs are influential and may be transferable across illness conditions (Ogedegbe, Harrison, Robbins, Mancuso & Allegrante, 2004). Higher self-confidence and perceived competence in self-management leads to enhanced self-esteem, empowerment, and self-efficacy (e.g., Mcdonald-Miszczak, Maris, Fitzgibbon, & Ritchie, 2004). Self-efficacy describes the individual's sense of perceived competence to complete a task (Bandura, 1999) and can be used to predict motivation to engage in health behaviour; the greater the individual's persistence and effort exerted towards a task and internalised attributions of success, the greater the level of self-efficacy, and therefore, a perceived lack of self-efficacy may incline the individual toward avoiding certain behaviour, including medication-mediation, particularly when certain skills and knowledge are required, such as correct inhaler use in asthma.

4.2.5 Optimism

The role of perceptions has been shown to have significant effect on outcomes. Dispositional optimism has a positive affect on outcomes (Scheier & Carver, 1985), in contrast to an unrealistic sense of optimism (Holmes & Pace, 2002), or indeed a pessimistic attitude, which is associated with a sense of disengagement, (Scheier, Weintraub, & Carver, 1986).

4.2.6 Beliefs about consequences

This concept considers the degree to which an individual's behaviour is influenced by an anticipated outcome and proposes that a patient will weigh up potential barriers and illness severity, incorporating beliefs and attitudes, to consequents of behaviour and outcome expectancies. Health-related behaviour is influenced by social norms, illness representations and cues and barriers to action (Ross, Walker & McLeod, 2004). Necessity of medication, concern regarding adverse side effects, or perceived consequences of illness, for instance, have negative effects on adherent behaviours (Horne & Weinman, 2002).

4.2.7 Reinforcement

It has been suggested that incentivisation to medication adherence can be effective (deFulio & Silverman, 2012) but there has been limited research in the area. Rewards may be proximal/distal, valued/not valued, probable/improbable, however there is a need for additional and higher-quality evaluations of the effectiveness - the reinforcement magnitude - of these incentive-based interventions, as well as the conditions under which these interventions are most sustainable and effectual (Carroll, Mach, La Nasa & Newman, 2009).

4.2.8 Intentions

The intentions domain relates to stability of intentions, the nature of goal setting, and intrinsic motivation to achieve goals. Intention is dynamically influenced by attitude, subject norms, environmental aspects, and perceived behavioural control (Ajzen, 2005) which prompt certainty of intentions and commitment. Intentional nonadherence relates to the deliberate omission of medication which could result from a lack of information about the advantages and drawbacks of the treatment, whether treatment benefits are immediately apparent and the psychological adjustment in self-perception as a person needing treatment (Elwyn, et al., 2003). Acceptance of the illness condition leads to a greater willingness to adhere to therapeutic regimes (Sidat, Fairley & Grierson, 2007) which, for chronic conditions, entails a life-long commitment to ensure optimal outcomes, ranging from improved wellbeing to survival (Lau, Lau, Cheung & Tsui, 2008).

4.2.9 Goals

Enabling patient-autonomy of a chronic illness is an essential component of successful management (Von Korff, Gruman, Schaefer, Curry & Wagner, 1997). Individuals express their health goals in terms of social or functional targets, defined by the physical, mental, spiritual, and social perspectives of their lives (Arcury, Quandt & Bell, 2001). This contrasts with healthcare professionals' use of biomedical linguistics pertaining to risk control and complications (Huang, Gorawar-Bhat & Chin, 2005). Goals differ between individuals and may be distal or proximal, autonomous, or controlled by external influences; characterised by target setting, action planning and intention of implementation. Motivating factors of individuals, such as improvement in quality of life (Krousel-Wood, Thomas, Muntner & Morisky, 2004), will determine the prioritisation of objectives. Furthermore, goals may be fluid over the course of the illness, so for example, surviving is the initial aspiration of cancer, hierarchically followed by remission and then the achievement of the all-clear.

4.2.10 Memory, attention, and decision processes

This domain incorporates attention control, decision making, appraisal, cognitive overload, tiredness, and schemas. For example, when missed doses are purposeful individuals have, in all probability, considered perceived pros and cons, and nonadherence is therefore intentional, in contrast to forgetfulness. However, it is worth considering the boundary between sporadic nonadherence and the development of a more habitual, intermittent forgetfulness; studies have suggested that the nature of forgetfulness is not as distinctive as it may at first appear (Morisky, Ang, Krousel-Wood & Ward, 2008). In one study (Atkins & Fallowfield, 2006) a differentiation was made between individuals who cited the cause of forgetfulness, and were therefore considered genuinely forgetful, and those who did not offer an explanation and were construed as potentially nonadherent. Furthermore, patients are less likely to adhere when they do not expect the medication to help.

4.2.11 Environmental context and resources

This domain relates to perception of the health system by service-users and encompasses environmental stressors, conflict competition, resources, material assets, barriers and facilitators, organisational culture, and knowledge of task environment. It specifically relates to the interaction between the person, their control over behaviour, versus the material and social environment, including salient events and critical incidents such as threats, negotiation, and empowerment (Sabate & Sabate, 2003).

4.2.12 Social influences

Social pressure, in terms of group norms, group conformity, group identity, and intergroup conflict are influential in health behaviour (Fongwa, et al., 2008), together with social comparisons, power, alienation, and social support (Schroeder, Fahey, Hollinghurst, & Peters, 2005).

4.2.13 Emotion

Adverse emotions may include negative affect, stress, depression, fear and burn-out (Wang, et al., 2002). Whilst negative beliefs can be unfavourably associated with health outcomes, such as self-reported anxiety in diabetes patients refusing injection treatment (Fu, Qui & Radican, 2009), positive states of mind have been evaluated as potential mediators of adherence (Gonzalez, et al., 2004).

4.2.14 Behavioral regulation

Behavioural regulation involves self-monitoring direct experiences, learning and review of internal causes of adherence, such as symptoms, and external stimuli, including risk (Leventhal, Meyer & Nerenz, 1980; Leventhal, Nerenz & Steele, 1984). This continuous evaluation is a cyclical process, allowing for modifications in behaviour, habit-breaking and action-planning (Brandes & Mullan, 2014).

The following factors were noted as having an influential effect on adherence in addition to the TDF domains, which were not immediately accommodated into the original categories:

4.2.15 Demographics

Differences across age, gender and racial subgroups have been used to determine the relationship with medication adherence and have indicated relationships. However, information is limited as to the nature of socio-demographics in terms of patient specific risk factors and they therefore currently have limited utility due to inconsistencies of results (Krousel-Wood, Muntner, Islam, Morisky & Webber, 2010).

Age - lower adherence has been correlated with youth (e.g., Marentette, Girth, Billings & Zarnke, 2002), but improving in middle age (Mann, Woodward, Muntner, Falzon & Kronish, 2010). Older age has been associated with better adherence, perhaps resulting from increased diligence, however certain deteriorations which occur in older age due to physical impairments, (such as vision-related where a ubiquitous amber container may challenge older adult's visual acuity and discriminatory ability), or cognitive-related (where impairment or memory lapse) are responsible for lowering adherence rates (Insel, Morrow, Brewer & Figueredo, 2006); previous results may have been confounded by an oversimplification of contexts or isolated studies such as population (e.g. specific diseases, age groups), setting (e.g. primary care), or multifaceted, leading to heterogeneity in findings. A lack of clarity in demonstrating any association may reflect the characteristics of the selected populations. Furthermore, the medication-use process, such as complication of regimes or unsupervised self-management, may be particularly problematical for older adults (Murray & Callahan, 2003), leading to a sense of overwhelm and represent potential impediments to care.

Furthermore, the involvement of caregivers, at both ends of the age range, integrates further potential complications, as it necessitates the consideration of a different set of potentially confounding factors (Hyre, Krousel-Wood, Muntner, Kawasaki & DeSalvo, 2007).

Gender - findings report that women are generally more adherent than men (Caro, Salas, Speckman, Raggio, & Jackson, 1999) but not when contextualised by hypertension, diabetes, and COPD illness conditions (Matsumura, et al., 2013). It has been argued (Hagstrom, et al., 2005) that reduced adherence may stem from difficulties reconciling masculine identity with the need for medication in males where gender is constructed biologically rather than psycho-socially, however, retired men have been positively correlated with adherence (Davies, et al., 2013). Predications on biological categorisation (Tantikosoom, et al., 2011) have not demonstrated consistent results, possibly perpetuating prejudices/biases consistent with those terms and is feasibly an area where a psychosocial investigation may lead to a more informative understanding.

Ethnicity/race – adherence is generally lower in black populations (e.g., Hyre, et al., 2007) however, the simple stratification of black or white does not embody the richness and diversity of language, culture, history, religion and intersecting social constructions of an individual's ethnic identity, and therefore quantitative analysis may not fully encapsulate all the nuances associated with ethnicity. Prosaic cross-cultural obstacles may include language barriers, miscommunication with health care practitioners and lack of affiliation with the health care system (Traylor, Schmittdiel, Uratsu, Mangione & Subramanian, 2010), all of which represent impediments to medication adherence.

Socioeconomics - dichotomous results have been reported in connection with the differences in global health systems; some studies note, in association with education, a positive influence on adherence (Mann, et al., 2010), whilst other studies show no correlation (Herttua, Tabák, Martikainen, Vahtera, & Kivimäki, 2013). The financial cost of fulfilling a prescription can be prohibitive to adherence although there are conflicting accounts regarding the financial burden of illness; research suggests that expenditure either renders the medication prohibitive (Steinman, Sands & Covinsky, 2001) or that the cost is mediated by perceived value in terms of symptom relief (Dunlay, et al., 2011). Enhancing or hindering adherence is contextually dependent.

4.2.16 Illness condition

Adherence rates are typically higher in acute conditions in comparison with chronic illnesses (Osterberg & Blaschke, 2005) and persistency rates following the initiation of therapy are variable (Cramer, Rosenheck, Kirk, Krol & Krystal, 2003). The need to achieve almost 95% adherence to HIV medications for instance, represents a very serious challenge not least because the regime is complex, incorporating multiple medications which are often expensive and may involve food interactions and further side effects (Chesney, 2003). In conditions such as hypertension where medication will provide no symptomatic relief, since hypertension is invariably asymptomatic, the benefits may not be clear to the patient (Ogedegbe, et al., 2004), and individuals are less likely to adhere when there are low expectations that the medication will be beneficial. In such cases adherence may ultimately hinge on the person's beliefs about the condition and its treatment (Wang, et al., 2005).

4.2.17 Safety, efficacy, and aversion to medication

Beliefs can be constructed through the medication interface (Tong, et al., 2010) which in turn influences behaviour (Dowell, Jones & Snaddon, 2002). Medication aversion may be engendered through apprehension regarding the medication or uncertainty as to side effects (e.g., Sale, et al., 2011), concerns about dependency (e.g., Seng & Holroyd, 2013), or outcome. A further hesitancy to medication may stem from the reluctance to accept the biological basis of the condition (e.g., Van Houdenhove & Luyten, 2008). Occasionally anxiety results from a lack of knowledge regarding the illness (e.g., Parnas & Henriksen, 2014), however this can potentially be mediated by actively searching for information (Gamble, Fitzsimons, Lynes & Heaney 2007), the receipt of knowledge (Abedian, Howard, Rawle & Thomas, 2010), and being assured of the suitability of therapeutic intervention (Sale, et al.). In addition, regimen complexity has been frequently alluded to as a potential source of nonadherence (Iskedijan, et al., 2002) as well as experienced side effects (Gregoire, et al., 2001).

4.2.18 Perceived needs

The literature frequently alludes to the rationale applied by individuals to assess the benefits and drawbacks of medication use and is particularly pertinent in the consideration of symptoms and side effects (e.g., Gallagher & Naidoo, 2009). Further consideration concerns economics and the prohibitive cost of medication (e.g., de Geest, Abraham, Gemoets & Evers, 1994) or the deleterious expense, geographically or financially, of access to medicine, particularly when involving insurance-based healthcare models (e.g., Muir-Cochrane, 2006).

Patients are less likely to adhere when they do not perceive the severity of their condition; adherence is the most proximal result of need as a result of symptom and illness-severity and the ability to cope and manage a complex regimen. According to the health beliefs model (Rosenstock, 1974) the decision to engage in health behaviours, such as adherence, is predicated on the perceived susceptibility and severity of an illness and the apparent utility and barriers to engage in the therapeutic regimen (Leventhal & Cameron, 1987). When health behaviour is assumed to be beneficial this gives rise to a positive adaptive response in the individual (Rogers, 1975), whereby medication-taking is more probable.

4.2.19 Routine

One of the most important components of a successful adherence regime was the establishment of a routine with memory (Hamer, et al., 2010), distraction (de Geest, et al., 1994) and lifestyle (e.g., Gamble, et al., 2007) forming critical elements. Occupational therapy studies (e.g., Radomski, 2011) have indicated that routine forms a self-care behaviour that assuages, to some extent, nonintentional medication nonadherence, which often occurs as a result of forgetting to take medication on the appropriate day at a specified time (Ryan & Wagner, 2003). A routine is particularly useful in asymptomatic conditions, such as hypertension, in the absence of overt symptoms; stable schedules increase regularity of medication-taking since cognitive processes, such as memory and decision-making, are minimised (Roley, et al., 2008). Habits that are typically performed as a part of a contextual task become imbued within a routine and, as such, form an automatic trigger and response contributing to the promotion of automatic behaviour, to the extent that disruption to routines jeopardise medication adherence (Sanders & Oss, 2013).

4.2.20 Interventional aids

Whilst interventions are not factors per se they do, or should if effective, have an impact on outcomes. Interventions may be directed at didactic education, behavioural regulation (such as motivation or support), (Krousel-Wood, Hyre, Muntner & Morisky, 2005), or focus on reinforcers or rewards (e.g., McDonald, et al., 2002), to support adherence (Whyte, et al., 2002). However, interventions are usually complex, labour-intensive, are insufficiently predictive and generally present only minor improvements to adherence, with increases in the region of 4 to 11% (e.g., Peterson, Takiya & Finley, 2003). One reason for this could be attributed to the lack of generaliseable utility; research supports the precept that interventions should be multifaceted and tailored to the individual in order to optimise efficacy (e.g., van Eijken, Tsang, Wensing, de Smet & Grol, 2003), however, in order to provide such interventions the unique predictors of medication adherence need to be understood. This may be achieved through a qualitative elicitation process (Fishbein & Ajzen, 1980) collecting individual's motivation to comply with behavioural beliefs corresponding to salient referents and norms, for each context and population. The outcomes may then serve as a guide for the development of contextually relevant assessment scales and interventions.

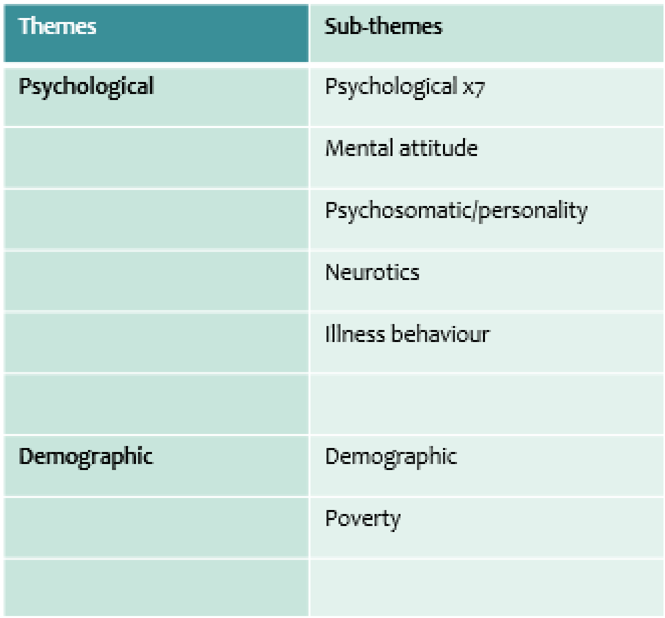
It seems intuitive that interventions are categorised to reflect the factors which facilitate or hinder adherence; in existing literature there have been several approaches to the classification of interventions, for example, Kripalani, et al. (2007) distinguished between informational and behavioural interventions, whilst Higgins and Regan (2004) considered external medication mechanics, and Haynes (2005) focused on conditions and treatment; a different interventional approach will apply depending on the motivation for nonadherence. If, for instance, a patient considers the medication to be ineffective an intervention may include educational mediation regarding the medication, or a cognitive intervention changing the belief or attitude towards it. If, however, medication is not taken due to economic reasons then this will require a more pragmatic resolution and educational or cognitive interventions will be ineffectual. Andersen (1995) observed the significance of mutability in health care access, and this applies equally to health behaviours, such as adherence.

The patient is not always accountable for their nonadherence; reasons may be out of the individual's control, due to lifestyle modifications, or social stigma of the disease and interventions are vital to ameliorate these impediments and to optimise medication-taking. The unintentionality of forgetfulness has been noted but it must be stressed that there might be additional components other than the impression of the apparently innocuous; for example, a study suggesting a belief component (Foley & Hansen, 2006) in cholesterol-lowering medication was supported by an investigation in a geriatric population which reinforced the notion that high concern beliefs are predictors of medication-forgetting (e.g., Eaton, et al., 2006), suggesting that cue-based interventions are appropriate (e.g., Horne & Weinman, 1999).

4.3 Iterative classification

The developed framework represents an overview of the copious factors of adherence to therapeutic regimes revealed by the exhaustive literature search; it comprises a collection of causal and descriptive factors accessed from the data reviewed since inception of academic records. The dominance of medicalisation is demonstrated in early studies, whilst in latter research the focus shifts more to factors pertinent to the patients themselves; furthermore, significantly different levels of analysis were observed. The taxonomical framework indicates the most significant directions of research in terms of taxa level and the formulation of clusters that exhibited similar characteristics. Hierarchically the model presents homogeneity within some clusters whilst in others it is clear that further research is needed to establish empirical correlation.

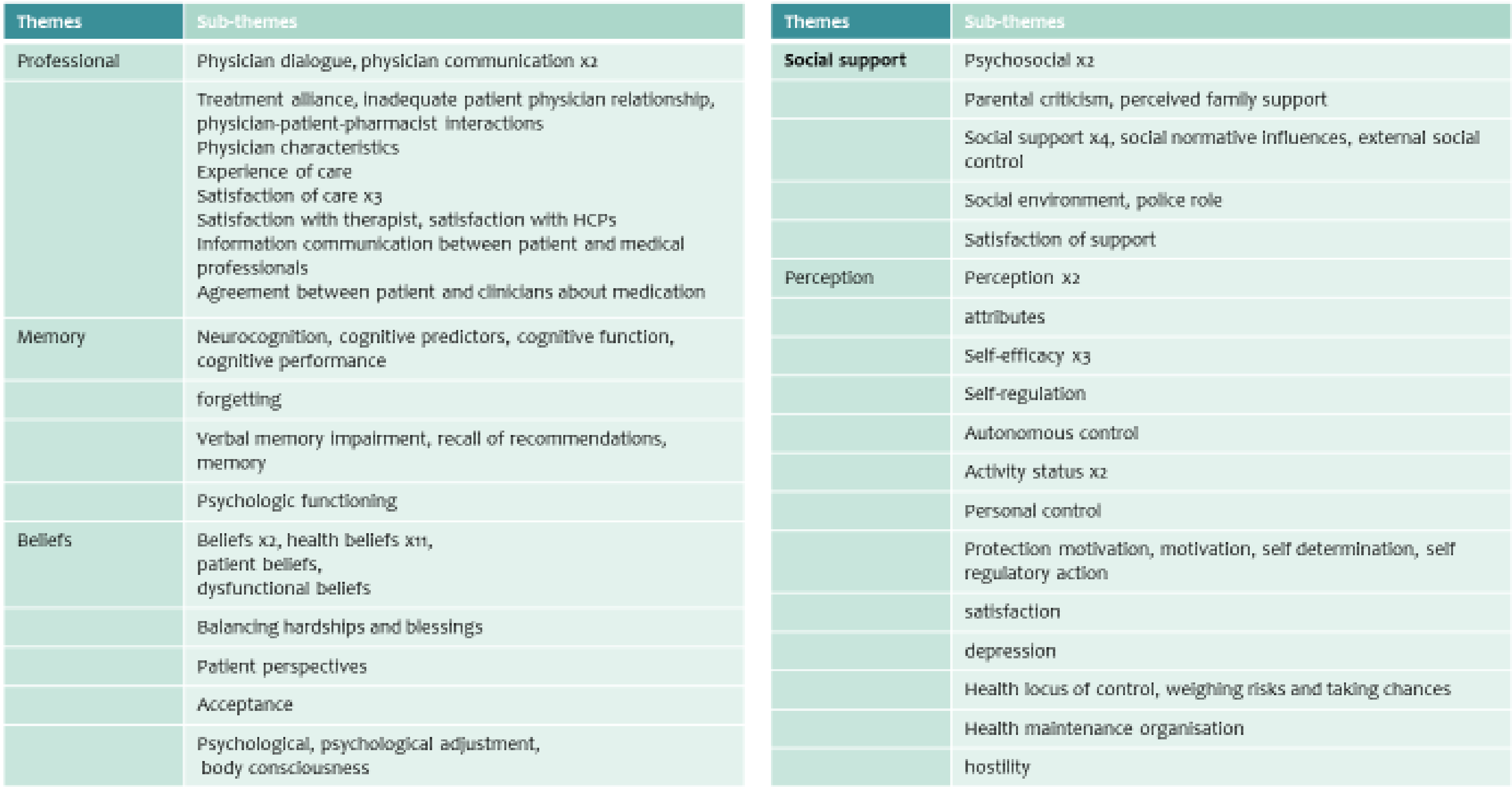
The core aspects are summarised in Table 4.5. The final classification is drawn from the three integral units of the historical literature review, reflecting the trilogy of stages: the beginning (from inception to 1969), early contemporary (1970 to 2000), and moving forward (2000 to date).



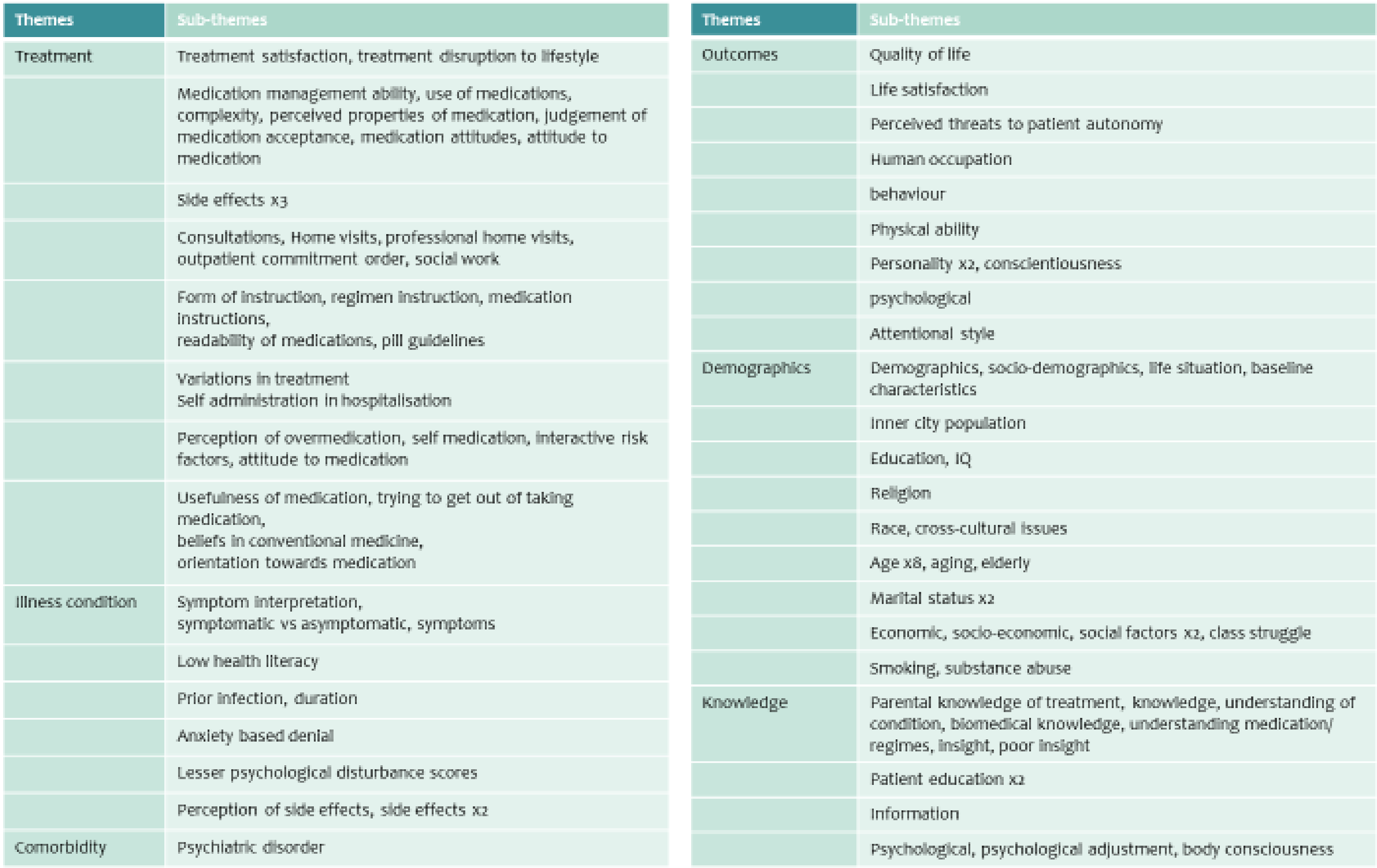
Themes	Sub-themes
Psychological	Psychological x7
	Mental attitude
	Psychosomatic/personality
	Neurotics
	Illness behaviour
Demographic	Demographic
	Poverty

Table 4.3 Adherence factors relating to *Stage I* – the beginning: an historical perspective.

Despite the paucity of research in this nascent era, it can be seen from Table 4.3 that concern largely focused on ‘psychological’ factors for noncompliance with a medication regime, replacing previously anecdotal studies. Centred on the condition of tuberculosis, personality and stress were considered in addition to the biological causation of the illness. Selye’s ‘revolutionary new’ (1956) definition of stress was understood, as ‘*the stimulous situation likely to arouse anxiety. The general adaptation syndrome is a response to stress and its failure results in disease*’ (Sparer, 1956, p.212). Environmental stresses were conceived as ‘*forc*[ing] *a continual adjustment on the part of the human organism*’ (Sparer, 1956, p.3) born of virological vectors shifting to a psychosomatic disease-state which ‘*appears to lie in wait for a neurosis to provide a satisfactory environment within which to become seriously pathogenic*’ (Sparer, p.209). During this progressive period, emotional factors were assessed as predictors of compliance as well as the effects of medication itself; treatment was reviewed, for instance the effect of isolation in the sanitorium. Furthermore, patient-staff relations in sanitoria were considered and the influence of sympathy, pity, and empathy. Sparer considered that personality was the locus of disease vulnerability and ‘*among the tuberculous, there is no prototype but a broad range of personality structure ... The high incidence of psychiatric disorders among the* *tuberculous is considered not to be due to the disease but to pre-existing personality dysfunction which renders the individual more vulnerable to the disease, and which may be accentuated by it.*' (in Leigh, D, 1957, p.240). Demographic variables such as social status, alcoholism, marital status, and employment status were investigated as integral to the problem as well as the reasons for discontinuation of treatment by patients, or 'irregular discharges' as they were known.



Themes	Sub-themes
Professional	Physician dialogue, physician communication x2
	Treatment alliance, inadequate patient physician relationship, physician-patient-pharmacist interactions Physician characteristics Experience of care Satisfaction of care x3 Satisfaction with therapist, satisfaction with HCPs Information communication between patient and medical professionals Agreement between patient and clinicians about medication
Memory	Neurocognition, cognitive predictors, cognitive function, cognitive performance
	forgetting
	Verbal memory impairment, recall of recommendations, memory
	Psychologic functioning
Beliefs	Beliefs x2, health beliefs x11, patient beliefs, dysfunctional beliefs
	Balancing hardships and blessings
	Patient perspectives
	Acceptance
	Psychological, psychological adjustment, body consciousness
Social support	Psychosocial x2
	Parental criticism, perceived family support
	Social support x4, social normative influences, external social control
	Social environment, police role
	Satisfaction of support
Perception	Perception x2
	attributes
	Self-efficacy x3
	Self-regulation
	Autonomous control
	Activity status x2
	Personal control
	Protection motivation, motivation, self determination, self regulatory action
	satisfaction
	depression
	Health locus of control, weighing risks and taking chances
	Health maintenance organisation
	hostility

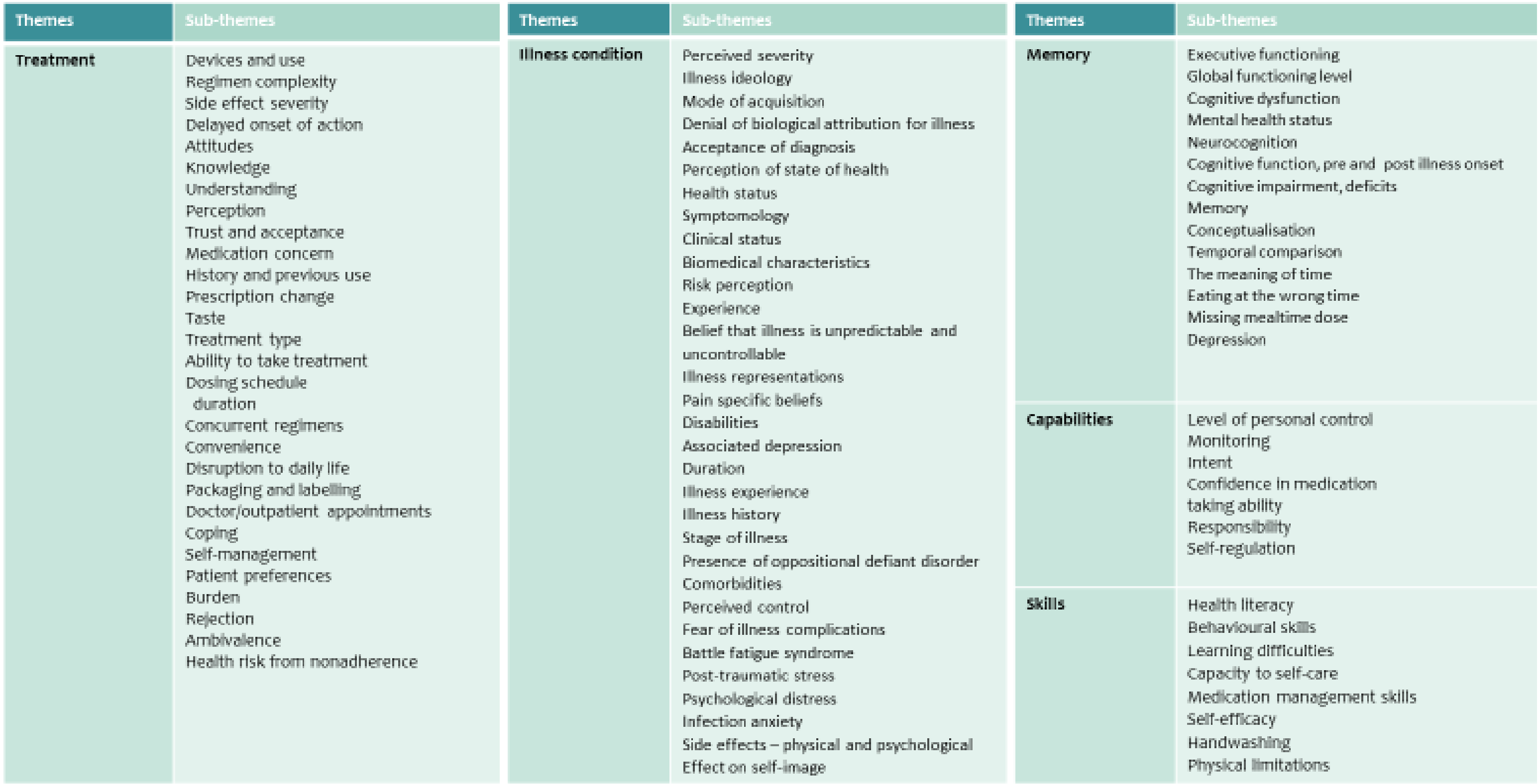


Themes	Sub-themes
Treatment	Treatment satisfaction, treatment disruption to lifestyle
	Medication management ability, use of medications, complexity, perceived properties of medication, judgement of medication acceptance, medication attitudes, attitude to medication
	Side effects x3
	Consultations, Home visits, professional home visits, outpatient commitment order, social work
	Form of instruction, regimen instruction, medication instructions, readability of medications, pill guidelines
	Variations in treatment Self administration in hospitalisation
	Perception of overmedication, self medication, interactive risk factors, attitude to medication
	Usefulness of medication, trying to get out of taking medication, beliefs in conventional medicine, orientation towards medication
Illness condition	Symptom interpretation, symptomatic vs asymptomatic, symptoms
	Low health literacy
	Prior infection, duration
	Anxiety based denial
	Lesser psychological disturbance scores
	Perception of side effects, side effects x2
Comorbidity	Psychiatric disorder
Outcomes	Quality of life
	Life satisfaction
	Perceived threats to patient autonomy
	Human occupation
	behaviour
	Physical ability
	Personality x2, conscientiousness
	psychological
	Attentional style
Demographics	Demographics, socio-demographics, life situation, baseline characteristics
	Inner city population
	Education, IQ
	Religion
	Race, cross-cultural issues
	Age x8, aging, elderly
	Marital status x2
	Economic, socio-economic, social factors x2, class struggle
	Smoking, substance abuse
Knowledge	Parental knowledge of treatment, knowledge, understanding of condition, biomedical knowledge, understanding medication/ regimes, insight, poor insight
	Patient education x2
	Information
	Psychological, psychological adjustment, body consciousness

Table 4.4 Adherence factors for *Stage II* – early contemporary to 2000.

Throughout the early contemporary period there was an attempt to understand the nature of adherence to medication regimes and various factors were acknowledged, including the patient-clinician relationship, the impact of social support and socioeconomic status. Treatment factors were also correlated to adherence, including dosing schedule and complexity, pill burden, duration of treatment and side effects (Ickovics & Meade, 2002). Frequency of doses is significantly related to adherence and is suboptimal in patients with a polypharmaceutical regime (Paes, Bakker & Soe-Agnie, 1997; Eldred, Wu, Chaisson, & Moore, 1998); there is evidential strength that the more complex regimes lead to suboptimal adherence, although there were variable outcomes across samples. Results showed that the complexity of the regime, including both dosing and time-dependent inhaled medications, related to poorer adherence and was engendered by forgetfulness, improper use of inhalers or cessation of medication in the case of COPD (Dolce, et al., 1991). Some reports suggested conversely that medication was overused, and that individuals took more puffs per dose than instructed in asthmatic conditions (Mann, Eliasson, Patel & ZuWallack, 1992). The WHO subsequently reported that the main barriers to adherence were dose frequency and side effects and emphasised the need to develop systems to mitigate these barriers (Sabate & Sabate, 2003). A reduction or simplification in the medication regime may be constructive since studies have shown that misunderstanding or poor comprehension of medication instructions are confounders of adherence (Hanchak, Patel, Berlin & Strom, 1996). Additionally, enhancements to treatments, including extended-release and modified release products, have led to the simplification of dosing schedules with the benefit of fewer daily doses in many conditions. The succeeding years established electronic monitoring devices, significantly improving measurement and studies previously impeded by the imprecision of methodological limitations.

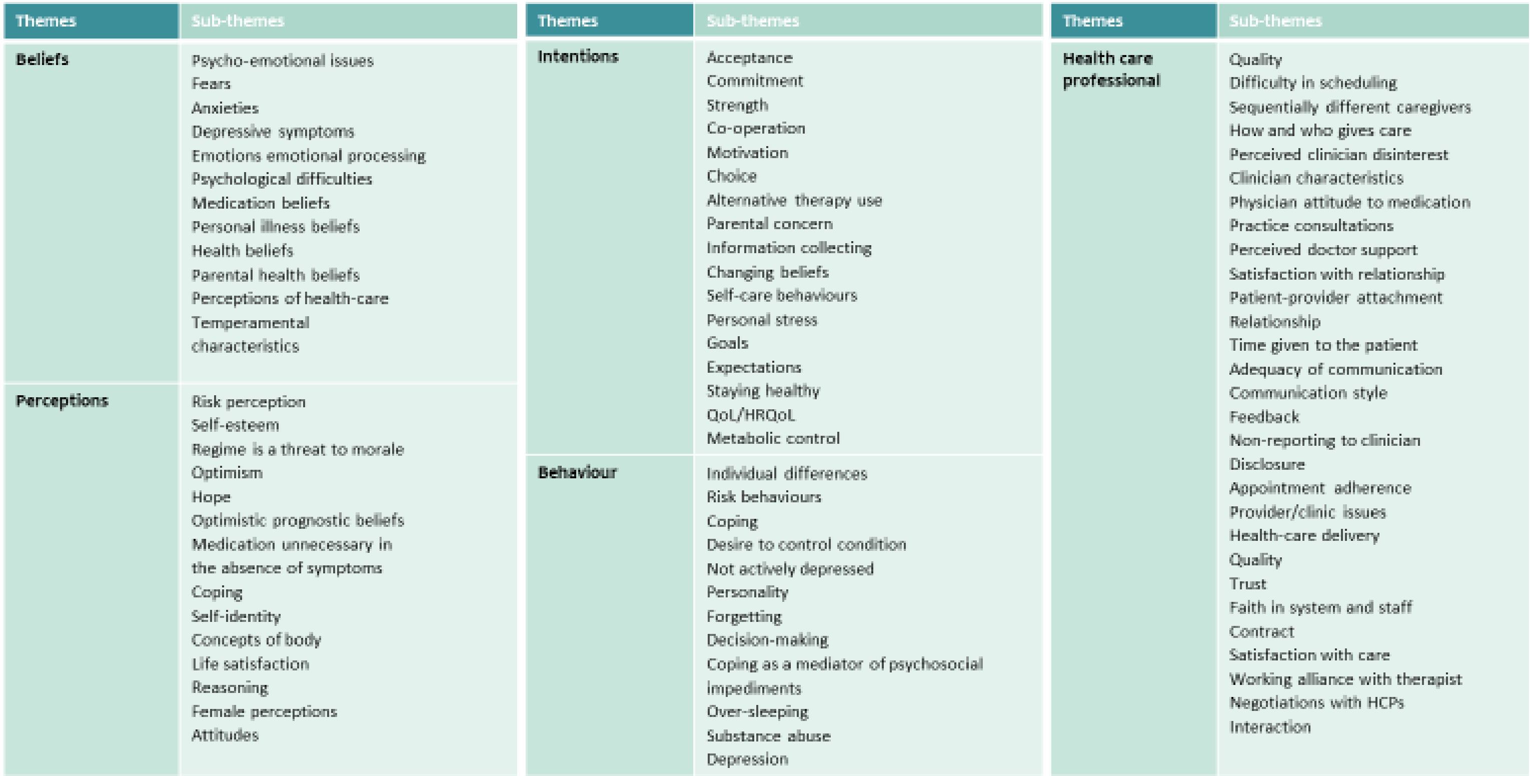
It is widely recognised that adherence to therapy is critical to long-term treatment success and yet rates are frequently subtherapeutic. Investigation into the associations between psychosocial characteristics multiplied in this period and galvanised inquiry into individual patient factors, such as measures of beliefs, self-efficacy, and personal and situational factors (Balkrishnan, 1998). Positive beliefs were associated with better perception, functional health, and socio-emotional cognitive function, whilst less positive beliefs correlated to greater stress, depression and symptom distress and associated with reduced treatment efficacy. Studies set about quantifying an individual's beliefs regarding the necessity of the prescribed medication and concerns about taking it (Horne & Weinman, 1999). Findings showed that a high percentage of patients believe in the importance of medication in terms of maintaining health, but also had concerns relating to becoming dependent, together with the long-term and adverse effects of pharmacological therapy medication. Inhaled corticosteroids, for example, are a central component of the management for asthma, however adherence is suboptimal. To some extent this is determined by potentially modifiable medication beliefs regarding possible addiction and side effects (Ponieman, Wisnivesky, Leventhal, Musumeci-Szabó, & Halm, 2009). Furthermore, the patient may interpret adherence and goal setting in a different frame to that of the healthcare professional; an individual's management perceived by them as accommodating life-style priorities, incorporating beliefs, may be labeled as uncooperative or noncompliant by the health care team (Roberson, 1992).



Themes	Sub-themes
Treatment	Devices and use
	Regimen complexity
	Side effect severity
	Delayed onset of action
	Attitudes
	Knowledge
	Understanding
	Perception
	Trust and acceptance
	Medication concern
	History and previous use
	Prescription change
	Taste
	Treatment type
	Ability to take treatment
	Dosing schedule duration
	Concurrent regimens
	Convenience
	Disruption to daily life
	Packaging and labelling
	Doctor/outpatient appointments
	Coping
	Self-management
	Patient preferences
	Burden
	Rejection
	Ambivalence
	Health risk from nonadherence

Themes	Sub-themes
Illness condition	Perceived severity
	Illness ideology
	Mode of acquisition
	Denial of biological attribution for illness
	Acceptance of diagnosis
	Perception of state of health
	Health status
	Symptomology
	Clinical status
	Biomedical characteristics
	Risk perception
	Experience
	Belief that illness is unpredictable and uncontrollable
	Illness representations
	Pain specific beliefs
	Disabilities
	Associated depression
	Duration
	Illness experience
	Illness history
	Stage of illness
	Presence of oppositional defiant disorder
	Comorbidities
	Perceived control
	Fear of illness complications
	Battle fatigue syndrome
	Post-traumatic stress
	Psychological distress
	Infection anxiety
	Side effects – physical and psychological
	Effect on self-image

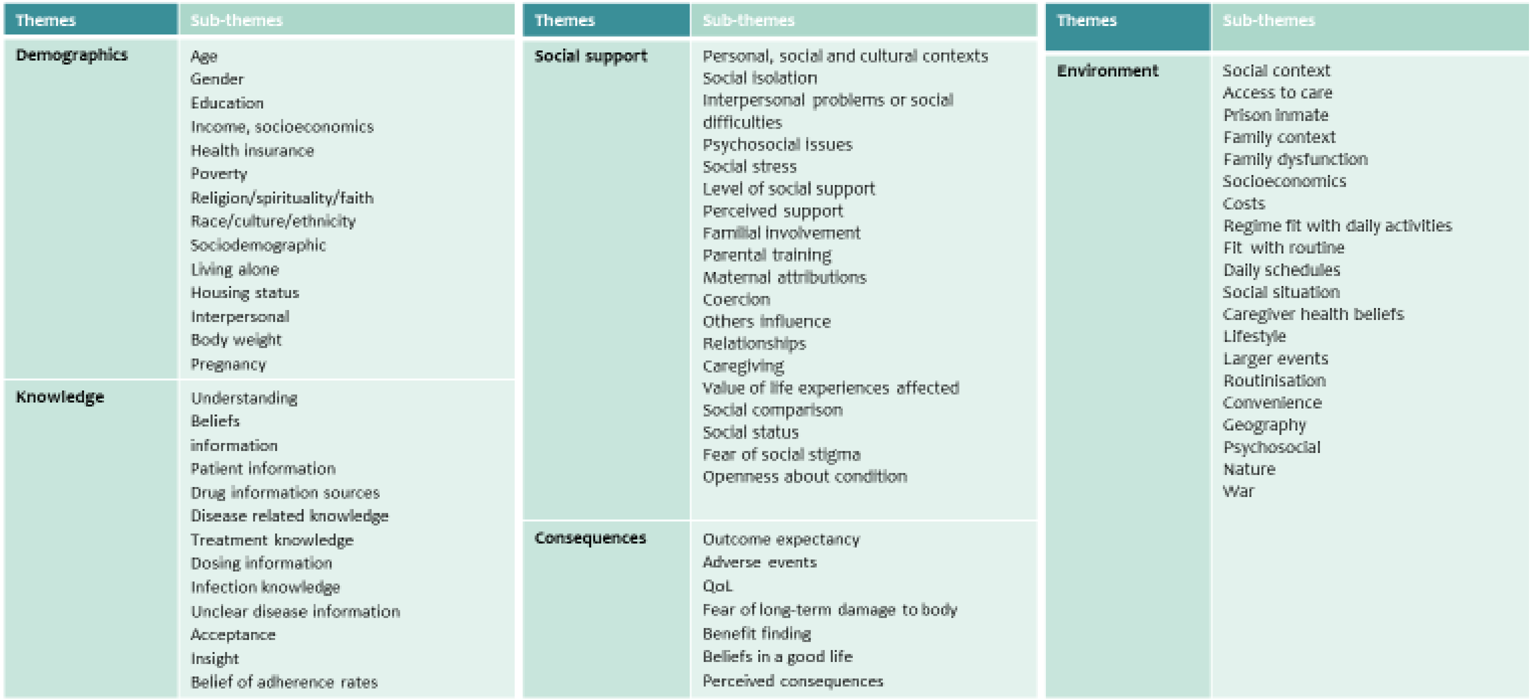
Themes	Sub-themes
Memory	Executive functioning
	Global functioning level
	Cognitive dysfunction
	Mental health status
	Neurocognition
	Cognitive function, pre and post illness onset
	Cognitive impairment, deficits
	Memory
	Conceptualisation
	Temporal comparison
	The meaning of time
	Eating at the wrong time
	Missing mealtime dose
	Depression
Capabilities	Level of personal control
	Monitoring
	Intent
	Confidence in medication taking ability
	Responsibility
	Self-regulation
Skills	Health literacy
	Behavioural skills
	Learning difficulties
	Capacity to self-care
	Medication management skills
	Self-efficacy
	Handwashing
	Physical limitations



Themes	Sub-themes
Beliefs	Psycho-emotional issues Fears Anxieties Depressive symptoms Emotions emotional processing Psychological difficulties Medication beliefs Personal illness beliefs Health beliefs Parental health beliefs Perceptions of health-care Temperamental characteristics
Perceptions	Risk perception Self-esteem Regime is a threat to morale Optimism Hope Optimistic prognostic beliefs Medication unnecessary in the absence of symptoms Coping Self-identity Concepts of body Life satisfaction Reasoning Female perceptions Attitudes

Themes	Sub-themes
Intentions	Acceptance Commitment Strength Co-operation Motivation Choice Alternative therapy use Parental concern Information collecting Changing beliefs Self-care behaviours Personal stress Goals Expectations Staying healthy QoL/HRQoL Metabolic control
Behaviour	Individual differences Risk behaviours Coping Desire to control condition Not actively depressed Personality Forgetting Decision-making Coping as a mediator of psychosocial impediments Over-sleeping Substance abuse Depression

Themes	Sub-themes
Health care professional	Quality Difficulty in scheduling Sequentially different caregivers How and who gives care Perceived clinician disinterest Clinician characteristics Physician attitude to medication Practice consultations Perceived doctor support Satisfaction with relationship Patient-provider attachment Relationship Time given to the patient Adequacy of communication Communication style Feedback Non-reporting to clinician Disclosure Appointment adherence Provider/clinic issues Health-care delivery Quality Trust Faith in system and staff Contract Satisfaction with care Working alliance with therapist Negotiations with HCPs Interaction



Themes	Sub-themes
Demographics	Age Gender Education Income, socioeconomics Health insurance Poverty Religion/spirituality/faith Race/culture/ethnicity Sociodemographic Living alone Housing status Interpersonal Body weight Pregnancy
Knowledge	Understanding Beliefs information Patient information Drug information sources Disease related knowledge Treatment knowledge Dosing information Infection knowledge Unclear disease information Acceptance Insight Belief of adherence rates

Themes	Sub-themes
Social support	Personal, social and cultural contexts Social isolation Interpersonal problems or social difficulties Psychosocial issues Social stress Level of social support Perceived support Familial involvement Parental training Maternal attributions Coercion Others influence Relationships Caregiving Value of life experiences affected Social comparison Social status Fear of social stigma Openness about condition
Consequences	Outcome expectancy Adverse events QoL Fear of long-term damage to body Benefit finding Beliefs in a good life Perceived consequences

Themes	Sub-themes
Environment	Social context Access to care Prison inmate Family context Family dysfunction Socioeconomics Costs Regime fit with daily activities Fit with routine Daily schedules Social situation Caregiver health beliefs Lifestyle Larger events Routinisation Convenience Geography Psychosocial Nature War

Table 4.5 Adherence factors to therapeutic regimes relating to *Stage III* – 2000 to date.

Analysis of Stage III disclosed 6,924 factors that were recorded from 2000 to completion of the review in July 2018 in their raw state (that is, prior to categorisation). Studies expounded on previous research investigating outcomes of noncompliance, scales and measures were developed and intervention strategies were devised. Furthermore, a greater focus centred on the factors relating to adherence. In conjunction with variables over which the individual has little or no control, such as financial or social variables, attention was also informed by individual differences such as beliefs, perceptions, and behavioural intentions with the emergence of attention directed to behavioural factors.

As the volume of research increased so too did the range of focus. Studies continued to scrutinise demographics, the socioenvironment of the patient as well as the illness and treatment, and impact of the healthcare system. The severity of the illness and discomfort or inconvenience of the treatment remained a prevalent target but also consideration of the social risks of medication, such as discrimination, continued ability to work, and the impact of family life and relationships. The influence on adherence of the operational method of the healthcare team and the relationship between healthcare practitioners and the patient was a persistent topic of research, concluding that a collaborative and informative association is the most beneficial.

As well as the influence of physical, medical, and social constructions of adherence the nascence of the connection between attitudes, beliefs, experiences, and adherence was investigated and emerging themes explored how psychological constructions influence the impact on medication adherence. A growing recognition developed regarding the necessity for lifestyle and behavioural changes to effect and maintain a successful treatment regime. Integral to this notion was the acknowledgement concerning the role of individual capabilities including cognition, skills, and comprehension of both the illness condition and its treatment. Beliefs were investigated and the diversities of the general population were considered, taking into account not just demographics such as age and gender but personal, cultural and ethnic principles. Inquiry was now confidently addressing the impact of belief-driven variables such as medication efficacy, relating to trust in the healthcare practitioner, and self-efficacy, the belief in oneself to successfully perform a specific action to optimise benefits of pharmaceutical intervention. Concepts of the individual also included perceptions, regarding the illness and the treatment, as well as control beliefs both over the illness and treatment. Anxieties concerning perceived disadvantages such as adverse effects of medication or painful treatment, were investigated in contrast to beliefs as to the effectiveness of the medication and the perceived benefits that were found to be significantly related to medication adherence.

4.3.1 Conceptual to empirical iteration

Following the initial empirical to conceptual iteration the most prevalent predictors were iteratively framed into ultimate categories: patient-specific (e.g., forgetfulness, beliefs), medication-specific (e.g., complexity of medication), logistic (e.g., frequency of clinic visits and pharmacy fills), and disease-specific (e.g., absence of symptoms for hypertension) factors, that facilitate development of the framework.

Factors were many and varied, exemplifying the differentiating factors as determinants of variants in rates between illness conditions; for example, the potential harm caused by statins may lead to nonadherence whilst in asthma nonadherence is driven by a lack of symptoms. The greater the participation in the treatment regime the more likely that the individual will decide to reduce or discontinue medication when feeling better or worse than those people who more passively participate (Schneider, Wensing, Quinzler, Bieber & Szecsenyi, 2007). Adherence studies commonly consider predictors as single entities (Brown, et al., 2005; Chia, Schlenk & Dunbar-Jacob, 2006; Elliott, et al., 2007), rarely taking into account more than one factor for scrutinisation. Components may relate to a specific illness condition (e.g., Horne, 2006; Horne & Weinman, 2002) such as an individual's perception of asthma as an acute, rather than chronic, condition; experiences of symptoms; general negative medication beliefs; long-term adverse effects of medications, which are associated with nonadherence; the perception that an apparent lack of symptoms decreases the need for pharmaceutical intervention (e.g., Ulrik, et al., 2006).

The core impacts on adherence have been re-classified from the broad dimensions in the interests of concision from which the TaxoMA (Taxonomy in Medication Adherence) was developed and is shown in Figure 4.2.

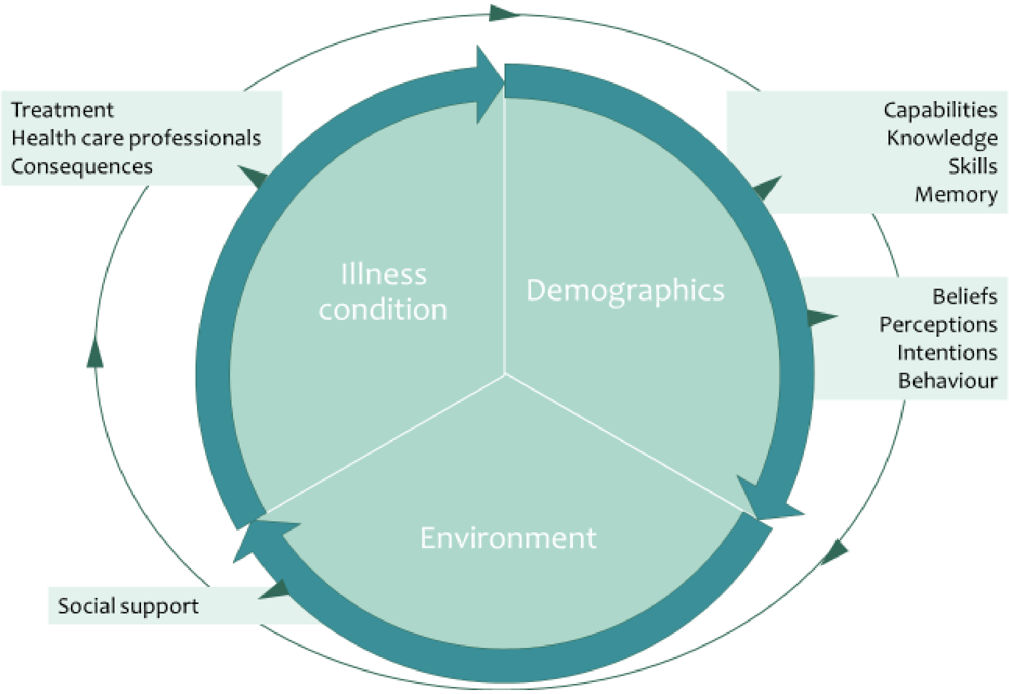


Figure 4.2. The TaxoMA: A taxonomical framework of the core impacts on medication-adherence summarises the contributing factors in their broad dimensions.

4.4 Taxonomical framework summary

The factors involved in medication adherence are numerous and extraordinarily complex. The present study is a significant incursion in articulating the behavioural and contextual influences that bear on individuals' adherence strategies. This framework contributes to the literature in several important ways: it offers a comprehensive taxonomical model for defining and understanding medication adherence, fulfilling the need expressed by commentators on the topic. Furthermore, it expands current conceptualisation of the subject. This research is the first to systematically identify the multidimensional factors applicable to medication adherence and to express potential dimensions in an empirical construction, that is inclusive of all accessible academic research on the matter. The TaxoMA Framework is an instrument that can be used in future research, in the first instance as a framework and secondly as a base from which further validation can be conducted.

A wide, scoping strategy inclusive of extraneous influences generated an extensive structure, one in which reactivity of influences is recognised. In this respect the framework is representative of the historical perspective employed, evolving from the focus of environmentally-driven factors to the incorporation of interactions with, and incursions from, additional factors. The framework represents a deep exploration of aetiology and functional needs, shifting attention from deterministic notions of illness as the research direction turns to the illness process, and the nascence of a focus on behavioural affects.

The taxonomical framework demonstrates the complexity and diversity of motivational and contextual influences on medication adherence by focusing on environmental elements, situational contexts, in addition to critical motivational affects. It identifies constituent components, synthesises evidence and provides a conceptual and practical characterisation. This pragmatic framework defines and organises components from systematic investigation, spanning centuries, into conceptual categories in an overarching comprehensive structure and as such, represents a directional entry point to the pathway, through the evidence. This may be valuable for future studies as a research-informed theoretical system through which to approach the field, as well as facilitating the analysis of gaps in the evidence and supporting priority-setting for new studies. A further potential benefit of the taxonomical framework is a deeper and richer understanding of what is known about adherence, confirming previously identified factors and highlighting recently-investigated influences. It is clear that whilst research has concentrated on variables such as demographics much more needs to be investigated around individual differences; this represents a huge fissure in literature which may be pivotal in the explication of adherence behaviour.

The TaxoMA framework reflects exhaustive conceptualisation (Chrisman, Hofer & Boulton, 1988) of medication adherence and clarifies our current understandings, despite contextual limitations of some studies, many conducted with limited focus, and previously published equivocal results. Analysis was conducted at component and elemental levels, which enabled characteristics to be identified (Murmann & Frenken, 2005) and inter-relational conclusions are reflected at taxa level. Results were organised as parsimoniously as possible to prevent the whole becoming unwieldy and unusable. The TaxoMA Framework may be generalised across time and context (Morris, Schindehutte & Allen, 2005) and is therefore of optimum utility and leads to huge opportunities for future research. Among the potentially important implications of the framework is its ability to highlight the contributory factors of medication adherence, which is of interest but also important in the design of interventions. Indeed, the present research has implications for the innovation of novel interventions tailored to an individuals' specific motivators or impediments, to render them more effective. The framework highlights that the topic would benefit from further evaluation due to the extensivity and complexity of the topic. Whilst the model already represents good generalisability due to the substantial research base included nonetheless it merits further review to evaluate the comprehensiveness of the dimensions and empirical evaluation of construct validity. The TaxoMA framework is concerned with the systemisation of adherence factors and successfully demonstrates the wide diversity of contextual variables. The comprehensive and versatile multi-dimensionality of the framework would benefit from a further refinement; the correlational evaluation and organisation of classifications of influences contingent on situational contexts to further demonstrate not only the factors but also the relationship between them. One limitation in the development of the taxonomy derives from the inclusion only of published academic articles; this exclusion biases away from those articles not published and also, self-evidently, those factors yet to be researched. Furthermore, the reporting of many studies was ambiguous or incomplete; important details concerning the method, rationale or nonsignificant results were omitted. Improved reporting may be of benefit in terms of the evaluation of the heterogeneous study outcomes, together with explications as to the variance in results. Further clarification would add to the value of results in extant literature and increase our understanding.

Given the variable nature of adherence it can be expected that different predictive dimensions will be associated in singular situational contexts; the importance of extrapolating these for greater definition is clear. The field of enquiry might proceed by clarifying definitions in domains and an extension of this framework may be utilised to develop and devise such interventions. Nonetheless, the framework provides an important roadmap for enhancing adaptation to illness and indicates where future research should perhaps be directed. For instance, the focus might centre on a particular illness condition in order to distinguish where differences occur with and between alternative conditions, and what constructs endure between all conditions. In fact, further studies within this current research will do just that: an excursion into asthma related conditions are researched as a separate dimension within the chronic illness spectrum to demonstrate where differences and similarities lie between medication adherence factors. It is expected that distinctive composites will be evidenced, contingent on particular dimensional aspects, and rarely in isolation but more often contingent on other constructs. The framework highlights the limited attention paid to the relation of adherence behaviour in the literature - another fruitful area of future research and one on which this research concentrates, particularly the role of personality affects, which is currently not often addressed in literature. Indeed, it is the impact of individual differences that is the direction of the remainder of the thesis.

5 Systematic review and meta-analysis of personality factors associated with adherence to pharmacological treatment in chronic illness

5 Systematic review and meta-analysis of personality factors associated with adherence to pharmacological treatment in chronic illness

Previous chapters have demonstrated that nonadherence to medication regimens is associated with negative clinical outcomes, and that, furthermore, the pervasiveness of low adherence-rates to treatment for chronic-illness is a problem of global significance. Research has explored many variables of medication adherence including environmental and contextual factors. A number of inquiries indicate possible association with personality (e.g., Ferguson, 2013); however, only a paucity of studies have explored the proposition and results are heterogeneous. Understanding personality's function in medication-taking could be pivotal in determining potentially non-adherent individuals, and consequently play a vital role in the development of strategies to mitigate risk of non-adherence. To date, no review has been undertaken which concerns personality affects in chronic illness medication-taking.

Addresses the research question 2: *what is known about the nature of personality in the context of medication adherence?*

Accomplishes Aim II*: to undertake a literature review of personality factors and medication adherence in chronic illness to establish where the 'gaps' are.*

The objective of this study was to systematically review and meta-analyse associations between personality and prescribed medication adherence in chronic illness. Previous research has identified a potential correlation between adherence and personality; yet research is scant and as a result of heterogeneous assessment methodologies results are not consistent. The review will assess extant literature and summarise the key findings of these reports. A comprehensive search of electronic databases, key journals, and reference lists for relevant primary research, published in the English language, between 1962 and May 2020 was conducted. Articles were screened against predetermined inclusion criteria and data on participant demographics, study design, analyses, and outcomes were extracted. Study eligibility required the explicit inclusion of a measure of medication adherence to pharmacological treatment for chronic illness, together with a measure of personality. A total of 17 studies which provided sufficient data for meta-analysis were selected for inclusion.

Data were extracted, using a standardised 15-item quality checklist, by the researcher and a further assessor, and potential differences resolved through discussion with a third reviewer. Personality traits were found to affect adherence, (outcomes ranging from ambiguous to positively or negatively significant), particularly when possible interactional effects of additional influencing factors (such as age and perceived health, (Hill & Roberts, 2011)), were considered. Quality assessment detected that the strongest positive relationships between personality and medication adherence related to agreeableness and neuroticism, concluding that there is an association between personality and adherence for patients with chronic illness. Research supports the association between medication adherence and personality traits, in addition to significant auxiliary factors; it is clear from preliminary incursions into the subject that the role of personality in adherence requires further exploration. As a result of this review's conclusions it could be argued that a model of adherence clearly demarcating the role of personality in adherence must be developed to support additional investigation; furthermore, findings of this review not only highlight the necessity for development of a predictive tool to assist healthcare providers determine those patients liable to encounter adherence challenges, but also stresses the need for interventions tailored to specific personality traits to support adherence to medication regimes.

5.1 Introduction

A global report commissioned by the WHO declared that chronic illness is '*the major cause of death in almost all countries*' (WHO, 2005, p.18), being the leading grounds for mortality and disease-burden worldwide, accounting for over 38 million deaths a year. According to the WHO (2017) the four major non-communicable chronic diseases (NCD) responsible for 80% of all premature NCD deaths include cardiovascular disease, cancers, chronic respiratory illnesses (such as asthma and COPD), and diabetes. Prevalence is projected to escalate and intensify in the absence of a successful management strategy, leading to substantial costs for individuals, communities, and nations. It is therefore judicious not only to reduce the incidence of chronic illness, not least to assuage human suffering, but principally to treat the patient by the most effective methods. Regrettably however, the current '*global response is inadequate*' (WHO, 2005, p.22); furthermore, research has indicated that despite the health benefits of taking medication as prescribed many patients are remiss about adhering to a regime (Sabate & Sabate, 2003).

Enabling adherence to medication regimes is a critical strategy to mitigate the effects of chronic illness; adherence can be defined as '*the extent to which a person's behaviour … corresponds with agreed recommendations from a health care provider*' (Sabate & Sabate, 2003, p.14). There has been expansive investigation concerning the prevalence of medication and DiMatteo's (2004) meta-analysis, incorporating fifty years of research, concluded that medication adherence ranges considerably from 4.6% to 100%. The significant variation in rates can be observed between specific illness conditions; in HIV adherence has been reported as low as 27% (Kastrissios, Suárez, Hammer, Katzenstein, & Blaschke, 1998), rheumatoid arthritis adherence rates range between 30% and 80% (Joplin, van der Zwan, Joshua & Wong, 2015), and similarly, coronary artery rates span between 21% and 71% (Baroletti & Dell'Orfano, 2010). Non-adherence to pharmacological treatment has serious implications in terms of reduction in therapeutic efficacy, particularly in chronic illnesses treated solely with pharmacology; suboptimal adherence is associated with increased mortality (Simpson, et al., 2006) and morbidity (DiMatteo, et al., 2002). However, whilst contemporary rates reflect negligible improvement in medication adherence from previous decades (DiMatteo, 2004) the specific psychosocial processes and behaviour which moderate adherence have yet to be categorically identified.

The phenomenon of medication adherence is complex and, thus, its management requires an individualised approach; research into adherence has burgeoned over the past four decades with a focus on identifying the factors which enable or impede adherence together with potential intervention strategies. From the perspective of the patient there can be several confounding factors which complicate adherence; for example, complexity of regimes, such as in HIV treatment (e.g., Arici, et al., 2002), severity and duration of the disease, comorbidity, and side effects (e.g., Kardas, 2002), and economic impact of medication (Meltzer & Bukstein, 2011). Further psychosocial factors impact on adherence (DiMatteo, 2004), including the relationship between patient and health care professional (Ingersoll & Cohen, 2008), as well as socio-economic aspects (DiMatteo, Haskard & Williams, 2007). Moreover, the significance of each factor may be moderated depending on the chronic illness (WHO, 2013). Additionally, and notably in terms of the current research, studies have shown that individual differences, such as knowledge and health-related beliefs, are influential in determining health-behaviour (Ferguson, 2013); personality traits are therefore of crucial significance in terms of adherence.

This review's ambit was designed to encompass any trait or factor related to personality that has been researched in extant literature; several definitions of personality were incorporated in the review, including the following:

A significant number of studies concerning personality and health behaviour have utilised the Five Factor Model (FFM) of global trait domains (Costa & McCrae, 2002). Also known as The Big Five, The Five Factor Model is a lexical hypothesis which represents a hierarchical structure of broad stable dimensions, consisting of five central personality traits (Digman, 1990): openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Individuals scoring high in openness to experience have an intellectual curiosity, an appreciation of art and beauty and are inspired by creativity and imagination; low scorers tend to have a conventional outlook preferring familiar routines (Digman). Conscientiousness measures the degree of motivation in goal-directed behaviour and is frequently applied to adherence performance; high scores indicate a strong moral radar, organisation, striving for personal achievement and a strong sense of self-efficacy. Conscientiousness has been recognised as a positive influence and is related to improved health outcomes, supported by studies in renal dialysis (Christensen & Smith, 1995) and HIV (Stilley, Sereika, Muldoon, Ryan & Dunbar-Jacob, 2004). Neuroticism relates to emotional stability and is characterised by a predisposition to psychological distress (Costa & McCrae, 1987); this may influence an individual's perception of health and consequently a tendency to a negative association with medication adherence for high scorers, as purported by the evaluation of Emilsson, et al., (2011) of asthma patients. Trait anxiety is a construct reflected in most models of personality, associated with neuroticism but very often studied in its own right; it refers to a relatively stable disposition prompting the individual to consider environmental events they encounter as potentially threatening. Extraversion refers to the measure and intensity of interpersonal interaction, with high scorers directing their energy externally into the social arena; whilst extraversion has also been negatively associated with antidepressant medication-takers (Cohen, Ross, Bagby, Farvolden & Kennedy, 2004) a positive correlation was found with asthma patients (Courneya, Friedenreich, Sela, Quinney & Rhodes, 2002). Whereas extraversion focusses on the quantity of interpersonal interaction, agreeableness relates to the value of interpersonal relations; high scoring individuals favour trust and modesty. Agreeableness is an influential personality trait that has been shown as a positive moderator in liver transplant patients (Telles-Correia, Barbosa, Mega & Monteiro, 2009).

The current review was not limited solely to analyses of the Big Five personality traits and further potential influencing traits, types or facets of personality were considered. The concept of type D personality, for instance, characterises an individual by their aggressive, ambitious, competitive, and organised tendencies. It has been asserted that type D personality is a prognostic factor in the development of chronic heart conditions (Friedman & Booth-Kewley, 1987) however, the risk may be a consequence of *components* of type D personality (Ferguson, et al., 2001), such as hostility, purported to be associated with negative biases in information processing and evaluation of others (Guyll & Madon, 2004), or trait anxiety, which has been described as low emotional stability and a possible discrete lower level facet of neuroticism (e.g., Lee & Ashton, 2004). Two prevalent character traits associated with type D personality are negative affectivity (NA) which involves negative emotional reactivity and poor self-concept, prompting the tendency to feel adverse emotions (Denollet, 2005), and social inhibition (SI), typified by the internalisation of problems, apprehension in social conditions and evaluation concerns, presenting as the inability to express undesirable negative feelings due to fear of rejection (Svansdottir, et al., 2013). Additionally, psychoticism, a trait characterised by aggressiveness and interpersonal hostility linked to vulnerability to psychoses development (Eysenck, 1992b), was investigated in the review.

This systematic review was undertaken to ascertain the extent of current evidence concerning the possible affects of personality on adherence to treatment for chronic illness. The analysis provides an assessment of methodological quality and reporting; furthermore, it identifies particular characteristics of interest and aims to assess whether commonalities can be drawn from different illness conditions. Medication adherence is complex and embodies a challenge for clinicians; it is crucial to capitalise on findings to build on our understanding in order to develop strategic interventions tailored to the individual to maximise therapeutic efficacy.

5.2 Method

Search strategy Relevant literature relating to personality and medication adherence was systematically searched using a standardised protocol using Boolean commands on online databases (PsycArticles and PsycInfo, CINAHL Plus, Medline, and PubMed). Additionally, reference lists of relevant studies were scanned and lead-authors contacted for potentially relevant non-published articles, to address publication bias. Review Protocol was registered in PROSPERO (registration number: CRD42016050998) in advance of the review.

Adherence terms (*medica* adheren* or medica* regime* or medication complian* or medica* concordan* or medica* treatment or patient adheren* or treatment abuse or medica* or meds or medica* non-adheren* or medica* abandon* or medica* abstain or medica* non-complian* or medica* abstention or medica* treatment refusal or treatment refusal or treatment dropouts*) were combined with personality terms (*personality or personality traits or personality types or individual differen* or psychometri* or type A personality or type B personality or type C personality or type D personality or type A behavior or The Big 5 or 5 factor model or the FFM or five factor model or NEO or conscientiousness or impulsiveness or neuroticism or openness or agreeableness or extraversion or self-discipline or avoidant personality or empathy or health anxiety or alexithymia or emotional process* or locus of control or negative affect* or social inhibition or time urgency or aggressiveness or assertive* or hostility or competitiveness or introversion or sensation seeking or medica* belief* or health belief* or psycholog* factor**) and illness terms (*chronic illness or chronic disease or chronic sickness or chronic disorder*).

Inclusions and exclusions of studies The search was limited to articles published in English between 1962 (the earliest recorded paper) and May 2020. Reviews, conference extracts and letters (together with responses) were excluded, as well as posters or news items from non-academic sources. The emphasis was on physical and not psychological conditions and therefore studies relating to psychiatric illnesses (including any research relating to personality disorders) were excluded; cancer conditions and current diagnosis of HIV/AIDs or other immune disorders were also excluded due to potential emotional responses and psychiatric morbidity faced by individuals with these conditions (e.g., Bezuidenhoudt, et al., 2011). An adult population (>18 - <70 years of age) was investigated, as the focus was not on care-giver factors in terms of minors, nor on possible confounding cognitive factors in older adults. Furthermore, studies that did not relate to a Western population were also excluded since psychometric personality scales are validated for each country and, additionally, discrepancies caused by language and ethno-cultural differences could undermine results. Local culture, culturally sensitive practices and ethnic beliefs held by an individual profoundly affect adherence behaviour (e.g., Bhui & Bhugra, 2002; Saravanan, et al., 2007) and illness experiences are shaped by socio-cultural and sociopsychological factors in addition to biological systems or pathogenesis (Mechanic, 1986). The study objective must relate to medication-taking with the primary outcome the influence of personality on adherence.

Selection criteria Articles must include a validated personality questionnaire (e.g., the NEO-FFI scale (Costa & McCrae, 1992)) to assess personality traits and a standardised measurement of medication adherence (e.g. the MEMs, (AARDEX® USA, CA)) and include an evaluation of the relationship between personality factors and adherence for individuals with a confirmed diagnosis of chronic illness (excluding conditions noted above). Electronic database searches of papers identified 2,039 possible studies and a further 108 studies were detected through hand-searches. Duplicates, reports not concerned with personality effects on adherence, and articles without full text were removed from the primary selection leaving 485 studies based on title and abstract. After obtaining the hard copies and reading the abstract a further 450 articles were excluded. 19 studies were then excluded because they were reviews (k=3), scale-related (k=1), QoL related (k=1), duplicated data (k=1), related to physiology (k=1), substance abuse (k=1), interventions (k=1), in respect of geriatrics (k=1), psychiatric (k=2), HIV population (k=1), or they did not include a measure of adherence (k=2), represent a Western population (k=2), or pharmaceutical regimen (k=2). A collection of 17 final articles were selected for further analysis.

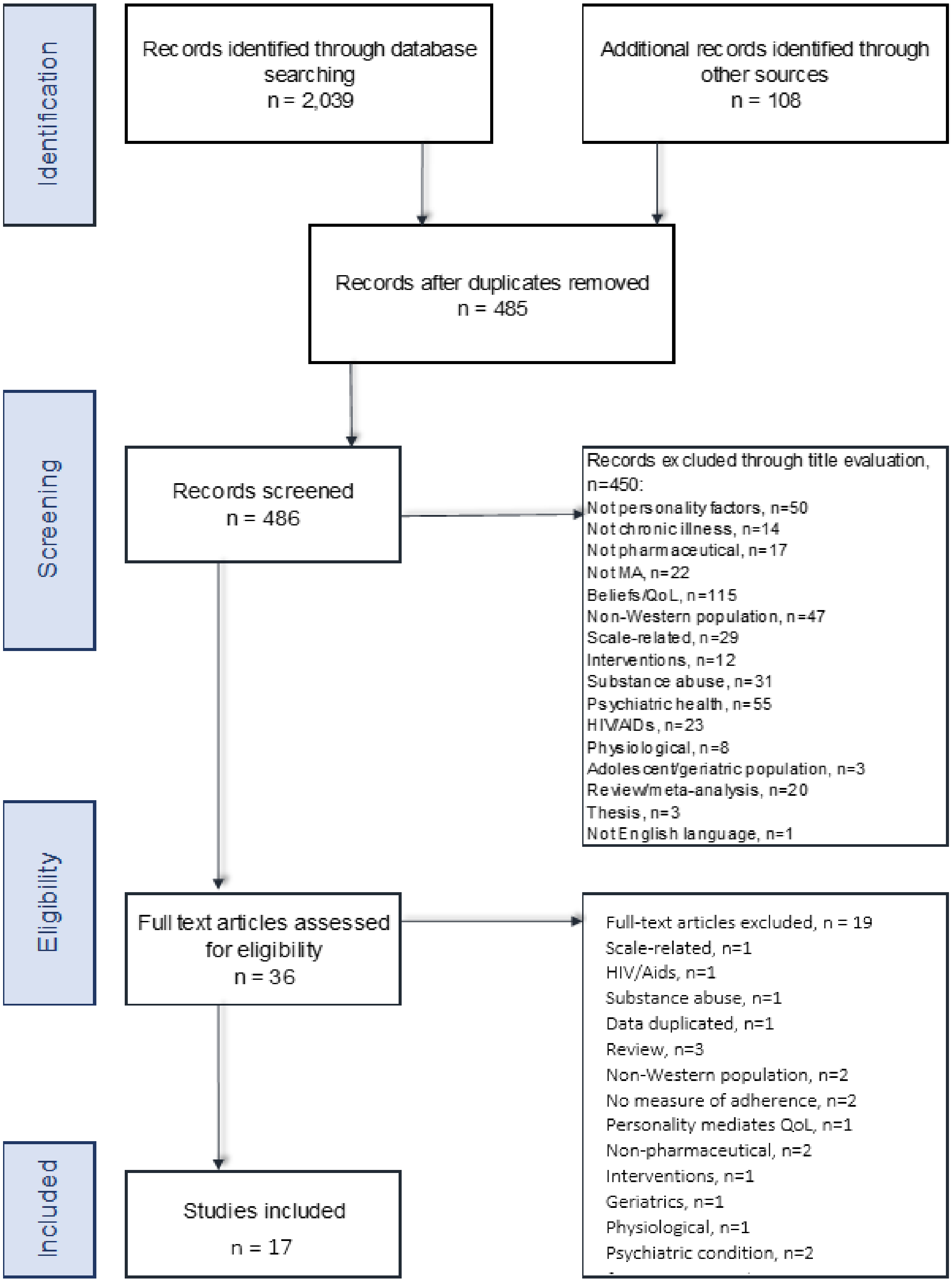


Figure 5.1. Flowchart of the selection procedure.

5.2.1 Quality assessment

Methodological quality The quality of each article was assessed; quality criteria were applied to determine the attributes of each study, based on interpolated items established in the COSMIN initiative (Terwee, et al., 2012) and PRISMA reporting (Moher, Liberati, Tetzlaff & Altman, 2009). Each study was assessed on the basis of title; abstract; introductory rationale and hypothesis; method design, scales, variables, and participants; analysis; descriptive and inferential results; discussion of key results and interpretation, generalisability; limitations; and conclusions. Each item was awarded a score between 0-3 (0=little or no detail; 1=partial detail/lacking in rationalisation; 2=sufficient detail/rationalisation; 3=complete detail/good rationalisation). Item scores were summed between 0 and 51.

Methodological Quality Evaluation Checklist

Title 1 Identify the study's design and objective

Abstract 2 Provide an informative, structured, and balanced summary of what was done and what was found

Introduction 3 Background for the study. Rationale and explicit statement of objectives including prespecified hypotheses

Method 4 Study design – specify study characteristics

5 Participants, study size and setting – including eligibility criteria, settings and locations

6 Variables – list and define all variables, assumptions, and simplifications made

7 Scales – detail assessment scales used, including the rationale for their utility

8 Analyses – describe statistical methods, missing data, sensitivity analysis, power

Results 9 Descriptive and inferential data – accuracy and fullness of reported outcomes

Discussion 10 Key results – are key findings summarised with reference to study objectives, including strength of evidence for each main outcome

11 Limitations – are limitations noted with possible solutions for future research?

12 Interpretation – are objectives considered, with any other relevant evidence?

13 Generalisability – is external validity of the results discussed?

Conclusions 14 – general interpretation of the results in context of existing evidence and implications for future research

15 Funding – is the finding source clearly documented?

Table 5.1 Methodological quality evaluation checklist applied to review papers.

Data were extracted and assessed by the primary reviewer (DJO)* and in addition by the second reviewer (AB) independently; both reviewers then met to discuss and agree scores to ensure consistency and accuracy. Any discrepancies were deliberated conjointly by DJO and AB to enable a sum to be agreed upon. The two reviewers met with the third reviewer (DS) at the completion of the review process; a Cochrane risk of bias (Cohen, 1960) was subsequently assessed by DS who confirmed inter-relater reliability (kappa) of 97%, suggesting significant levels of concordance. The checklist for methodological quality evaluation is shown in Table 5.1 and the evaluation of methodological quality can be reviewed in Table 5.2.

	Study reference:	1			2			3			4			5			6			7			8			9			10			11			12			13			14			15			16			17		
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1	Title	1	3	2	3	3	3	3	2	2	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	3	3	3	2	2	2	3	2	2	3	3	3	3	3	3	3	3	3	2	2	2	3	3	3	3	3	3
2	Abstract	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	3	3	3	2	2	2	3	2	3	2	2	2
3a	Introduction - rationale	2	2	2	3	3	3	3	3	3	2	1	1	3	3	3	3	3	3	2	3	2	2	1	2	3	3	3	2	2	2	3	3	3	3	2	3	3	2	3	3	3	3	3	3	3	2	2	2	3	3	3
3b	Introduction - hypotheses	2	2	2	3	3	3	2	2	2	2	2	2	3	3	3	2	2	2	2	2	2	1	0	0	1	1	1	3	2	2	3	3	3	3	2	2	3	2	2	3	3	3	3	3	3	0	0	0	3	3	3
4	Method - design	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	1	1	2	1	1	2	2	2	3	2	2	3	3	3	3	3	3	2	2	2	3	3	3	2	2	2	3	3	3	2	3	3
5	Method - participants	2	2	2	3	2	3	2	3	3	3	3	3	1	3	2	3	3	3	1	2	1	2	3	2	1	1	1	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	2	3	3	2	2	2	3	2	2
6	Method - variables	3	3	3	2	1	2	2	3	3	1	1	1	3	3	3	3	3	3	2	2	2	2	2	2	3	3	3	3	2	2	3	3	3	3	3	3	2	1	2	2	2	2	3	3	3	2	2	1	2	3	3
7	Method - scales	3	3	3	2	3	3	3	3	3	2	2	2	3	3	3	3	3	3	2	2	2	2	2	2	3	3	3	3	1	3	3	2	3	3	2	3	3	3	3	3	2	3	3	3	3	3	2	2	3	3	3
8	Analysis	2	2	2	2	1	1	3	1	1	1	1	1	2	2	2	1	0	1	0	0	0	2	1	1	1	1	1	2	1	2	3	2	2	3	3	3	3	2	2	2	2	2	1	0	1	2	1	1	2	1	1
9a	Results - descriptives	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	1	1	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	1	1	1	0	0
9b	Results - inferentials	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	3	2	2	2	1	2	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3	3
10	Discussion - key results	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	3	3	3	2	2	2	2	2	2	1	1	1	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	1	2
11	Discussion - limitations	2	2	2	2	2	2	2	3	2	1	2	1	3	3	3	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	3	3	3	3	2	2	2	2	2	3	3	3	3	2	3	2	2	2	3	2	2
12	Discussion - intepretation	3	3	3	3	3	3	3	3	3	2	3	2	3	3	3	3	3	3	2	2	2	2	3	3	1	1	1	2	2	2	3	3	3	3	3	3	3	3	3	2	2	2	3	3	3	3	3	3	3	3	3
13	Discussion - generalisability	1	2	1	3	3	3	1	3	1	0	0	0	1	1	1	3	3	3	0	1	0	0	3	2	1	1	1	1	2	2	3	3	3	2	3	3	2	2	2	2	3	3	1	1	1	1	0	0	1	0	0
14	Conclusions	3	3	3	2	2	2	2	2	2	3	3	3	3	3	3	2	1	2	1	1	1	2	3	2	1	1	1	1	2	1	2	3	3	2	3	3	2	3	2	2	2	1	1	1	1	2	3	2	3	3	3
TOTAL SCORE	(ex item 15)	37			37			38			30			40			40			23			26			27			32			44			43			37			40			36			28			33		
15	Funding	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0	0	0	0	0	0	3	3	3	3	3	3	0	0	0	3	3	3	3	3	3	3	3	3	0	1	0	0	0	0	0	0	0

Table 5.2 Evaluation of methodological quality for review papers.

*DJO – Deborah Owen: AB – Dr Amy Baraniak: DS – Professor David Sheffield.

5.2.2 Characteristics of included studies

The study revealed that data were not as abundant as expected prior to the review; the amount of appropriate research was disappointing, with relatively few rigorously-designed studies, and additionally a lack of phenomenological perspectives, despite the critical need for such research. No qualitative research had been undertaken that met criteria for inclusion in the review; the qualitative method is relatively new and is distinctive from biomedical statistics (Keen, 1975), which form the foundation of studies, and whilst it has burgeoned over the past few decades (Goodwin, Mays & Pope, 2006) it is not as pervasive as it might be, (due partly to word constraints in journal articles). Whilst realignments concerning the exclusion of qualitative research in certain academic journals are unconstructive, nonetheless, the zeitgeist is moving to one of recognition of the subjective construction of phenomena by individuals to form their ‘truth’ (Creswell, 2007). Taking everything into account, there is a paucity of data relating to personality factors influential in medication adherence.

The systematic review focused on 17 academic journal articles that included statistical data on personality and adherence to medical regimens. Whilst a variety of study designs and measures were utilised inquiries reported similar research aims.

Participants All studies used a population with a clinical diagnosis of a chronic condition with 6,748 participants.

Study characteristics Studies were dominated by respiratory conditions (k=4, n=866) and kidney/liver transplant or dialysis patients (k=4, n=327); a further significant contribution related to heart conditions (k=3, n=320). Remaining illnesses concerned hypertension (k=1, n=620), irritable bowel syndrome (k=1, n=326), high cholesterol (k=1, n=158), glaucoma (k=1, n=68), and mixed chronic conditions (k=1, n=749). In terms of population, diabetes was the most significant study (k=1, n=3,314). The mean age was 53 (SD±29) with females forming 46% of the population. Study populations were recruited from Holland (k=1, n=3,314), USA (k=8, n=1,294), Sweden (k=4, n=1,480), Canada (k=1, n=326), Hungary (k=1, n=58), Turkey (k=1, n=135) and the United Kingdom (k=1, n=131).

Primary assessment of personality factors Half of the studies (k=9) used the Neuroticism, Extroversion and Openness - Five Factor Inventory (NEO-FFI) scale (Costa & McCrae, 1992) to evaluate personality traits. One study supplemented the NEO-FFI with the Brief Symptom Inventory (BSI) (Derogatis, & Spencer, 1982), the Health Anxiety Questionnaire (HAQ) (Lucock, & Morley, 1996) and the Mastery Scale (Pearlin, Lieberman, Menaghan, & Mullan, 1981), whilst another study used the Hostility Scale of the BSI. A further study utilised the NEO-PI-R (Costa & McCrae) which, in addition to the Big Five personality traits assessed in the NEO-FFI also reports on six facets (subcategories) of each trait. The Type D Scale (DS-14) (Denollet, 2005) was used in three articles; further scales included a shortened version of the Chernyshenko Conscientiousness scales (CCS) (Chernyshenko, 2002; Green, O’Connor, Gartland & Roberts, 2016), the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975) and the Eysenck Personality Questionnaire – Revised Abbreviated Form (EPQR-A) (Eysenck, Eysenck & Barrett, 1985), and the Hostility Scale (Greenglass & Julkunen, 1991).

Assessment of medication adherence For the purpose of this review adherence was defined as adhering to a therapeutic intervention for a chronic illness as prescribed and/or agreed between the patient and healthcare provider. Scales for adherence were extensive, as were supplementary personality assessment inventories, and are shown in Table 5.3.

Self-report measurements include the extensively utilised Medication Adherence Rating Scale (MARS) (Thompson, Kulkarni & Sergejew, 2000) which is a five-item report scale that includes unintentional and intentional non-adherent behaviour. The MARs was used in isolation or as part of a battery of scales, such as in the study undertaken by Ediger, et al., (2007) which, together with the MARS, incorporated the Beliefs about Medication Questionnaire (BMQ) (Horne, Weinman & Hankins, 1999), and additionally developed two further measures specifically for their study: the Obstacles to Medication Use Scale and the Medication Reminders Scale. The Medication Event Monitoring System (MEMS) (MEMS, AARDEX® USA, CA) used by two studies is an example of an accredited measurement tool. It works by recording the amount of times the medication dispenser is opened and closed, indicating the number of doses taken.

All measures from studies were converted into effect sizes in the interest of parity. The overall effect sizes were combined using a random-effects meta-analysis and 95% confidence intervals (CIs) were calculated. The analyses should be considered suggestive rather than conclusive because small numbers of comparisons were available for several potential moderators; nonetheless, small to moderate negative and positive associations were found.

Non-generic scales were employed for some analyses and condition-specific measures were utilised, such as Serum P Analysis and Interdialytic Weight Gain, which are gauges used in haemodialysis patients (Moran, Christensen & Lawton, 1997; Wiebe & Christensen, 1997). Moreover, one study (Lee, Mendes de Leon, Jenkins, Croog, Levine & Sudilovesky, 1992) developed a bespoke scale (the Physical Symptoms Index) specifically for their research with hypertensive patients.

Reference	**Research topic**	**Illness condition**	**Population characteristics**	**MA measure (plus any scale for additional variables)**	**Personality measure**	**Study quality score (max. 51)**
1 Wu and Moser (2014) **USA**	To examine the association between Type D personality and medication adherence	Heart failure	84 (Type D: 20) Mean age: 60±13 (5±13) Female: 44% (50%) Caucasian: 77% (60%) Married: 58% (45%)	[1]Morisky Medication Adherence Scale (MMAS-4) [2]Medication Event Monitoring System (MEMS) [3]Multidimensional Perceived Social Support Scale (MPSSS)	Type D Scale (DS-14)	40
2 Axelsson, et al (2013) **Sweden**	To determine the mediating effects of personality traits, beliefs about asthma medication and adherence behavior	Asthma	516 Mean age = 47±15 Female = 60% Caucasian= - Married = -	[1]Medication Adherence Report Scale (MARS-5) [2]Beliefs about Medication Questionnaire (BMQ)	Neuroticism, Extroversion and Openness to Experience – Five Factor Inventory (NEO-FFI)	40
3 Axelsson, et al (2014) **Sweden**	The role of personality, gender and HRQoL on MA	Allergic rhinitis/asthma	180 Mean age = 49±11 Married = 65% Female = 58% Caucasian = -	[1]Medication Adherence Scale (MARS) [2]Short Form-8 Health Survey (SF-8)	NEO-FFI	41
4 Gorevski, et al (2013) **USA**	To measure the association of personality, depression, and QoL with MA	Liver and kidney transplant	136 liver (50) and kidney (86) transplant patients. Mean age = 53.6±15.7 Female = 33% Married = - Caucasian = 84%	[1]Immunosuppressive Therapy Adherence Scale (ITAS) [2]Patient Health Questionnaire 9 (PHQ-9) [3]Short Form 36 (SF-36) [4]Karnofsky Performance Status Scale	NEO Five Factor Inventory Scale (NEO-FFI)	33
5 Williams, et al (2011) **Scotland**	To assess the link between Type D and MA	Myocardial infarction	192; 131 at follow-up. Mean age = 66±10.8 Female = 28% Married = - Caucasian = -	Medication Adherence Report Scale (MARS)	Type D Personality Scale (DS14)	43
6 Axelsson, et al (2011) **Sweden**	To determine whether personality influences MA	Chronic disease	749 Mean age = 54 ± 11.09	Medication Adherence Report Scale (MARS)	Neuroticism, Extraversion and Openness to	43

			Female = 57% Married = - Caucasian = -		Experience Inventory (NEO-FFI)	
7 Wiebe and Christensen (1997) **USA**	To test whether MA Is predicted by health beliefs and personality in an interactive manner	Haemodialysis	63 Mean age = 56 ± 16.77 Female = 40% Married = 59% Caucasian = -	^{1}Health Beliefs Model ^{2}Serum P Analysis ^{3}Interdialytic Weight Gain	Neo-Five Factor Inventory (NEO FFI)	23
8 Hollo, et al (2009) **Hungary**	To investigate the influence of personality traits, depression, and training on MA	Glaucoma	58 Mean age = 67.3±14.1 Female = 60% Married = 50% Caucasian = 100%	^{1}Travalert Dosing Aid ^{2}State Trait Anxiety Inventory (Hungarian version) ^{3}Beck Hopeless Scale and Depression Inventory (Hungarian version)	Eysenck Personality Questionnaire (Hungarian version)	26
9 Emilsson, et al (2011) **Sweden**	To explore the influence of personality traits and beliefs about medication on MA	Asthma	35 Mean age = 52.8± 14.7 Female = 71% Married = - Caucasian = -	^{1}Medication Adherence Report Scale (MARS) ^{2}Beliefs about Medicines Questionnaire (BMQ Specific)	NEO Five-Factor Personality Inventory	30
10 Kalkan, et al (2013) **Turkey**	To identify profiles that indicate a high risk of nonMA	Allergic rhinitis (AR)	85 AR and 50 COPD Mean age = 43 ± (SD=19.4) Female = 43.7 Married = - Caucasian = -	^{1}MARS ^{2}Short Form 36 Health Survey (SF-36) ^{3}Mini Rhinitis Quality of Life Questionnaire (Mini-RQLQ)	Eysenck Personality Questionnaire – Revised Abbreviated Form (EPQR-A)	35
11 Farrell, et al (2011) **USA**	To determine whether personality, hostility and depression are associated with MA	Heart failure (HF)	105 Mean age = 57.38±10.75 Female = 38% Married = - Caucasian = 25%	^{1}Medication Adherence Scale (MAS) ^{2}Millon Behavioral Medicine Diagnostic (MBMD) scales ^{3}Center for Epidemiologic Studies Depression Scale (CESD) ^{4}Medical Outcomes Study Social Support Scale	Hostility Scale	44
12 Nefs, et al (2015) **Holland**	To explore Type D personality with health behaviours and emotional distress	Diabetes	3314 Mean age= 55 ±14 Female=53% Married = 80% Caucasian = 97%	^{1}Diabetes Self Care Inventory-Revised (DSCI-R) ^{2}Adherence Starts with Knowledge questionnaire (ASK-12) ^{3}Patient Health Questionnaire (PHQ-9) ^{4}General Anxiety Disorder questionnaire (GAD-7) ^{5}International Physical Activity Short Form (IPAC-Short) ^{6}Dutch Eating Behavior Questionnaire (DEBQ) ^{7}Problem Areas in Diabetes scale (PAID) ^{8}Brief Illness Perception questionnaire (BIPQ)	DS14	43
13 Ediger, et al (2007) **Canada**	To assess personality, demographic, clinical and psycho-social characteristics on MA behaviours	IBD	326 Mean age = 41 ± 14.06	^{1}Medication Adherence Scale (MARS-5) ^{2}Beliefs about Medication Questionnaire (BMQ)	^{1}Neuroticism, Extroversion Openness – Five	40

			Female = 60% Married = 65% Caucasian = 95%	^{3}Obstacles to Medication Use Scale ^{4}Medication Reminders Scale ^{5}Brief Symptom Inventory (BSI) ^{6} Health Anxiety Questionnaire (HAQ) ^{7}Mastery Scale	Factor Inventory (NEO-FFI)	
14 Stilley, et al (2004) **USA**	To examine the association between psychological and cognitive functioning and MA	High cholesterol levels	158 Mean age = 46.2± 8.7 Female = 45% Caucasian = 88.6%	^{1}Medication Event Monitoring System (MEMS) ^{2}Hamilton Depression Scale (HDRS) ^{3}State-Trait Anxiety Inventories ^{4}Wechsler Adult Intelligence Scale (WAIS-III) (Vocabulary and Performance subtests) ^{5}Cognitive tests: Digit Vigilance Test; Trails B, Rey Auditory Verbal Learning Test, Rey Complex Figure Test.	NEO-PI-R	43
15 Moran, et al (1997) **USA**	To assess the interaction of conscientiousness and social support in MA	Haemodialysis	56 Mean age = 57.2 ± (SD=15.1) Female = 36% Married = - Caucasian = -	^{1}Social Provisions Scale (SPS) ^{2}Serum P Analysis ^{3}Interdialytic Weight Gain	NEO-Five Factor Inventory (NEO-FFI)	36
16 Lee, et al (1992) **USA**	The impact of hostility and MA	Hypertension	620 Mean age = 48 ± (SD=17) Male = 100% Married = 80% Caucasian = -	^{1}General Wellbeing Adjustment Scale (GWB) ^{2}Physical Symptoms Index (developed for the present study)	Hostility Scale of the Brief Symptom Inventory (BSI)	28
17 Christensen and Smith (1995) **USA**	The role of personality in MA.	Renal dialysis	72 Mean age = 46.4 Females = 46% Married = - Caucasian = -	^{1}Serum K Analysis ^{2}Serum P Analysis	NEO-FFI	33

- denotes missing or undisclosed data.

Table 5.3 Characteristics of studies included in the review.

5.3 Results

P-values are reported to indicate effects in addition to Confidence intervals (CI) which are more informative. CIs denote the value of the reported measure between an estimated range. Should the range of the CI cross the ‘value of no effect’ (as shown in Figure 5.2) this connotes that the observed effect is statistically not significant; in contrast, where the range does not contain zero the observed effect is statistically significant.

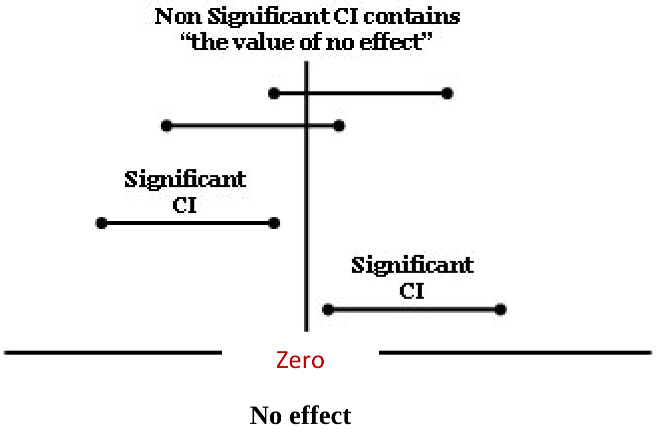
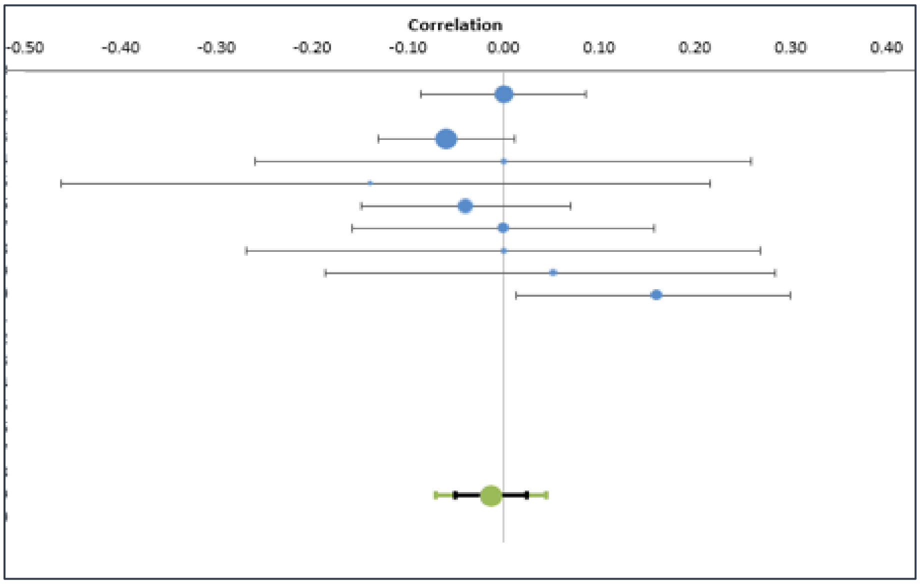


Figure 5.2 Significant and non-significant CIs (adapted from Attia, 2005).

The main outcome of the meta-analysis was the generation of the forest plots; these represent a pictorial representation of the effect sizes of the data. The effect sizes of the studies demonstrate symmetrically funneled plots, representing the distribution of the estimated effect sizes, indicating fairly equal distribution with little possibility of publication bias for the measure. *P*-values were computed to determine the observed variance in the dispersion of results in the forest plots and the extent to which this reflects a difference in the effect of the trait on adherence (Borenstein, Hedges, Higgins & Rothstein, 2009). The bottom row of each funnel plot indicates a summary; the bullet represents the weighted average effect size (that is, the combined effect size), the black bullet is the confidence interval, and the larger green line indicates the prediction level. The prediction level corresponds with the range of effect sizes that have been meta-analysed and that are represented in the forest plot; the level therefore acts as a description of the range of effect sizes.

Results for The Big Five

Openness – A negative relationship (*X*= -.01, 95% CI [-0.05, 0.02]) was found between openness and medication adherence. Gorevski, et al., [4] found an association between low openness scores and non-adherence (OR 0.09), with poor physical function and depression having a mediating effect. Furthermore, 25% of kidney and liver transplant participants were nonadherent due to 'forgetfulness'. No relationship between openness and medication adherence was found in COPD or asthmatic conditions [6; 9; 3], and there was no association (OR 0.86) in inflammatory bowel disease (IBD) [13] or renal dialysis (OR 1.46) [17]. No results were reported in studies 2, 14 or 15; a figure of zero was imputed for these studies and may not truly represent the actual findings. Results are depicted in Figure 5.3.



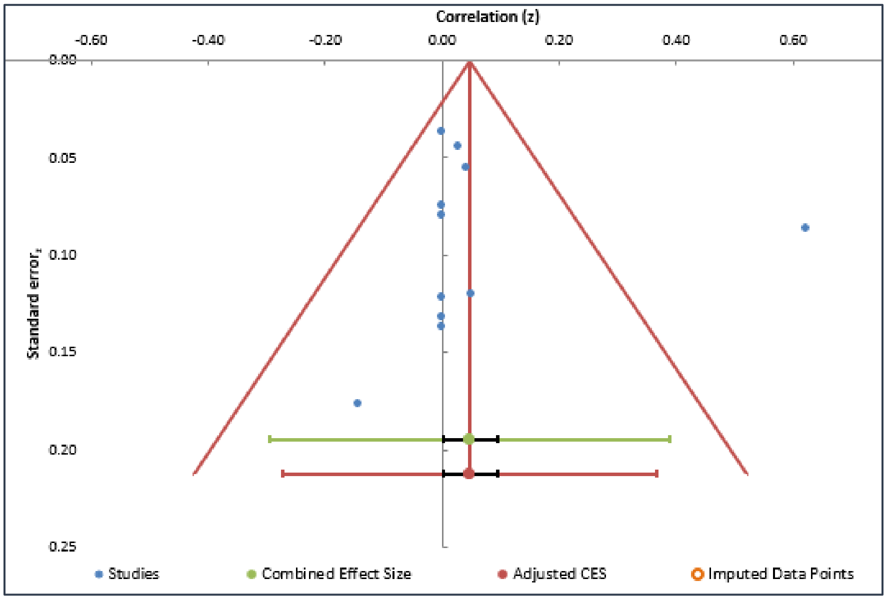


Figure 5.3 The forest and funnel plots depicting results for openness.

Conscientiousness – Conscientiousness was targeted by many studies (k=10) as a potential indicator of medication adherence and it was found that conscientiousness scores (*X*= .09, 95% CI [0.03, 0.16]) represent a modest, but significant, positive correlation. Conscientiousness was positively associated with adherence (OR 3.29) in 180 [3], and (OR 1.52) 516 participants with asthma [2], both as an independent variable, and together with concern as a mediating factor; conscientiousness and IQ were strong predictors (OR 2.14) of adherence among individuals with high lipoproteins serum cholesterol levels, whilst dutifulness and deliberation were the traits most strongly correlated with adherence [14]; a positive association (OR 1.81) was also found in chronic illness patients [6]. Christensen [17] reported that higher conscientiousness scores correlated with better adherence in renal dialysis but not in dietary adherence for the same cohort. Ambiguous results were reported in samples of haemodialysis patients [7; 15], and asthmatic conditions [9], whilst a study of IBD patients [13] did not find an effect (OR 1.20) between conscientiousness and adherence. Wiebe [7] found no correlation between conscientiousness and health beliefs, however high disease severity was associated with better adherence and high susceptibility was associated with poorer adherence in relation to conscientiousness. Emilsson [9] observed no association in asthma patients (OR 2.66). Results are depicted in Figure 5.4.

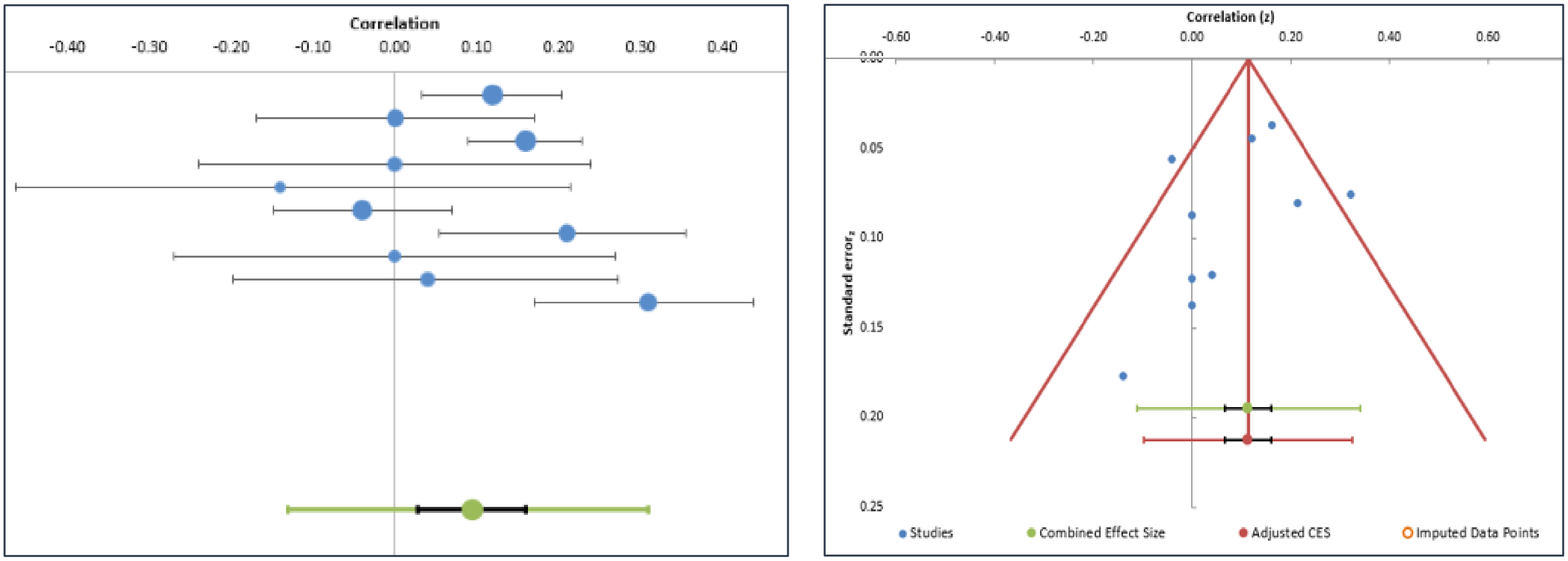


Figure 5.4 Results for the trait conscientiousness.

Extraversion – no relationship was demonstrated between extraversion and medication adherence in varied populations including asthma and/or allergic rhinitis (OR 1.04) [6], (OR 2.02) [9], (OR 1.61) [3], glaucoma (OR 2.15) [8], renal dialysis (OR 1.07) [17], or IBD conditions (OR 1.08) [13]. Overall, a small positive effect was found between extraversion and medication adherence (*X*= .02, 95% CI [0.00, 0.05]). However, five of the eleven studies did not reveal results where no significant effect was found; when imputed zero results were extracted in respect of these studies heterogeneity was not enhanced, nor was a more significant positive correlation evidenced (*X*= .04, 95% CI [0.00, 0.08]). Results are depicted in Figure 5.5.

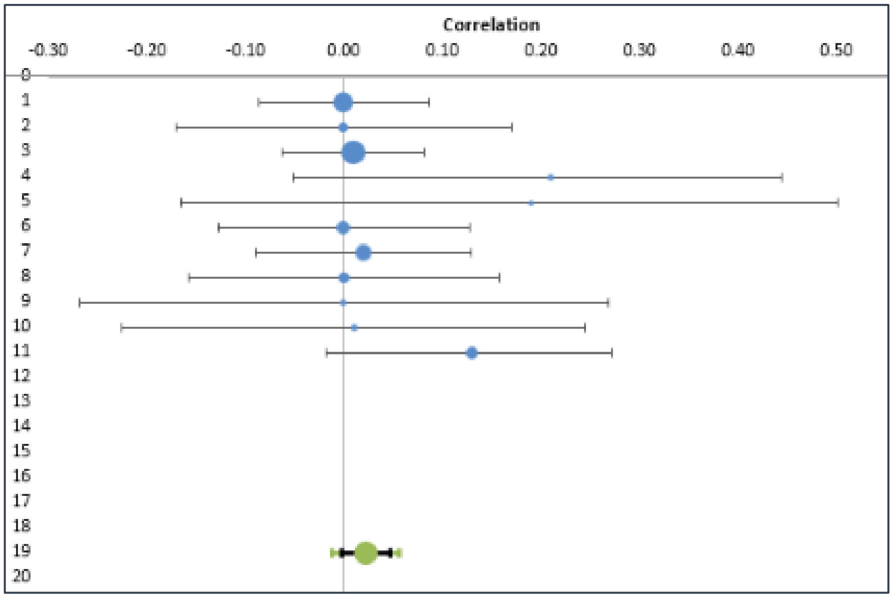
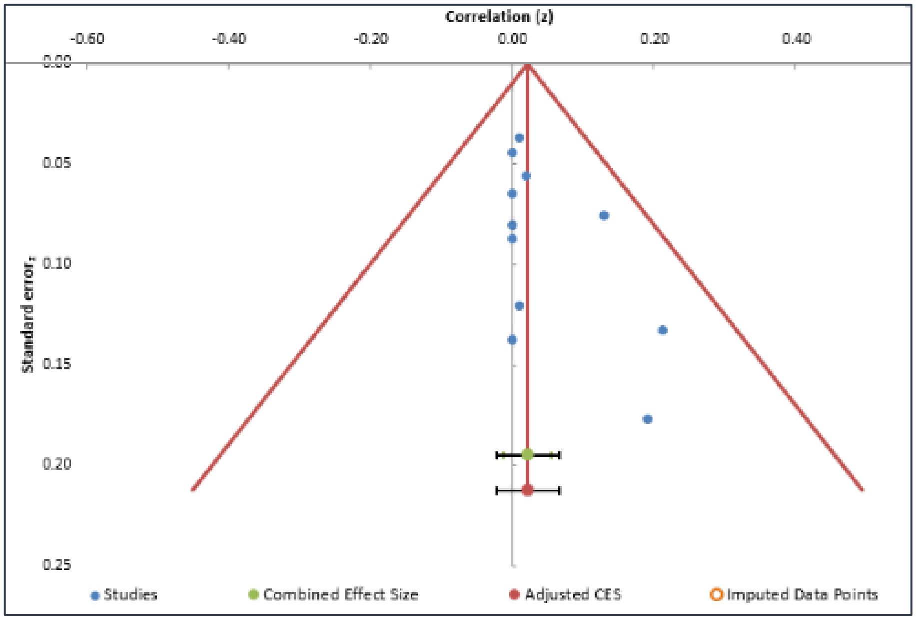
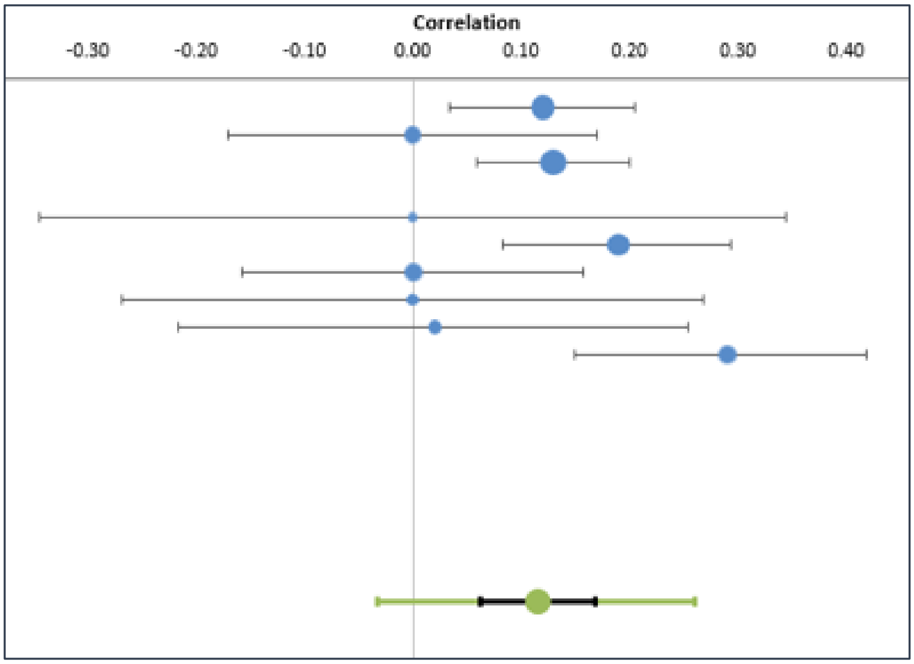


Figure 5.5 The forest plot and funnel plot results depicting extraversion.



Agreeableness – a positive association was found between agreeableness and medication adherence (*X*= .12, 95% CI [0.06, 0.17]). Agreeableness was positively associated with medication adherence (OR 1.59) in a sample of 516 people with asthma, with concern being a mediating factor [2]; for IBD sufferers (OR 2.04) [13]; higher agreeableness scores (OR 2.94) were associated with better adherence [3] in asthma and/or allergic rhinitis and in 98 asthma and COPD (OR 1.60) [6]. Low agreeableness in IBD was related to reduced adherence (OR 2.03) [13]. In contrast, in Christensen's study [17] agreeableness was not a predictor of adherence (OR 1.17). Results are depicted in Figure 5.6.



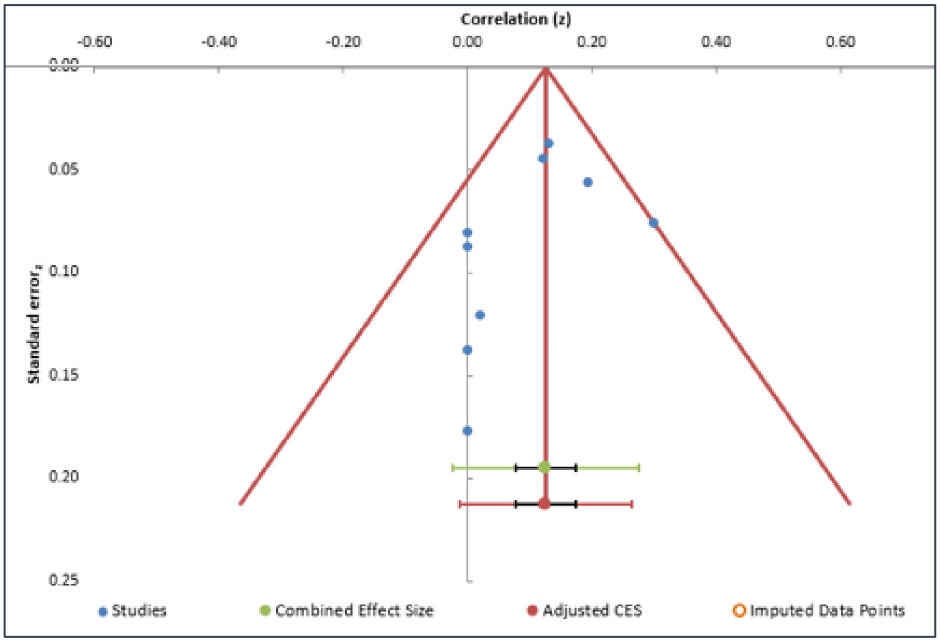
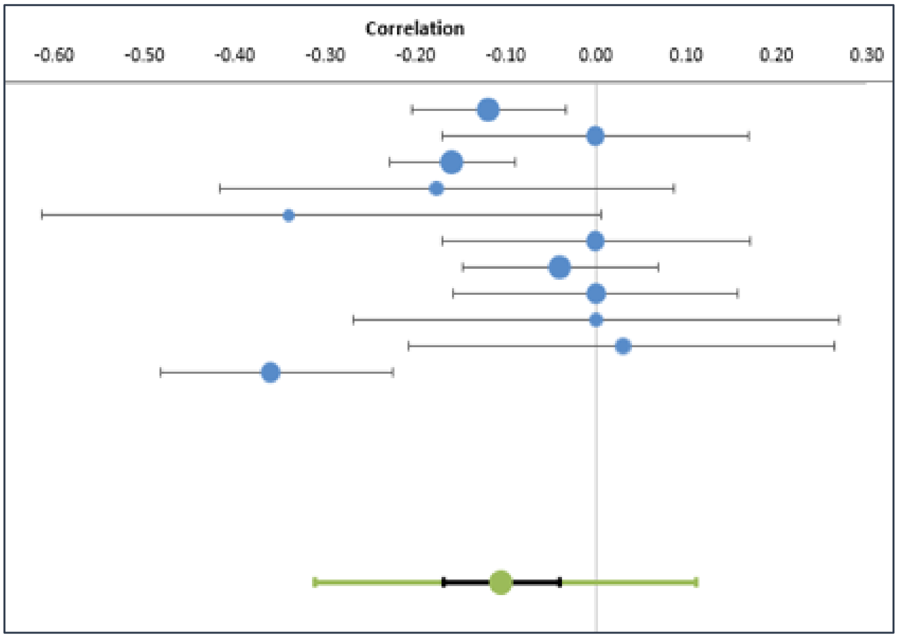


Figure 5.6 Results for agreeableness.

Neuroticism – except for conscientiousness, neuroticism was the most frequently observed personality trait. A significant negative correlation was observed between neuroticism and medication adherence (*X*= -0.10, 95% CI [-0.17, -0.04]). Axelsson [6] noticed a negative effect of neuroticism and medication adherence (OR=0.566) in 98 asthma, COPD, and chronic illness participants; an association with adherence was observed (OR 0.65) in 516 individuals with asthma [2], and also the partial mediating effect of concern. However, no relationship was found in a study of glaucoma patients (OR 1.92) [8], nor in COPD patients [10]. Contrasting gender outcomes suggested that neuroticism is (OR 0.25) a negative correlate of adherence in men [18] and that lower adherence (OR 0.27) was observed in males with asthma [9]. No effect was observed in IBD patients (OR 1.14) [13], in renal dialysis patients (OR 1.11) [17] or in patients requiring cholesterol lowering treatment [14]. Increased trait anxiety, associated with neuroticism, was associated with reduced medication adherence in a sample of adults with elevated cholesterol levels [14] but no relationship was found (OR 2.06) in a sample of glaucoma patients [8].



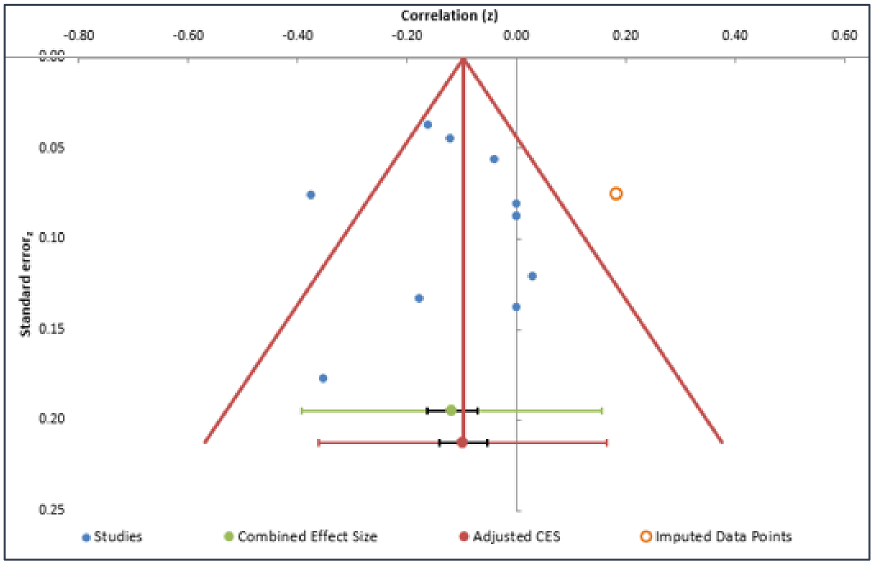


Figure 5.7 Funnel and forest plots for neuroticism.

Overall results are reported in Table 5.4.

Reference	**Research topic**	**Personality factor**	**MA measure**				**Analysis**	**Adherence rate**	**Conclusions**
Quality			**OR**	**d**	**r**	***t* value**			
1 Wu & Moser (2014) **N=84**	To examine the association between Type D personality and medication adherence	Type D: Type D (N=20) NA (N=28) SI (N=36)	1.875 1.923 0	0.3466 0.3605 0	0.1707 0.1774 0		Multivariate analysis to compare clinical and demographic factors. Multiple regression explored the relationship between type D personality and MA.	Type D personality is more likely to be associated with poor MA before and after adjusting for covariates as a categorical variable (1.05 vs .56, *p*=.027), (adjusting for psychological [perceived social support] factors *p*=.042), but not when analysed as a dimensional construct. NA was associated with MA compared to non NA (1.00 vs 0.52, *p*=.015). SI not associated with MA.	Negative affectivity, a component of Type D personality, was associated with medication adherence.
2 Axelsson, et al (2013) **N=516**	To determine the mediating effects of beliefs about asthma medication, personality traits and adherence behavior	Big 5: O C E A N	0 1.5242 0 1.5912 0.6508	0 0.2324 0 0.2561 -0.2368	0 0.1154 0 0.127 -0.1176	0 2.634 0 2.902 -2.685	Confirmatory factor analysis and structural equation modelling.	Agreeableness (0.151), neuroticism (-0.114) and conscientiousness (0.133) are significant factors in MA with concern to a partial mediator on adherence behaviour.	Agreeableness, conscientiousness, and neuroticism were associated with adherence behaviour.
3 Axelsson et al (2014 **N=180**	To investigate the role of personality and gender in rhinitis and asthma patients	Big 5: O C E A N	1.7668 3.2913 1.609 2.9406 0.2489	0.3138 0.6568 0.2622 0.5947 -0.7668	0.155 0.312 0.13 0.285 -0.358		Descriptive statistics, bivariate correlations, and multiple regression	Men with higher neuroticism scores are more likely to be less adherent (-0.358) whilst better adherence was correlated with higher conscientiousness in men (0.312)	Neuroticism and conscientiousness influenced adherence behaviour in men, but no correlation was found for women. Lower N, higher A and C scores associated with better MA.

4 Gorevski, et al (2013) N=136	To measure the association of personality, depression, and QoL with MA	Big 5: O C E A N	0.09 0 0 0 0	-1.3276 0 0 0 0	0.553 0 0 0 0	Logistic regression analysis	56% reported adherence rate. Participants with low openness scores were 91% more likely to be non-adherent (OR=0.09, CI=0.01-0.51, p<.02)	Low openness is associated with MA with poor physical function and depression having a mediating effect.
5 Williams et al (2011) N=131	To assess the link between Type D and MA	Type D: NA SI	10.314 0	1.285 0	0.541 0	Hierarchical multiple regression analyses.	33.9% categorised as Type D personality. Type D personality's scores (M=18.72, SD=5.12) for MA were significantly lower than non-Type D (M=23.05, SD=1.95) individuals (t (1,190) =-6.94, p<0.001).	NA and SI (constituent components of Type D personality) predict MA after controlling for demographic and clinical risk factors
6 Axelsson et al (2011) N=749	To determine whether personality influences MA	Big 5: O C E A N	0.7924 1.814 1.0445 1.603 0.566	-0.1283 0.3283 0.024 0.2602 -0.3138	-0.064 0.162 0.012 0.129 -0.155	Descriptive statistics performed and univariate associations tested by Pitman's permutation test and multiple linear regression.	Negative relationship between neuroticism and MA (p<0.001), but a positive association between agreeableness (p<0.001) and conscientiousness (p<0.001) and MA.	Personality factors may interact in influencing adherence behaviour. Neuroticism indicates an inclination to nonMA
7 Wiebe & Christensen (1997) N=63	To test the hypothesis that health beliefs and personality predict MA in an interactive manner	Big 5: C	0	0	0	Hierarchical, forced-entry regression	Significant relationship between age (β = -.37, p<.01) and diabetic status (β = .13, p<.05) driven by the interaction of C and perceived severity (β = .45, p<.01) but the remaining interactions were negligible. Only C reported	The interaction of conscientiousness and health beliefs was not significantly associated with weight gain but did predict serum phosphorous levels.
8 Hollo et al. (2009) N=58	To investigate the influence of personality traits, depression, and training on MA	NEOP + Anxiety N E/I P Anxiety	1.9201 2.1545 1.5503 2.057	0.3597 0.4232 0.2417 0.3976	0.177 0.207 0.12 0.195	Kruskal-Wallis test and Spearman's correlation.	Adherence was 77%. No relationship was found between anxiety or personality traits and non-adherence: state anxiety (Rs=0.065), neuroticism (Rs=0.177) and extraversion/ introversion (Rs=0.207) where p≤0.05.	Objectively measured adherence was good and not influenced by treatment characteristics.

9 Emilsson et al (2011) **N=38**	To explore the influence of personality traits and beliefs about medication with MA	Big 5: O C E A N	0.5987 2.6559 2.0178 0 0.2694	-0.2828 0.5385 0.3871 0 -0.7231	-0.14 0.26 0.19 0 -0.34	Mann Whitney's U-Test. Linear regression analysis, Pitman's test, and Pearson's correlation coefficient to explore associations.	Personality traits did not correlate with MARS. However, N explained 52% (R^2=0.52) of the variance in MARS. Each unit increase in N in men decreased MA by 0.41 units (p<0.01).	Overall, personality traits were not associated with MA however, higher N scores in men were associated with lower adherent behaviours whilst higher C scores predicted higher MA.
10 Kalkan et al (2013) **N=135**	To identify profiles that indicate a high risk of non-adherence	Traits: E N Psychoticism	0 0 0	0 0 0	0 0 0	Kruskal-Wallis test, Mann-Whitney test, Fisher exact test, Pearson, and Spearman correlations.	Women exhibited higher mean scores of E (3.83 [1.89] vs 3.03 [1.95]; p=.01). 20.7% reported perfect adherence whilst 28.2% reported suboptimal. Adherence improves with HRQoL (r=0.311, p<.001). No correlations were found between personality traits and MA (r=-0.063[p=.46] for E, r=-0.047[p=.59] for N, and r=-0.079[p=.36] for PCS.	None of the personality traits predicted adherence.
11 Farrell et al (2011) **N=105**	To determine whether depression, hostility and personality are associated with MA	Traits: hostility	2.0869	0.5811	0.279	One-way ANOVAs. Multiple regression.	Mean adherence was high (5.93, SD=2.22). 58% of the sample suffered from depression. Hostility was a significant predictor of MA (β=.202, t[102]=2.072, p=.041).	Hostility was associated with poor adherence.
12 Nefs et al (2014) **N=952**	To explore Type D personality with health behaviours and emotional distress	Type D	2.86	0.5793	0.2782	AN(C)OVAs	Type D=29%, SI=17% and NA=15%. MA between groups not significant.	Type D personality associated with unhealthy behaviours and negative emotions.
13 Ediger et al (2007) **N=326**	To assess demographic, clinical and psycho-social characteristics on MA behaviours	Big 5: O C E A N	0.8554 1.2035 1.0753 2.0412 1.1355	-0.0861 0.1021 0.04 0.3934 0.07	-0.043 0.051 0.02 0.193 0.035	Logistic conditional regression examined the relationship between MA and explanatory variables including personality	Low adherence identified in 35% of participants with 11% only taking meds when they felt like it. Agreeableness significantly predicted MA – those scoring low agreeableness are twice as likely to report low MA.	Various predictors of MA were analysed with different variables reported by men and women.

14 Stilley et al (2004) **N=158**	To examine the association between psychological and cognitive functioning and MA	Big 5: O C E A N Anxiety	0 2.1378 0 0 0 0	0 0.4189 0 0 0 0	0 0.205 0 0 0 0		Pearson and Spearman correlations. Simple linear regression analyses and hierarchical regression analyses.	Neuroticism, depression, and anxiety were significantly correlated with lower IQs and non-adherence. Dutifulness and deliberation were the facets of C most strongly associated with MA.	Only 23% of participants were fully adherent at least 80% of the time. IQ and C were strong predictors of MA with depression and anxiety less statistically significant.
15 Moran et al (1997) **N=56**	To assess the interaction of conscientiousness and social support in MA	Big 5: O C E A N	0 0 0 0 0	0 0 0 0 0	0 0 0 0 0		Hierarchical regression analysis	The main effect for age in support and C was significant (t=-5.18, β=-.57, p=<.0001). The interaction effect for support and C was significant (t=-2.2.7, β=-.25, p<.05), and among high C patients high and low levels of support had minimal differing effects (Y=5.74 lb and 5.47lb respectively).	High support in patients with low C was associated with poor MA but no interactive effect on high C patients. Furthermore, older patients have better MA.
16 Lee et al (1992) **N=620**	The impact of hostility and MA	Traits: hostility	0.7202	-0.1809	-0.0901	-2.25	ANCOVA, t-tests and ANOVA.	Hostility levels were significantly higher in patients who reported skipping meds than in those who adhered (x=2.75 vs x=2.14; t=-2.25, p<.05)	Hostility levels lower in patients adhering to medication.
17 Christensen and Smith (1995) **N=72**	The role of personality traits in renal dialysis MA	Big 5: O C E A N	1.4554 1.3219 1.0729 1.1673 1.1134	0.1029 0.0767 0.0194 0.0426 0.0592	0.0514 0.0383 0.0097 0.0213 0.0296		Forward entry stepwise regression	Higher levels of Conscientiousness report better adherence (Y=5.58 mEq/L)	Cross sectional measurement renders conclusions limited however conscientiousness may enable compliance to a complex medication regime but not dietary adherence

Table 5.4 summary of findings in the review papers.

Further reviewed traits

Results were equivocal for psychoticism (X= .04, 95% CI [-0.05, 0.13]) where medication adherence was not predicted in either study investigating it [8; 10], and negative affect (NA) (X= .38, 95% CI [0.05, 0.63]). NA was shown to influence medication adherence in a sample of 131 myocardial infarction patients (OR 10.31) [5] and was negatively associated with adherence in heart failure patients [1] (1.00 vs .52, p=.015). Results were also inconclusive in respect of hostility (X= .09, 95% CI [-0.22, 0.38]) and anxiety (X= .07, 95% CI [-0.08, 0.21]). Studies focusing on hostility as a personality trait found that this facet was negatively associated with medication adherence in haemodialysis patients [7], was a significant predictor of adherence (OR 2.87) in heart failure [11] and that hostility levels were higher in hypertensive patients who skipped medication than those who adhered. No relationship was found between anxiety or personality traits and non-adherence: state anxiety (Rs=0.065) in glaucoma but was correlated with overall adherence in cholesterol-lowering medication (OR -.16).

Studies showed that there was a significant positive correlation between medication adherence and Type D personality (X= .28, 95% CI [0.25, 0.30]). Wu (1) observed poorer medication adherence in type D than in non-type D heart failure patients (1.05 vs .56, p=.027). The association between NA and SI and adherence in a cohort of diabetes patients [12] was not significant (OR 2.86) but type D personality was associated with negative emotions and unhealthy behaviours. Overall Type D personality scores (M=18.72, SD±5.12) for adherence were significantly lower than non-type D (M=23.05, SD±1.95) myocardial infarction patients [5] (t(1,190=-6.94, p<0.001) potentially identifying a predictive association between the constituent parts of type D personality (i.e. NA and SI) and adherence. No results were reported in respect of personality types A or C.

Consideration was given to the quality assumptions accorded to each of the reviewed papers and further analysis of traits was undertaken to check the strength of associations; this, however, resulted in no variation in statistical heterogeneity. Additionally, as part of the sensitivity analysis, a supplementary meta-regression was conducted in terms of the potential effects of the type of measure used; again, no differences were found in results between subjective and objective assessment measures of adherence.

5.4 Discussion

Studies have shown that personality traits have utility in identifying an individual's predisposition to health behaviour (e.g., Friedman, 2008) and, consequently, that adherence is a mediator between personality and health (Cloninger, 2005). The goal of this review was to add to literature by analysing whether personality influences medication adherence in chronic illness conditions and whether affects are mediated by further direct or indirect variables. This study extends insight into personality traits and their relationship with adherence in chronic illness; findings suggest a correlation between personality traits and medication adherence, however the results need to be interpreted with caution due to the heterogeneity across the studies in terms of population, study design, personality inventories and statistical analyses. Findings demonstrate unique relations and provide support for the conceptualisation of traits as multi-faceted constructs, indicating the potential for personality to be used predictively to identify those individuals at risk of poor adherence. FFM traits have been linked with health behaviours such as adherence to medication (e.g., Chapman, Duberstein & Lyness, 2007) and adeptly capture much of the variance in characteristics (Conrad & Barker, 2010). In particular, three traits are significantly associated with medication adherence in chronic conditions: conscientiousness, agreeableness, and neuroticism. This is significant in terms of targeting interventions which could be strategically developed for individuals.

Conscientiousness Two constituent characteristics of conscientiousness are discipline, and organisation; individuals with raised scores in this trait may possess a predisposition to achieve the goal of the therapeutic regimen as a result of an elevated propensity for health-behaviour (Bogg & Roberts, 2004) and report higher levels of wellness maintenance (Edmonds, Bogg & Roberts, 2009). Motivation tends to emanate internally rather than externally (Ingledew & Markland, 2008) which leads to a greater inclination to medication adherence. In contrast, people with lower conscientiousness scores tend to have less motivation in goal-directed behaviour, perceive more barriers and consider that they have less control, resulting in less healthy lifestyles and reduced adherence. Axelsson, Brink and Lötvall's (2014) investigation in asthma and allergic rhinitis support previous research suggesting the influence of conscientiousness in adherence (Molloy, O'Carroll & Ferguson, 2013). Conscientiousness was most commonly reported as being positively associated with adherence, however Axelsson, Brink, Lundgren and

Lötvall's study (2011) found that higher conscientiousness correlated with reduced adherence. These contrasting findings may be attributed to individuals trusting their self-management ability and therefore feeling comfortable moderating medication without reference to clinical advice; further, it should be noted that these participants were younger and also scored higher in neuroticism. In Axelsson, Brink and Lotvalls's (2014) study conscientiousness also co-varied positively with older age, indicating that younger individuals may find it more challenging to adhere to treatment regimes; possessing lower self-discipline and being less structured could lead to forgetfulness with a concomitant potential impact on adherence, particularly in men. Therefore, additional support will be indispensable and the utilisation of strategies, such as medication reminders, in addition to the most effective routine. Whilst, in general, conscientious individuals demonstrate higher levels of adherence to self-care, age differences may be a modifying factor. Literature concerning age and health behaviour indicates that it is an influential variable in understanding the relationship between adherence and personality. Conscientiousness seems to be more strongly correlated with older age and in extant research older age has been linked to greater difficulty in learning clinical information (Barclay, et al., 2007), and generating more adherence-related errors (Morrell, Park, Kidder & Martin, 1997) whilst paradoxically, demonstrating higher levels of adherence (Park, 1999). As a result, it may be understood that it is possible to construe adherence in multiple ways (Meichenbaum & Turk, 1991) and therefore that conceptualisation as a single construct may be problematic.

Wiebe and Christensen (1997), found no association between conscientiousness and health beliefs and suggested that the combination of high conscientiousness and high perceived disease severity may have an unfavorable effect on adherence since individuals engage in non-rational and maladaptive coping strategies characterised by procrastination and irrationalisation, resulting in the formation of hasty decisions based on limited information, and illogical cognition (Janis, 2016). Furthermore, this exemplifies differences across illness conditions since haemodialysis patients are subjected to many procedures which are not directly controlled by themselves and, even though an individual may be high in conscientiousness, negative outcomes may be inevitable in this condition regardless of patient adherence (Christensen, Smith, Turner & Cundick, 1994).

Stilley, et al., (2004) found that conscientiousness robustly predicted medication adherence, with deliberation and dutifulness the facets most strongly related. This evidence could be useful in terms of intervention strategies which might prove more efficacious if, for example medication-taking was incorporated more autonomously in daily routines rather than as a separate volitional activity. Conscientiousness was also significantly correlated with correct scheduling, which is critical for pharmacological therapy that is required to be taken at specified times. Moran, Christensen, and Lawton's study resulted in no association, however observed that being absent from home in social situations was a major adherence barrier, and it was suggested that low conscientiousness scorers may be susceptible to nonadherence in these circumstances, being more prone to lacking self-discipline and self-control. Christensen and Smith (1995) found that high conscientiousness predicted better medication, but not dietary, adherence. Subsequent studies (e.g., Turk & Monarch, 2018) support previous research and suggest the interaction between psychological and social factors from which we may conclude that various aspects of health behaviour result in individual difference correlates. However, this highlights the difficulties in assessing components which may not be subject to behavioural influences (e.g., potassium concentration in the dialysate). Qualities of diligence implicit in conscientiousness may influence the individual's ability to adhere to medication but further research is required to identify the possible behavioural processes at play.

Agreeableness Studies have found it difficult to find a relationship between agreeableness and adherence, contrary to potential expectations, particularly taking into account negative links with risk-taking behaviour (Booth-Kewley & Vickers, 1994). Individuals low in agreeableness are characterised by scepticism and a propensity to distrust, which could be influential in how a person considers their medication. However, individuals high in agreeableness also tend to have an altruistic character, giving precedence to others' needs before their own (Costa & McCrae, 1992). Axelsson, Brink, Lundgren and Lotvall (2011) showed that this trait has a positive effect but only to a particular point, conceivably due to high agreeableness scores correlating with low conscientiousness. One study (Ediger, et al., 2007) investigating 326 IBD patients indicated that nonadherence in women was associated with low agreeableness. Whilst gender may play a significant role, beliefs and attitudes are integral influences, the amount and degree of any obstacles strongly predict adherence and therefore other markers, such as financial pressures, may force the patient to behave inconsistently. Furthermore, lower agreeableness may produce physiological responses that contribute to illness conditions, such as cardiovascular disease, due to heightened sympathetic activity causing elevated interpersonal conflict and distress, exacerbated by the likelihood of decreased social support. Nevertheless, realities such as physical impediments, are testable and therefore potentially removable, leaving the way open to investigate the trait psychological and cognitive factors. Agreeableness has been correlated with adherence in hypertensive adolescents (Zugelj, et al., 2010) concluding that individuals high in agreeableness tend to be less strong-willed and more co-operative with healthcare providers.

Neuroticism High scorers in neuroticism are prone to an enduring experience of negative feelings, have more avoidance-related concerns, an increased risk of depression and elevated levels of medication concerns; a worrying type of person, with poor emotional status, who tends to engage in riskier health behaviours, such as smoking, and who may deviate from disease-management strategies' (Bruce, Hancock, Arnett & Lynch, 2010). Despite this however, individuals seem to be more attentive to somatic symptoms and tend to utilise health care provision more regularly (Costa & McCrae, 1997). The analysis by Axelsson, et al., (2011) suggests that neuroticism combined with additional mediating factors, such as age or gender, influence medication adherence. In fact, Emilsson, et al., (2011) found that neuroticism in men was associated with lower adherence when additionally scoring high on the specific concerns scale of the BMQ. This combination may be explained by concerns about potential negative consequences of medication, since high scorers in neuroticism tend to experience apprehension, fear, and anxiety, and consequently elect to be selective in their choice of medication. Situational context is also relevant as neurotic individuals tend to interpret events in a more pessimistic manner (e.g., Mroczek & Almeida, 2004), experiencing disproportionate levels of distress in response. Furthermore, neuroticism was negatively correlated with adherence in men (Axelsson, et al., 2014) supporting the theory that men and women have gender-specific needs (Messing, et al., 2003) which could be of significance when designing interventions. However, neurotic individuals tend to report more physical illness and symptoms than are existent in reality and self-report may therefore be problematic. Neurotics are more prone to depression (Booth-Kewley & Friedman, 1987), which is interpreted as a direct causal agent, particularly pertinent in cardiovascular disease studies such as the ones analysed in this review. The paradoxical effect of neuroticism is evident; some individuals who experience anxiety, in addition to adjunctive predictors of nonadherence including a lack of social support increase the risk of failing to adhere to treatment regimes, whilst others experience increased neurotic vigilance leading to enhanced health behaviour (Weiss & Costa, 2005). Neurotics are more liable to display anxiety and frustration in situations or in response to stimuli which others would not find challenging (Costa & McCrae, 1992), this may lead to frustration and thence to nonadherence; neurotics experience exigence of delayed gratification (Ajzen, 2005), which in the context of chronic illness medication could prove problematic. Wiebe and Christensen (1996) argue that linear models are incapable of capturing the relationship between neuroticism and adherence and consequently propose a curvilinear relationship, which is an issue that could be addressed by future research.

Limited focus was conferred on the remaining Big Five traits of openness and extraversion, which have exhibited inconsistent relationships with adherence in extant literature. Previous studies have demonstrated an association between extraversion and exercise adherence (Courneya, et al., 2002) and also with antidepressant medication (Cohen, et al., 2004), possibly reflecting mastery seeking and perseverance intentions (Clark & Watson, 1991), or that individuals higher in extraversion have a predisposition to positive affect and learning orientation (Zweig & Webster, 2004), however no studies in this review were able to detect a correlation. This conflicts with the conceptualisation that high extraversion scorers are engaged with their lives, in which performance is rewarded, but does suggest that when hedonistic tendencies (Meehl, 1975) are not satisfied the individual may disengage from goal-directed efforts. This might suggest that personality traits may have different influences dependent upon the specific illness condition and various health behaviours, and it highlights that adjustments for correlates such as gender, cognitive function, and social support should be taken into account. Nonetheless, relationships are somewhat intuitive currently; low openness, (higher conservativeness and lower levels of curiosity and independent judgement) may relate to situational apprehension, whilst condition-severity may be more salient in extraversion (positive emotionality and general activity), (Rosellini & Brown, 2011). Of the FFM traits Openness has effected the most debate and is widely defined in various inventories as a consequence (e.g., Costa & McCrae, 1997;

Kalpan, Levinson, Rodebaugh, Menatti & Weeks, 2015; John & Srivastava, 1999). Low openness was associated with nonadherence in the study of kidney and liver transplant patients, as may be expected from incurious, insensitive, intellectually unmotivated individuals with narrow perspectives (Costa & McCrae, 1988); the study also found a connection between low openness, depression, and poor physical function, which negatively impacts on medication adherence. Psychological distress and perceived transplant-related stress are known factors affecting adherence (Achille, Ouellette, Fournier, Vachon & Hébert, 2006), furthermore, prednisolone was administered to the kidney transplant cohort, a drug associated with depression in transplant-patients and known to be a psychiatric factor of nonadherence, which may have confounded results. It has been posited that clinical descriptions of alexithymia, an inability to differentiate bodily sensations or to express and describe feelings (Sifneos, 1973; Kano & Fukudo, 2013), may correspond to facets of low scale of the openness factor (Elfhag & Lundh, 2007). Alexithymia may indicate a genetic predisposition or epigenetic factor (Holloway, Yang & Holgate, 2010) and a higher incidence of near-fatal asthma is found in alexithymics (Serrano, et al., 2006). Axelsson (2014) was the singular paper suggesting that male alexithymics have less asthma control than their female counterparts. Alexithymia is a psychodynamically oriented construct associated with health behaviour (Lumley, et al., 1996) which features a difficulty to communicate, influence in patient-practitioner interactions and the quality of care received as a consequence; however, whilst lacking in emotion alexithymics are socially conforming and literal which may be of advantage in adherence behaviour.

The review studies support previous findings that individuals with type D personality are at higher risk of nonadherence (e.g., Molloy, et al., 2012). Type D personality is defined as the blend of high negative affect (NA) and social inhibition (SI) scores (Denollet, 2005), and is associated with unhealthy behaviours and adverse emotions, particularly loneliness, depressed mood and emotional distress (Nefs, et al., 2015); it is a personality profile predictive of poor mental health and medication adherence associated with the report of increased barriers and the likelihood of engaging in unhealthy behaviour, such as suboptimal consultations (Nefs, et al., 2015). A study investigating type D patients with heart failure (Wu & Moser, 2014) indicated poorer adherence, however the sample was small which may have confounded the regression analyses, and consequently findings should be considered exploratory. Nonetheless, research does present an indication that type D personality is more likely to be associated with poor adherence as a categorical variable, (adjusting for psychological [perceived social support] factors) but not when analysed as a dimensional construct. Furthermore, whilst NA is predictive of lower medication adherence, Williams, et al., (2011) demonstrated that it is the interaction between NA and SI dimensions, after controlling for demographic and clinical factors, which predict reduced adherence in myocardial infarction patients. Previous research has been inconclusive, producing conflicting results (effects in opposite directions) regarding the influence of type D personality but studies have tended to test the categorical dimensions as opposed to the interactions between them; as a binary construct type D personality seems to predict a decline in adherence. The studies included in this review do seem to indicate that results are caused by the main effect of NA, or as a result of the interaction between NA and SI, rather than the independent mediating effects of SI (which was largely either unreported or noted as not significant). However, there may be further correlating influences such as concerns regarding the recommended medication regime or apprehension regarding side effects and, as such, adherence differentiation may result from adaptive treatment-related behaviour and self-management. Alternatively, for instance, previous research in asthma patients (Burkhart & Rayens, 2005) has reported that an external locus of control was associated with lower adherence; additionally, it has been suggested (Molloy, et al., 2012) that self-efficacy may be a factor in terms of adaptive decision-making under demanding circumstances, and further research is needed in this area. The SI dimension indicates an individual who is likely to find emotional expression problematic for fear of rejection or disapproval (Denollet) and therefore may find the social interaction with the health care professional difficult. This may subsequently lead to possible adherence issues and is useful to know in terms of possible intervention strategies. The ability to differentiate negative emotional experiences may reflect regulatory strategies moderating maladaptive processes and adherence behaviour. Critics of the type D construct suggest that it is merely a measure of depression, however this review’s conclusion supports previous studies investigating the interaction between NA and SI (e.g., Denollet, et al., 2006;2008) that there is a phenomenological distinction between depression and type D personality.

Hostility, anxiety, and psychoticism were the final traits reviewed; however, the volume of evidence is limited. In previous research hostility has been consistently related to coronary disease (e.g., Smith & Williams, 1992) and a negative association with adherence. The review suggested that hostility is a significant predictor of medication adherence in heart failure patients and in hypertensive individuals and was reported as higher in those who skipped medication rather than those who adhered (Christensen, 1997; Farrell, 2011; Lee, 1992); however, high hostility scorers were more likely to admit to forgetting medication, which could be of utility in terms of therapeutic regime interventions. One rationale for nonadherence is that hostility correlates with other traits, such as neuroticism, which also predict poor medication adherence.

High scorers of hostility not only face increased side effects from their medication regime, which may contribute to a reduction in adherence, but additionally social incompetence is a component of the hostile individual and a subsequent tendency to experience lower social support. This could be a further possible explanation of the negative association between hostility and adherence, since previous research has indicated the importance of social support in medication adherence, (Lee, et al., 1992). Interventions could therefore utilise this knowledge in therapeutic strategies.

Results of previous studies concerning anxiety have been variable (DiMatteo, et al., 2002); results in the review sample were found to be comparable to population norms and as a result had no influence on medication adherence in glaucoma patients. The high adherence rate (77%) in this small sample supported previous findings (e.g., Schwartz, 2005) that glaucoma patients have a tendency to over-estimate their adherence due to social desirability, but did not demonstrate significant association between personality traits and adherence. Higher levels of anxiety were associated with reduced adherence but only when considered independently in cholesterol lowering therapy; for example, when conscientiousness and IQ were considered anxiety was not a significant factor, suggesting that there is a component of independent adherence. The trait of psychoticism was also explored in the review however, investigation was limited. Neither of the studies in the review were able to support an association with adherence; psychoticism levels did not differ from the population norm and significant results were therefore not expected. Additional research is needed to clarify how, if at all, the constructs are meaningfully related.

Correlational effect warrants some discussion; various correlations were of modest effect (Hemphill, 2003). This leads to the conjecture that stronger effects might be found if more objective and precise measures were investigated; that said, results for conscientiousness in this meta-analysis, for example, correlate to similar meta-analytic research which showed an average range of .05 to .28 (Bogg & Roberts, 2004). As part of the quality review process, results were analysed with reference to the quality scores attributed to each paper to test whether quality affected relationship size measures. Each of the Big Five traits were considered and it was determined that associations were not significantly impacted by the quality of the papers.

Assessment methods were questionable in some papers, (as noted in Moran, et al., 1997) and may account for some of the lack of homogeneity; additionally, self-report methods can be harder to interpret in, for instance, neurotic individuals due to their conflation in reporting physical illnesses and symptoms. Temporal directional relationship among the FFM domains and adherence was not considered in the studies however there is utility in considering longitudinal relationships. Furthermore, it would be useful to consider confounding variables that might serve to artificially inflate associations between subjective variables and increase understanding of the role of mediating effects such as self-efficacy (Axelsson, Lötvall, Cliffordson, Lundgren, & Brink, 2013), or coping. Coping with illness, involves situational responses or preferred dispositional style, and is affected by illness and treatment-related experiences, and is particularly pertinent when congruent with the particular type of treatment (Folkman & Moskowitz, 2004). Nonetheless, results demonstrate the complexity of adherence and highlight the prerequisite to take this into account when researching the topic. Furthermore, results endorse the conclusion that, for practitioners ‘these findings support the need to consider patients' personality dispositions when charting a treatment plan’ (Hill & Roberts, 2011).

Comparable to the majority of reviews undertaken findings should be considered in the light of several limitations. The review identified articles published in peer-reviewed journals; it is improbable however that rigorous studies are not available, even those that failed to find significant results. From those articles that were included meta-analysis was not straightforward due to the small number of studies, and populations, from which to draw. Furthermore, a number of studies did not report results in their entirety, due to nonsignificant findings. Additionally, research was not undertaken on consistent bases, subjects were not drawn from homogeneous cohorts neither were standardised methods used. The set of publications from which data was derived may be biased; potential selection bias, for example, cannot be identified in meta-analyses since deductions are not able be made from data that is absent. Nonetheless, the method used for this review was designed in order to mitigate these limitations as far as possible and results deliver insights into the relevance of particular moderators.

5.5 Literature review summary

The aim of this review was to summarise findings of the studies concerning personality traits and medication adherence in chronically ill patients; the results suggest that there is a correlation between personality traits and adherence behaviour. Whilst associations between personality and health are increasingly well-documented (Friedman, 2008), the complex causal inter-relations reflecting the idiosyncratic processes involved in chronic illness is less understood. Studies included in this review incorporated personality factors conceptualised by the FFM, together with additional traits such as type D personality, and sought to explain how personality relates to medication-adherence.

Of the Big Five, conscientiousness emerged as the most prevalent influence in adherence; previous research established a positive correlation between conscientiousness and better health outcomes (Bogg & Roberts, 2004; Lodi-Smith et al, 2010). Type D is correlated with subjective health complaints (Costa & McCrae, 1987), and has been proven to have a negative impact on health outcomes (e.g., Denollet, et al., 2000; Pedersen & Denollet, 2006). The research noted in this review were generally consistent with previous findings however, ambiguous findings may be explained by alternative causes (e.g., Moran, et al., 1997) for instance, where the quality of the biochemical measurement lacks robustness. Furthermore, inconsistencies may be attributable to insufficient power necessary to detect correlational rather than main effects. The expediency of innovative analytic approaches could have utility in detecting pathogenetic mechanisms, such as higher levels of circulating pro-inflammatory cytokines and larger cortisol surges in response to stress (Habra, et al., 2003); for instance, neuroimaging research (Booth, et al., 2014) contests that measures of brain integrity are effectively outcomes of health behaviour. This may assist in consolidating what we know and offer further informative insights into the relationship between traits. The analytic method and differences in measurement instruments should also be considered to explain differences in results.

Data were inconsistent across studies, nonetheless there was general consensus that personality is a mediating factor in medication adherence; decreased adherence was attributed to personality factors such as low conscientiousness and agreeableness or high neuroticism. Conversely, the combination of high conscientiousness with high neuroticism may turn health-concerns into motivation for preventive action. Individual traits are influential at domain level or facet level with associations and interactions between, for example, the moderating effect of high extraversion with low conscientiousness to engage in health-damaging behaviours. Inconsistent results might be explained by the mediating effect of additional factors, for example an individual scoring high in conscientiousness would expect to attain high levels of medication adherence, however mediating higher neuroticism scores may confound the effect (Axelsson, 2013); gender differences also have a confounding effect (e.g., Ediger, et al., 2007) with a positive correlation for men but not for women.

Studies focussing on concurrent, competing constructs, rather than an individual factor (e.g., Murphy, Wulf, Catmur & Bird, 2018) are rare. There may be utility in analysing traits not merely as singular influences but as correlational constructs to experience the variance in behaviour (e.g., Axelsson, et al., 2011); agreeableness and low conscientiousness, for example, negatively predict medication adherence. Additionally, for instance, when considered in isolation neuroticism resulted in heterogeneous findings as to the level of influence in adherence, but results may differ when including a mediating factor such as self-efficacy or coping. Despite research over several decades personality affects on adherence remain relatively enigmatic, feasibly due to the complexity of its nature. Evidence indicates that traits are not linearly deterministic, rather the interaction with cognitive factors and situational and environmental contexts bias behaviour; furthermore, mechanisms are modulated over the lifespan. The challenge lies in integrating the different constructs and their unique and combined contributions to the prediction of health behaviour intentions.

This review observed that there is a complex and multidimensional relationship between personality and medication adherence in chronic illness and that multiple traits influence patient behaviour. Given the importance of maintenance to a medication regime for optimal health outcomes there are surprisingly few studies which investigate this area. This systematic review reaffirms that adherence is a challenge for many patients with chronic illness, with rates dependent upon both illness condition and influential external factors. Although findings were not homogeneous there was evidence in support of the hypothesis that personality traits, distinctive between individuals, are influential in predicting adherence. However, whilst the review demonstrates an association between personality and adherence more research is needed to consolidate what is known about the predictive utility of personality and to focus on the hierarchical modulation of traits and specific biopsychosocial factors, together with the level of proximal mediation on health behaviours; quantifying the variability and specificity of mediation mechanisms will benefit the explanation of associations of particular facet-level effects. Personality is determined by a complex infrastructure of traits and further explicated by nebulous and heterogeneous external factors; given that personality is clearly a significant factor, but is not an independent state, rather is influenced by external factors, it should not be considered in isolation and the importance of establishing the confounding or mitigating factors which impact on adherence should not be underestimated.

It has been stated that correlates of personality are '*important although frequently ignored predictors of compliance*' (Cohen, et al., 2004, p.106) however, results from this review indicate that we cannot categorically state their significance, yet. The review demonstrated overall small effect sizes when considering personality traits as an independent variable. Medication mediation is an adaptive process, and it is likely that personality affects are influenced by supervening contextuality and that expressed behaviour results as a function of variability to environmental sensitivity. It is vital that further research is undertaken to consolidate what we know about existing observed associations and explore ancillary factors which mediate correlations of adherence. Further research concerning the influence of personality and additional interacting factors is essential in understanding the biopsychosocial indicators of the chronic illness condition, with particular reference to an individual's subjective personality. Identification of those at risk of nonadherence, can have utility in terms of interventional strategies. Whilst personality traits are relatively stable dispositions, mediating variables, such as self-efficacy, may be modifiable; awareness of the mechanisms by which they work would be beneficial in the development of targeted personalised intervention programs in chronic conditions and it is therefore of clinical relevance.

This thesis undertakes to extend results from this review and, furthermore, to augment current understandings by qualitatively exploring the nature of medication adherence from an individual's perspective. This investigation will be complemented by psychometric investigation to ascertain quantitative data supplementary to the literature review and phenomenological inquiries.

6 Collection of novel data: methodology, ontology, and epistemology

6 Collection of novel data: methodology, ontology, and epistemology

Previous chapters have highlighted the complexity of adherence to medication; the myriad of facilitators and barriers to adhering to a medication regime indicate the convolution of disparities between individuals. Extant research suggests that one area of influence accountable for variations in adherence is personality, however research is limited as to the extent and the manner in which personality affects medication-taking; individual differences are therefore an apposite area on which to base future inquiries. This thesis attempts to assess the association between individual characteristics, such as personality, and management of a treatment regime in chronic illness conditions. The current research reflects an extensive anthological assessment of medication-taking; the structure and content of this thesis is determined by analysis and evaluation of extant data and supported by novel findings. The foundational taxonomical framework, generated from results of previous studies, will be augmented by novel psychometric and phenomenological data in order to assess influential factors of adherence. Previous chapters investigated and organised extant literature; this chapter enhances the analysis of what is currently known by means of novel data compilation. Original data, including demographics, personality traits and clinical correlates, will be appraised in relation to reviews of existing data by means of statistical and phenomenological data, and is both deductively and inductively driven.

Addresses the research question 3: *what barriers and facilitators to medication adherence exist, and how do individual differences influence these factors?*

Addresses the research question 4: *what is the nature of medication adherence in the context of the illness process?*

Addresses the research question 5*: might a sense of the interrelation between factors of adherence be developed and reframed?*

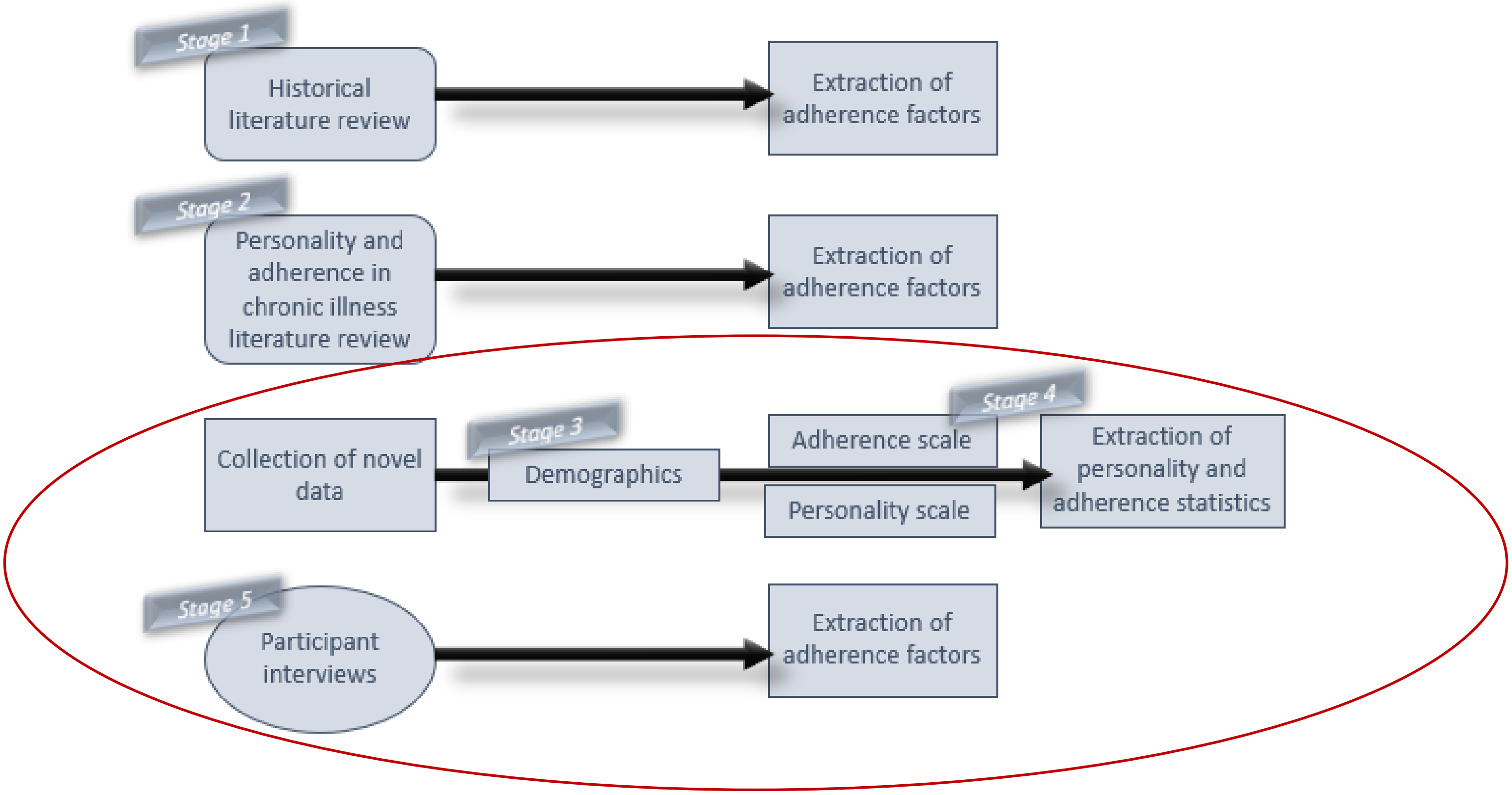


Figure 6.1 Process of data collection.

Let us briefly reflect on the locus that has so far been accomplished in terms of data collection and analysis by reviewing the process as shown in Figure 6.1 (originally seen in Chapter 1). Stages 1 and 2 consisted of the literature reviews: the historical review of medication adherence and systematic literature review and meta-analysis of personality affects on medication adherence in chronic illness. A scoping literature review was conducted to inform an historical timeline relating to adherence factors; extant literature was systematically searched from inception of records (1969) to July 2018 and included more than 7,000 primary academic articles on the topic. The anthology of research largely (95%) dated from 2000 and thus represented a relatively contemporary impression of the subject. The collation and analysis of this substantial corpus of empirical literature incorporated research principally over twelve decades (detailed in Chapter 3), and demonstrated numerous barriers or facilitators to adherence; however, it emerged that the influence of individual differences, with particular reference to personality traits, was under-observed in the literature. Therefore, a further systematic review (described in Chapter 5) refined the focus and meta-analysed the affects of personality on medication-adherence in chronic illness. It was found that, although inquiries are relatively nascent, research indicates a potential link between personality factors and medication adherence.

The structured review process enabled the identification and coding of contextual variables; studies were classified into illness conditions, and further categorisations were developed to indicate the influential factors in adherence, from which a taxonomical framework was designed. Determinants differed between illness conditions and were stimulated by different motivations; for example, symptom severity may induce an individual with asthma to adhere to their prescribed medication, but in an asymptomatic condition such as hypertension the patient may be prompted by the possibility of an adverse cardiovascular outcome. Factors extracted from the literature (as consolidated by the taxonomic framework) were thematically ordered so that they may be integrated with the factors identified in the participant psychometric scales and qualitative analyses; the utilisation of this method will allow for a comprehensive framework and understanding of the topic of the affect of personality traits on medication adherence.

Subsequent novel investigations supervened on the findings of the reviews with the intent of generating a model illustrating influences of, and interrelations between, adherence in chronic illness. Stages 3, 4 and 5 focus on the collection of novel demographic data, completion of psychometric scales, and qualitative data collection. A comprehensive inventory identified factors relating to the patient, medication, illness, and health care system, together with psychosocial influences. Auxiliary details were extrapolated via the interviews in which participants were asked to describe their experience of medication-taking and were encouraged to expand on positive or negative influences. From these data a phenomenologically-driven thematic approach was utilised to categorise influences of adherence into a matrix. Each identified factor was firstly coded, then arranged into clusters and, finally, classified. A comparison of categories was subsequently undertaken as a check to verify each constituent, prior to the generation of the conceptual models. A myriad of influences complicate the strategy of pharmacological adherence; many factors are associated with medication-taking, some of which mitigate the possibility of nonadherence, whilst others jeopardise the prospect of adherence to pharmaceutical therapy. Results underscore that strategies need to be multidimensional to incorporate the diversity of influences.

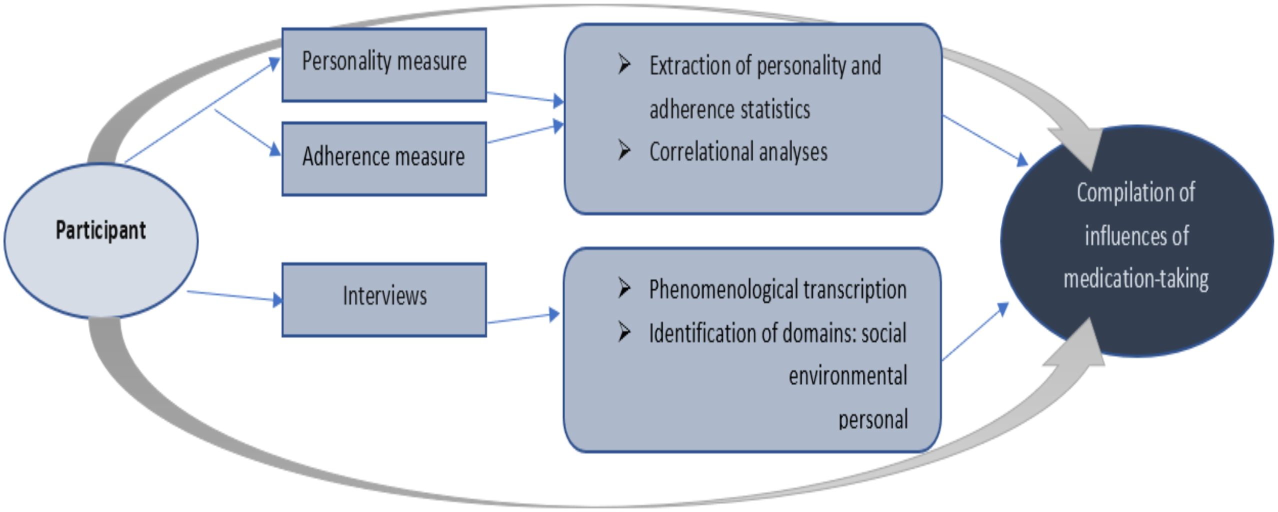


Figure 6.2 Qualitative data collection and analysis research stage.

This study was approved by the University of Derby Ethics Committee (Ref: 27-1617-DEp).

A further explication of the data collection follows.

6.1 Phenomenological inquiry

As previously alluded to, qualitative methods are under-utilised in medication adherence studies. Phenomenological inquiry is, however, most pertinent as a means to explore medication adherence; medication, whether it be in tablet or other form, possesses objective chemical characteristics that are tangible and predictable and are likely to be construed similarly in societal terms; from a phenomenological perspective, however, the individual will interpret and subjectively process the same chemical characteristics embodied in medication and invest intuitive meaning, influence and significance. The scientific investigation of the subjective requires a radical epoché – the transcendental phenomenological reduction to ground psychology (Husserl, 1954) and, in terms of this study, to enable the construction of codes reflecting the textural aspects of medication adherence as a phenomenon. Phenomenological methodology allows for the investigation of the dynamic negotiation between objective stimuli and internal subjective psychosocial processes. In this study, parity of consideration was given to the nuanced accounts from each individual; this enabled a rich dimension ensuring that no reflections were omitted. Thoughts and attitudes were collected through interviews until a sense of accomplishment in terms of saturation of themes was achieved to generate a meticulous and comprehensive narrative of medication adherence (Francis, et al., 2010; Stern & Porr, 2011).

Phenomenology is a qualitative research method which has profoundly influenced social science research using '*scientific methods that are uniquely fashioned to support psychological researchers in the investigation of human experience and behaviour*' (Wertz, 2005, p.167). It is a conceptual framework created on existential ontology (Plager, 1994; Wojner & Swanson, 2007), applied to explore and understand individuals' lived-experiences; a philosophical movement combining rigorous science and mystical theology (Ferguson, 2006). Phenomenology centres on understanding the uniqueness of experience (van Manen, 2019), as illuminated by the testimony of an individual, that culminates in a 'fusion' of both the researcher's and participant's horizons (Gadamer, 1994; Warnke, 2013). Understanding is a circular manifestation of the constituent parts within the whole and the fabrication of the whole from its components (Bleicher, 2017). Themes are constructed from the paradox of the ubiquity of the 'unique' experience of the individual which is collectively 'unique' between many of the principals (Galvin & Todres, 2009).

Husserl, the German philosopher who established the school of phenomenology, broke from positivist epistemology stating that naturalists and historicists misinterpreted *facts* into senseless confusion to the point where reality is transformed, and the notion of a concept becomes a superstition. Husserl contended that '*all scientific knowledge rests on inner evidence*' (Moustakas, 1994, p.26) and developed the phenomenological method as a complimentary adjunct to psychology's mainstream quantitative approaches with the objective of faithfully reflecting the first-person experience. He considered that philosophy was an integral component of the questioning (Socrates, 469-399 BCE) and empiricism (Aristotle, 384-322 BCE) which forms the scientific method, in contrast to the biomedical stance which, to date, has been the most influential research perspective. The level of influence of the biomedical model was discussed in Chapters 1 and 2. The mechanistic view of the human body, and concomitant tenets of predictability and control, as determined by the biomedical model, lead to bifurcation of the mind and body, detracting from the inextricable influence of the psychological domain. It is important to critically engage with alternative paradigms, moving away from the limitations of the isomorphic assumption of extreme medicalism. It is suggested that a social constructionist approach is apposite; such an approach is concerned with understanding and interpretation. It is argued that to integrate corporeality and the subjective experience of the dynamic and nebulous will encompass the embodiment of medication adherence.

There are multiple approaches to phenomenology (including interpretative or hermeneutic), which focus on interpretations of the experience (Moustakas, 1994; van Manen, 2011); transcendental phenomenology centres on descriptive accounts from constitutive components, the 'what' and 'how' (individuals' perceptions, thoughts, and experiences) of events (Keen, 1975; Holmes, 2018). Although constructed as binary phases of the investigation the 'what' and 'how' intersect and interrelate giving rise to the fluidity of structural and textural phenomenological investigation (Moustakas, 1994). Transcendental phenomenology was adopted as the methodological framework underpinning this study; '*an unrelenting rational process of describing, through naming, classifying, distinguishing, what is irreducibly present in experience*' (Ferguson, 2006, p.12).

Critics argue that the construal of experiences which occurs linguistically (Gadamer, 1976), is subject to interpretations of the researcher and it is therefore arguable that a transcendental phenomenological approach is scientifically more robust (Giorgi, 2009) because an integral component (the epoché) relates to the recognition, acceptance and addressing of researcher biases. Husserl conceived phenomenology as the philosophical interpretation of all transcendental phenomena, rooted in rigorous science, without the impediment of presuppositions; investigation concerns how knowledge and understanding are formulated. He reflected on the intentionality of the conscious – that all consciousness is directed and entails a sense of awareness which is intentionally constitutive; analysis is an explication of how phenomena are constituted in, and by, consciousness. The constructivist paradigm dictates that meaning and knowledge are produced through the subjective perception of objective characteristics, analogous to phenomenology's concept of intentionality in the construct of experiential reality (Ferguson, 2006). Consciousness is constructed from the subjective experience of the objective phenomenon and thus forms the dual constructs of reality and experience (Moustakas, 1994). The process of epoché is essential to limit the projection of preconceptions onto the data and will involve different predeterminations and presumptions for each researcher.

Husserl was keen that scientific inquiry should commence with a pure and unbiased depiction of the subject matter and proposed the application of specific techniques to achieve this. Banton (2013) highlights that social research is influenced by the researcher's personal attitude however, Husserl's fundamental assertion of epoché is to ensure the abstention of influencing biases. This requires that the researcher refrains from assimilating theories or conceptualisations of the subject matter (Husserl, 1939;1999). Prior assumptions and scientific preconceptions about the external world must be suspended ('bracketed') to gain access to Sachen selbst ('the things themselves'), the lived-through meanings of phenomena. The researcher may then empathetically enter the world of the study's protagonist and apprehend meanings as ascribed by them. Moustakas, (1994, p.88) notes that '*the challenge* [of transcendental phenomenology] *is to silence the directing voices and sounds, internally and externally, to remove from myself manipulating or predisposing influences and to become completely and solely attuned to just what appears, to encounter the phenomenon, as such*'. The objective of the phenomenological paradigm is to reflectively identify and set aside (transcend) preconceived biases, prejudices, and presuppositions to enable comprehension of the essence of the phenomenon. It is conceivably an unattainable objective to transcend *a priori* sociolinguistic knowledge and consequently this will impact to a lesser or greater degree on the research; the researcher has nonetheless subjected themselves to the constructive process of an alternative perceived reality (Creswell, 2007; Moustakas, 1994). Epoché allows for the distinction between codes that are identified due to preconceived researcher bias or as a result of data analysis and informs '*the absolute*' (Moustakas, 1994, p.26; Kockelmans, 1967).

Kant (1977) described transcendental reduction as the dissection of experience to discern what is conceived by the mind as opposed to given intuitions, and for Husserl this results in a reduction to pure consciousness, eschewing worldly interpretations. In this way, by bracketing the existence of entities, it is possible to 'purely' investigate the intentional constitution of things. The investigation has been 'reduced' to the psychological, the 'natural attitude', an unreflective comprehension of the world in its raw state, without reflection or awareness of meanings or experiential processes. This bracketing allows for the next phase of analysis which includes embracing the recollection of the researchers own experiences which will be incorporated empathetically to enable reflection from an intersubjective experiential perspective. Husserl considered that this process philosophically grounded and informed the scientific method of investigation (Husserl, Ricour, Merleau-Ponty & Sartre, 1954).

This method concerns grasping the essence of 'what' something is; it descriptively defines the invariant properties of the phenomenon to clarify each constituent. Husserl's concept of free imaginative variation describes a method of conceptualising a subject and thinking about it in every possible way in order to distinguish accidental or incidental features; this mode of thinking demonstrates that the notion of a phenomenon, the colour green for instance, not only imposes an idea of 'greenness' but also determines conceptualisations associated with that colour, for example social contexts in which green connotes various, but particular, properties (for instance, ecology, or immaturity, or verdancy, and so on), from which can be identified structures of experiential understanding; powerful observations and perceptions can be highlighted. This insight enables evidence of psychological findings in any subject matter whether they be material or morphological essences. This utilisation of the researcher's ingenuity to detect connections between the structural components that precipitate textural aspects is a critical component not only in the surmounting of reductionism but also in terms of phenomenological critique. The world is socially shared with mutual references but viewed by each individual by the temporal lens of their perspective. Through variation phenomenological philosophy is equipped to empirically inform investigations that are respectful of the essential qualities of the subject matter (Leleu-Merviel, 2018); research begins with a subjective phenomenon and the reflective explication produces a radical ecological and relationally contextual analysis of the experiential meanings ascribed by an individual. In short, the procedure of intentional analysis developed by Husserl '*is relevant to psychology because it provides knowledge of human situations, their meaning, and the processes that generate those meanings*' (Wertz, 2005, p.169).

Contemporary qualitative research has benefited from the initiative of the Social Science Research Council in the 1930's, challenging all criticisms levelled at qualitative psychological methods, and acknowledging the high scientific significance despite a perceived low regard. Phenomenological methods were formalised, analytic procedures were developed to ensure rigorous empirical specifications and attempts made to effect transparency. '*Phenomenological methods are scientific by virtue of being methodical, systematic, critical, general, and potentially intersubjective*' (Wertz, 2005, p.170). The refinement in methodology, with the emphasis on accountability, has led to a surge in productivity in the qualitative research movement with the publication of a considerable body of empirical research.

6.1.1 Research rigour

Higgs (2001) ascribed the importance of rigour, or research validity, in research; this necessitates sound reasoning and the selection of an appropriate methodological approach (Byrne-Armstrong, Horsfall & Higgs, 2001). Schutz (1970) postulated that three conditions must be followed in the research-process in order to achieve analytical rigour, illustrated by the demonstration of integrity and competence within the study (Aroni, et al., 1999). The conceptual research framework must:

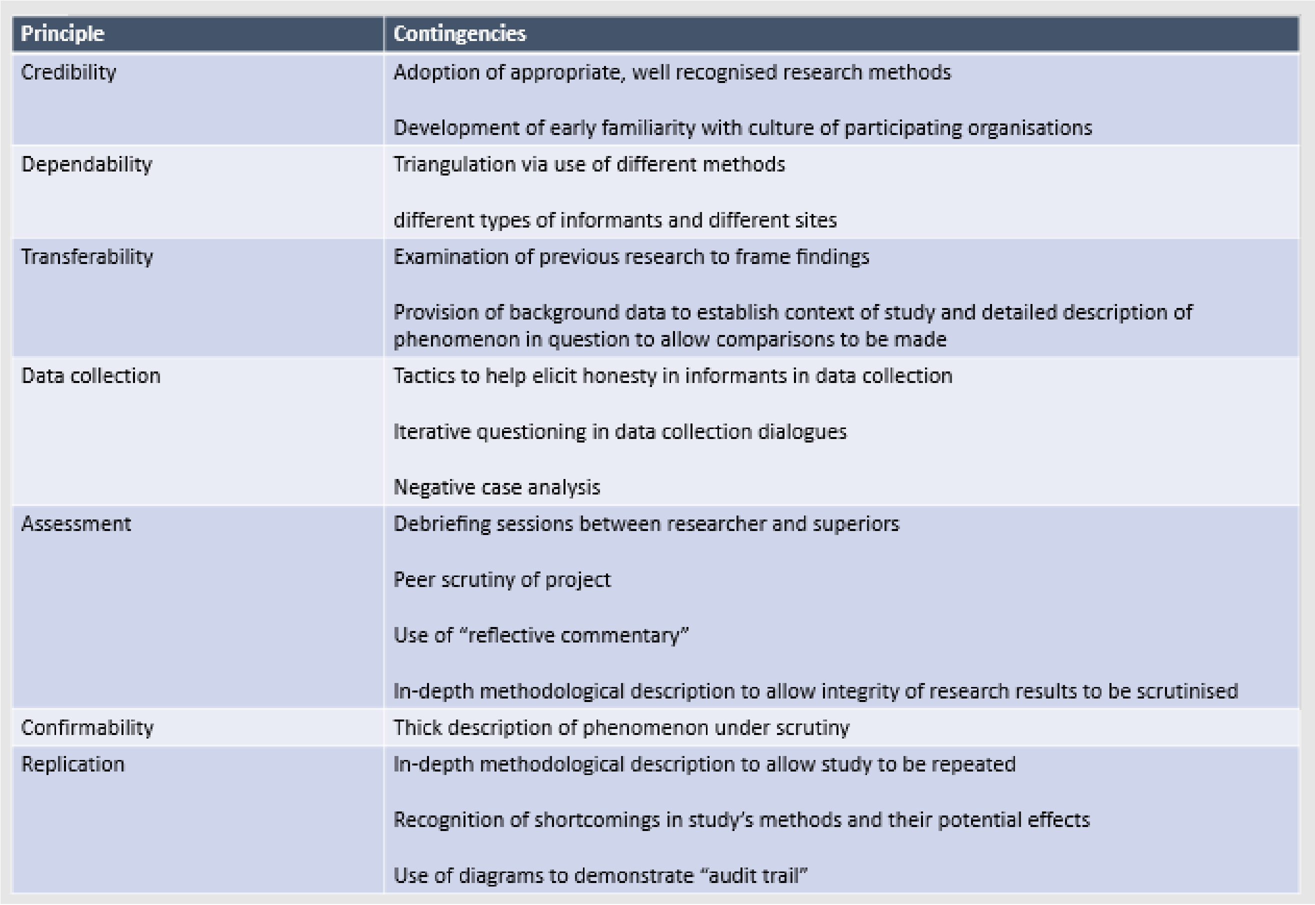
① establish clarity and logic,

② be grounded in subjective interpretation, contextualised, and illustrated by reflections from raw data, which strengthen validity and credibility of the research (Patton, 2002), and

③ show consistency between the researcher's constructs and the principals (everyday actors) to ensure that interpretation is directly rooted to the participants (Schutz, 1973).

These precepts should be observed to demonstrate integrity and trustworthiness (Koch, 1998) as the concepts of credibility, transferability and dependability supplant the positivist constructs of external validity and reliability (Emden & Sandelowski, 1998; Guba & Lincoln, 2005). The individual's subjective perspective must be defended so that their view is not displaced by the illusory, false world constructed by the researcher. Schutz (1967) proposed a dual approach to the interpretative understanding of social actions, such as the subjective experiential aspect of medication adherence that is the phenomenon of this research. The dual method consists of, firstly, exploration of the process by which individuals make sense of, or interpret, the phenomenon, and secondly, the generation of typologies to express the phenomenon. This study uses inductive analysis (Boyatzis, 1998) to achieve the first aim and the deductive use of a theoretical framework to accomplish the second (Cane, et al., 2012).

In order to assuage detractors of qualitaive methods Shenton (2004) argued that trustworthiness is a prerequisite in order that research be academically sound. Trustworthiness results from the integrity of the research process; when the reported results accurately and cogently reflect the experiences of the principals, (Clayton & Thorne, 2000). This also positively impacts on the applicability of the study. An accurate account of the formative data must be presented with a truthful reflection of the participants' accounts. Research robustness is comprised of four principles including credibility, (a faithful representation of the phenomenon is being depicted), transferability, (the provision of sufficent context for replicability of studies), dependability, (the facility for another researcher to undertake the study), and confirmability, (demonstration that the findings emanate from the data rather than the researcher's predispositions). These have been duly considered in this research and the following contingencies (as guided by Shenton) have been discharged in this study to ensure rigour. Rigour contingencies have been noted in Table 6.1.



Principle	Contingencies
Credibility	Adoption of appropriate, well recognised research methods Development of early familiarity with culture of participating organisations
Dependability	Triangulation via use of different methods different types of informants and different sites
Transferability	Examination of previous research to frame findings Provision of background data to establish context of study and detailed description of phenomenon in question to allow comparisons to be made
Data collection	Tactics to help elicit honesty in informants in data collection Iterative questioning in data collection dialogues Negative case analysis
Assessment	Debriefing sessions between researcher and superiors Peer scrutiny of project Use of "reflective commentary" In-depth methodological description to allow integrity of research results to be scrutinised
Confirmability	Thick description of phenomenon under scrutiny
Replication	In-depth methodological description to allow study to be repeated Recognition of shortcomings in study's methods and their potential effects Use of diagrams to demonstrate "audit trail"

Table 6.1 Rigour contingencies, as applied to the current adherence research (developed from Shenton, 2004).

As previously noted, a central strategy to ensure research rigour is to employ a theoretically driven approach which facilitates the systematic identification, evaluation, and assessment of pertinent factors. More than 7,000 research articles have been identified by this study's literature reviews which identify articles that adequately assess medication adherence factors, however there is no prominent utilisation of one methodology. Results are therefore highly contextualised with no corresponding assessment criteria. There are a multitude of theoretical models which assess various behaviours or attitudes; with so many theoretical hypotheses it renders selection of a single appropriate theory subject to idiosyncratic hindrances which may lead to difficulties in application. Research would therefore benefit from clarification and simplification; this is a matter that is addressed in this thesis.

6.2 Participants

In order to be considered for inclusion in the current study certain eligibility criteria were established. Potential participants were required to be:

- prescribed a pharmaceutical intervention for the treatment of a diagnosed chronic illness(es). Certain conditions were excluded, such as cancers, since side effects can be worse than the disease symptoms and provide a different experiential focus. Other profiles (HIV/AIDs, psychiatric conditions, and cognitive impairments) were excluded for possible confounding factors, due to social stigma and clinical/condition related confounds,
- adult, aged between 18 and 70; a paediatric population is reliant on parental support however, the focus of the current study does not relate to parental or caregivers' beliefs/ attitudes towards paediatric medications, nor is it to be possibly confounded with age-associated factors such as decline in cognitive, visual, or aural acuity, or difficulties related to the increased burden of management of age-related polypharmacy, more prolific in older age,
- limited to a western population, to control cultural aspects or issues relating to ethnicity and race,
- English speaking, willing and able to articulate about their medication experiences. There are two requisites for participation in a phenomenological study; to have experienced the subject under investigation and a disposition to relate that experience (Thomas & Pollio, 2002), to ensure rich and authentic data (Morse, 1991).

6.2.1 Participant recruitment

Participants were selected using criterion-based sampling and were included if eligibility requirements were met. Existing contacts were initially approached by the researcher to either participate or nominate others who may be interested; further recruitment was supported by promotion on social media, such as Facebook and LinkedIn, and within support groups such as those delivered by COPD UK. Recruitment continued until notional data-saturation was attained (e.g., Suter, 2012); theoretical saturation point is achieved when data no longer contributes anything novel, occasioning duplication or recurrence of themes. In the present study participants were still suggesting nuanced aspects to their experiences however, no new thematic codes were arising and therefore it was considered that notional saturation had occurred.

Following the applicants' expression of interest to participate each individual was contacted to arrange a suitable time, place and medium (e.g., skype©) for an interview. All participants were provided with a package which included an Invitation, a Consent Form, a Participation Information Sheet (providing further details of the study), and finally, a Debrief detailing the aims and importance of the study. Anonymity was assured by recording and storing data in a place accessible only to the author (until ultimate destruction), and by applying a standardised anonimisation ID code for each participant. There is a justifiable concern regarding confidentiality and anonymity in phenomenological inquiry through which participants disclose intimate details about their experiences (Guba & Lincoln, 1994) - privacy must be evaluated, (Punch, 1994), safeguarded and ethical parameters respected (Kylma, et al., 1999). Out of deference, the participants are considered as co-researchers, or principals, engaging in dialogue through which they relate their truth of a subject in which they have expertise (Halldórsdóttir, 2000), and shall henceforth be referred to as such.

Principals were UK residents prescribed pharmacological treatment for chronic conditions. Thirty-one individuals consented to participate, and none withdrew from the study after its completion. Potential participants were initially screened by the researcher to confirm inclusion criteria and to arrange completion of the surveys. Eligible and consenting individuals then participated in an interview at a date, time, and place mutually convenient. Interviews contained questions relating to historical and treatment-related experiences and demographic information, including gender, age, and marital status, was confirmed; illness-condition and treatment details were collected, together with time since diagnosis, length of treatment time, and comorbidities.

Individuals were appraised of the nature of the study, but it was impressed upon them that there were no right or wrong answers and that the focus was on their experience so as to try to limit, as far as possible, any potential social bias in the interview process. An information sheet was provided incorporating detailed study information prior to engagement in the consent process. Anonymity was assured in the research process, due to the extraction of genuine names from the report. The procedure was explained; two short self-report questionnaires would be completed followed by an informal interview with the researcher. Principals received no financial incentives to contribute to the study. Sociodemographic details were recorded together with clinical characteristics, including illness condition and medications prescribed for the 31 principals who completed the study.

6.3 Method of novel data collection - psychometric assessment and patient perspectives

The aim of this study is to recognise, understand and configure influences of medication adherence. Data were collected utilising both quantitative and qualitative methods; factors were uncovered through literature reviews, psychometric evaluation, and qualitative analysis. The literature reviews (refer to Chapters 3 and 5) formed the foundation of what is currently known and guided the interviews to further explore and elaborate the supplementary material from the qualitative analysis.

Individuals were selected from a convenience sample, initially recruited via word of mouth and thereafter by response to a survey published online, and represented a fair generaliseability (Schonlau, 2004); the target size was designed to maximise response whilst keeping the sample size manageable, since the focus was on meaningful, rather than numerically focussed data, from which to interpret results (Pound, et al., 2005). All participants completed the online survey consisting of demographic inquiries in addition to two psychometric scales. Medication adherence was measured using the 10-item Medication Adherence Rating Scale (Thompson, et al., 2000). This validated instrument has been used extensively in health psychology and has demonstrated good internal consistency and high constrict validity in studies relating to chronic illness. Personality was evaluated by a shortened version of the Big Five Inventory (Costa & McCrae, 1992), to assess personality traits. The questionnaires generated demographic as well as clinical characteristics; factors relating to adherence were extracted and classified thematically.

On completion of psychometric scales, recruited individuals participated in an interview with the researcher. Elicitation of the patients' perspective on the determinants of adherence was imperative since extant studies are largely conducted using quantitative analysis and utilise pre-formulated assumptions; articles assessed from the literature reviews rarely garnered information directly from the patient. It was therefore considered productive to conduct a qualitative study to more deeply understand patient perceptions. The content has been developed in a systematic way, using psychological theory to identify influences on adherence behaviour. The intent as far as the qualitative data were concerned was to reach saturation point (Marshall & Rossman, 2014); there were many areas of consensus and occurrence however each individual highlighted a different aspect of medication adherence, whether it be in entirety or a nuanced interpretation. Two foci were highlighted by the data analyses; the investigation into medication-taking in chronic illness was the first aim whilst the supplementary focus evaluated data relating purely to respiratory conditions. It is intended that a viable model for use in clinical practice will be developed from the content of the data, with the potential to improve adherence and health outcomes by potentially effective intervention design.

6.4 Participant completion of psychometric scales

A theme frequently recurrent in adherence literature is the lack of a gold standard of measurement (e.g., Osterberg & Blaschke, 2005; Vermeire, et al., 2001). Whilst numerous measures are in operation, the exactitude of many measures remains questionable (Vik, et al., 2004); these have been appraised in Chapter 2.2. The self-report measures that have been selected for this study are the Medication Adherence Rating Scale (Thomson, et al., 2000) and the Big Five Inventory 15 item scale (Costa & McCrae, 1992) which, notwithstanding their parsimonious attributes, have shown appropriate validity. Medication adherence is a mutable behaviour which lies along a continuum, rather than a fixed entity, ranging from fully or partially adherent, to nonadherent, contingent on distal and proximal variables.

There is no standard benchmark of adherence associated with optimal outcome and therefore the definition of adherent versus nonadherent can be problematical; there is a prospective futility in the use of an arbitrary cut off point, as some medications require almost 100% adherence to a regime whilst others tolerate latitude in administration and require less consumption. In extant literature individuals are generally considered adherent if they reported taking 80% of their medication (e.g., Ettinger, Manjunath, Candrilli, & Davis, 2009) however, regard must be paid to the methodological approach to dichotomous categories to ensure that results are not rendered inauthentic due to spurious reporting (Cramer, et al., 2008). Nonetheless, the MARs provides a quantification of adherence for descriptive purposes, and in the absence of empirical guidance this study devised a notional metric for standard scores (i.e., 8-10 highly compliant, 6-7 moderately compliant, 4-5 somewhat noncompliant and under 3 noncompliant). Whilst this is a less than perfect solution, the challenge of evaluating adherence across different illness conditions with differing treatment is addressed, on the basis that the primary objective of the study was to test the hypothesis that adherence is affected by individual differences that are plastic by nature (McCullough, Tunney, Elborn, Bradley, & Hughes, 2015); furthermore, this allows the contextualisation of the basic comparison of results. Results were statistically analysed to predict personality traits and adherence tendency. During the interview principals were also asked to ascertain the number of times they missed doses; dialogues disclosed that adherence fluctuated, was subject to variations in duration and intensity and represented continual reconsiderations and modifications. Adherence outcomes were heterogeneous, providing a challenge to the assumption of normality.

It is argued in this thesis that trait affect, including for example, alexithymia (Parker, Keefer, Taylor, & Bagby, 2008), health anxiety (Ferguson, 2009), and type D personality (Ferguson, et al., 2009), is multi-dimensional and subject to continuous variables (Parker, et al., 2008); arbitrary cut off scores may accordingly be questionable. Dichotomising reduces statistical power, engenders incorrect categorisation, leads to misapplication of theoretical models and in the extreme, misdiagnosis (Ferguson, et al., 2009; Ruscio, et al., 2006). For example, the association between type D personality and cardiovascular conditions has been demonstrated (Denollet, Schiffer & Speck, 2010), and it is therefore critical that sensitivity and specificity analyses direct cut-off scores. It seems counterintuitive then to arbitrarily bracket results with respect to distributions (e.g., Beauchaine, 2007), and signifies further evidence of the merit of the application of taxometric methods (Waller, 2006). Pragmatically however, distinctions do need to be made and the scales chosen for the current research represent empirical and systematic tools capable of identifying sensitivity and specificity (Ferguson, 2008).

6.4.1 The Medication Adherence Rating Scale (MARS)

The Medication Adherence Rating Scale (MARS) is a concise ten-item self-report measure of medication adherence (Thompson, et al., 2000). Originally designed to assess adherence in psychotic conditions it has performed well in alternative illness conditions, such as asthma (e.g., Horne & Weinman, 2002; Chan, Horne, Hankins & Chisari, 2020). The MARS was developed from two existing scales, the 30-item Drug Attitudes Inventory (Hogan, Awad & Eastwood, 1983) and the 4-item Medication Adherence Questionnaire (Morisky, Green & Levine, 1986), with the intent of creating a more robust and reliable tool to assess adherence to medication regimes. The scale addresses some of the limitations ascribed to subjective measures; fundamentally it aims to set a nonjudgemental tone and thereby minimise social desirability bias, and in doing so limit inflated adherence responses. It also requires the participant to consider barriers to adherence in contrast to focussing purely on nonadherence by the individual and therefore considered a most appropriate scale for this research.

Scores reflect an understanding that adherence is a continuous variable and range from 0 to 10, with the higher score indicating better adherence. The MARS is a well validated scale (e.g., Fond, et al., 2017) which evaluates attitudes toward medication, together with actual medication-taking behaviour; furthermore it indicates whether poor adherence can be attributed to motives that are intentional (a decision is deliberately taken not to take medication, which often involves the cessation of medication following an improvement or deterioration in symptoms), or nonintentional (occurring when an individual intends to take medication but is prevented for some reason, primarily concerning forgetfulness and carelessness in taking medications). However, an individual's adherence behaviour is unlikely to be statically positioned along the continuum; rather, it is anticipated to fluctuate dependent upon a variety of reasons, such as nonadherence due to fear of side effects resulting in taking medication only when the individual considers it necessary (Perkins, 1999; Perkins, et al., 2006). It has been contended (Abrar, Shoka, Arain & Widuch-Mert, 2012) that health behaviour is adaptive to anthropological nature to crave and indulge in inappropriate practices; individuals are more likely to adhere to medication that brings immediate results, such as pain relief, whereas the further removed the reward the more erratic adherence becomes. Furthermore, adherence appears to be a learnt phenomenon which needs to be nurtured throughout the lifespan. Medication adherence is generally considered as a distinctive entity, with the individual being binarily compliant or not; however, this simplification does not necessarily reflect actuality and it is a reasonable assumption that whilst a person may be adherent to one medication there may be reasons why they struggle with another. Krigsman, Nilsson & Ring, (2007) studied adherence across two illness conditions, COPD, and diabetes, and they reported that refill patterns were different for each condition, although they were unable to determine the reason for this. To illustrate, the MARS considers forgetfulness and carelessness in medication-taking when feeling better or worse unintentional, but skipping or missing doses when feeling better or worse as intentional. To construe forgetfulness as an overarching theme may be to conflate the nuances of motivation and represent an over-simplification of patient experience. In terms of the individual there is considerable variance between the two; cognitive reasoning is different for intentional or nonintentional adherence (Donovan & Blake, 1992; Lowry, Dudley, Oddone & Bosworth, 2005). Inevitably, whilst convenient for quantifying data, this does not capture the diverse reasons for nonadherence. Foley and Hanson (2006), for example, identified that a major component in forgetfulness was belief, which accounted for a third of nonadherence to cholesterol-reducing medication. When John, et al., (2006) employed the Beliefs in Medication Questionnaire (Horne, et al, 1999) they also found that belief was a significant predictor of forgetfulness, which contradicts the unintentional aspect of the MARS. Consequently, it is important to qualify the reasons for nonadherence in addition to quantifying the prevalence; hence, one of the reasons for the qualitative component in this study is to support extant psychometric findings.

6.4.2 Completion of the personality scale – the Big Five Inventory

The last decade has seen the emergence of an increasing interest in the integration of psychology, particularly the psychology of personality, in adherence studies (Wagner, Frick, & Schupp, 2007). However, though nearly 330,000 studies have been published regarding adherence only 17 pertained to personality in chronic illness, according to the literature review (results of which were reported in Chapter 5), and whilst emerging results reflect associations, more investigation is necessary for definitive results. Several rating instruments have been developed; the most comprehensive and widely used scale to assess the Big Five dimensions is the NEO-PI-R (Costa & McCrae, 1992) which is a 240-item inventory measuring six specific facets within each of the Big Five dimensions. It is, however, a lengthy tool, taking approximately 45 minutes to complete, and numerous shorter instruments have consequently been developed in the interests of time constraints. One criticism of brief measures is their apparent inability to gauge individual facets of personality constructs (Gosling, Rentfrow & Swann, 2003) subsumed within the broader dimensions, which may be better predictors of specific criteria (Paunonen & Ashton, 2001); however, neither the 44-item nor the 60-item five factor inventories provide facet scores and furthermore, use of the shorter measure enables the dedication of additional time to experiential investigation of principals, plus negating the need for extensive resources in completion and assessment.

To meet the need for a concise instrument, inventories have been developed that include 15, or less, items; in order to be effective, measures should be as concise as possible whilst demonstrating sufficient validity to ensure adequate utility. Although subordinate to the more extensive multi-item scales these parsimonious instruments nevertheless reach good levels of test-retest reliability, patterns of predicted external correlates and convergence with self, observer, and peer reports (Gosling, et al., 2003). In fact, truncated scales are advantageous in that they not only reduce excessive participant burden, but they also reduce the '*fatigue, frustration and boredom associated with answering highly similar questions repeatedly*' (Robins, Hendin, & Trzesniewski, 2001, p.152) whilst demonstrating similar validity to lengthier and more sophisticated scales (Burisch, 1984; Bäckström, & Björklund, 2016). Psychometric cost may not, therefore, be as considerable a trade-off as expected.

The Big Five Inventory (BFI) (Costa & McCrae, 1992) is a hierarchical model of personality traits that is prevalently used to assess personality (John, Naumann, & Soto, 2008); furthermore, the integral constructs represent a widely accepted framework (Lang, John, Ludtke Schupp & Wagner, 2011). The framework suggests that individual differences in personality characteristics are reflected in five broad empirically-derived dimensions from which further bipolar factors, (for example, extraversion vs introversion), reflect a facet, (such as sociability), and incorporate many and various corpora of specific traits, (e.g., gregariousness). The BFI-S (a shorter version of its original counterpart) retains conceptual focus and fidelity of the larger scale whilst benefitting from structural brevity – its widespread application is testimony to its attractiveness. The BFI-S framework has become one of the most widely applied personality models (e.g., Hahn, Gottschling & Spinath, 2012), enjoying extensive support (e.g., John & Srivastava, 1999). It has not received universal acceptance however (e.g., Block, 1995) and alternative scales assessing personality traits have been developed. Recently, measurement has endeavoured to embrace differential adaptivity dependent on contextual contingencies, more specifically, responses associated with provocation and frustration (Lawrence & Hodgkins, 2009) and additionally, in respect of situational motivation (Denissen & Penke, 2008). This may help to provide a more contextual assessment of personality traits. However, the current 15-item Big Five Inventory Scale was considered a satisfactory tool for this study in terms of convergence of fundamental broad dimensions of consistent personality (John & Srivastava, 1999) and the PsyToolkit implementation of the short 15-item Big Five Inventory was used.

6.4.3 Qualitative analysis

A limited number of studies in extant literature are construed from a qualitative perspective, however, researchers (e.g., Vervoort, et al., 2010; Marshall, Wolfe & McKevitt, 2012) have acknowledged the utility of this approach as a methodology which presents unique insights into a phenomenon, capitalising on the distinctive lived-experiences of the individual. In the qualitative paradigm phenomena are situated in the objectivity of the world and constructed through the subjective lens of the individual to form their '*truth*' (Creswell, 2007; Erlingsson & Brysiewicz, 2013), and in this sense the methodology forms a significant contribution to research in the sphere of adherence. Phenomenology is philosophically concerned with experiential description and interpretation elicited from individual knowledge, as explicated in personal narratives, the analysis of which is a source of insight into the principal's unique understanding and management of their condition (Kleinman, 1988; Karp, 2017). One argument commonly hailed against phenomenological research (and qualitative approaches in general) is the potential for research-bias which the researcher must attempt to avoid by identifying and discarding previously held beliefs/prejudices/presuppositions through a reflective process known as epoché within the text; this comprises the reflection, and elimination, of preconceptions and judgements in order to understand the essence of the issue (Creswell, 2007). Discourse analysts may contend that it is not possible to transcend current understanding and prejudices unless different language is used in descriptions of the phenomenon (Moustakas, 1994) and, furthermore, that objectivity is difficult to achieve in the social sciences since studies are influenced by the researcher's knowledge and experiences (Banton, 2005). However, identifying preconceived biases relating to a phenomenon, and putting aside those assumptions, helps to facilitate transcendental reflexivity in data analysis. It has previously been noted that contextual factors, including the age, gender, ethnicity, and social class identity of the researcher, together with the place that interviews are conducted are potential limitations or confounding factors; the way in which the interviewer's background can influence qualitative research can be complex and may shape enquiries both positively and negatively, (Richards & Emslie, 2000). There is also the potential for researcher background and knowledge to influence data analysis and synthesis (Ritchie, Lewis & Elam, 2003). But nothing is without bias and as expressed previously it is how its managed; measures put into place in the current research to address this are described throughout the process.

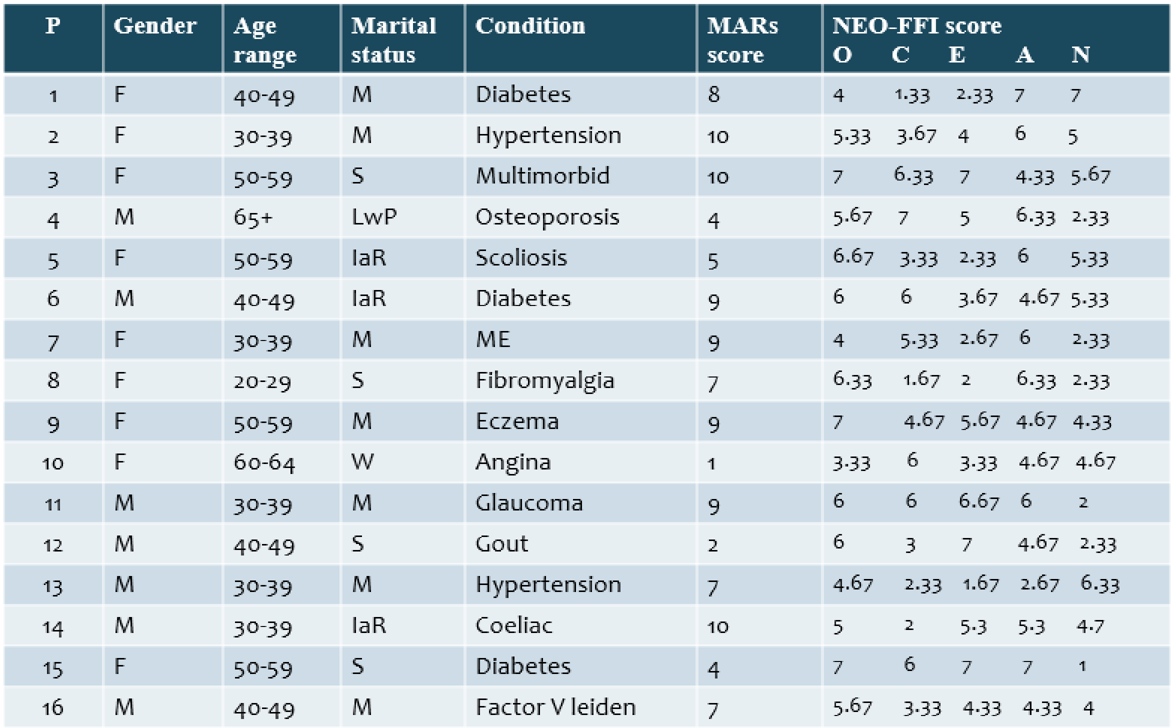
6.5 Data analysis

The qualitative approach was informed by the theory of social phenomenology as both a philosophical framework and methodology (Schutz, 1967). The phenomenological stance of Schutz explores social action within the context of the individual's rational world and emphasises spatial and temporal qualities of social relationships and subjective experiences; it is a descriptive and interpretative theory which assumes that the individual is equipped to ascribe meaning to, and make judgements about, a phenomenon. Individuals' contextualised uniqueness relating to automatic (habitual), and deliberative (reasoned), determinants of adherence were indexed; the content was refined and revised throughout the iterative process which was flexible and determined by the data itself.

Amongst the advantages of the qualitative technique is the flexibility regarding sample size, since the emphasis is on the depth of analysis (Crotty, 1998), to the point of theoretical data saturation. Medication adherence is a challenging issue, and the aim of this qualitative analysis was to gain detailed insight into patients' personal accounts of influences, and explore self-reported levels to, medication adherence for chronic illness. Qualitative data provides helpful information on the '*understanding of medication knowledge and compliance patterns*' (Wolfe & Schirm, 1992, p.137). The sample size was therefore determined by the data collected; 31 participants were interviewed and completed the psychometric scales, and included a relatively broad scope of population in respect of age, gender, and illness condition groups, (this generalisability is a constructive method to reduce the amplification of certain effects in specific population-samples, such as an aged population).

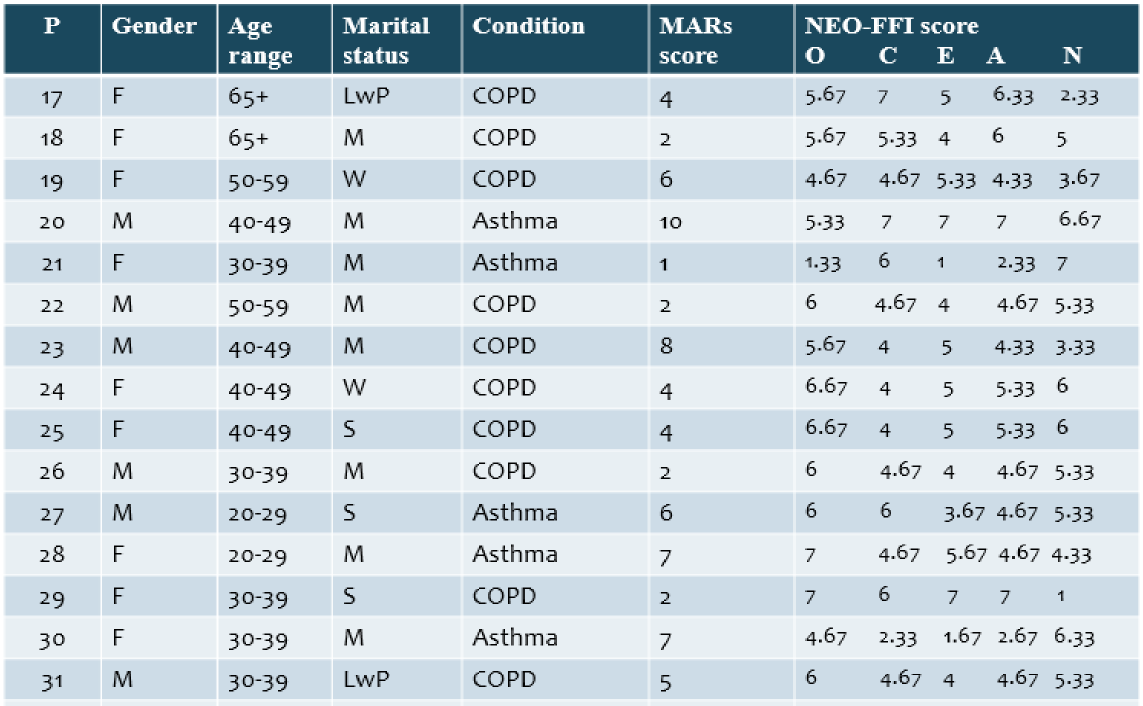
6.5.1 Statistical analysis

The final sample consisted of 31 principals. 70% of principals fell into the 50-70 age bracket (range 21-75), and 67% of the cohort were female. The mean rate for forgetting to take medication was 62%, whilst 46% admitted to cessation of medication when feeling better. 48% considered that they were careless with medication and 34% acknowledged to taking medication only when feeling sick. Self-reported adherence was demonstrably higher in the general chronic illness conditions group than the respiratory conditions (68 versus 27%). Participant characteristics and psychometric outcomes are presented in Tables 6.2 and 6.3 for each condition group. Scores for medication adherence range between 1, being the lowest and an indication of noncompliance, to 10, suggesting a high level of compliance to pharmaceutical therapy. The scope of scores for the personality traits range from 0, indicating a low degree of that trait; the maximum trait score is 7, at which a high level of that trait is exhibited.



P	Gender	Age range	Marital status	Condition	MARs score	NEO-FFI score				
						O	C	E	A	N
1	F	40-49	M	Diabetes	8	4	1.33	2.33	7	7
2	F	30-39	M	Hypertension	10	5.33	3.67	4	6	5
3	F	50-59	S	Multimorbid	10	7	6.33	7	4.33	5.67
4	M	65+	LwP	Osteoporosis	4	5.67	7	5	6.33	2.33
5	F	50-59	IaR	Scoliosis	5	6.67	3.33	2.33	6	5.33
6	M	40-49	IaR	Diabetes	9	6	6	3.67	4.67	5.33
7	F	30-39	M	ME	9	4	5.33	2.67	6	2.33
8	F	20-29	S	Fibromyalgia	7	6.33	1.67	2	6.33	2.33
9	F	50-59	M	Eczema	9	7	4.67	5.67	4.67	4.33
10	F	60-64	W	Angina	1	3.33	6	3.33	4.67	4.67
11	M	30-39	M	Glaucoma	9	6	6	6.67	6	2
12	M	40-49	S	Gout	2	6	3	7	4.67	2.33
13	M	30-39	M	Hypertension	7	4.67	2.33	1.67	2.67	6.33
14	M	30-39	IaR	Coeliac	10	5	2	5.3	5.3	4.7
15	F	50-59	S	Diabetes	4	7	6	7	7	1
16	M	40-49	M	Factor V leiden	7	5.67	3.33	4.33	4.33	4

Table 6.2 Results for the chronic conditions group (marital status legend: M=married, S=single, LwP=living with partner, IaR=in a relationship, W=widowed).



P	Gender	Age range	Marital status	Condition	MARs score	NEO-FFI score				
						O	C	E	A	N
17	F	65+	LwP	COPD	4	5.67	7	5	6.33	2.33
18	F	65+	M	COPD	2	5.67	5.33	4	6	5
19	F	50-59	W	COPD	6	4.67	4.67	5.33	4.33	3.67
20	M	40-49	M	Asthma	10	5.33	7	7	7	6.67
21	F	30-39	M	Asthma	1	1.33	6	1	2.33	7
22	M	50-59	M	COPD	2	6	4.67	4	4.67	5.33
23	M	40-49	M	COPD	8	5.67	4	5	4.33	3.33
24	F	40-49	W	COPD	4	6.67	4	5	5.33	6
25	F	40-49	S	COPD	4	6.67	4	5	5.33	6
26	M	30-39	M	COPD	2	6	4.67	4	4.67	5.33
27	M	20-29	S	Asthma	6	6	6	3.67	4.67	5.33
28	F	20-29	M	Asthma	7	7	4.67	5.67	4.67	4.33
29	F	30-39	S	COPD	2	7	6	7	7	1
30	F	30-39	M	Asthma	7	4.67	2.33	1.67	2.67	6.33
31	M	30-39	LwP	COPD	5	6	4.67	4	4.67	5.33

Table 6.3 Results for the respiratory conditions group.

Data were organised between the chronic and respiratory categories (as detailed earlier). Overall, scores showed a moderate level of adherence, with an average MARs score of 5; the chronic conditions group scoring a slightly higher average (5.5) than the respiratory conditions group (4.67). however, there was a higher incidence of highly and moderately compliant individuals within the chronic conditions cohort (eight principals) than their counterparts in the respiratory group, only two of whom achieved this. In contrast, nine principals in the respiratory group scored within the somewhat noncompliant or noncompliant categories, whilst in the chronic conditions group five scored in these categories and only two of those in the lowest scoring classification. Scores are highlighted in Figure 6.3.

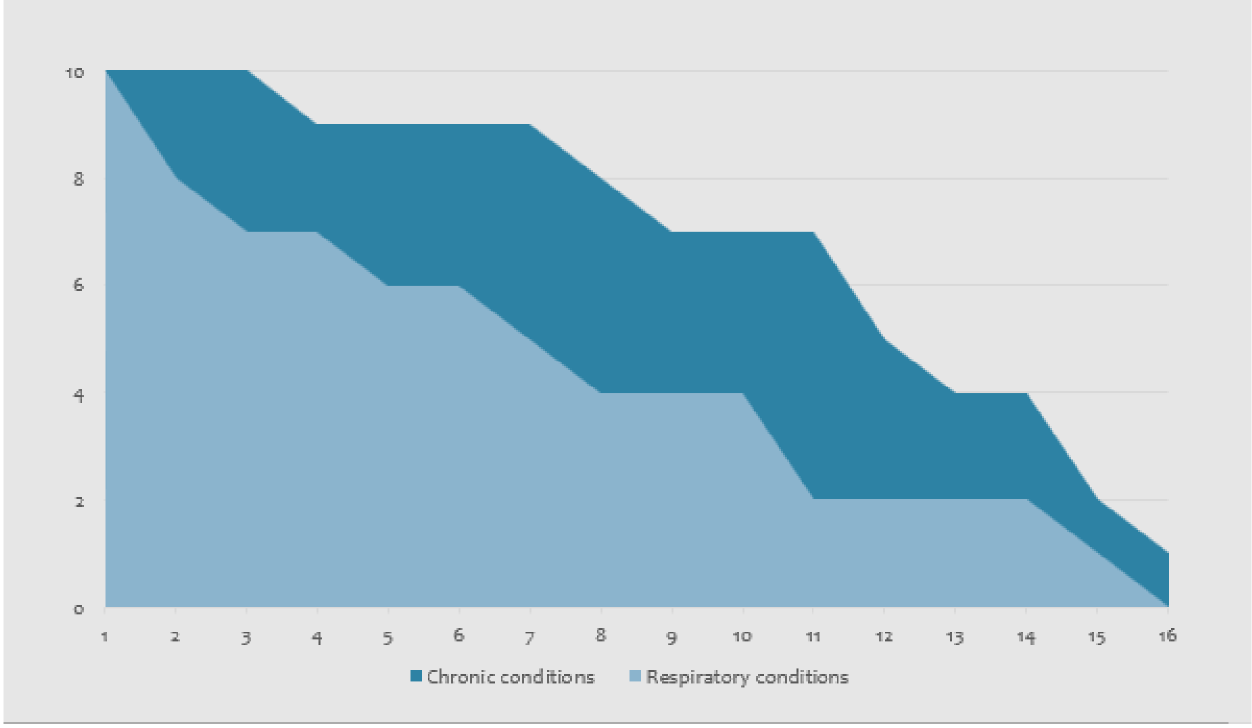


Figure 6.3 Adherence scores between the chronic conditions and respiratory conditions groups, indicating the scoring categories.

Pearson product-moment correlation coefficients were computed to assess the relationship between adherence scores and the personality traits openness, conscientiousness, extraversion, agreeableness, and neuroticism within and between the chronic and respiratory conditions groups.

P values were statistically non-significant (probabilities all ranged higher than 0.05), however a moderate correlational effect was found supporting the hypothesis of a correlational effect between personality traits and medication adherence. Nonetheless the data do not conclusively support the hypothesis since the magnitude was modest in many cases. Undoubtedly, there are additional variables outwith the focus of personality traits affecting results, a phenomenon known as the *tertium quid*. In the case of the present study this can be attributed largely to tendencies for adherence or nonadherence to become stronger at each end of the trait spectrum; for example, individuals high or low in conscientiousness are more likely to either be highly compliant or noncompliant, whilst behaviour in respect of individuals placed in the middle of the spectrum is less predictable. It is therefore more meaningful to review specific foci, such as the ends of the spectra where closer inspection illustrates a more sophisticated inference. Scores for each trait are reflected in Figures 6.4 to 6.8.

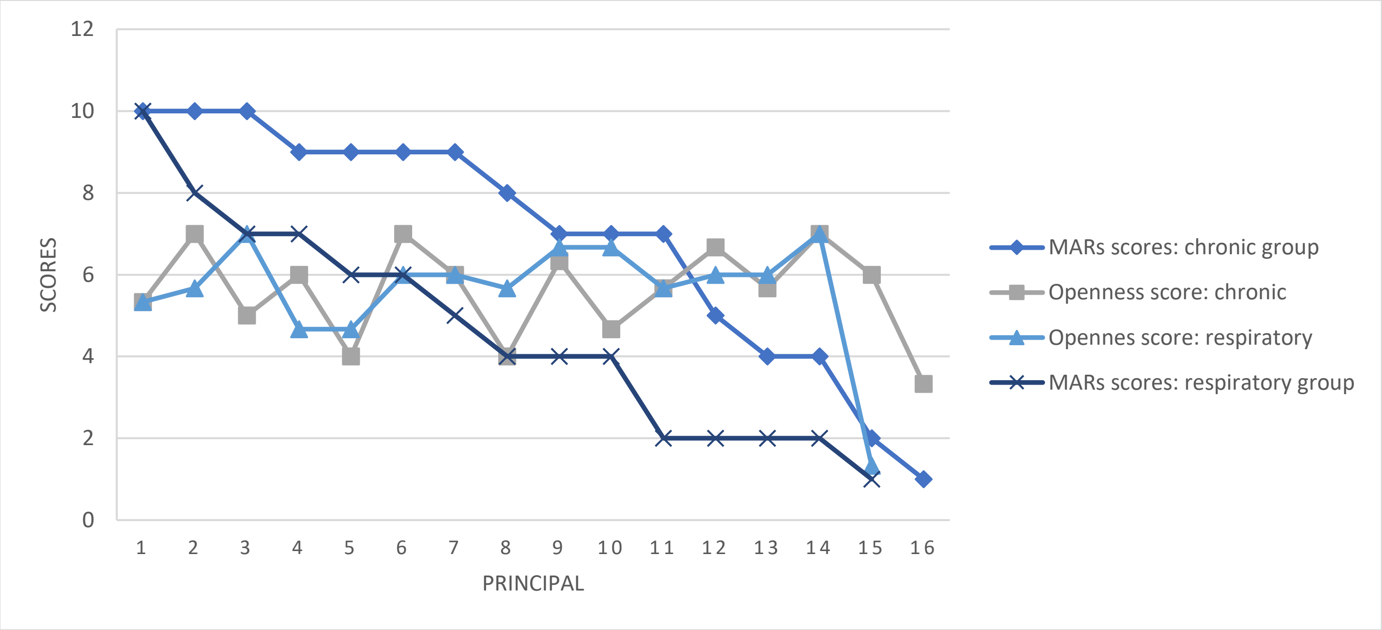


Figure 6.4 Adherence scores correlated with the trait of openness for chronic and respiratory conditions.

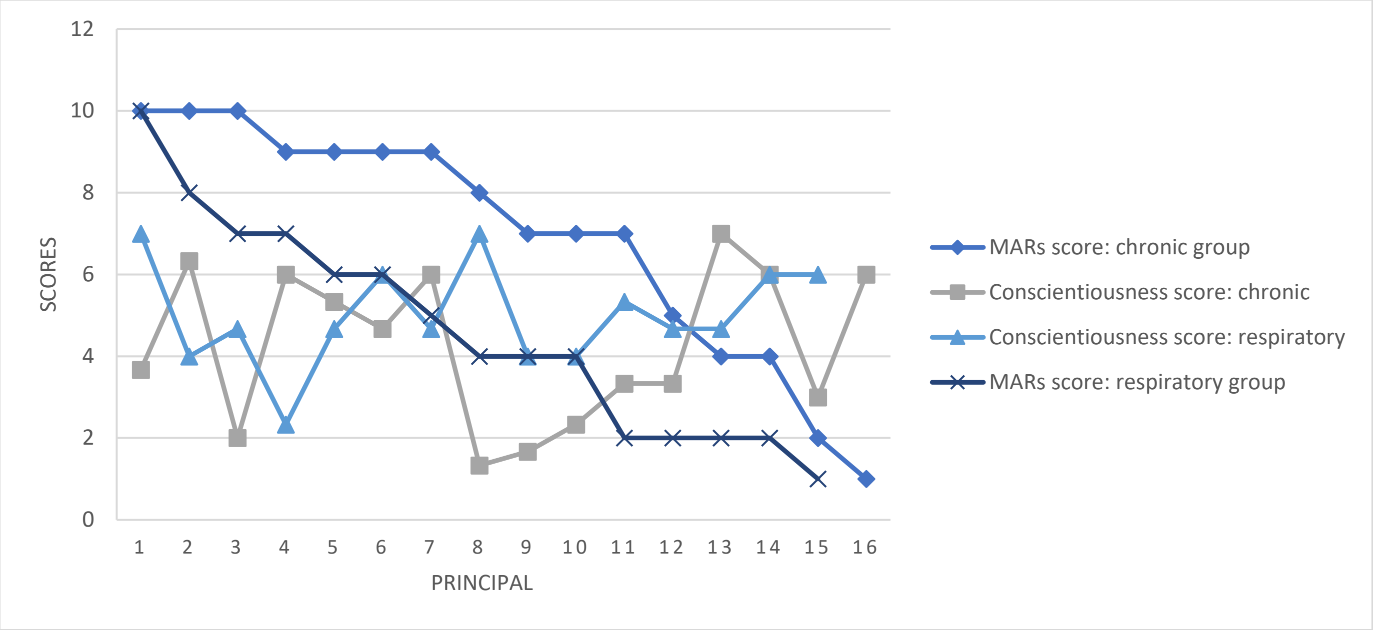


Figure 6.5 Adherence scores correlated with the trait of conscientiousness for chronic and respiratory conditions.

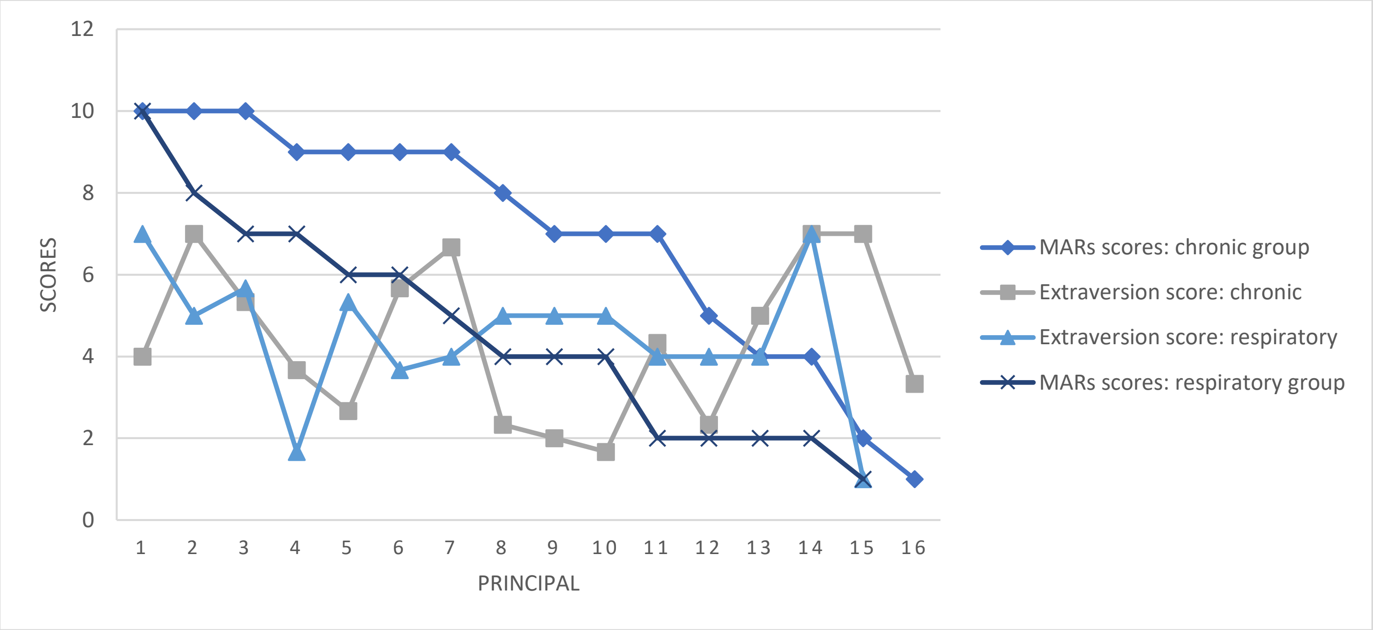


Figure 6.6 Adherence scores correlated with the trait of extraversion for chronic and respiratory conditions.

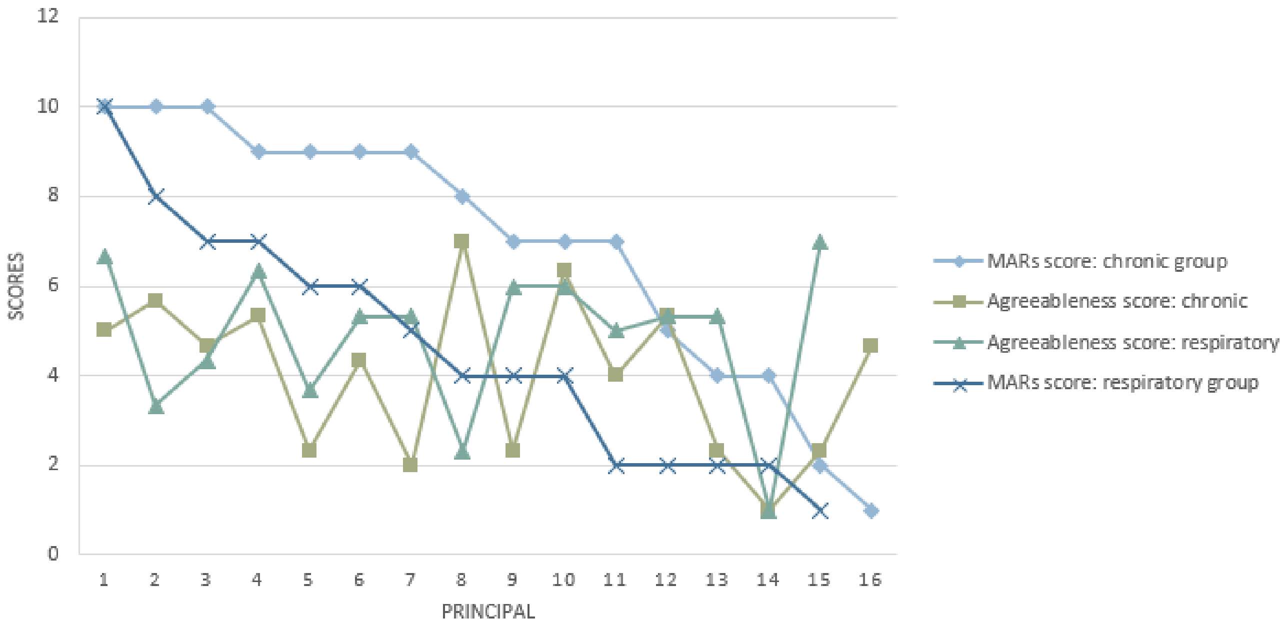


Figure 6.7 Adherence scores correlated with the trait of agreeableness for chronic and respiratory conditions.

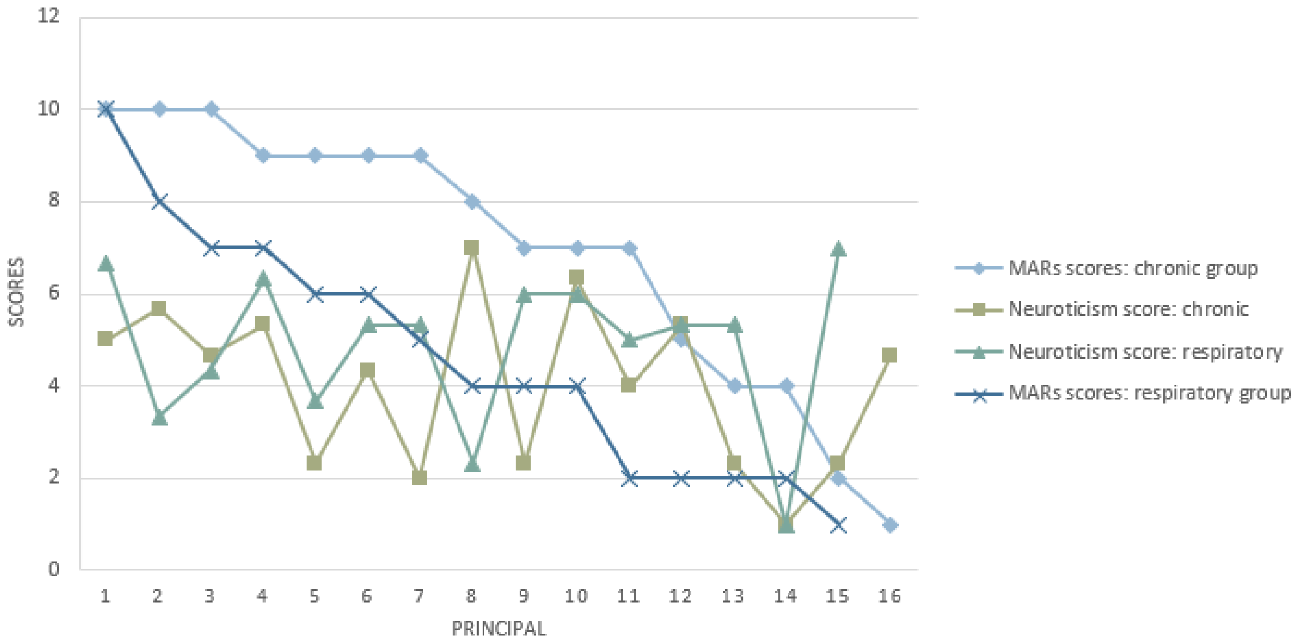
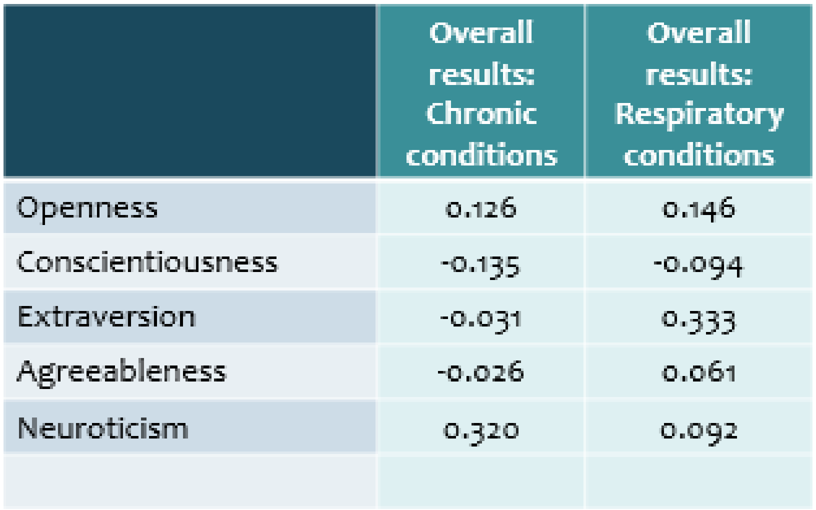


Figure 6.8 Adherence scores correlated with the trait of neuroticism for chronic and respiratory conditions.

Data show a low relationship between openness and medication adherence; for the chronic conditions group r=0.126, with similar results for the respiratory group, r=0.146. However, when results are concentrated purely on the highly compliant or noncompliant principals for each trait a stronger outcome is observed; this indicates the possibility that openness has a role in the high and low ends of the adherence spectrum. Similar results pertained to other traits investigated, indicating the higher or lower a trait score the more likely this is to predict the influence on adherence.



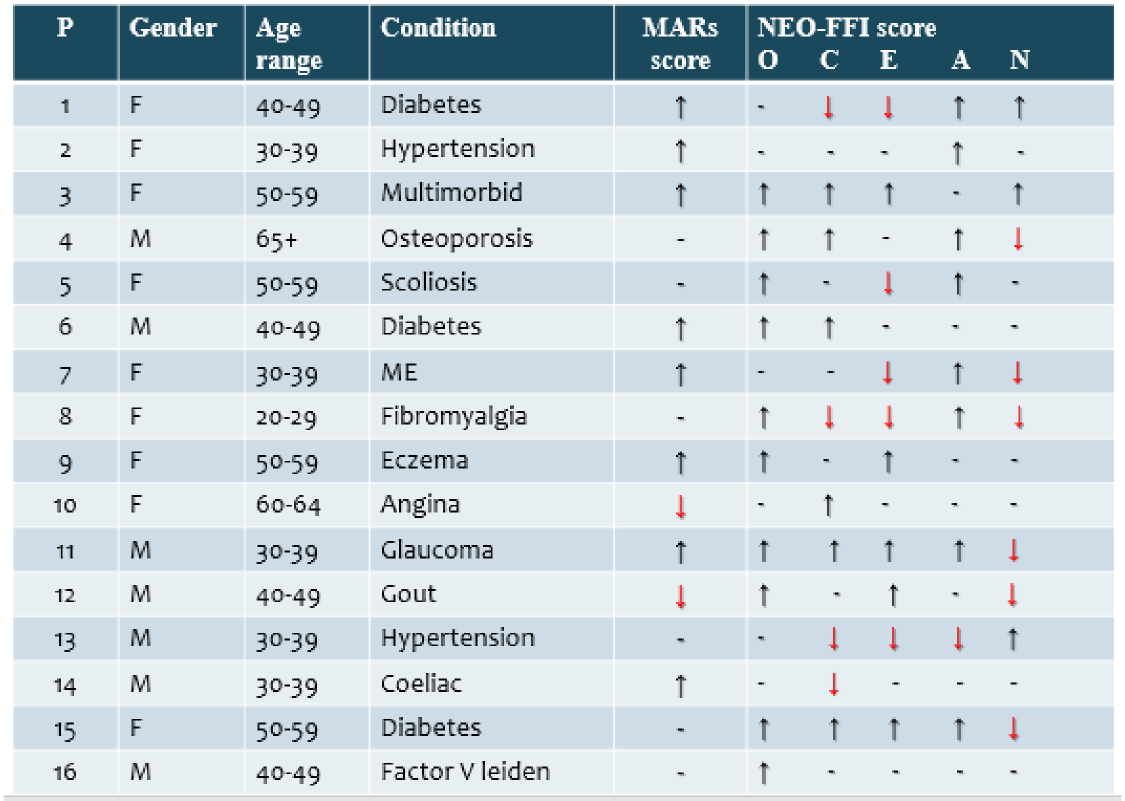
	Overall results: Chronic conditions	Overall results: Respiratory conditions
Openness	0.126	0.146
Conscientiousness	-0.135	-0.094
Extraversion	-0.031	0.333
Agreeableness	-0.026	0.061
Neuroticism	0.320	0.092

Table 6.4 Results for both the respiratory and chronic conditions groups, indicating correlation Pearson’s *r* for adherence and personality traits.

Results demonstrate that whilst small or moderate correlations were found in the investigation of certain traits, overall outcomes do not convincingly meet the assertion that personality has a strong and determinable effect on medication adherence. Weaker relationships than expected lead to the conjecture of the determinants that would deliver stronger effects; perhaps this rests with the type of objective adherence measures utilised, or additionally that specific factors in isolation may not detect the predictors of adherence, and this warrants further analysis of correlating influences to understand the potential complex influences.

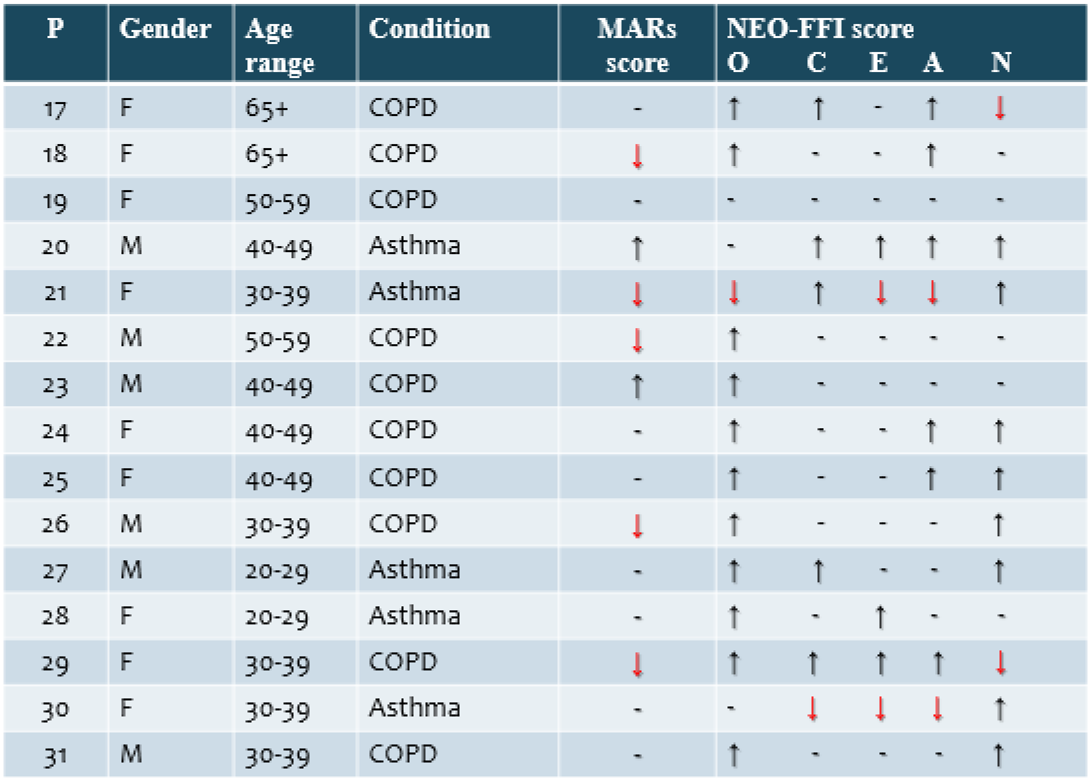
Data for this component of the study was gathered by self-report tests; several issues have previously been registered with scales of this nature, such as being subject to recall bias or social desirability bias which may therefore lead to conflation of responses and may account for some misrepresentations. Furthermore, testing the constructs of adherence and personality as categorical dimensions may not result in unequivocal outcomes, as demonstrated by the computations in this study, and further exploration of interactions between factors may be of benefit. Testing an isolated variable may not be sufficient as a predictor of adherence and further contextual factors may act as behavioural adaptive influences.

An easy visualisation of the results is indicated in Tables 6.5 and 6.6; high and low scores for medication adherence and the personality traits openness, conscientiousness, extraversion, agreeableness, and neuroticism are shown. High scores are connoted by an upward arrow, whilst a downward arrow indicates lower scores; where the scores fall in the median range these are denoted by a dash.



P	Gender	Age range	Condition	MARs score	NEO-FFI score O	C	E	A	N
1	F	40-49	Diabetes	↑	-	↓	↓	↑	↑
2	F	30-39	Hypertension	↑	-	-	-	↑	-
3	F	50-59	Multimorbid	↑	↑	↑	↑	-	↑
4	M	65+	Osteoporosis	-	↑	↑	-	↑	↓
5	F	50-59	Scoliosis	-	↑	-	↓	↑	-
6	M	40-49	Diabetes	↑	↑	↑	-	-	-
7	F	30-39	ME	↑	-	-	↓	↑	↓
8	F	20-29	Fibromyalgia	-	↑	↓	↓	↑	↓
9	F	50-59	Eczema	↑	↑	-	↑	-	-
10	F	60-64	Angina	↓	-	↑	-	-	-
11	M	30-39	Glaucoma	↑	↑	↑	↑	↑	↓
12	M	40-49	Gout	↓	↑	-	↑	-	↓
13	M	30-39	Hypertension	-	-	↓	↓	↓	↑
14	M	30-39	Coeliac	↑	-	↓	-	-	-
15	F	50-59	Diabetes	-	↑	↑	↑	↑	↓
16	M	40-49	Factor V leiden	-	↑	-	-	-	-

Table 6.5 Presentation of results denoting high and low scores of adherence and personality traits for the chronic illness conditions group.



P	Gender	Age range	Condition	MARs score	NEO-FFI score				
					O	C	E	A	N
17	F	65+	COPD	-	↑	↑	-	↑	↓
18	F	65+	COPD	↓	↑	-	-	↑	-
19	F	50-59	COPD	-	-	-	-	-	-
20	M	40-49	Asthma	↑	-	↑	↑	↑	↑
21	F	30-39	Asthma	↓	↓	↑	↓	↓	↑
22	M	50-59	COPD	↓	↑	-	-	-	-
23	M	40-49	COPD	↑	↑	-	-	-	-
24	F	40-49	COPD	-	↑	-	-	↑	↑
25	F	40-49	COPD	-	↑	-	-	↑	↑
26	M	30-39	COPD	↓	↑	-	-	-	↑
27	M	20-29	Asthma	-	↑	↑	-	-	↑
28	F	20-29	Asthma	-	↑	-	↑	-	-
29	F	30-39	COPD	↓	↑	↑	↑	↑	↓
30	F	30-39	Asthma	-	-	↓	↓	↓	↑
31	M	30-39	COPD	-	↑	-	-	-	↑

Table 6.6 Presentation of results denoting high and low scores of adherence and personality traits for the respiratory illness conditions group.

Whilst some results demonstrated a correlation with medication adherence, for example high and low scores in neuroticism predicted negative and positive associations respectively and reflect outcomes from the meta-analyses in the review (as detailed in Chapter 5), overall outcomes did not indicate an unambiguous pathway and the results were not as conclusive as some previous studies have indicated. The next rational stage is therefore to direct research by means of an alternative method of investigation to quantitative research with a view to determining further evidence in terms of the connection between adherence and personality traits. Further elucidation was therefore sought from the qualitative investigation; phenomenological inquiry was considered to be an apposite method for the context of the current research since it focusses on individual representations of illness and medication-taking that determine behaviour. Since overall outcomes of the quantitative element of the study were not convincingly significant qualitative inquiry may be the key to understanding the additive or synergistic associations between the influence of personality traits and medication adherence, and further explication follows.

6.5.2 The qualitative data process

'*Knowledge is socially constructed in the interaction of interviewer and interviewee'* (Kvale & Brinkmann, 2009, p.54). Semi structured interviews were conducted according to schedules that mapped enquiries to the research aims and objectives but remained sufficiently flexible to allow principals to fully express their understandings and judgements. Interviews lasted between 30 and 90 minutes; dialogues were initiated with broad questions concerning diagnosis and initial treatment; subsequently, exploratory, and penetrating inquiries revolved around patients' perceptions of their condition, self-management, and experience of medication, but the dialogue remained sufficiently flexible to facilitate the inclusion of any other areas which the participant felt relevant. The psychometric evaluation scores were not revealed to the principals during interviews – notably, none of those participating was curious enough to enquire as to their results. The conversation elicited the principals' construction of their lived experiences and illustrative details were expressed through this interaction.

An advantage of an adaptable interview schedule is that it enables conversation to flow naturally, facilitating emerging themes from earlier qualitative enquiries to be explored in subsequent interviews; furthermore, it empowers the individual to express thoughts freely within the topic area. Interviewees were asked open-ended, rather than closed, questions supporting exploration of the topic from the principal's perspective whilst allowing the interviewer to cover all required aspects. Exploratory dialogues focused on management, behaviours necessitous to accomplish adherence and additionally, impediments to the medication-taking process. Dialogues elicited lived experiences of medication adherence; involvement in the prescription process; experiences of medication taking; importance of medication; and perceived influences of adherence. Principals were asked to discuss their experiences and opinions regarding the factors which they considered significant in terms of the rate and satisfaction with their medication-taking; an example of the questions included: ‘*under what sort of circumstance would you alter the medication from the way it was prescribed?*’; conversations focused on barriers and motivators influencing adherence, self-report rates and strategies to overcome barriers. Interviews were intended to be informal and project a relaxed approach whilst the interviewer actively encouraged principals (whilst endeavouring not to influence the direction of the interview), empowering expansive expressions. Interviews were audio-recorded and transcribed verbatim. Each participant was assigned a unique identifier, simply constructed using P1 (principal) and numerically accumulating, (this was also utilised as the code should they wish to withdraw from the study).

The outcomes of the interviews are a co-product of the interaction between the principal and the researcher to gain a deep understanding of the phenomenon (Kvale, 1996); the anthology of dialogues were compared in a process of interpretation, reflection, construction, and verification, to understand the issue, and isolate similarities and differences. The interview process illuminates the principal’s response to the recurring challenges of adherence and negotiations, both internal and in dialogues with others, such as HCPs.

6.5.3 Theoretical conceptions of adherence

A theoretical method is a general technique or process that may be used to evaluate and influence change in determinant intentions and behaviours (Eldridge, et al., 2016). Theoretical conceptions may support medication adherence research in determining germane factors that influence behaviour by enabling an understanding of the behaviour (Eccles, Grimshaw, Walker, Johnston & Pitts, 2005), directing research, and facilitating transferability between populations (Michie, et al., 2017) through creating a robust, cumulative theoretical foundation. Ensuring long-term treatment adherence, in itself a mutative behaviour, presents a considerable challenge, not least to health initiatives; explanatory theories enable us to understand why a patient behaves in a particular way and behaviour-change theories, an essential component in adherence intervention studies, support guidance in the development of strategies to modify behaviour to improve health. Individual characteristics can be synthesised and reframed to present a paradigm that has global application. The development and maintenance of behaviour-change are informed by various interpersonal, environmental, and organisational influences. Theories are useful to aid our understanding of health behaviours and the context in which they occur. However, each theory uses a unique vocabulary to articulate the specific factors of importance; they are not laws of science but rather models which work in specific settings (Turner, 1986; Hammersley, 2018).

Behaviour-change theories may help to illuminate the complex processes of health behaviour, not least from the enabled benefit of comparison between studies (Weinstein, 1993). However, there are a multitude of theoretical bases which have produced varying success in terms of interventions and, moreover, may prove overwhelming to health planners. Theories tend to encompass a wide range of health behaviours which are qualitatively different to each other and therefore their applicability in domains outwith their intended focus is dubious (e.g., Ashing-Giwa, 1999; Davis, Campbell, Hildon, Hobbs & Michie, 2015). For example, chronic illness factors may be different to take-up of prevention medication; there are diverse impacts of various factors, the effect of which may alter in various contexts. As demonstrated by this condensed summary (which is by no means exhaustive but is intended to situate and contextualise the current study), there is an active debate about the role of health-behaviour theories in adherence studies concerning conceptualisation, methodology and efficacy, which, as yet, is inconclusive (Eccles, et al., 2005).

The choice of theory is made challenging by the multitude of theoretical frameworks and models available, and the best option may not be immediately evident; no single theory or conceptual framework dominates research or practice but the most widely-used consider multiple factors at various levels. In a recent review nearly 120 psychological behaviour-change theories were identified (Kwasnicka, Dombrowski, White & Sniehotta, 2016), rendering the selection abstruse to ensure that the most appropriate one is chosen, with potentially acute consequences in medication adherence studies particularly in terms of intervention studies. Theories therefore need to be examined carefully to ensure their relevance to the research question. Leventhal and Cameron (1987) suggest that there are five main theoretical perspectives relating to adherence research, each of which may comprise additional theoretical components, classified into biomedical, behavioural learning, communicative, cognitive, and self-regulative (Leventhal & Cameron; Horne & Weinman, 1998; WHO, 2003; Munro, Lewin, Swart & Volmink, 2007).

Further theories continue to emerge, such as the common-sense model, devised by Leventhal et al., (1992a), which posits that somatic illness symptoms are an internal representation of the illness identity and that the patient's decision-making process, based on heuristics constructed from beliefs and values resulting from previous experiences, is inexorably linked to representations of the symptoms. Behaviour-change is therefore possible by means of experiential learning supported by an individual's own representations in relation to medication-identity.

This section is intended to provide a capsule commentary, with brief summaries of contributions and deficits, drawing on Leventhal and Cameron's classification, rather than an in-depth investigation. Finally, there is reflection for utilisation of the chosen theory for the present study, the individualistic model.

The biomedical model addresses solely physiological issues - focussing on demographic factors, such as age or gender, and biomedical causes, such as viruses, - and eschews the notion of possible psychological or social effects. This perspective assumes that health, and by virtue of that, illness, derive from pathogenic-related origins, such as bacteria. The behaviour of the patient is credited with no accountability in the cause, condition, or treatment of an illness, and it is the removal of the pathogen that results in a cure; bio-mechanical treatment, such as pharmaceutical therapy, is therefore the principal solution (Ross & Deverell, 2004). Patients are assumed to be passive recipients of directives from the health care profession and nonadherence is attributed to patient demographics, such as age and gender (Morris & Schulz, 1992). Following its emergence, the theory prevailed following successful treatment of infectious diseases such as tuberculosis, prevalent at the start of the 20th century, however has since failed to eliminate chronic diseases that are prevalent today. Technological innovations, such as the Medication Event Monitoring System (MEMS) (Cramer, Mattson, Prevy, Scheyer & Ouellette, 1989), support the biomedical model in terms of adherence (Sabate & Sabate, 2003). The prevalence of the MEMS' use within clinical organisations however is dichotomous and is used infrequently in interventions, which may have stemmed from its deficiencies, following rejection of potential connections with psychological concerns; patient characteristics which may impact on health behaviours are not considered, for example, health beliefs regarding the illness and the medication (Sabate & Sabate, 2003), psychosocial influences (Zwikker, van den Bemt, Vriezekolk, van den Ende, & van Dulmen, 2014) or socioeconomic factors (e.g., Sumartojo, 1993). One reason why relying on demographics as proxy variables is problematic is that certain groups can be seen as lost causes because those factors cannot be 'changed' and that population may therefore be excluded from treatment interventions (Singh, et al., 2002). Contemporary application of the biomedical model is therefore limited. Nevertheless, a positive development for this theory has been the integration of a biomedical element into a more comprehensive biopsychosocial theory which incorporates wider contexts (Campbell, Clauw & Keefe, 2003).

In contrast, *the behavioural approach* is based on the supposition that behaviour can be scientifically researched without implicating any independent inner mental states. This theory has significantly contributed to psychological inquiry and, consequently, pharmacological intervention. Bandura's Social Learning Theory (1971), for example, considers adherence as a behavior which can be learnt, incorporating antecedents (internal thoughts and external cues) and consequences (punishment or rewards for behaviours) as a mechanism for influencing medication adherence, eschewing less conscious behavioural influences such as past behaviour and habits. Behavioural theory (illustrated in Figure 6.9) posits that all behaviour is determined by the environment, free-will is illusory and behaviour is determined through association or reinforcement (Sabate & Sabate, 2003). It embodies the principles of antecedents, which are internal (thoughts) or external (environmental) cues, and consequences (rewards or punishments) for a behaviour; In other words, a stimulus elicits a response, and the probability of an individual's behaviour will depend on the afore-mentioned variables.

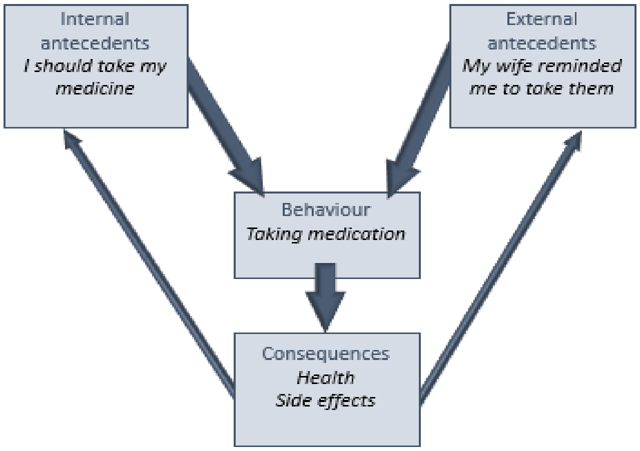


Figure 6.9 Behavioural learning theory (based on Bandura's social learning theory).

This approach can be used to inform adherence-promoting strategies, such as medication reminders (Dunbar, et al., 1979) which have recognised utility in chronic illness medication-taking (Haynes, McDonald, Garg & Montague, 2002). However, this perspective is limited by its focus on external influences; furthermore, there are reservations concerning the effectiveness of behavioural learning theory, as it lacks an individualised approach and consideration for less conscious influences, for example past behaviour or habits, not linked to immediate rewards (Blackwell, 1997).

Cognitive theories focus on the influence of cognitive variables in behaviour change and posit that attitudes and beliefs (Stroebe, 2011) and expectations relating to outcomes (Gebhardt & Maes, 2001) are major determinants of health-related behaviour; individuals will select behaviours most likely to result in positive outcomes when faced with alternatives and therefore patients will be more adherent when they have a logical understanding of benefits and risks of pharmacological intervention. One prominent theory in this field is the Health Belief Model (Bandura & Simon, 1977), which considers that adherence is the product of an evaluation between barriers to, and benefits of, the medication. As such, low barriers and high perceived threat and benefits encourage healthy behaviour (Becker, 1979). The model also considers self-efficacy and supports cues to action such as internal symptom perceptions or external factors, for instance health communication (Rosenstock, Strecher & Becker, 1988). In a meta-analysis, however, Harrison, Mullen, and Green, (1992) found that this model only predicted 10% of the variance in behaviour.

6.5.4 The individualistic perspective

One limitation to those theories cited above is the lack of recognition of the effect of external influences on individual behaviour (Gebhardt & Maes, 2001), such as stigma and social reputations in HIV/AIDs (Ingham, Woodcosk & Stenner, 2004), or the involvement of associates in risk behaviour (Bloor, 1995). Furthermore, the behavioural skills necessary to ensure adherence are not taken into consideration (Sabate & Sabate, 2003) and, to a limited extent, the creation of beliefs and their influence on other behaviours (Weinstein, 1988; Webb & Sheeran, 2006). The Health Belief Model, for instance, considers that behaviour change is predicated on a rational appraisal between perceived benefits and barriers to action (Hu, et al., 2018); perceived susceptibility to, and severity of, illness are influenced by demographic and socio-psychological factors (Redding, Rossi, Velicer & Prochaska, 2000). Cues to action are prompted by perceived threats which may emanate internally, for example symptom perception, or externally, for instance resulting from illness education (Sabate & Sabate, 2003); the greater the perceived threat the stronger the likelihood of engaging in recommended behaviour (Becker, 1979) and effecting long-term change, particularly when taking into account self-efficacy (Rosenstock, et al., 1988).

Frequently, model components are considered as independent predictors of health behaviour (Armitage & Connor, 2000), not moderated by each other; furthermore, there is no indication as to the relationship between them. Repeatedly, there is an absence of the influence of social relationships or behavioural coping skills and, furthermore, variables are assumed to affect behaviour directly, impervious to behavioural intentions (Stroebe, 2011). Additional factors, such as the role of unconscious motivations (habits) like smoking and socially-determined influences are not incorporated (Rosenstock, 1990; Lwin, et al., 2015). A reciprocal determinism between the individual, environment and behaviour is hypothetically plausible (Glanz, Rimer & Viswanath, 2015); behaviour will change if the individual perceives control over the outcome, has confidence in their ability to execute the behaviour and there are few external barriers (Armitage & Connor, 2000). This study posits that adherence is influenced by both positive and negative attitudes towards the behaviour, subjective norms, including the perceived expectations of significant others and motivation to comply with expectations (Fishbein & Ajzen, 1980); potentially, the strongest predictor for behaviour is behavioural intention. However, it is fallacious to assume that the individual will constantly behave rationally (Mullen, Hersey & Iverson, 1987; Loewenstein, Asch, Friedman, Melichar, & Volpp, 2012).

The current research assumes that the individual is central to the adherence process, such as the persons’ subjective experience of health threats which direct coping strategies such as medication adherence (Leventhal, Diefenbach & Leventhal, 1992b). The individual forms cognitive representations of threats and related emotional responses which are interpreted in connection with past experiences, informed by a complex interplay of personality, social and cultural factors (Edgar & Skinner, 2003), and environmental perceptions (Leventhal, et al., 1992a), thereby influencing coping strategies, such as health behaviour. The phenomenological approach adopted for this study recognises the behavioural response to affective factors; its flexibility allows for the incorporation of additional elements that may be missing from established frameworks, hence its selection for the foundation on which to base this current analysis.

6.6 Thematic analysis

Data were evaluated using manual thematic analysis, a process described as the '*product of … a construction between the respondents and the researchers*' (Hibbert, Bissell & Ward, 2002, p.53), enabling the development of codes, which in turn form clusters of themes. Thematic analysis (Braun & Clarke, 2013) is a method which identifies and extrapolates themes (e.g., Fereday & Muir-Cochrane, 2006) identified as significant to the protagonists of the research in their subjective descriptions of the phenomenon (Daly, Kellehear, & Gliksman, 1997). The process involves exhaustive recognition and extraction of themes through '*careful reading and re-reading of the data*' (Rice & Ezzy, 1999, p.258); factors are tessellated within the data from which the emergent themes can be classified, and vectors stratified to create a multi-dimensional image.

Exploratory interviews with principals elicited data which were analysed and transformed into hierarchical clusters to denote factors that facilitate or impede adherence.

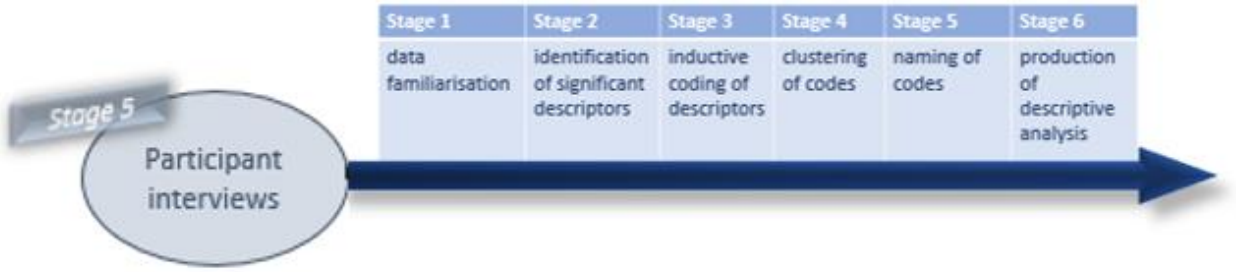


Figure 6.10. Stages of thematic analysis (based on Moustakas, 1994).

Following data-collection a comprehensive and systematic process of data-coding was undertaken. Thematic analysis comprises six phases of analysis, which are shown in Figure 6.10:

- data familiarisation, that is, reading and re-reading raw data (the transcripts) to ensure that the developing themes were grounded in the original data, with the primary objective of representing the subjective view of the principals;
- initial generation of descriptive data, collation of codes into potential themes; phrases paraphrased or summarised to ensure inductive coding and comparison to other codes within the dataset to form a framework of potential themes;
- review of themes and clustering of data-driven codes;
- systematically interrogating, appraising and reflecting on the meaning (Moustakas, 1994), and verification of codes. Conceptual maps were also developed illustrating the constructs;
- analysis refinement where themes are defined into understandable and descriptive language, incorporating sensitivity to ensure the original meaning is not lost, and named;
- and finally, production of an empirical article in which the essences of the particpants are described structurally and textually.

The inductive analytical process identified principal theoretical categories which were refined to sub-thematic conceptualisations. Boyatzis (1998, p.161) described themes as '*a pattern in the information that, at minimum, describes and organises the possible observations and, at maximum, interprets aspects of the phenomenon*'. Text was coded, enabling organisation of the data, descriptive clusters were identified and developed, and analytic themes generated (Thomas & Harden, 2008). Factors were clustered according to conceptual proximity, i.e., to their relatedness, and clusters were labelled according to the most appropriate summary of the meaning of the factors they included. These were synthesised to develop a structural and contextual account of experiences (Creswell, 2007) and were used to code the principals' descriptors of barriers and motivators of adherence and to assess attitudes, experiences, and perspectives. Data collection and analysis were undertaken concurrently - analysis was guided, but not limited to, preliminary codes; the interactivity of this iterative and reflexive process has been described as the overarching principle of "goodness" (Tobin & Begley, 2004). Stringent content analysis was not the aim and, therefore consideration was given to the mention of even a singularly observed factor.

As noted, a hybrid analytical process was used; this methodological approach integrated data-driven psychometric scores with theory-driven ones based on the tenets of social phenomenology. Demographic data were summarised using descriptive statistics to assess the frequency distribution of responses. The process of data-coding and identification of themes precedes the development of overarching themes that captured the essence of the phenomenon of medication adherence in long term conditions from the perspective of the patient.

The process of identifying themes and patterns across the sets of data (Crabtree & Miller, 1999) continued with the connection of codes. Similarities and differences emerged at this stage and were provisionally clustered, indicating areas of consensus and areas of potential divergence. Clustering occurred with differentiations noted between responses of particular groups/demographics; for example, illness conditions. The final stage concerned the confirmation of clusters; even though unintentional, contriving evidence can be a common problem in the process of data-interpretation (Crabtree & Miller), often attributed to the unconscious observation of material that does not exist but that is expected by the researcher. In this research, however this was not an issue because there was no pressure to ‘find’ a particular outcome, or persist rigidly with an existing theoretical framework, and the clusters were scrutinised to ensure that they were representative of the data. The overarching, or core, themes were assigned a succinct nomenclature to describe the underpinning theme-meaning; this is an interpretive phase in which the clusters were connected into the explanatory framework consistent with the text. Principals position themselves as rational and legitimate and are cogently able to represent their intentions and justify their actions (Bury, 2001; Carlick & Biley, 2004); their reconstruction captures the experiential essence, consistent with the realist philosophical stance.

6.6.1 First impressions of analysis - the tale of the iron man

The principals described their experiences of pharmacological therapy for chronic illness and the influences, either supporting or impeding, which have a bearing on adherence. Participating in a pharmaceutical regime is to integrate medication-taking with the self, the chronically-ill person is combined with the old, former self to create the new being, the nascent norm, alternatingly with success or difficulty, as described in the powerful imagery of one principal;

> '*you know, I feel like an iron man, you look strong and you have that persona. But you know what happens to iron over time? It rusts'*(P16).

Lifeways are developed in which the individual will accommodate or shun the therapeutic regime however, there is generally an erosion of some or many elements of their current self; some individuals consider themselves as experts both in the condition and their bodies which increases adherence to the regimen.

Several sociodemographic characteristics were found to be significantly associated with medication-taking, such as health literacy, and both illness- and treatment-related knowledge. However, the key emergent theme was the constant tension between the old and new self together with the rationalisation and validation of medication-taking; the negotiation of medication-taking develops throughout the illness and medication processes, from initiation of the regime and forward. Individuals generally strove to be adherent, although the connotation of this did not necessarily correlate with the prescriber's intentions. Confusing communication or misunderstood instructions led to unnecessary complications in what was already for some a perplexing situation. Several individuals were doubtful of benefits or disliked the idea of being submissive to pharmaceuticals. Individuals who expressed greater access, and trust in the health care system were more likely to exhibit better adherence since the value that was placed within the structure benefited them in return. Additionally, the greater the acceptance of the illness and the treatment, the more adept the individual became at integrating the illness condition into their life; the corollary of which was the sense of contextual stability from which individuals were able to demonstrate adjustments to their daily lives: the adoption of a pragmatic outlook.

Approach, interaction, and commitment to pharmacological intervention accounted for the variance in medication adherence; forgetfulness was a central factor, particularly in the absence of an established routine. In addition, the active adjustment of doses or discontinuation, albeit temporarily, and the level of support, from family and associates or deriving from professional stakeholders had a mediating effect. Central to dialogues was the juxtaposition between a certain sense of futility stemming from the knowledge that there is no cessation to the condition and a sense of empowerment in the ability to self-manage.

Influential affects on medication-mediation were consolidated into five original overarching themes:

the paradoxical nature of medication-mediation and identity,
information versus knowledge,
treatment versus beliefs,
the human condition; the dichotomy between choices and control, and
the personality of adherence.

Accounts regarding these descriptive categories are further elucidated in the following section, in which the characterisation of experiences are expansively discussed.

6.7 Principal's accounts of adherence management

Continual refinements to the medication-taking process are indicative of the complexity of the issue and illuminate that an unequivocally suitable definition consistent between the pursuance of clinical attention, obtaining medical advice and non-divergence from the pharmaceutical recommendations has yet to be accomplished. Medication-taking is a process and embodies many things. As a consequence, the current terminology of adherence, concordance or compliance has been eschewed in this study; the corollary of findings evidence that the task of optimising a medication regime is none of these things, rather a combination of that and something more - it is an individual's mediation between many competing influences which enables or hinders the medication-taking process, as noted throughout this thesis so far. Therefore, the collocation of 'medication-adherence' is redefined into the appenditure

medication-mediation; standardised terminology is useful in order to quantify the differences between medications and populations, and this terminology will henceforth be employed in this document (unless referring to external studies which necessitate the term adherence).
Several principals were slightly surprised at some of their responses during interviews; this appeared to derive from a lack of previous attempts to analyse motivations or attitudes, which the interviews compelled. However, this was embraced by all and many expressed that they felt it had been a valuable, reflective experience. They were given the opportunity to contemplate during interviews, which was constructive in terms of the depth of the data outcomes. It was discerned that patient-specific influences were multi-faceted and sets of unique factors were observed; furthermore, multiple methods were employed as strategies to initiate and maintain medication-taking.

Reporting conventions: to illustrate key points principals' quotes have been incorporated into the text and are identifiable by italicised font, followed by the participant identification code. Words which were stressed by the individual are highlighted in bold, swearwords have *** interpolated within the expression; (…) indicates that irrelevant text has been omitted for the benefit of conciseness; [] denotes an insertion to support comprehension; and … indicates that the principal's account has trailed off.

6.7.1 Characterisation of experiences

The objective of this study was to investigate the influences on medication-mediation in chronic illness; various factors that emerged supported previous research, in addition to selected distinctive findings from the current inquiry as a result of the phenomenological approach. This emphasises one of the benefits of qualitative investigation, (although limited for comparison in terms of extant studies), that the principals are using their own lexicon and contributing their own meaning rather than attempting to correspond to researcher's predefined categories.

Several principals were slightly surprised at some of their responses during interviews; this appeared to derive from a lack of previous attempts to analyse motivations or attitudes, which the

interviews compelled. However, this was embraced by all and many expressed that they felt it had been a valuable, reflective experience. They were given the opportunity to contemplate during interviews, which was constructive in terms of the depth of the data outcomes. It was discerned that patient-specific influences were multi-faceted and sets of unique factors were observed; furthermore, multiple methods were employed as strategies to initiate and maintain medication-taking.

Principals' views offer an interesting and unique perspective of the relationship between barriers and facilitators. Influences were organised into five categories, to wit:

> the paradoxical nature of mediation and identity,
> information versus knowledge,
> treatment versus beliefs,
> the human condition; the dichotomy between choices and control, and
> the personality of adherence.

The paradoxical nature of mediation and identity Adherence has previously been captured as a social construction in which healthcare providers (Langer, 2008) exert their professional power (Wilson, 2001); indeed, Conrad (1985;1987) distinguishes the notion of self-regulation and nonadherence between perspectives of the patient and provider. Autonomy is encapsulated by concepts of independence, self-determination, and self-care (Redman, 2005) and experienced to a lesser or greater degree between all principals. Several principals expressed perceived autonomy in terms of their decisions regarding medication, which in some cases disregarded the opinion of the healthcare professionals. Rather, some considered that autonomy was retained as a result of the collaborative relationship with their healthcare team, leading to a sense of emancipation. In contrast there was a perception that chronic illness diminishes identity since its very existence implicates the necessity for pharmacological interventions, interrupting and disrupting daily life. Following diagnosis, a negotiation ensues regarding the integration of the condition and its management process (Hernandez, 1996; Whittemore & Dixon, 2008).

One component of this negotiation is ascribing meaning to the condition and its prioritisation for the individual, specifically, whether it exists as a primary or secondary focus, and the contextualisation of wellness and illness. Successful mediation occurred when management of the regime was established without jeopardising quality of life, however this was unattainable for some principals as their life centred around the condition, and the illness had arrogated the individual's identity. In order to reclaim one's identity, contested by the necessity for medication, a method of coping accommodating restrictions imposed by the illness and medication regime must be determined; a sense of stasis, a reclamation of identity, '*the new normal*', in accordance with Paterson's (2001a) model of Shifting Perspectives. Meaning-making is modified to assimilate the individual's neoteric construction of lost independence whilst retrieving an altered sense of control for the sake of normalcy.

A sense of control, rather than a passive stance, is important in terms of identity. When an individual has achieved 'active control' (Paterson & Thorne, 2000), whereby illness is integrated into the individual's life and control is assumed, there follows a determination to self-manage. This resolves the paradox of losing independence due to the illness but being obliged to self-manage, take control, and adapt identity. Meaning-making periodically involved personification of medication to enable self-agency (Koch, Jenkin & Kralik, 2004); medication assumed human characteristics (e.g., Hartrick, 1998; Stuckey, 2009), assisting the coping process. For some, medication takes on the persona of an alter ego; as such its qualities and attributes may be more easily understood and therefore contended with. An element of the new identity comprised keeping symptoms or side effects private (Gannon, Glover, O'Neill & Emberton, 2004), rarely discussing these with others due to the potential negative impact both on relationships and the subjective estimation of oneself (Rajaram & Rashidi, 1998; Johnson & Johnson, 2006). This may lead to attempts to self-manage the regimen rather than seeking assistance, but it is a question of finding the balance to achieve optima mediation.

Dimensions of illness perceptions (Leventhal, et al., 1992b) comprise knowledge about, understanding of, and personal control over the condition. In alignment with this the principals spoke about influences which may include severity of the condition, symptoms, treatment control and controllability:

‘*you do have to not let it take over, but it’s difficult because it’s such a big part of your life. You always having to think, because of remembering to do the tablets’* (P15).

Furthermore, effects were felt on emotionality, how the condition causes the individual to feel; sometimes an impassive approach was demonstrated, whilst periodically, sensitive responses were experienced, such as anger, disappointment, and anxiety. Negative outcomes have been linked to chronic illness include cognitive impairment, increased comorbidity, poor quality of life, impaired daily living activities and depression (DiMatteo, 2004; Osterberg & Blaschke, 2005). Research has shown that individuals with depression are three times more likely not to adhere to medication (Morrison & Wertheimer, 2004) and dialogues with the principals supported this, such as this young principal with hypertension;

‘*it’s depressing to think that you’re always on medication. I have got depression now actually because of the other* [illness condition]. *I hide my tablets so I don’t get reminded*’ (P2).

Severity of illness produces conflicting results (Morrison & Wertheimer); paradoxically, it is not necessarily an indicator of adherence, since anxiety associated with more serious conditions may exert an inhibitory effect on adherence behaviour (Ross & Guggenheim, 1983; Kinon, Ascher-Svanum, Adams, & Chen, 2008), or may relate to moderating judgements concerning how the condition’s severity is considered, for instance whether it relates to the level of control or purely on input from healthcare providers (Boulet, Boulet & Milot, 2002).

Treatment factors featured in principals’ discourse and comprise the healthcare system, resources, services, and patient-practitioner interaction; principals report significant effects relating to the treatment regimen, such as convenience of dosing, and complexity of the regime. Polypharmacy can be considered as a proxy indication of regimen complexity consistent with previous research (Muir, Sanders, Wilkinson & Schmader, 2001; Phatak & Thomas 2006) and a predictor of nonadherence (Bartlett, 2002; Pantuzza, Ceccato, Silveira, Junqueira, & Reis, 2017). The frequency and inconvenience of side effects (Glidden, et al., 2017) and the extent to which they interfere with everyday life and ability to perform is also considered:

‘*I guess it works, and it doesn’t stop me, but *** me I get some shocking headaches as a consequence’* (P24).

Principals disclosed that multiple prescribing physicians were problematic and have a negative effect (Vik, et al., 2004), and this investigation found that prescription from a specialist predicts greater adherence than by a GP, indicating superior trust levels, supporting previous research (Atella, Peracchi, Depalo & Rosetti, 2006).

There were repeated reports from principals of an evaluation of beliefs regarding the medication's benefits, in terms of efficacy, against detriments involving a sense of personal loss, causing the individual to take stock regularly. According to the necessity-concerns framework (Horne & Weinman 1999; Wroe 2002) there are two accountable domains in terms of medication beliefs; necessity beliefs rationalise the perceived role of medication in preserving the health of the patient, and concern beliefs which relate to the perceived potential of difficulties in medication-taking, such as side effects or dependency development. The necessity/concern differential represents the patient's reasoning based on the perception of treatment and personal circumstances (Pound, et al., 2005), and could be construed as a cost-benefit analysis since the patient's perceptions of benefit (necessity) are evaluated against cost (concern). The following comment was made by a principal low in adherence to COPD medication;

'*it is a worry to think that you are shoving these things in your body, but what's the choice?*' (P18).

It is asserted that individuals make decisions which are irrational to the healthcare provider, but which appear intelligent to them (Donovan & Blake, 1992; Atkins & Fallowfield, 2006). Principals report that evaluations include whether treatment fits daily schedules, weighing up undesirable effects of the medication to see whether it is worthwhile continuing or reducing medicine to see what happens, the level of satisfaction with the medication, obtaining information from others, and using objective indicators such as blood pressure monitors and subjective indicators such as feeling good or bad (Pound, et al., 2005). Various concerns were expressed regarding the long-term nature of medication-taking;

'*you've got to think about long-term effects, what's it doing to you?'* (P17);

'*it is a disruption – there's other things I'd rather be doing than thinking about meds*' (P29);

'*what if I do become dependent? Yeah, that's a worry*' (P2).

In addition, side effects such as dizziness or tiredness, impracticality of administration such as between meals, fear of disruption to sexual performance or other physical function, or concern of becoming dependent. Conversely, there may be an inexorable sense that taking medication as prescribed is the right thing to do:

‘*The thought of taking them for the rest of my life? It was a shock at first then you get used to it but there’s times when you think oh *** it and you just carry on, get on with it’* (P17).

Health literacy, which relates to the extent of illness and treatment knowledge, influenced by the availability, and merit of information (Vlasnik, Aliotta & DeLor, 2005), varied amongst principals. A patient is equipped to subjectively understand their condition by virtue of knowledge; a firm understanding may lead the individual to alter medication-taking in a more informed way. Interviews are particularly useful when appraising a patient’s understanding (German, Klein et al. 1982; Hajjar, Cafiero & Hanlon, 2007) and why, for some, medication remains a mystery:

‘*I don’t know what it is or how it works, but I’m told it does’* (P28),

steering principals to take medication due to perceived need (Eriksson, Undén & Elofsson, 2001; Fayers & Sprangers 2002; John, et al., 2006). As a rule, lack of clarity concerning drug administration is detrimental to adherence and therefore frequent interaction, incorporating suitable communication, with the healthcare team is essential; unresolved concerns regarding diagnosis, absence of symptoms and length of time for the drug to take effect (Osterberg & Blashke, 2005) were predictors of nonadherence:

‘*you think, do I really need to take these, and it’s tempting not to*’ (P22).

Information versus knowledge Nonadherence has often been attributed to knowledge deficit (e.g., Russell, et al., 2010; Rouse, 2010), which is to oversimplify a complex issue. There is a distinction to be made between knowledge, information and understanding; with understanding of the illness condition and medication comes the ability to set and accomplish goals and is a prerequisite for successful self-management.

Information concerns the necessary evidence to become aware of the properties of the illness condition and treatment. Information is retrieved from various sources, primarily in the first instance from the healthcare team, but is often supplemented by the individual themselves via social media, an illness-specific website, support associations, or friends and family. Knowledge informs the trilateral interaction between illness, medication, and mediation. Knowledge translates to proficiency in skills necessary for best-practice in medication-taking, such as the most effective way to use asthma inhalers, and conscious response of the body under differing circumstances. Equipped with information and knowledge the patient is able to become informed, but it is a dynamic and demanding process. Edification transpires organically throughout the normal course of the illness and on occasions when an aggravating event might occur, such as a spike in INR level. However, whilst this may be construed as a positive learning opportunity to manage such an episode, the experience may be distressing and may lead to the individual being overwhelmed, resulting in mismanagement and, in the worst instance, failed medication mediation.

Many aspects of the treatment regime were considered, including symptom alleviation, coping with side effects, pain amelioration and the endeavour to live a normal life. P17 describes how

‘*you always have to think about it. Like if you’re going out, then you think have I got my inhaler, have I got my, for this, for that, emergency stuff, you know? And not just that but then when you’re somewhere you have to think about, when where you’re gonna have your, like the oxygen. Well, have you seen it? I try to do it in private, ‘cos like it’s probably gonna scare kids, you know, it’s scary’*.

Several principals considered that expanding knowledge was fundamental to successful administration of a treatment regime. Accounts varied as to the ease of access to information, together with potential sources of understanding of illness and the attribution of medication in the amelioration of symptoms and its role in the management of long-term illness. Knowledge and information are advantageous in addition to literacy and numeracy skills and appropriate training.

There is a balance to be made between daily life and medication management, which requires laborious engagement to facilitate the regime. Whilst there may be input from others, including healthcare professionals, the main factor determining the outcome was driven by the patient’s behaviour. P13 acknowledged that there is a sense of '*getting to know your body*' which complimented educated understanding:

'*oh yeah, you know what's on, not all the time, but yeah you know if you're gonna have an attack or whatever… I suppose that's good, cos erm you can prepare*' (P20).

This account contrasts with P22 who professed that, in relation to his COPD, would

'*just leave it the doctors. That's what they're there for. No good me saying anything, I don't know what I'm talking about do I? No, I rely on them*.'

Furthermore, P6 acknowledged that

'*you don't want a lot of information. What you gonna do with it?*'.

Opinions varied as to how, or indeed whether, the individual is responsible for their own monitoring and management of the condition but it was generally felt that accountability for medication-taking rested with the patient:

'*It's like your responsibility, I mean a thing that is down to you whether it's made right or not.*' (P31).

There was a wide extent of expectations and experience.

'*When you come home, you're like, ooh I must go and have a look at that* [on the internet] *even though you've just been told by your doctor. It's crazy really!*' (P3),

but she felt that she did not want to miss any opportunity to support and supplement information received from the healthcare practitioner. Taking warfarin and verifying that a particular food is innocuous in terms of the affect to P16's INR level leads the principal to

'*always check actually before I eat anything, I'm sure of to check that I can*'.. '*sometimes you forget of course, I'm always looking up red stuff, cos erm you can't have cranberries, so is it any berry or any other red fruit? I'll just check to be sure*.'

This in part leads to successful medication mediation. P14 reads the coeliac association magazine which can be misleading as he assumed that his illness could develop with very severe consequences until it was pointed out by a relation that this was a different condition, highlighting the importance of getting the facts right:

'*there are certain people I will go to* [for information] *and I know that it's right*'.

Some principals however, were disinterested in acquiring knowledge, preferring to rely solely on the healthcare practitioner's advice which on occasion led to some comprehensively erroneous conclusions:

'*I would say that there's only so many* [types of medication]*, right? So it's not gonna make any difference what ones you take, 'cos they all do the same, work the same'*(P10).

Organisation is an essential component to successful management; P16 comments that he had several systems in place to ensure that he did not overlook his medication; these included a diary, a dated dispenser, and reminders on his phone and from his wife. Despite this however,

'*I still forget sometimes. It's sometimes that you're on the road or if my* [work] *shift is different, as I take them the same time of day each day then that can get in the way and the next day when I look the pill's still there and I think ***s*'.

Contemporaneous monitoring and recording are essential in order to keep the GP informed of accurate information since

'*who can remember what happened two months ago, actually even last week, really?*' (P23).

Diligent self-monitoring can identify patterns from which deviations may be highlighted, as noted by the following principal with a high level of adherence:

'*I have my INR recorded so I have a record of what it is every 6 weeks or so but then when it spiked or dropped I thought I'd put in the diary why, what I'd done or eaten, to have the effect. It helps explain so I know what to expect* [in the future]' (P16),

whereas P18, a low adherer with COPD, explains that by monitoring the condition it merely draws attention to it:

'*I don't want to be involved really, I know I suppose I should but if I'm thinking about eating this, should I, or doing that or what's, you know, then I'm never free of it, I'll always be thinking of it* [the illness] *and then I'm never free. I don't want to live my life like that. I want to be normal*'.

Various tools or strategies to aid adherence were employed and supported engagement by virtue of convenience, organisation, and stimulation, including calendars, diaries, and smartphone functions. Above all, routine was considered invaluable and the key to a successful regime.

Monitoring represents '*a pain in the arse!*' (P24) for some principals:

‘*I feel a bit like school. I know it’s not but it brings out the same feelings like you better get this right or you’ll get a black mark*’, (P19).

There was a sense that medication monitoring was boring, tiresome, a challenge to fit into daily routines and frustrating since it is easily forgotten - not to mention a constant and unsolicited reminder about being ‘ill’. ‘*Sometimes you just want a break*’ (P15) from the monitoring and medication-taking, explains one participant, although they would feel guilty about being negligent or neglectful of their own bodies if this materialised. P13 meticulously kept records and found this effective,

‘*well, you know if you’ve missed a dose and also it’s a double check, I do refer to it*’.

Correlated to the concept of knowledge is the notion of perceptions regarding proficiency and competence to adjust medication appropriately which diverge and fluctuate. P16 explains that

‘*I tend to know when things need changing. I check with the consultant but I know what he’s going to say before he does!*’,

noting that he now has the expertise to know whether the dose will be adjusted and whether his level has increased or reduced, and this awareness and collaboration with the healthcare providers lends satisfaction. Being able to cope when situations arise that are outside the norm without becoming anxious, and flexibility over pre-arrangements, together with proactivity and adaptability in changing schedules are all integral to maintaining and keeping the condition under control. In contrast, P9 resolves to ‘*just do it* [take medication] *when I need to*’, similarly P12 waits until he is forced to take medication as his foot becomes too painful to walk on but takes no precautions in the meantime; he is reactive to the condition rather than focussed on preventative measures. Mediation of the process is challenging, and P7 indicates that

‘*if I’m stressed I know it’s gonna get, be worse, so I keep them* [tablets] *handy so I can just take them. But then they’re like there you know staring me in the face saying well you can’t manage on your own*’.

Aside from the balancing act in terms of illness management medication-taking can not only require substantial advance planning but also interfere with social niceties, as one principal notes regarding her COPD medication;

‘*I go into the toilets to do it* [take oxygen] *because who wants to see that, the children would scare them*’, P17 notes her endeavours to be unobtrusive for the sake of others indicative of situations that disrupt normal routines.

Assimilation of information and knowledge evolve into understanding, whereby the patient may be regarded as expert; augmenting awareness of the illness, medication and the body's response confers a status on the individual. There may be an incongruity between the opinion of the individual and the healthcare provider however armed with integration of experiential knowledge the patient is better able to contend their perspective in a reasonable rationale and contribute to the collaborative relationship in a constructive way.

Treatment versus beliefs The character of medication-mediation is unique to each individual, predicated largely on beliefs which are attributed to the illness and its treatment. The regime carries with it an expectation of behaviour; there may be variance between the individual and the providers expectations.

The individual must resolve the dichotomy between perceptions of the old self and the health behaviour required to establish routines of self-management; when a balance is achieved new, necessary beliefs will emerge to accommodate medication-taking. This may initially entail selective adherence (Thorne, 1990), diligently focusing on some aspects of self-management whilst others may be less attended or ignored; a process of continual manipulation and modification, taking into account newly learnt knowledge and adapting beliefs as a consequence.

The external environment was not viewed as conducive to adherence by some principals, with some factors such as the lack of access to out-of-hours care, time pressures within the working environment and difficulties sourcing medications when facilities are closed. Occasionally, administration of medication was a question of prioritisation,

'*look, you can't do everything. Sometimes you just don't have the time or it's not convenient, or whatever*' (P8).

One principal mentioned that he 'tablet-shares' with his friend who has the same condition of gout. It ‘*makes it convenient if one runs out, that’s usually me and I just say what-ho* [name] *chuck us some drug*’ (P12).

On occasion the availability of resources is limited, including information,

‘*sometimes you go through this useless round of waiting to see the GP, he won’t say anything without a referral to the specialist, then you wait months for that and in the end he’ll prescribe something and you go back to the ***ing GP who could have just done that in the first place or with a phone call. It drives me mad. Bet that doesn’t happen in private* [hospitals]’ (P6).

This leads, additionally, to a sense that the system operates less than optimally and re-organisation would be beneficial in economic terms to the patient. There was, however, a pervasive appreciation that information is easily available and accessible in various formats, although its quality level was rarely considered, nor was reliability often judged. P10 explains:

‘*even the consultant he said, don’t bother with those, just stick to the British ones* [websites]. *The others aren’t so good. He was sort of whispering in case anyone else heard!*’.

Principals described the practice of disseminating experiences with others as a method to share thoughts, in support groups for instance, and educate those without the condition. One principal, with scoliosis, had made provision in the event of an emergency, saying

‘*if this happens then call an ambulance and tell them what I’ve got*’ (P16).

In some cases, the involvement of others is elicited, although as P5 notes

‘*it’s not great when Dad comes back and says oh I’ve spoken to so and so and he knows someone with what you’ve got. They were really poorly and I think they haven’t long to, you know, live. Not helpful!*’.

Aside from the chance that the eponymous individual suffers from a different condition altogether, it is immaterial in managing the illness, and is possibly the reason why some principals adopt a more discrete stance:

‘*what do you want to go sharing that sort of stuff for? Who’s interested?!*’, (P11); ‘*I just go into my bedroom and shut the door*’, (P18).

Medication is missed on occasion due to haphazard administration or carelessness; at other times it is planned;

‘*you don’t tell them* [doctors] *that you haven’t been taking stuff because well you know you don’t want them to know that … yes, they probably should know I suppose, but you don’t want to be thought of as badly, they’re trying to help*’, (P21).

There are contrasting relationships with the healthcare provider:

‘*I always think twice before I pick up the phone, I don’t want to bother them*’, (P23);

‘*it’s what they’re there for*’, (P24);

‘*it doesn’t matter if I don’t do what they say, that’s their job to make us better*’, (P25).

P24 expresses the dichotomous nature of her decision not to take COPD medication as prescribed whilst expecting the clinical support to perform their job competently; P16 however articulates that

‘*it’s better if you know your own body*’

dispensing with the reliance on others. Sometimes there is a desire not to do the ‘*right thing’,* (P27), in terms of clinical instructions and the dilemma of behaving autonomously versus potential negative outcomes is presented. The outcome of nonadherence action is defined as ‘getting into trouble’ and the optimal goal is to take medication without compromising the benefits of what makes life good. Temptations, risk and attached value are evaluated and outcomes assessed against action. There are limitations as to what the clinical team can, or are willing to do, in conjunction to parameters set by the individual; a successful intervention occurs when positive vectors of adherence intercept.

The burden of chronic illness is limited not just to the experience of physical symptoms and there were expressions relating to the necessity of psychological attributes to enable optimisation of both physical and psychological wellbeing. The potential of ‘*going off track*’ (P14) is a source of continual anxiety to most of the principals;

‘*you’re always thinking about it* (INR levels) *and what could make it worse*’(P16).

Most principals expressed limited concern with less-immediate results and rarely thought about more severe long-term consequences, although being aware of such, further in the future. This results not from any flippancy but more through inability to cope with the potentiality of the chronicity of the problem;

‘*I’m not saying you live for today, that’s a bit over-dramatic but you certainly don’t want to think of down the line, what could happen, you know how things could be, get worse. No, you don’t want to think about that. Today is enough*’, (P8);

‘*ach, I can’t think that I’m going to be stuck with this forever, that’s too depressing*’, (P20).

Furthermore, alteration of symptoms without any apparent specific reason is a source of frustration, but one which some principals took in their stride;

‘*I do generally know but times I don’t well you jus have to get on with it. It’s best to try and work it out so you for the future but well, there you go*’, (P26).

‘*Sometimes, it’s annoying when you know you are worse because of something that wasn’t your fault, I mean when, if I get, I’m stressed that’s from someone else and it’s annoying because that’s not my fault but I have to suffer the consequences*’, (P30).

Expressions were articulated comparing the illness to an additional physiological entity:

‘*it’s like a companion, and if you don’t take your med it’s like cheating on them. The disease is like something that needs feeding and you do it with pills, but it gets hungry again*’, (P29);

‘*it’s like a thing controlling you, like a machine or something and you don’t have the manual so you’re in the dark for most of the time but then you have moments when you can see clearly and it makes sense*’, (P15);

‘*like a presence that doesn’t like you very much and you have to appease it or it will make things bad for you,* (P30)*’.*

There was a sense that although the entity was present within the body it was akin to a foreign essence which is ‘*is scary cos you don’t talk its language*’, (P4). Some principals were stoically determined:

‘*I’m not changing who I am. I want to do my stuff and if I can’t then I’m not taking tablets if that get in the way*’, (P15).

Principals were reluctant to allow the condition to disrupt normal life:

‘*plenty of time to be ill before you die, when you’re old*’ (P11).

The persistent nature of medication-taking is burdensome and many principals expressed

‘*sometimes you just want a break from having to take* [medication]’, (P28), which leads on occasion to choosing not see symptoms in order not to have to deal with choice in medication, as one principal with COPD expressively articulated:

‘*I don’t want to live my life through the lens of a disease* - *that’s not going to happen*’ (P31).

For some, everything was evaluated through the illness ‘lens’, some were at peace with this knowing that the outcome was worth it whereas others still struggled to accommodate it within everyday life and felt a battle, and a few tried to only pay it the minimal amount of attention when necessary:

‘*you can’t let it take over or it will ruin your life*’, (P15).

The human condition: the dichotomy between choices and control Nonadherence is often characterised by irrational and irresponsible behaviour, contravening the directions of a healthcare professional (e.g., Wens, Vermeire, Van Royen, Sabbe & Denekens, 2005), although other research takes a less draconian view (e.g., Coates & Boore, 1998). There is a complex interplay of factors affecting the individual at any one time, not all of which are in their control; intentions do not always translate into successful behaviour. A question frequently asked relates to where the responsibility for adherence lies (e.g., Sewitch, et al., 2003); there was a pervasive sense that principals were facing the challenge effectively alone, in spite of support from family, friends and the healthcare system, and that ultimately the individual is liable and answerable for their own welfare. A tendency not to pursue support is a manifestation of the need for independence, however, it is cause for concern as it may indicate a lack of trust in the healthcare provider.

Self-determination is a key component of self-management, the resolve for decisiveness with limited interference from further authorities, and respect for choice. Initial treatment is sometimes perceived to be foisted on the individual, who takes no part in negotiations, however a key component of maintenance incorporates collaboration and design by the principal. Adaptations to the regimen may be made over time and perceived by the individual as further evidence of their influence. Principals who viewed self-management as control over the illness, rather than the ailments’ influence over them, adopted the regime as part of their lifestyle; whilst this was valued by some, others construed this as an impediment to normality, representing constraints to freedom, requiring adjustments to regain control.

At times, control is excessively intractable to achieve, causing temporary neglect of the treatment regimen; this is perceived to be a consequence of weaknesses such as carelessness, forgetfulness, or self-discipline. Stability is challenging to maintain over protracted periods of time in the absence of meticulous control and is facilitated by customary practice of medication-taking; routine is challenged on occasions when the ordinary is supplanted by a particular event or occasion, such as certain social situations. Chronic illness is however a burden, even for those who perceive themselves as in control, the corollary of which is a sense of loss. Such is the complexity of beliefs and perceptions that nonetheless, there are opportunities for health behaviour, supporting Thorne and Paterson's (1998) theory that an initial conceptualisation of loss and burden shifts into more optimistic depictions. In fact, many perspectives exist within and between each individual and are subject to temporal and situational modification, sometimes transmuting, other times returning to base.

Principals gave accounts of their condition as burdensome, requiring constant effort to keep in control:

> '*I live with it, I won't let it control me*' (P16),

and

> '*you can't let the thing beat you otherwise what's the point?*' (P5).

Pill administration was only one area for discord, as P16 describes, his anti-coagulation regime is more than taking the warfarin to regulate his INR:

> '*You have to be so careful what you eat, broccoli, erm cranberry, because it can impact on the, the* [INR] *result. And not just that, food, but for example if I go on a long car journey … I know that it would spike after. So, it's all things to think about. And obviously I can't fly so that's a trip to Canada out, which my wife's not too happy about!'*.

This also raises the important aspect of the social support given by his wife; he expresses her role in the collaborative management of the regime and recognises how his condition impacts on her too.

The perennial wrestle to balance management of the condition and ‘living’ life was noted; priorities and values are sometimes at odds with the medication regime and a frustration that, on occasions, it impedes activities which can’t be undertaken with satisfaction. There is a trade-off between participating in a valued endeavour and the reality that it can no longer be achieved;

‘*God, I’d love to run like I used to but I can’t now. You just have to accept it and get on with what you can do and enjoy it*’ (P11).

P11 stoically accepts his limitations due to his condition but enjoys what he can do within those constraints. P9’s disappointment was evident, however, and realised in a sense of loss due to her eczema, with nothing to replace the grief;

‘*I can’t swim anymore. I’ve been swimming since school, there. And I really miss it. I was good at it and it was took up a lot of time but can’t now because of the affect on the skin*’.

The management of chronic illness is a long-term process with no finality, such as remission of the condition; none of the principals viewed the process in phases, such as initiation or maintenance, but tended to take an inveterately unremitting view of uniformity in approach. Any deviation was seen as failure rather a temporary relapse. There was no prevailing sense of accomplishing lateral personal goals; in fact, on occasion it was felt that the principals had competing objectives with healthcare providers. Several principals expressed the impression that healthcare providers are concerned merely with imparting knowledge or clinical implications rather than alleviation of discomfort or inconvenience experienced which lead to a sense of dislocation between the two viewpoints. The patient-practitioner relationship requires trust, particularly in asymptomatic conditions where the individual cannot evidence the efficacy of medication:

‘*there’s no proof that the tablets, those medication work is there?*’ (P13).

For the patient, rationalisations are more straightforward when symptoms present experiential difficulties, for example in gout when pain is felt. In certain conditions pathology can be similar but signify different things, such as high and low blood sugar levels in diabetes, and can therefore be misinterpreted. Furthermore, some chronic conditions are asymptomatic such as Factor v, and the participant has no indication of the course of the condition:

‘*you know I often think, wonder, oh have I got an er embolism, ‘cos that’s how it started, how I found out. But I won’t know if it’s coming ‘til it’s too late*’(P16).

Even when there are symptoms this is no guarantee that the patient will take action - sometimes indicators may simply be ignored; this occurs for a variety of reasons, since the individual may be uneducated or inexperienced in the disease, frightened to act or simply ambivalent.

‘Y*eah I know when something’s wrong now. It’s taken, oh, 5 years’* (P19);

‘*I can tell him* [the consultant] *when something’s not right. You get to know*’ (P30).

The principals recognise that certain food, lifestyle activities, or events affect their condition. For some this was enlightening, whilst for others, despite the positive results this represented a burden due to the ongoing attention that has be assigned. Awareness is important:

‘*if you listen your body will tell you’* (P17),

but for others this was not easy and they felt that they were unable and ill-equipped to do this. Rather, responsibility rests with the healthcare practitioner, emanating not pedantically but instead from a sense of helplessness:

‘*how can you tell anything? That’s their job*’ (P12).

Several principals mentioned the impact of cost, not only of the medication itself but in terms of time and impact on the image of the self. Expenses are a significant factor (Hutchison, Jones, West & Wei, 2006) to both society and the individual, and may include expense of travelling, financial incentives, time costs and income. Health insurance is of greater significance in countries such as the USA where healthcare is largely disbursed individually (Medicare/Medicaid), in contrast to the UK (Soumerai, et al., 2006). Access to medications can impede adherence, mostly affecting elderly, female, and disabled patients, but also relevant to those who need to fit in with working hours:

‘*I have to get my prescription when the surgery’s open which happens to be when I’m at work - the last prescription was dated three months ago and I’ve just managed to pick it up*’ (P17).

Cost is defined not only in terms of the financial aspects but also additional aspects that impact on daily living.

A sense of unease was pervasive, deriving from the paradox of taking a medication for symptom-alleviation to enable disregard of the illness, whilst consciously evoking recollection to administer treatment which requires cognisance, thus rendering it prominent in consciousness;

‘*You take the medication to make it go away, well I know it doesn’t but it’s always there. I don’t know if that makes sense’* (P1).

Attempts to limit interference in daily life occasioned by medication-taking is exacerbated by actions or sentiments of others which are incongruent with the patient’s illness perspective (Pierret, 2003), as P26, a principal with COPD, explains:

‘*I’m not allowed to carry any personal belongings on site* [place of occupation] *and no breaks. They can a fag break but I’m made to feel uncomfortable if I ask to go to take my meds’*.

Unpredictable symptoms were associated with the unfamiliar, and therefore correlated with fear, particularly in individuals with asthma,

‘*you think, oh Christ, what’s this? How do I deal with it and then you have to think whether you need a doctor. It’s a constant worry*’ (P18).

Difficulties in self-diagnosing and mediation in medication-taking were expressed by several principals. Some principals were happy to experiment with doses for instance, whilst for others clinical advice was a prerequisite prior to administering any deviation in medication:

‘*you think crikey, what’s happening*’ (P20),

connotating whether a new symptom was the preamble to a comorbid condition, a worsening of the present condition, or the mortal end. Whilst many principals were diligent in symptom-seeking the extremity was typified by a principal with gout (P12) who held the assumption that

‘*if you can’t see it, then there’s nothing wrong. Makes sense?*’.

The personality of adherence The ‘uniqueness’ of each person was a concept that was apparent in the dialogues. Diversities in values, beliefs, characters, personality traits together with situational context determine the medication-taking process experience; this will influence an individual’s response.

Principals believed that the irregularity of particular factors, such as administration practicalities, access, social support, and assistance, result in inconsistent outcomes, in support of previous research (e.g., Morrison & Wertheimer, 2004). Age was not found to be a predictor despite nonadherence in the elderly being high in the general population, commonly due to polypharmacy and cognitive impairments (Vik, et al., 2004); age and gender are more significant in paediatrics than older age (DiMatteo, 2004). Gender, marital status, occupation and living arrangements may also be poor predictors (Vermeire, et al., 2001), although this study produced strong evidence to support the advantage of being married or in a relationship (87% of the chronic conditions group that attained a high score of adherence were married, living with a partner or in a relationship). Ethnicity is significant (Balkrishnan, 1998), demonstrated by African-Americans' reduced rates of adherence exacerbated by medication beliefs, lower literacy, lack of trust in the healthcare team and poor access to healthcare (Vlasnik, et al., 2005); none of the principals fell into this category.

The attitude of others towards illness is significant since an individual might feel the impacts of influences on their beliefs and social pressure to perform the target behaviour (Fishbein & Ajzen 1975). Furthermore, social support is valuable in numerous ways, but particularly for reminders, assistance, and encouragement, as noted by the following principals, both with asthmatic conditions:

'*I didn't think I could do it without her* [daughter], *she's been so brilliant. I couldn't have asked for anything more. She sorts everything out for me, it's like having another doctor here – in fact I think she does more for me than a doctor*' (P21);

'*it's hard on your own, you've got no support. I think you, it makes you worry more*' (P27).

Individual characteristics include attitudes, beliefs, preferences, and motivation. The strongest predictor in the study was motivation which affected attitudes and beliefs and was characterised in several semblances such as self-efficacy, self-regulation, and locus of control (although utilising layman's terms).

Self-efficacy relates to the antecedent of behaviours (Bandura, 1997) and concerns the level of belief a person has in their ability to accomplish an undertaking; its significance can be evidenced in behaviours (Walker, Gebregziabher, Martin-Harris, & Eged, 2015). One principal with asymptomatic hypertension remarked:

'*Mm, well, yes I have to say that I am guilty of running out sometimes. Usually when I'm on holiday, or have to go away on business. I just forget to get them sorted before I go and then I'm like, uh-oh'* (P2);

medication-taking is made more challenging with a busy lifestyle, being away from home or travelling and when the timing of administration is awkward, as this principal notes regarding her insulin injection for diabetes;

'you can't just do it at work. Well, I suppose you could but it would be a bit embarrassing' (P1).

It was further noted that reminders, and support from significant others was invaluable and alleviates one impediment to taking medication. The importance of a routine assuages many potential impediments, particularly in asymptomatic conditions.

Self-regulation regards engagement in healthy behaviour and the motivation to follow a treatment regimen and involves autonomous regulation (the individual's desire to manage) and controlled regulation (the motivation of what others think):

'*my wife would be well mad if I didn't take it because if I get sick she'd blame me 'cos I ain't taken them'* (P14).

For some principals medication-taking was their personal challenge to overcome, however with adherence comes improvement in health and a sense of surmounting a challenge, resulting in a personal sense of achievement and worth:

'*I suppose partly, you do what you're told* [by the GP], *but I suppose the longer you are away from them the more you have to be self-reliant and say it's because you want to be as good health as you can. It's up to you'* (P13).

Internal locus of control concerns a person's belief about the location of causality of the controlling influences in their life; implicit is an active approach to life whereby eventualities result from an individual's own attitudes and behaviour, for which they are prepared to take responsibility:

'*it's quite a burden because I know that if I don't take them as I should then I suffer, no-one can make that better. Well, they probably can in the short term but there will come a time when nothin' more can be done, and if that's the end of the line, that's my fault'* (P8).

'*funny innit, when you get worse it's your fault, but when you're improved you say aren't the doctors good?! What's wrong with that picture?*' (P10).

Certain coping mechanisms in terms of illness perceptions and effectiveness of medication-taking were noted by the principals. Individuals will evaluate behaviour (Hagger & Orbell, 2003), formulate, and engage in a particular coping procedure according to the Common Sense Model (Leventhal, Brisstte & Leventhal, 2003);

'*how can you know if it's working really, but I work on the premise that it does and that it would be worse if I didn't take them and so I do take them as best I can and I hope that it makes a difference and that is how I get through and what makes me think I should take them'* (P3).

In contrast, higher levels of independence have been found to lead to resistance of medication regimes in an attempt to secure autonomy (Insel, Reminger & Hsiao, 2006); therefore, whilst an active coping style is generally considered a positive personality trait typically associated with aptitude for enhanced health behaviour, the capacity for individualism may counter the positive affect:

'*no, well, I think you don't want to be behold, to what they* [GPs] *say. You can do, take things but if you think different then you know, you have to do what you think is right. I started taking them* [tablets] *but I didn't think they agreed with me so I stopped for a while. I might start them again when I feel better*' (P5).

Occasionally, principals were all-consumed by attempts to control the condition, resulting in mismanagement, such as P26 who took it upon himself to disregard prescribed medication and opt for a '*natural*' (i.e., cannabis) remedy; '*more farmer not pharma*', he insisted, explaining that he felt his natural remedy must be more efficacious than the chemicals prescribed by his GP. Interestingly though, he still regularly consulted the GP, collected his prescriptions whilst not divulging his alternative treatment. Self-management and monitoring are closely linked with satisfaction with health care, which is interconnected with communication with healthcare professionals. Involvement in the formulation of plans and positive interaction with healthcare providers has a significant impact on self-management. P3, an individual with multimorbid conditions and high in adherence explains:

'*I do ask questions and get active when I'm talking to the GP. I think it helps, sure, it's clearer in my mind and it means I can make better choices*'(P3).

Mutual trust in the provider-patient relationship enables positive continuity of care and promotes faith in the ability to manage effective continuity of care. P7 notes that her GP respectfully acknowledged her concern regarding the choice of medication:

'*he went, ok well we can try something different. Great. You see that wouldn't happen if I hadn't of said something so I'm glad we have that relationship*'.

In contrast P6 expressed an analogous experience within the healthcare team between whom he sensed had differing goals:

'*I dunno, you go to one they say this, you go to another the next day an' it's different. What do you do with that? You can't say anything, it might get you in trouble*'.

Striving for outcomes which were not coincident between the patient and practitioner led to confusion and dejection, potentially undermining the process, causing some patients to modify, even cease, medication-taking without informing the healthcare team. A perceived unenthusiastic response from the GP negatively impacts the individual.

A persistent theme throughout narratives is the anxiety triggered as a consequence of a chronic illness. The initial diagnosis may cause distress and disbelief, with continued feelings of apprehension and uneasiness as to the prospect of coping and capability to administer. At times, this presents as 'reality avoidance' (Gillibrand & Flynn, 2001), an existence of contradiction, inner conflict experienced by the individual to resist the truth, that living with a chronic illness is to accept a position of inexorable and implacable weakness. Vulnerability (Weiss & Hutchinson, 2000) results from an assailment of internal and external cues, including those emanating from healthcare providers in which threats are commonly applied to manipulate adherence (Wens, et al., 2005). External warnings of this nature do not tend to alleviate anxiety and are generally ineffective.

Directly competing with anxiety in terms of influencing medication-taking is motivation; motivation concerns the rationale for medication-taking and the self-discipline to do so. The will is the ‘essence of being a person’ (Frankfurt, 1971, p.16; Schapiro, 2009) and subject to persistent internal conflicts. In chronic illness there is a will to return to normality, which is achieved by some but not others. This may relate to difficulties in adapting to the new normal and attentional biases may partially explain an individual’s resistance to consider substitute possibilities other than conventional, that is, those previously experienced. Positively associated cues have been clinically linked to attributes such as anxiety.

6.7.2 Patient-practitioner relationship

This sub-section represents an epigrammatic incursion into the patient/practitioner relationship as many principals particularly noted its impact, positive or deleterious, in terms of medication-taking. Various aspects concerning the patient/practitioner relationship have been considered to date; the liaison has been investigated in depth in depression studies, the therapeutic alliance has been observed as a robust predictor of treatment outcome (e.g., Joyce, Piper & Ogrodniczuk, 2007; Martin, Garske, & Davis, 2000), and has long been known to be dependent upon the frequency, duration, and quality of interaction (Rosenburg, 1997). Research regarding the influence of the practitioner has concluded various effects; integral to this is the notion of patients’ understanding of the intention of their medication (Horne & Weinman, 1999), together with an individual’s expectations. Due to the complex nature of adherence it is essential that healthcare practitioners are attentive to prospects of adherence, and the burden of demand from treatment regimes and the healthcare system faced by patients and their caregivers (Mair & May, 2014), even when their patient may not present clinical signs of nonadherence.

Ross and Deverell (2004, p.56) described communication as '*the cornerstone of every patient-practitioner relationship*'; indeed, communication theory highlights the importance of the interactional skills of the health care team to develop affiliation with the patient, and posits that adherence to medication will be enhanced as a result of good patient/provider communication. The emphasis is placed not only on clear and coherent interactions but also the nature of instruction and the timing of treatment and instruction (Zolnierek & DiMatteo, 2009; Sabate & Sabate, 2003). Critics argue that this perspective does not take into account the motivational, interpersonal, and attitudinal influences of individuals which may affect the interpretation and response to communication (Ha & Longnecker, 2010) and is therefore unable to predict changes in behaviour, however, a number of interventions have utilised this approach which consider the affect of communication on medication adherence (e.g., Rolfe, Cash-Gibson, Car, Sheikh, & McKinstry, 2014).

Improved communication in consultations has the benefit of improving the GP/patient relationship and satisfaction with care (Lewin, Skea, Entwistle, Zwarenstein, & Dick, 2001). There is limited evidence regarding the influence of communication on health behaviours, such as adherence, but initial reports are encouraging concerning the improvement of health behaviour and health outcomes (Griffin, et al., 2004). In reality, interventions focussing on this factor in isolation are likely to receive limited success because of the influence of additional factors (e.g. social or financial), particularly environmental; if economic factors prevent the acquisition of a medication there is little that a good bedside manner could fix, but there is some evidence to suggest that a better relationship boosts interaction and therefore patients are more likely to discuss potential solutions; Hauser and Matthes, (2017) recognised the potential effect of poor communication and investigated an approach aimed at medical students to improve communications. Further studies have demonstrated the importance of good dialogue, in particular to address medication concerns and administration techniques to ameliorate nonadherence, even when there is no clinical indication of adherence problems (Pasma, et al., 2015). In order to be successful the relationship needs a nonjudgmental approach by HCPs to recognise and address patients concerns and barriers.

The practitioner forms a psychological contract with the patient determined by the provider's attitude toward the patient (Robbins, 1980; Wrench & Booth-Butterfield, 2003), which influences elicitation of, and empathy towards, concerns; despite the fact that studies have shown that almost half the information a patient is apprised is forgotten almost instantaneously (Ley, 1979; Kessels, 2003), the aspiration is to respect patient autonomy, empower individuals to make informed decisions regarding health by the provision of appropriate, comprehensible information (Davis, et al., 2006). Impersonal consultations are detrimental and lead to unfulfillment of patient expectations. Practitioners adopt various attitudes such as '*educators, detectives, negotiators, salesmen, cheerleaders and policemen*' (Lutfey, 2005, p.421), in contrast to former traditional methods where authority was designed to bring about obedience. However, this buff stance was not conducive to adherence since patients were more liable to falsify accounts of illness and adherence and in the extreme fail to attend appointments (Lindsey, et al., 2014). The WHO (2003) acknowledge adherence as a dysfunctional concept in chronic illness and support a paradigm shift in which assumptions are re-evaluated, services are re-organised and skills re-learnt, prompting a shift in perspectives, a redefinition of roles challenging who is the expert (Anderson & Funnell, 2010); moreover, commending the relationship as one of collaboration and partnership, replacing the authoritarianism of previous decades (Hook, 2006; Jonsdottir, Litchfield & Pharris, 2004).

In addition to the role of the provider is that of the protagonist, the patient.

'*I suppose you do take on the persona of the sick person, at first anyway. After a while I think that changes, well, it did with me. I'm more like, we can talk about stuff. Of course, some of them* [healthcare personnel] *are just, you just get talked over and you feel they're not really interested*' (P17);

'*sometimes I think, how they do a proper job without knowing me, what I am, who I am, what makes me tick. Because surely that accounts for a lot, you hear all the time about psychological things having an impact on your body. Where does that come in? why don't they ask about that?*' (P30).

Each patient presents different needs, and it is important for the provider to bring resolution by exploiting authentic dialogues and appealing to the individual's autonomy, to deliver care tailored to the values, judgements and needs of the individual (Redman, 2005).

The setting in which medication is prescribed can have an affect on adherence, including the grade of clinician, such as nurse and specialist.

'*I can just phone him* [the consultant]. *It's really good actually. I just say I've got this or I'm thinking about, and he can put me on the right track*' (P3);

a simple phone-call, eases the principal's mind and ensures that the correct medication is taken at the right time in the correct dose. The collaborative quality of the encounter alleviates concerns of the patient. Furthermore, the length of consultation was a notable factor in terms of patient security:

'*you're in and out like that. I don't know how they think they can make an assessment in that time, unless you're superman*' (P21).

The principal is left with a feeling of dissatisfaction, bewilderment, and uneasiness due to the thought of potential inaccuracy of diagnosis and prescription. This is a latent causation of nonadherence.

Nonadherence does not necessarily indicate contrived deviance from a regime and the provider should recognise that alternative resolutions may be responsible, such as a patient's attempt to modify medication to optimise treatment. Assumptions rooted in the biomedical model emanate from a perspective of self-serving beneficence (Lupu, Rădoi, & Cojocaru, 2014) and prioritise illness over health, rather than the lived world of the individual. Healthcare providers enjoy a paternalistic potency in their relationship with the patient, traditionally exemplified in dominance, authority, or influence; however, in compliance with ethical principles the individual's autonomy should be respected (Árnason, 2012), the provider should not act in any way that compromises the individual's values, beliefs and aspirations or, indeed, the patient's entitlement to refuse treatment. The challenge is in finding a balance between extreme authority (Hess, 2004), characterised by detachment and indifference to the patient's choices and entailing consumerism, where information is arbitrarily provided in the absence of recommendations and a humanistic relationship. Such an association benefits from mutual trust, responsibility, and equality, collectively appreciating expertise and authentic dialogue with a focus on actively assisting a patient in decision-making, based on sufficient and clear information (Olsen, Smith & Oei, 2008). The individualised approach (Hornsten, Lundman, Selstam & Sandstrom, 2005), where care is tailored to the patient's experiences, perceptions and behaviours that are acknowledged as unique, increases patient satisfaction, and affords the context for ethical therapy (Radwin & Alster, 2002). An effective communication is essential to deliver correct information but equally to attend to the patient: '*you have two ears and one mouth!*' (P10). Personal inquiry and collaborative encouragement is more liable to produce positive results; in contrast, poor communication can function as a disabling device.

Experiences vary between levels of access and frequency of visits to clinicians with specialist knowledge. Perception of encounters ranged from acquiescent and consenting to resistant and defiant, resulting in fluctuations in medication-taking. For many principals there was a pervasive sense that the clinician expected compliance and became brusque or dismissive when there was a sense of nonconformity from their patient. The healthcare professional sets the tone of the relationship which P10 expresses by making a maternal comparison:

'*it's sort of like a mum and child, you're there to help them along but you have to let them fail sometimes, hard, but it's for the best and when you need encouragement you're there'*.

For principals who did not enjoy a good relationship GP visits were often viewed as a waste of time, whilst others found reassurance in the connection with their clinician, as a safeguard. GPs who appear interested in the illness condition tended to be able to express themselves more lucidly, with articulations of encouragement and support, which was appreciated by principals:

'*I know I can ask her* [the GP] *anything and she'll take the time to listen and explain and not as if she was talking to a child but like I've asked a sensible question*' (P29).

Reluctance to question the practitioner leads to acceptance of medication but not necessarily taking it;

'*mm, I have got boxes of stuff in the cupboard. I could start my own pharmacy!*' (P19).

The longer the individual has lived with a condition the greater the expectation, with some accuracy, they will comprehend it. However, on occasion there was a sense that a healthcare professional, particularly specialists, were reluctant to verbalise information, not through a sense of discerning the patient's comprehension, rather because it was for the professional to deal with and not a lay person:

‘*it’s like getting blood out of a stone. I feel, made to feel like I shouldn’t be asking, but it’s my body. They should be telling me*’ (P24).

The collaboration works best when a mutual responsibility is perceived

‘*sometimes I might say, shall I try such and such or reduce dose or put it up, like I know that sounds cheeky but he’ll listen and say ok we’ll try that. It’s good to be like that*’ (P17),

and this fosters a sense of respect and integration in the process rather than the ‘*conveyor-belt*’ (P14) of the patient’s supplicant role. Others are content to eschew autonomy and place themselves in the hands of their healthcare provider:

‘*I do what they say. They’re the professionals, and they know. I don’t need to know, just do what they tell me and it’ll be alright*’ (P27).

Some principals feign acquiescence with the GP’s opinion or recommendation and then disregard it afterwards

‘*sometimes I do take what they say but a lot I will think no it’s better I don’t, so they* [the tablets] *stay in the box. Sometimes I genuinely, I do, forget but, or I deliberately think no*’ (P30).

Principals reflected on contrasting opinions of nurses:

‘*they try and tell you what to do but they don’t know, they think they do, or they want you to think that. I think that’s dangerous ‘cos they could be telling you all sorts of ****’ (P25);

‘*oh my nurses are absolutely brilliant. Yeah, I talks to ‘em all the time and I feel like part of the team*’ (P17).

P17 discusses the informality in the support group run by nurses that was particularly helpful. However, it was recognised that responsibility for a good relationship did not rest solely with the GPs and the attitude of the patient was equally important;

‘*you have to be willing to have a bit of faith in them, that they know what they’re doing. But they need your support too, they’re not wizards and you need to tell them what’s wrong or what you’re feeling so they can do the best, what’s best for you*’ (P12).

The healthcare provider’s role does not accord them immediate respect,

‘*nobody wants to be patronised in this day and age. Yeah so you’re a doctor, big deal*’ (P25).

Attitudes of healthcare professionals are shaped through the initial clinical curriculum and supported by peers within the occupational practice. Studies have shown that nurses avoid ‘difficult’ patients; the consequences of such unethical discrimination may cause a patient to withdraw from future appointments. Furthermore, whilst principals received physical attention from healthcare providers there was a sense of a lack of psychological support, with such assistance rarely available, or acknowledged. This represents a ‘*deficiency in the system*’ (Zoffman & Kirkevold, 2005, p.755). Psychosocial challenges, such as depression, are frequently a corollary of a chronic physical condition and through addressing these issues may assist in improving the outcome of the chronic condition itself; however, clinicians customarily lack resources such as time, skills, and referral system to achieve this (Paliadelis, Parmenter, Parker, Giles, & Higgins, 2012). Additional organisational constraints, such as lack of continuity in care, are further impediments to successful implementation of individualised care (Rogers, Kennedy, Nelson & Robinson, 2005).

Interventions concerning the practitioner have been effective (Teng, Yen, Fetzer, Sung, & Hung, 2013) together with pharmacist-led interventions (e.g., Lindenmeyer, et al., 2006). However, some pharmacy facilities, such as the repeat prescription service, reputedly led to patient confusion (Beattie & Nelson, 2008) as well as reducing patient autonomy by excluding patients from the clinical process. Successful interventions result from open and honest discussion emanating from a position of respectfulness with the healthcare provider (Childress & Beauchamp, 2001; Entwistle, Carter, Cribb, & McCaffery, 2010). To achieve this the practitioner approaches the patient in the absence of coercion and manipulation, practising the presentation, the reflection, of oneself (Gadamer, 1994). A grey area exists between beneficence and advocacy (Tomkowiak & Gunderson, 2004), exacerbated by notions of adherence, which even so connote patient’s compliance to a predetermined strategy; however, in order to be authentic encouragement must be grounded in a respect for the patient’s autonomy. This is not straightforward or effortless to achieve (Bournes, 2000) for the healthcare professional as it requires questioning the relationship and potentially re-defining the foundation on which it is based.

6.8 Conclusions and implications for practice, policy, and intervention development

The commentary of inter-relational influences, as expressed in the principal's narratives, is a judgement, or series of decisions regarding treatment and is illustrated in Figure 6.11. Treatment-decision is a process, plastic in nature and subject to the various and complex influences which are temporally and situationally dependent.

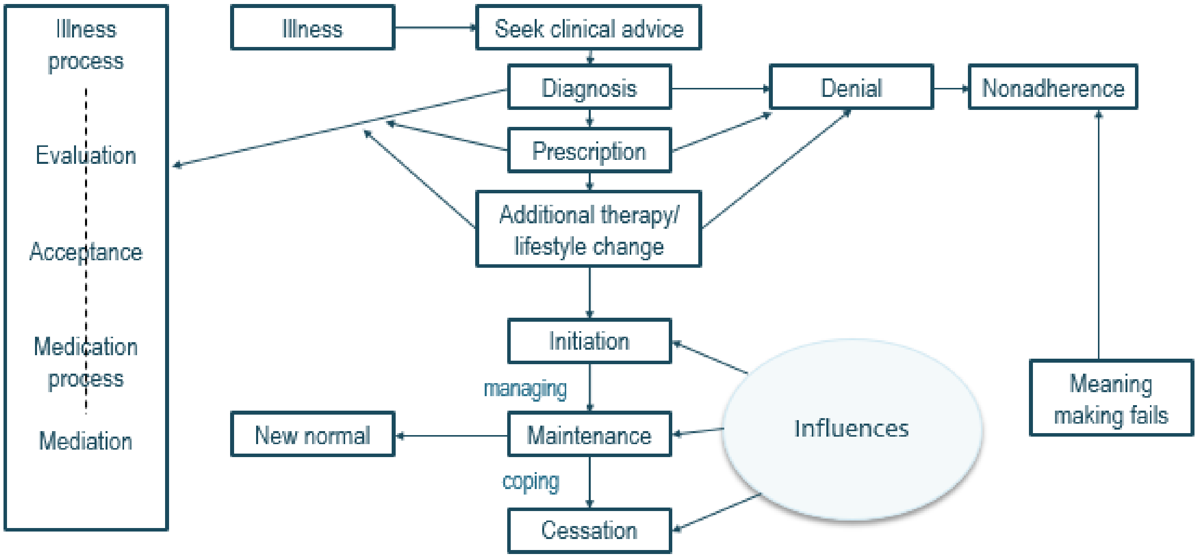


Figure 6.11 the medication decision-making process in chronic illness.

The treatment process is exemplified, denoting the route of illness and medication processes, both of which are subject to internal and external influences, and treatment outcomes including cessation or continuance of medication, alternative dosage experimentation, or strictly respecting prescription guidelines.

A reduction in symptoms, or severity, can distort pharmaceutical necessity due to a false sense of wellness and precede modification or cessation of medication (Grime & Pollock, 2004). Cessation of medication, however, is liable to generate symptom recurrence and prompt the individual to rethink their decision (Bollini et al., 2004). Acceptance and tolerance of a new normal may signal an aspiration for greater involvement in the treatment process (Garfield, et al., 2004), at once building confidence in proactive self-management and fostering a collaborative relationship with the healthcare provider (Nolan & Badger, 2005). Additionally, side effects are less tolerated in chronic conditions than in acute illness (Malpass, 2009), particularly those which interfere with daily activities, and are also a catalyst to experimentation with dosage modification (Haslam, et al., 2004). Furthermore, negative affects may also cause the patient to question the proficiency and capability of the healthcare provider whilst reassurances regarding the nature of the illness and treatment may assist in dissipating concerns and support maintenance of treatment. Conversely, apparent medication inefficacy and the absence of therapeutic effect may lead to frustration and is again a potential source of treatment cessation (Holt, 2007) and highlights the importance of patient education so that individuals are aware of what to expect from the treatment regime. Furthermore, principals tend to have preconceived anecdotal and experiential notions concerning medication; consequently, individuals may approach medication-taking with reservations relating to side effects, addiction, and indication of a loss of personal efficacy. A supportive patient-practitioner relationship, in which the patient is monitored and information imparted at key stages, can be beneficial in alleviating concerns and reassuring the patient; credence in the biomedical explanation for illness, and therefore the appropriateness of pharmaceutical intervention, is more liable to elicit adherence (Givens et al., 2006).

The self-determination triggering cessation of treatment may result from a decision to take alternative therapy, or a need to feel in control without recourse to pharmaceutical intervention, as long-term medication is seen as a '*threat to autonomy*' (Grime & Pollock, 2003, p.518). There is a tension between the former self and the new normal. Discontinuation of therapy however risks '*dysfunction*' (Grime & Pollock, p.517) and illness relapse. Central to the notion of self-determination is the concept of autonomy; options are needed based on conditioned response and evolving situational contexts. The absence of perceived control creates a debilitating passivity which is a strong predictor of nonadherence, particularly in individuals high in openness and conscientiousness traits. A further consequence is the development of depression, a factor that further inhibits adherence; individuals with an orientation towards involvement in their own care and enjoying in a more collaborative style of decision-making are better placed to make effective adjustments and have greater perseverance in maintaining their therapeutic regime.

This study has demonstrated that the treatment process is subject to continual mediation and acceptance, rather than '*a simple medical decision*' (Karp, 1993, p.344); there are periods of antagonism between therapy representations and conflicting perceptions, beliefs, and subjective norms. Patients employ '*tactical*' negotiation (Holt, 2007, p.1937) between experientially based notions, the psychosocially symbolic role of medication and expert advice; this reciprocal negotiation informs the new identity and enables development of coping strategies relating to psychological processes and treatment decisions. Thus, the self-concept is continually transformed, in an attempt to achieve control, in response to the threat to an individual's integrity resulting from the chronic illness experience; the illness process is one of continual evaluation, in which the individual's identity is pivotal. Medication-taking represents the instigation of a transmutative process; '*putting the first pill into one's mouth begins both a revision of one's biochemistry and one's self*' (Karp, p.346) despite certain patients, whilst adhering to pharmaceutical treatment, remain only '*partial believers in biochemical explanations*' (Karp, p.350).

This investigation represented a deep exploration of the experience of medication-taking in chronic illness as expounded by the principals' beliefs, perceptions, and motivations; exemplified in their attitudes towards, and behaviour engaging with, medication adherence. Experiences were diverse and resulted in a wide range of salient features. Some experiences supported previous research, such as the negative impact of side effects on medication adherence; whilst novel influences of individual differences expounded on what is currently known. Conscientiousness, for example, has been associated with healthy behaviours (Edmonds, Bogg & Roberts, 2009) and therefore a higher likelihood of adhering to a medication regime. However, it is not to be conceptualised as a singular linear construct; rather, the current study demonstrates the multifactorial nature of trait affect on adherence; there are many factors at play that influence medication adherence. It does not always follow that a conscientious person will follow their regime; for example, one of the principals with a high score of conscientiousness (six) rated low in terms of adherence (four) reported that, whilst diligently taking all her prescription (including paracetamol, calcium tablets and angina tablets), she did not adhere to the correct times of administration, in fact taking all 12 together ante meridiem (in the morning). This was principally due to the perception that, in this way, she maintained some control over the regime and therefore retained a sense of independence. This injudicious method of administration was further exacerbated by not disclosing her actions to the HCP; a somewhat paradoxical logic. These findings strengthen the rationale for considering the topic of adherence as multifaceted; furthermore, that personality traits must be addressed in terms of their plasticity, resulting from their high dependence on the situational context which drives behaviour in relation to medication-taking. The complex interplay of factors and the function of additional variables which act as mediators between traits and adherence will now be formalised into a novel conceptual model.

7 Development of the IndEx-MediC model

7 Development of the IndEx-MediC model

In 2003 the Agency for Healthcare Research and Quality stressed the urgent need to address the substantial disparity between current treatment success rates and potential pharmacological efficacy; this has yet to be achieved. Clearly, unsuccessful mediation with a treatment regime has serious implications in terms of potential reduction in therapeutic effectiveness, notably in chronic illnesses with a purely pharmacologic treatment; furthermore, suboptimal adherence is associated with increased upfront and indirect costs, together with increased mortality (Simpson, et al., 2006) and morbidity (DiMatteo, 2002). An essential focus of chronic illness is the assessment of factors which contribute to the successful application of a treatment regime; the Center for Managing Chronic Disease at the University of Michigan consider that 99% of disease management is in the hands of individuals, and their families, and consequently, ensuring adherence to medication regimes is a critical strategy to mitigate the effects of chronic illness. Research into 'adherence' has burgeoned over the past four decades however '*there has been relatively little theoretical research exploring the cognitive complexity*' (Rickles, 2010, p.49) of an individual's decision-making in terms of their pharmacological treatment regime and, consequently, studies have focused on identifying enabling and impedimentary factors. From the patient's perspective there can be many and various confounding factors which complicate treatment mediation; demographics and socio-economic aspects (DiMatteo, et al., 2007), economic impact of medication (Meltzer & Bukstein, 2011), illness severity and duration, as well as therapeutic characteristics, such as regimen complexity, as in HIV treatment (e.g., Arici, et al., 2002), comorbidity and side effects (e.g., Kardas, 2002). Added to these are cognitive perceptions regarding both the condition and pharmacological intervention, and further psychosocial factors (DiMatteo, 2004) such as the relationship between patient and HCP (Ingersoll & Cohen, 2008). Moreover, the significance of each factor may be modifiable depending on the chronic illness condition (WHO, 2013). Significantly, studies have shown that individual differences, such as knowledge and health-related beliefs, (e.g., Phatak & Thomas, 2006) are influential in determining health-behaviour and that personality traits are of significance in the topic of medication-mediation (Friedman, 2008; Smith, 2006).

Addresses the research question 5*: might a sense of the interrelation between factors of adherence be developed and reframed?*

Accomplishes Aim IV: *to construct a conceptual, factorial model of medication adherence in two separate illness-condition contexts; a general chronic conditions group and a sub-category focussing on respiratory conditions. This synergises extant and novel data to provide a state-of-the-art facsimile of the issue*.

It is of critical importance to understand positive impacts on medication-mediation together with risk factors that limit medication-taking. This requires patient profiling of an individual's response to the continual challenges and concerns along the spectrum of the illness course; it has been illustrated throughout this thesis that rarely does the individual accept and take the medication as prescribed due to the complex issues at play. Individuals make an initial attribution towards their prescribed medication and subsequently, continually assess its use, contingent on environmental and cognitive resources, seldom relating their expectations of outcomes with long term goals. Rather, present or short-term objectives are the primary concern, juxtaposed with the concept of chronic illness, which by its nature is more extensive and complex than acute conditions. Chronic illness involves the continual reassessment of individual factors, associated external capital, and subsequent correlative behaviour modification. Although factors are often considered in isolation it would be beneficial if correlational aspects were taken into account to limit potential sources of dichotomous outcomes and inconsistencies in results. Furthermore, prevailing studies rarely consider the role of personality as a significant factor; research (Ferguson, 2013) has indicated the scope and relevance of personality among the gamut of auxiliary factors and recent studies (including those reported in this thesis and undertaken by the current author) have suggested the influence of personality factors, particularly in terms of a mediating function with additional correlational effects. This highlights the importance of incorporating behavioural influences in any medication-taking model as a critical component to performance-related topics to facilitate insight into the associations and correlations between guiding determinants, thereby signalling potentially relevant factors. 'Nonadherence' to medication is a commonly-reported challenge of global concern and despite being widely studied no conceptual model has, to date, been developed which captures the gamut of potential influences, certainly with specific consideration to the influence of individual differences. Decades of research have failed to find an unambiguous paradigm of adherence; research findings have been inconclusive, attributable at least in part to a lack of a sociopsychological model to explain the various empirical findings. Although well-respected, models such as the health belief model (Bandura & Simon, 1977) are predictive of no more than 50% of behaviour (e.g., Montano & Kasprzyk, 2015; Rickles, 2010). Thus, there is a large amount of behaviour which is unaccounted for, representing a significant missed opportunity, and one of the aims of this thesis is to develop a novel conceptual model of factors in chronic illness that identifies the complex and intricate associations of influences on medication-taking which lead to negative medication-mediation or conversely positively motivated medication-behaviour. This is to be achieved by integrating the data ascertained in the current research with what is currently known from extant studies.

Previous chapters presented the results of the novel data collected for this study within the context of existing metrics, which have also been detailed. Data were reviewed to determine the main components, which were then characterised and categorised. In this chapter, results from all sources are combined and the multidimensional influences of stakeholders are assimilated to develop two conceptual models; the principal model is an integrated perspective predicated on a broad spectrum of chronic conditions, from which is derived a subsidiary model focusing on respiratory conditions. The models provide foundational information on thematic parallels together with dissimilarities relating to the mediation-concept between each group; these have the potential to inform future research, which could aid the development of supportive intervention strategies. Further utility of the development of such models results from the precision of the metrics concerned; explanatory variables, which are accurate and consistent, and are useful for future meta-analytics across studies. Results could further facilitate understanding of stakeholders' experience of living with chronic conditions and assist in explaining the mechanisms by which the mediation of medication takes place.

To date, few studies have addressed medication adherence in such a comprehensive manner. Understanding the mechanisms linking the various factors of medication-mediation and organising factors in a systematic construction could provide useful knowledge as an interventional framework, promoting optimal outcomes for pharmacological therapy. The development of the conceptual models was designed to consolidate existing evidence and propound a concise, consistent, and unifying abstract, encompassing the continuum of mediation, the changing expectations, resources, and outcomes; behaviour influenced by individual differences was a particular focus, supporting generalisability and the facilitation of future research by comparative effectiveness, enabling meta-analytic exploration.

When mapping new horizons the first step is to model the problem by thoroughly defining the topic in terms of the behavioural and environmental determinants of the issue; the proposed model is informed by various data sources, with an emphasis on reviewing existing research evidence, in conjunction with novel research to address gaps in knowledge, directly involving stakeholders (i.e. the population at risk), interaction with environmental agents which are influential over the health behaviour, and the health problem itself. The component parts are deconstructed by means of ordinal measures and reconstructed through the method of normative theories in order to generalise schema. The data is constructed graphically in the form of a logic model where inferential relationships between causes and consequences of adherence are displayed.

The IndEx-MediC (Individual/External Medication-mediation In Chronic illness) and IndEx-MediR (Individual/External Medication-mediation In Respiratory illness) models will be informed by the historical timeline review, the systematic literature review and meta-analysis of personality and medication adherence, together with novel qualitative enquiries with stakeholders. The multifaceted approach identified key factors contributing to medication-taking health behaviour, enabling the generation of themes; the objective for this chapter is to identify and present the ‘truths’ that the principals expressed, to expand analysis surrounding the phenomenon and construct comprehensive understandings. Generating the matrices of the model was an iterative and creative process, an interpretative research investigation; singularities of the components were reviewed, analysed, synthesised, and reported. Synthesis is a dynamic, creative and interactive process, not necessarily reflecting the traditional view of a predictable trajectory; one challenge of synthesising studies is to deliver sufficient data to preserve the integrity of the original research whilst avoiding a plethora of detail whereby '*no usable synthesis is produced*' (Sandelowski, 1997, p.130) - an effectual model demonstrates understanding of the body of research and enables the reader to appreciate context, perspectives of the principals and the researcher's interpretation together with potential alternative construals (Sandelowski, 2006; DeWitt & Ploeg, 2006; Sandelowski, 2010).

Factors that influence medication adherence were identified from the historical timeline, empirical inquiry, including qualitative and psychometric data evaluated from the current research; significant correlations were found between influences of factors in medication adherence in chronic illness. The modification of deleterious influences can have a positive effect on medication-taking and since rates are low this is a positive advance in terms of practice implications in the management of chronic illness; results could improve health outcomes since taking medication as prescribed reduces comorbidity and mortality and improves quality of life (e.g., Murray & Callahan, 2003). Furthermore, innovative interventional strategies to improve medication use are critically needed (Haynes, McDonald & Garg, 2002).

Data-collection focused on pharmacological treatment mediation in chronic conditions and centred on two cross-sectional studies, with different samples; an 'all-chronic conditions' group and a derivative 'respiratory-conditions' group. The rationale for this was to draw a distinction between the groups whilst assimilating any parallels, to attain appreciation of where differences and similarities lie between illness groups in order to facilitate a global integration of adherence influences.

Chronic illness conditions group – chronic illness is defined by Mosby's Medical Dictionary (2009) as a human health condition or disease '*that persists over a long period and affects physical, emotional, intellectual, vocational, social and spiritual functioning*'. Chronicity, indicating an enduring condition, is a broad concept incorporating a diversity of behaviours and experiences throughout the span of the illness and is limited not merely to persistent pain but also associated dysfunctional pathophysiology, such as the incidence of constraints in daily existence.

According to the WHO (2015) the four major non-communicable chronic diseases (NCDs) which account for 80% of all premature NCD deaths include cardiovascular disease, cancers, chronic respiratory illnesses (such as asthma and COPD), and diabetes. An indication of the magnitude of the problem is the estimation that approximately 25% of American adults have two, or more, chronic conditions (Ward, 2016).

Respiratory conditions group – respiratory conditions have a high prevalence globally, with chronic obstructive pulmonary disease (COPD) currently the fourth leading cause of mortality globally (Barnestein-Fonseca, et al., 2011), and expected to increase to the third by 2020 (Halbert, Isonaka, George, & Iqbal, 2003). A major goal of therapy is to improve quality of life by alleviating symptoms, and supporting effective management to reduce exacerbation rates, hospitalisations, and mortality. The effectiveness of treatment however is dependent upon the patient's conformity to the therapeutic regime, but rates average 50% (Sabate & Sabate, 2003) due to under- or overuse, improper or inappropriate utilisation. COPD is a prevalent condition which has been studied extensively, along with hypertension and cardiological conditions, and therefore this study has utility in not only being able to support existing data but also to supplement it with novel findings.

Inconsistent conclusions of previous studies may indicate that we have failed to capture the convoluted and dynamic character of medication-taking. Assessing factors comprehensively may help clarify mediating and moderating influences; furthermore, the identification of interactions is helpful for interventions aiming to ameliorate the effects of nonadherence. To the best of the author's knowledge this study is the first to identify and course the effects of influences in medication-mediation; moderating influences were investigated to develop a hypothesised model that explores the effects of factors and to illustrate the complex interrelated relationships between potential sources of common experiences of mediation of both protective factors and negative characteristics or interruptions or discontinuations. A new flexible, theoretical approach is proposed concerning the affect of individual evaluation and internal and external attribution on behavioural intentions and motivations, elucidating some of the variance in dynamic, individualistic health behaviour, subject to continual feedback driving re-evaluation.

The aim of this inquiry was to construct a model that shows the relational factors affecting medication-mediation in chronic illness. This would be achieved by means of qualitative and psychometric data (described in previous chapters) to explore management of pharmaceutical therapy in chronic illness using the Behavioural Model as a framework (Andersen, 1968). The Behavioural Model was selected as a foundation from which to map the numerous determinants of medication-mediation, which is positioned as a dynamic behaviour reflected in the model's domains. The Behavioural Model demonstrates three sequential categories of predictive variables: the predisposition to, and the ability and need of the factor; various additional influential variables are accredited in subcategories. The model does not however specify the method of operationalisation between factors which is left to the discretion of the researcher. Nonetheless, a strength of the model lies in the potential mutability of descriptors depending on the research question. The integration of novel data substantiates current understanding and illustrates the large context of determinants of medication-mediation; this supports the proposed new concept, the IndEx-MediC model of medication-mediation in chronic illness. This model assimilates extant and novel research findings in one conceptual framework, towards the development of an integrative model, a comprehensive framework that encapsulates predictors of adherence. The proposed conceptual model defines separate constructs, and distinct sub-domains, relating to internal and external factors. Significant correlations between influences of factors and possible mutual inter-relational influences and effects are demonstrated; in addition, the additive effect of syndemic influences are considered, whereby one or more indicators, such as disease concentration, interaction, and underlying social forces, are associated with increased likelihood of nonadherence to medication in chronic illness.

7.1 Methods

This is thought to be the first study to illustrate the complex interaction between all influences determined by the research rather than focussing on one factor in isolation. A vast range of influences were ascertained with the objective of composing a model showing the mediating and moderating effects of various factors and barriers. A hybrid analysis was the preferred methodology for this study, incorporating an inductive approach achieved by content analysis (Elo & Kyngas, 2008) of quantitative data (Boyatzis, 1998), as identified in previous research (e.g., Sabate & Sabate, 2003; Vik, et al., 2004) and complemented with the deductive a priori framework (Crabtree & Miller, 1999), informed by qualitative research, exclusively for this study. This robust approach complemented the research inquiry by integrating the emergent social phenomenological themes from the data with factors known from extant research.

Qualitative data analysis supported and augmented core themes from the literature reviews and results were encapsulated into a conceptual process, involving individualistic variables and external components; concepts are further summarised in the next section together with presentation of the IndEx-MediC model of medication-mediation. An overview of the steps involved in the model development process are as follows:

Data collection: the process of gathering data from the parent study has been detailed previously, but essentially comprised reviewing medication adherence literature, honing-in on studies relating to chronic illness conditions and personality. The historical review indicated the breadth of outcomes in terms of measurement, context, or illness condition; further qualitative data collection was undertaken to further explicate or support extant knowledge. Qualitative data analysis supported and augmented core themes from the literature reviews and were encapsulated into a conceptual process, involving individualistic variables and external components.

Data analysis: in the review and summary of the articles from the literature reviews data were evaluated to enable factor identification and a list of factors affecting adherence was generated. Quantitative data was mapped onto a taxonomical framework and the transcripts from principal's interviews were analysed. Data from phenomenological inquiry were thematically categorised and integrated within the item sets obtained from the statistical analysis. Rich analysis was achieved from the qualitative evaluation as principals were able to articulate the inter-relatedness and conditional nature of factors.

Model development: broad, and subsidiary, themes were identified as a result of integration of all sources. The model development phase focused on the assimilation of all factors into pertinent categories and were incorporated into a model to visually present the results. The preliminary model was based on the factors from the framework and appended to Andersen's (1968;1995;2008) behavioural model. The model was then further refined to incorporate all themes from the qualitative analysis; the final modification involved categorising the themes into the most appropriate vectors considering the data that was ascertained.

The model highlights differences and shows similarities applicable globally which enhances generalisability; it illustrates causal directions and underscores the importance of investigating the multiplicity of adherence factors. Integrated perspectives to the model include the environment, such as family and community, the policies, resources, and organisation of the health care system, together with patient characteristics, for instance predisposing factors predictive of medication adherence, such as perceptual cognitive resources. Health-specific functioning include health literacy, pre-existing medication knowledge and prescription management skills. This contemporary model is a comprehensive integration and reflection of both internal and external characteristics that demonstrates a wide-ranging understanding of the topic and, as a result, highlights for instance, that even with the presence of coping ability and aptitude to self-manage a treatment regimen the patient must perceive a proximal need for adherence.

7.2 Theoretical underpinning of a predictive mediation model

It is useful to preface the development of the model with a purview of the approach taken. A critique of current psychosocial medication-adherence theories reveals several limitations (e.g., Rickles, 2010): research upon which extant paradigms are based, have been conducted with small sample sizes, using multiple methodological designs and instruments which inhibit cross-study comparisons, with conflicting results. Furthermore, the dynamic nature of the medication-mediation process, in which states and individual considerations fluctuate, is insufficiently supported. An example is the biomedical model which posits that medication 'adherence' can be conceptualised as an objectifiable numerical value, similar to that of the disease components (for example, blood pressure). As the patient progresses through the illness condition, they encounter biopsychosocial experiences abstracted metaphorically as dichotomous 'barriers' or 'facilitators' of 'adherence' or 'nonadherence'. The biomedical model also positions medication-mediation as an achievable paradigm rather than a phenomenological ‘truth’; this stance is possibly the reason why interventions do not achieve the results hoped for. Research has persisted in this stance, focusing on particular elements, such as illness group or specific barrier, which detracts from understanding the phenomenon in its entirety; examining only singular contexts may limit application on a global level. For example, beliefs and medication-taking may alter at different stages of illness and during different phases of therapy, such as in the treatment of depression (Buus, Johannessen & Stage, 2012); furthermore, correlations between collective factors also impact on ability or motivation.

Alternative theoretical models may imply a consistent pattern of response however, people are not passive responders to clinical instruction and attributional behaviour may result from both immediate and cumulative events, positive and negative. Some behaviour is unidimensional, such as locus of control, affected by multidimensional concepts, such as learned reasoning, for example, which is also contingent upon whether the individual is actively and rationally adherent or nonadherent. Individuals form cognitive illness representations and attempts to maintain internal and external homeostasis despite the illness trajectory’s characteristics which are both stable and inconsistent; furthermore, the patient’s involvement in treatment may be active or reactive. A dynamic approach is necessary to integrate theoretical commonalities of variables reflecting patient decision-making in the management of chronic illness together with evolutionary changes in individual behaviour and different states and levels of treatment engaged at different points throughout the process.

It was the design intention of the current model to provide a useful framework for understanding and mapping factors. The results suggest that the framework has utility in care self-management studies, and that the use of quantitative and psychometric data supports the definition of key terms, reducing the potential for ambiguity, whilst qualitative input construes actual, rather than hypothetical, understandings, enhancing validity (e.g., Lather, 2017).

Numerous models have hitherto been developed, attempting to demonstrate utilisation of pharmacological therapy and, in a wider sense, utilisation of the health care system however, the literature suggests that no one theory adequately explains medication-mediation – each theoretical basis has advantages and deficiencies. A prevalent theory, shown in Figure 7.1, is the Common-Sense Model of Self-Regulation of Health and Illness (Leventhal, Brissette & Leventhal, 2003), which has been used in chronic illness research (Hagger & Orbell, 2003), such as neck pain (Hill, Lewis, Sim, Hay, & Dziedzic, 2007), to assess perceptions and predict ‘adherence’.

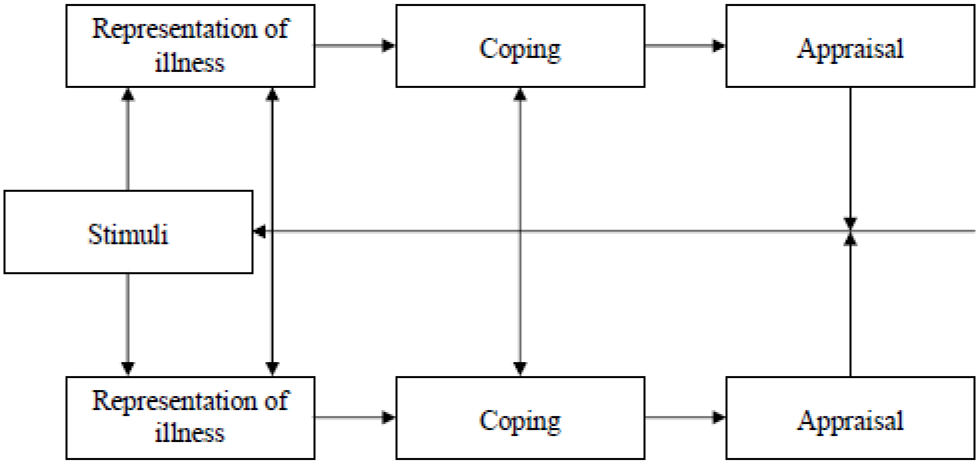


Figure 7.1 The Common-Sense Model of Self-Regulation of Health and Illness (Leventhal, et al., 2003).

The Common-Sense Model posits that the illness, symptoms, and treatment are cognitively and emotionally processed by the individual (Leventhal, et al., 1992b; Diefenbach & Leventhal 1996); mental representations and perceptions are foundational to the coping procedure in the management of chronic conditions. Representations are predicated on available information regarding illness identity and the individual’s beliefs about somatic symptoms, the chronicity, perceived controllability, and ramifications of the condition. Knowledge can be formed from cultural intelligence of the illness condition, authoritative or perceived significant sources, such as a GP or consultant, social environments, such as acquaintances, or experiential. The individual evaluates information and formulates strategies of illness management in endeavouring to accomplish their mental representation of adequate or achievable outcome, and corollaries may comprise emotional responses, such as anxiety, fear, or depression (e.g., Cameron, et al., 2005).

However, symptomatic response is influenced by additional exogeneous factors such as environmental variables. One theoretical model which seeks to understand the wider behaviour in the health care system was developed by Andersen, (1968). The Behavioural Model of Health Services Use (the Behavioural Model) (Andersen, 1968) is a multilevel model which originally sought to explain the variability in health care service use and considered both individual and contextual factors. It '*divides the major components of contextual characteristics in the same way as individual characteristics have traditionally been divided - those that predispose …, enable …, or suggest need for … services*' (Andersen, 2008, p.652). Further studies have extended the model to explore alternative behavioural foci, such as self-care (e.g., Linden, Jormanainen, Swigonski, & Pietilä (2005).

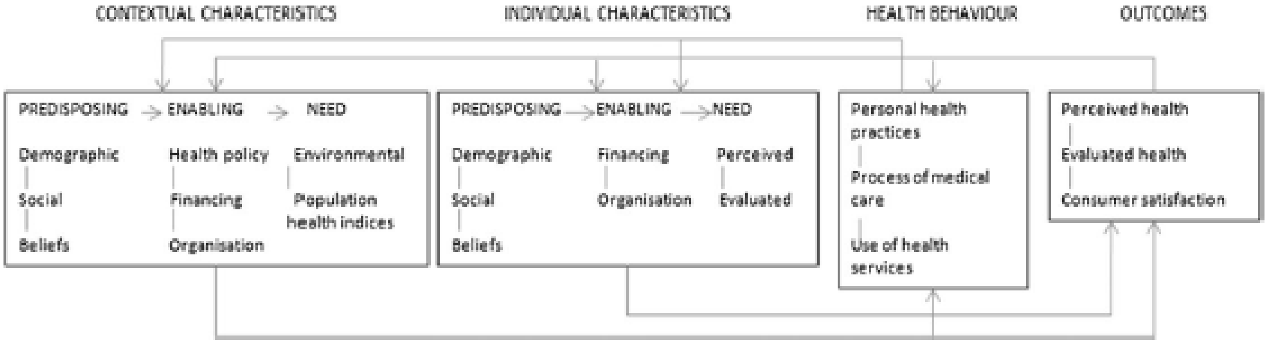


Figure 7.2 The Behavioural Model of Health Services Use (the Behavioural Model) (Andersen, 1968).

Further empirical studies have been developed from the Behavioural Model, such as the adaptation from its original focus to predict individual health care use (Murray, et al. 2004; De Smet, Erickson & Kirking, 2006) and is predicated on predisposing factors, such as demographics, enabling resources such as social support, and needs, including the illness condition. Andersen (1995) emphasised the mutability of factors to explain health care use, including medication 'adherence'. The model is an example of how a framework can be modified to reflect the topic under review; it has, for instance, been used to predict self-reported adherence in asthma patients (De Smet, et al.) and to develop a conceptual framework considering ‘adherence’ in older adults (Murray, et al.), as shown in Figure 7.3.

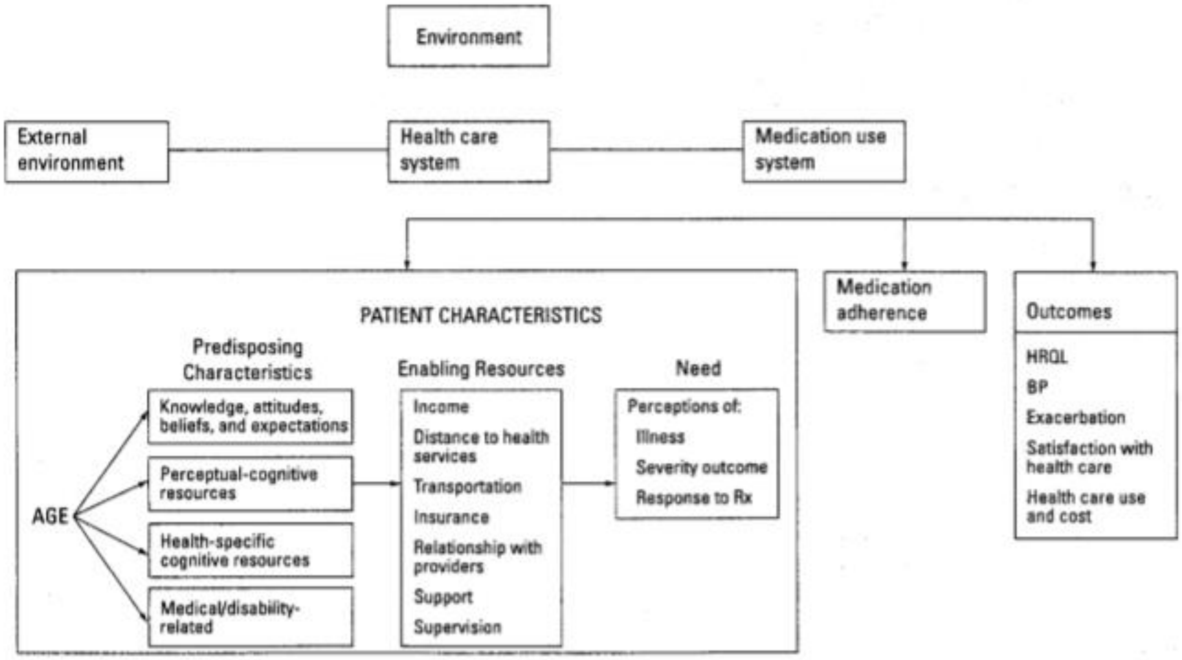


Figure. Study conceptual model. Rx = prescription; HRQL = health-related quality of life; BP = blood pressure.

Figure 7.3 Murray, et al’s., (2004) model of medication adherence in older adults.

Murray, et al’s., conceptual model concerning medication ‘adherence’ in older adults used congestive heart failure (CHF) as the exemplar illness condition with which to illustrate their insight into adherence factors and outcomes. CHF frequently results from historically poorly managed hypertension, and requires multiple medications which, together with the concomitant increased propensity in the older adult for additional chronic conditions and cognitive impairment, raises the risk of nonadherence. The conceptual model considers cognitive and medication-taking processes and focusses on the relationship between environmental factors and patient characteristics. Furthermore, the effect on outcomes, in the context of Philip’s (Phillips, Morrison, Andersen & Aday, 1998) healthcare-utilisation model, is considered, demonstrating an effectual integration of several frameworks to accommodate the research aims. Extraneous hypotheses and concepts can be appended to an existing model or framework; whilst this has the advantage of reducing the need to develop a model from scratch, an impediment is that additions may interpolate specific theories which may become disconnected or misinterpreted from the original hypothesis. It is therefore essential to ensure that any model is used appropriately with vigilance given to the theoretical hypothesis. Andersen (1995) has since suggested further modifications to the Behavioural Model to include disease characteristics that shape attitudes towards medication use; this is indicative of the flexible properties and adaptability of such a framework. The utility in adapting variables to suit various targets of research demonstrate the model's potential usefulness in healthcare.

Themes and subthemes were derived from the sources applied in this research: influences reflecting the principals' accounts in the qualitative analysis, psychometric analysis, factors informed by the systematic literature review of personality factors, and the taxonomical framework from the scoping review of adherence factors. All factors which were extracted from reviews corresponded to the conditions as stipulated in Chapter 2, i.e., a western population prescribed pharmaceutical intervention for chronic illness, over 18 and under 70. Thematic analysis of the synthesised data was used to identify and summarise relevant factors of medication-mediation. Individuals characterise their experience in terms of motivations, beliefs regarding the illness and treatment, navigation of the healthcare system and factors that contribute to the continued management of a long-term illness; for every stage in the process there are different choices for the individual, alternatives, and difficulties (Pasma, et al., 2015). The process is modifiable, dependent on treatment effectiveness, symptoms and how the individuals 'feel', together with idiosyncratic assessments throughout the life course. The IndEx-MediC model was formulated to illustrate an understanding of the determinants underpinned by the individuals' accounts of medication-mediation.

In terms of utility, an original model must be reflective of the interactions and influences of the situational context, the individual and their beliefs, the utility of the regimen, perceived benefits over costs and efficacy, which affect intentions to adhere (Rosenstock, 1974). Determinants have been distinguished hierarchically between proximal, distal, and ultimate (Flay & Petraitis, 1994); proximal factors are usually modifiable and emanate from the individual, and may include employment or marital status for example, distal factors, such as culture, are usually indirect, situationally contextual determinants, and ultimate components, which are even more remote than distal and which are mostly problematic to modify. In a broad sense these contexts are reflected in this study and are further represented by the following conceptual influences:

Contextual – populated by aggregate rather than individual components, including community- and provider-related characteristics; organisational and financial factors are considered in this tranche.

Individual – the Behavioural Model posits that certain individuals are predisposed to utilise health services, with variations explained by demographic and social factors (Patton, 2002). Moreover, enhancing the Behavioural Model to include eclectic psychosocial factors encapsulates a more expansive assessment; such influences include knowledge, attitudes, social norms, and perceived control (Bradley, et al., 2002). The individual must perceive a need in order to deem mediation with a regime appropriate, with different levels of behaviour requiring differing levels of perception, for example, paying for a medication may involve more perceived need than taking it. (It should be appreciated that provider evaluated need may differ from patient perceived need, however, this study essentially concerns the individual's perspective.)

Health behaviour – this describes the method by which individuals manage medication-taking and includes personal health practices. It has been acknowledged that the practitioner-patient relationship is particularly pertinent to the process of medical care and the level and nature of interaction which influences medication-taking (e.g., Young, Len-Rios, Brown, Moreno & Cox, 2017).

Outcomes – this relates to the influence of previous experiences of the health care system and medication-taking on subsequent behaviour and may include knowledge, satisfaction and attitude to illness or medication.

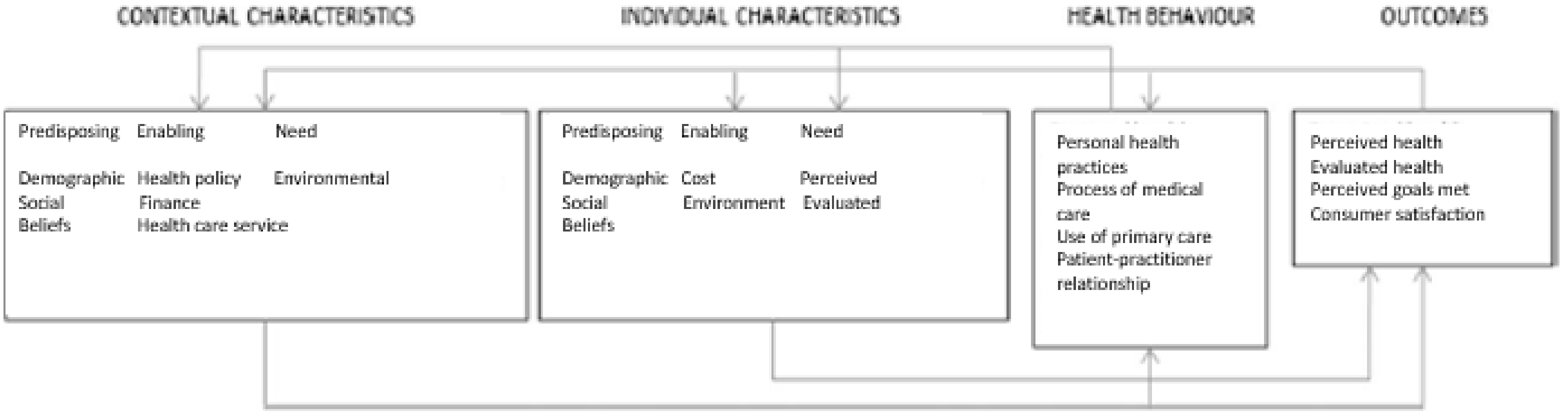


Figure 7.4 illustrates how results extrapolated from data were mapped on to the preliminary model, based on Andersen's Behavioural Model, prior to the addition of supplementary endogenous and exogenous variables.

7.2.1 Contextual characteristics

Contextual characteristics frame the use of medication; factors predisposing individuals to medication-mediation include demographics, cultural norms, the social composition of communities and collective and organisational values. However, whilst the systemic level undoubtedly has an impact on medication-mediation the foci of this study is the individual's perspective and therefore only a cursory reflection will be presented relating to this domain.

Organisation in this context refers to the structure, distribution and location of health services and personnel, and the educational programmes, level of involvement and health policies that are in force. This may encompass the community's resources in terms of health services, or methods and rates of compensation that providers receive, which ultimately has an impact on the individual. Also encompassed is the level of financial support, or health-insurance, available; prevention of lapses in financial coverage; ability and ease of filling prescriptions, attending appointments; complexity of, and frustration with the system; navigation of the organisation; hindrances with the provider in terms of perceived lack of knowledge, limited resources (including time), poor communication, lack of empathy or respect and personalisation and understanding, level of co-ordination and uniformity of information between multiple care agencies. Population health indices are overall measures of community health, including epidemiological indicators of mortality, morbidity, and disability; environmental need reflects the health-related conditions of the environment, for example occupational injury.

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7.2.2 Individual characteristics

Individual characteristics are partitioned into predisposing characteristics, enabling resources and needs:

7.2.2.1 Predisposing characteristics:

Predisposing factors include '*biological imperatives*' (Andersen, 2008, p.7) such as gender and age, together with social components for instance, educational-level, occupation, and ethnicity. Also considered are social relationships and psychosocial factors such as beliefs, attitudes, values and knowledge of the illness and treatment-related factors.

Age – significant associations have been found with age and utilisation of health care services but seem dependent on additional participant characteristics. For example, older participants are less likely to be involved with substance or alcohol abuse than younger participants but are more susceptible to potential degradation of cognition (e.g., Stockdale, Tang, Zhang, Belin & Wells, 2007). Furthermore, it is more likely that an older person will have acquired a diagnosis for their condition than their younger counterpart (Ani, et al., 2008).

Gender – women have a tendency, on average, to consult their GP more frequently than men when considered as a single variable (Andersen, et al., 2002), whilst women with a chronic illness are more likely to delay (Insaf, Jurkowski & Alomar, 2010).

Ethnicity – individuals from certain ethnic groups are less likely to receive treatment (Blackwell, Martinez, Gentleman, Sanmartin & Berthelot, 2009) but are more likely to have issues concerning substance and alcohol abuse (Stockdale, et al., 2007); visible minorities are less liable to report specialist consultations (Nabalamba & Millar, 2007).

Education – training is significantly associated with health care use (e.g., Parslow, Jorm, Christensen & Jacomb, 2002), and the likelihood of requiring treatment for mental or emotional problems is increased the lower the educational status (Dhingra, Zack, Strine, Pearson & Balluz, 2010).

Marital status – single status is repeatedly found to be associated with utilisation of health care services (e.g., Wu, et al., 2012); it has also been shown that separated or divorced women living with children are more prone to visit a GP (Cummings & Kang, 2012).

Cultural norms – women prefer to be seen by specialists of their ethnicity (Insaf, et al., 2010), whilst traditional male norms concerning vulnerability negatively impact on African American men (Hammond, Matthews & Corbie-Smith, 2010).

Region of residence – living in an urban area increases the likelihood of using services (Thode, Bergmann, Kamtsiuris & Kurth, 2005), which may be due to limited access in rural areas (Broyles, McAuley & Baird-Holmes, 1999).

Trust – trust is associated with more health-service use (Afilalo, et al., 2004; Hammond, Matthews, Mohottige, Agyemang & Corbie-Smith, 2010).

Beliefs – beliefs that are influential in a person's medication-taking practices, the level at which they choose or are able to commit to the therapy, operate as justifications for the way in which illness is managed (Loades, Rimes, Lievesley, Ali & Chalder, 2018). One influential belief is that medication serves as a protective function from worsening of the condition.

Attitudes – attitudes pertain to medication-taking, both positive and negative, which may be influenced by the HCPs, knowledge, and treatment type.

Knowledge – knowledge of symptoms, treatment, and illness impacts on medication-taking. Knowledge could be gained from professionals, previous experience or supplemented by an individual's own research from supporters or external sources, such as the internet, and inform the responsive health-behaviour. A lack of knowledge does not necessarily predict lower levels of medication taking, in contrast to previous research where a lack of knowledge tended to indicate a lower level of adherence (Smalls, et al., 2012) as some individuals who are not interested in the type or method by which a medication worked take it simply because they are instructed to.

Social norms – social norms relate to accountability of individuals for their own health, including the acceptability of using the health service, for instance, utilisation only when necessary or consistently throughout the duration of the illness condition. Being overweight with the condition of diabetes could, for instance, exacerbate symptoms, however, a sense of associated stigma and isolation could lead to hesitation of utilisation of services.

Perceived control – control relates to beliefs regarding an individual's own abilities to self-manage.

7.2.2.2 Enabling resources

The second classification relates to enabling resources and comprises the financial capability at the individual's disposal for the provision of appropriate medication. Also included are means of transportation, travel time to and waiting time for health care.

Personal financial resources – lower income in the US is associated with less utilisation (Blackwell, et al., 2009), but increased psychiatric treatment (Dhingra, et al., 2010). Absence of financial strain, the affordability of medication costs (Ani, et al., 2008) and health insurance significantly increases use and limits length of delay (Gaffney, et al., 2019). Prevalent economic difficulties are significant predictors of nonadherence (Soumerai, et al., 2006).

Usual source of care – having a regular location and personnel increases likelihood of scheduling appointments (Peters-Klimm, et al., 2010). Individuals without a regular doctor are less likely to contact a GP, or case manager over the previous twelve months than those who do (Hochhausen, Le, & Perry, 2011).

Availability of information – information is associated with the pursuit of a GP diagnosis (Ani, et al., 2008).

Emotional support – people who enjoy respectful and compassionate social relationships, from friends, family, and the care providers, are less likely to use health care services for emotional or psychiatric issues (Dhingra, et al., 2010), but are more likely to sustain treatment. The absence of social support, particularly in the elderly population (Happ, Naylor & Roe-Prior, 1997; McAiney, et al., 2017) may precipitate greater nonadherence (Kelly, Zyzanski & Alemagno, 1991; Mondesir, et al., 2018); furthermore, the attitude of others is also significant since representations can be endorsed or rejected by the pre-existing attitudes of members of a social community, a spouse for example (Vermeire, et al., 2001).

Community resources – included in this category are necessary resources for health care use to take place, such as geographical location of services (proximity of resources), time (for example waiting time for a GP) and availability of correct information. Convenience is perceived as a driver of self-management, and difficulties, such as fitting a job around the availability of a GP or the pharmacist, could prove burdensome and liable to impede treatment maintenance.

7.2.2.3 Need characteristics:

The final categorisation influencing medication-taking relates to needs. At the individual level, a differentiation is made between the individual's perceived need pertaining to functional state, experience of illness symptoms, and personal view of health (Hagger & Orbell, 2003), and the objective and evaluated assessment of the HCPs and clinical intervention need (Andersen, 1995). Perception of need also relates to the level of personal control and awareness regarding the consequences of the illness (Moss-Morris et al., 2002; Ross, et al., 2004). Perceived need and poorer self-rated illness severity, level, and persistence of debilitation, is associated with use (Lindamer et al., 2012), and is also predictive of accident and emergency visits over primary care use (Carret, Fassa & Kawachi, 2007); poorer physical and mental status is a significant predictor of higher health service use (Smith, et al., 2017). Furthermore, health care services are utilised more frequency in comorbid conditions than in single conditions (Parslow, et al., 2002).

7.2.3 Health behaviour

Health behaviour concerns practical strategies of self-management, (Evans & Stoddart, 2017), including the choice of therapy and self-care practices such as keeping apace of correct medication-taking. Support may be sought from HCPs, such as the GP, specialist, or pharmacist, lay supporters, such as friends and family, and the media, including television, magazines, and the internet. Regulation of health behaviours is determined by the individual's perceived support in discharging such behaviours, as well as perceived control over health and motivation, (Kanfer & Gaelick-Buys, 1991); health behaviour therefore is concerned with self-regulation, internal locus of control and self-efficacy. Research has demonstrated that self-efficacy is a significant predictor of adherence in chronic conditions (e.g., Horan, Kim, Gendler, Froman & Patel, 1998; Ogedegbe, Mancuso, Allegrante & Charlson, 2003). Studies of HIV/Aids have indicated the role of self-efficacy as a predictive criterion of medication-taking but has been underexploited in other chronic conditions (e.g., Remien, et al., 2007). Lower health locus of control has been associated with intentional nonadherence by patients who considered that they lacked influence over their own health (Atkins & Fallowfield, 2006).

7.2.4 Findings from qualitative inquiry

Included in this category is the aspect of consumer satisfaction with the service and HCPs which will vary depending upon experience. Outcomes are affected by health behaviours and perceived health status, influenced by previous episodes of illness, successful or unsuccessful treatment and the individual's role in the management of that, which in turn influence treatment satisfaction and outcomes, all of which have an effect on adherence.

This section mapped known adherence behaviours from extant literature onto Andersen's Behavioural Model prior to the addition of supplementary endogenous and exogenous variables derived from novel inquiry from the current research. Significant correlations were observed between various factors that lead to positive or negative medication adherence. The objective of the next phase of investigation was to extrapolate findings from qualitative inquiry and assimilate these onto the preliminary model to create a comprehensive aggregate.

7.3 The medication-mediation experience

This study's phenomenological inquiry shows that the medication-mediation experience represents a constant reconciliation and rationalisation of the illness and medication-taking processes. The desire to live a normal life is often juxtaposed with the necessity for medication-taking and the recognition of living with a chronic illness; there is an incessant endeavour to achieve a balance between psychosocial wellbeing and physical health. The experience is dynamic, plastic and, at times nebulous, evolving throughout the process; it is characterised by an engineered understanding from beliefs and perceptions, also resulting from idiosyncratic experiences and the changing contours of the illness itself. The individual, the principal, is contextualised within the situation of the illness and their role in social milieu. Therapy is at once the remedy to normality and autonomy, but also a threat, a disturbance of normality, conflicting not only with life priorities but also with the person's perceptions. This conflict potentially leads to false rationalisations of behaviour between the principal and also with their HCPs in justification of their behaviour; at times physical discomfort is endured despite a remedy being on hand as a result of these competing facets. Difficulties in persisting with medication, together with the fear of consequences of unsuccessful mediation, give rise to internal dialogue, which is at times remote but on other occasions almost all-consuming, causing stress and, sometimes, psychological outcomes such as depression. An individual's medication-mediation directly results from readiness for a therapeutic intervention, integrating psychosocial factors and the individual's capabilities and environmental resources; beliefs and perceptions are developed throughout the process.

Despite evidence of impaired quality of life, development of complications and troubling or painful symptoms, an inconsistent response to the illness, even sporadic denial, may present as a consequence of the combination of beliefs, perceptions, and experience; periods of attentiveness and diligent medication-taking contrast with episodes when the achievement of treatment goals is arduous. These interludes give rise to feelings of futility and there may be resistance or even abandonment of the treatment regime, though for principals who had a high level of illness-acceptance lifestyle changes were easier to effect, with medication becoming part of daily life, resulting in a more successful medication-mediation. An individual's sensitivity of their health and functional state, their experience of illness and symptomatic discomfort influences the rationalisation of perceived need to seek clinical assistance; in this way symptoms and treatments are cognitively and emotionally processed.

It is of note to expound on the definition of adherence; this study has used meaning from the perspective of the protagonists rather than pre-defined classifications by the scientific community. This may allow for more effective intervention strategies to be devised which is a positive advance as, while there are many interventions available, the success rates are generally low (Peterson, et al. 2003). One rationale for this is the lack of a suitable, and globally recognised classification of adherence and the absence of a single systematic predictor of nonadherence (Vik, et al., 2004). A solid theoretical foundation supports absorption into research practice as it may be assimilated with current research (Brazil, Ozer, Cloutier, Levine & Stryer, 2005), thereby extending our conceptual knowledge. A valuable element of this research design is the terminology of taxonomical categories; as a result, the influences in each category relate to specific prognosticators of adherence.

For principals more able to accept the modification to daily life therapeutic integration is easier, and procurement of information and adaptation to the illness is less problematic (in terms of medication-mediation); self-management is more accepted and, consequently, assimilated into everyday life. There is a need for individuals to feel supported whatever the level of collaboration with their HCPs, leading to a sense of security. Perceived control over therapy is matched with more edifying encounters with HCPs, whilst problematic encounters with HCPs considered as patronising, indifferent or unknowledgeable, tend to result in negative reactions leading to inferior communication and a decrease in medication-taking or the decision to experiment with alternative therapies. The negative associations with the HCP are transferred on to the medication itself and represents the antecedent of covert behaviour, fabrication or distortion of information, non-attendance, and poor medication-mediation.

The main determinants influential in medication-mediation were extracted from the reviews and supported by qualitative investigation; factors retrieved from the phenomenological investigation reveal the inconsistent, enigmatic, and nebulous nature of medication-mediation. Taking into account all data sources the material was further refined and the following thematic categorisations which exemplify the nature of medication-taking in chronic illness were extrapolated:

- the paradoxical nature of mediation and identity,
- information versus knowledge,
- treatment versus beliefs,
- the human condition; the dichotomy between choices and control,
- the personality of adherence.

The response from the principal does not represent '*a single 'truth'', but rather one possible story amongst many*' (Hibbert, et al., 2002, p.53) and emergent themes are framed in the individuals' contextual understanding and perceived reality. Principals had contrasting accounts of their experiences of influences on medication-mediation however, a central theme was the '*biographical disruption to life*' (Bury, 1982, p.167); threats to the identification of the self as well as the perceived change in the self, either positively or negatively associated as a result of diagnosis of a chronic illness which prompts identity reconstruction, a re-identification, with a person's unique body in association with the condition. Additionally, psychosocial issues directly influence illness-management and accounted, in part, for the divergence in rates of adherence. The essence of understanding the principal's lived experiences, their perspectives and biases lies in how their comprehension was contextualised and construed and understanding the corresponding affect of factors and their influence behavioural outcomes (Eberle, 2012).

It has been argued (Bury, 1982; Balmer, Griffiths & Dunn, 2015) that chronic illness disrupts normality and initiates a period of re-examination of expectations. The individual's subjectivity, the sense of identity, is altered along a continuum of reconciliation between oneself and with medication-mediation; it is not, therefore, merely a biographical disruption but also a liminally psychological disturbance too. Findings support the argument that we need to look further than singular factors and concentrate on syndemic psychosocial influences of consequence to the individual.

Interviews identified principals' explication of experiential evidence, such as feeling weak if medication is needed, or feeling unable to ask the consultant to explain further even when directions are not clearly understood. Having a chronic illness conflicted with perceptions of healthy living (Hansen, Vaughan, Cavanaugh, Connell & Sikkema, 2009); the idea that fulfilling a prescription is somehow injurious is juxtaposed with the knowledge of symptom-relief. This presented occasionally in a complete repulsion of pharmaceutical intervention which resulted in the use of only complementary medicines; one principal commented there should be '*more farmer less pharma*' (P25), alluding to his belief that substances such as cannabis were somehow more natural, wholesome, than prescription medicines.

The level of competency to self-manage the treatment regimen varied between principals; several individuals would not consider deviating from medication-taking without the advice of their HCP, as management was considered not only too difficult but purely the responsibility of the professionals as '*that's what they paid for*' (P10). Certain principals mentioned that there was an assumption made by the HCP that either the patient knows automatically what the medication is prescribed for, and how it works, or that this is irrelevant provided the medication is administered correctly; this resulted in individuals forming their own constructions concerning the characteristics of the illness and its treatment. Construes can be hazardous when incorrect assumptions are made. Hopelessness and anxiety contributed to negative control perceptions exacerbated by a lack of trust in the medical community, '*do they really know what they're doing, I mean really? Isn't it that you know you're body and things more – how do they know?*' (P19), and may inhibit engaging in care or reaching out for social support. Emotional responses to chronic illness may include stress, depression, frustration, and apathy, and impacts on behavioural intentions, including reduced engagement with care, which in turn affects physiological consequences, such as disease progression.

Perceived control is possible with the tacit agreement and integration of the new normal. '*You just have to get into a routine that's all there is to it, it's not good thinking oh I wish I could have that. You can't and that's all there is to it. Get on with it haven't you. Some people they think ooh I'll just have a bit, well if you can't have it you can't and it's as simple as that*' (P14). There is a rationalisation between the current status of needing medication and the possibilities if the condition was more serious. Adherence is a dynamic, interactional sequence informed by the knowledge and experiences of the individual and supported by the context of identity of self and interface with the world; it is subject to modification and is positioned as an issue to be addressed throughout the life of the chronic illness.

Medication-mediation is posited as a social construction of therapy, symbolic of the illness condition and transformed by the principals from inanimate chemical creations to socially construed entities (Deverts, et al., 2010; Cohen, et al., 2012); subjective meaning is derived from social constructions to understand medication adherence (Gore-Felton, et al., 2005), and embodied as social identity. Individuals ascribe symbolic meaning to their medication and credit it with anthropological attributes; '*it keeps an eye on the pressure and keeps it down, and that means I can keep driving*' (P11), rather than just a chemical compound to keep glaucoma in check, the medication has taken on an anthropomorphic characteristic and is identified with a role to perform with a concomitant consequence, in this case that the individual may continue driving his car due to the actions of medication. Due to the drug's efficacy he is able to function in his desired way. Individuals attribute qualities to the medication, almost a personification, and experience an interaction with their therapy, on which are built psychosocial beliefs (Gamble, et al., 2007; Shoemaker & de Oliveira, 2008). Short term periods of intentional nonadherence form part of the notion of phenomenological interaction with medication as the embodiment of a social actor (Laba, Brien & Jan, 2012).

The creation of an 'identity' helps the principal to understand the medicine and its role, '*so this med is for chestiness, and this is for, to stop my legs getting worse*' (P8); a method which informs education of a patient, who is a layman in clinical terms. However, this only seems to be effective when connected with a single medicine – where several medicines are prescribed the more likely is it to be beyond the scope of comprehension for most individuals. Invariably, not even the drug class and mechanisms of medication were known or recalled by the principals, let alone the brand name, even when the individual had been taking them for years, but nicknames were designated, often drawing on physical appearance, so warfarin is called '*pink and brown*' (P16), rather than 5mg and 1mg, in one principal's check of his nightly tablets to his wife as a safeguard that he has the correct ones. Familiarisation in the appellation may assist in receiving the medication more positively by positioning therapy in a more hospitable way, such as you might an acquaintance or friend, rather than a distant, complicated entity that can't quite be comprehended. Indeed, use of idiomatic linguistics enables transmogrification of the medication from something clinical, and not necessarily understood, to a nonthreatening mechanism, doing good, and therefore taking on a more benign meaning. Only one principal was sufficiently familiar with medication to use the clinical terms of his drugs accurately and constantly. In conjunction with this notion of individualising medication is the accustomisation with the medicine, its foibles and quirks consistent with any relationship, and just as in any affiliations navigating benefits to offset the imperfections so that the procedure becomes more palatable. The scientific biomedical functions are modified into lay understandings which are then represented in terms that the ordinary person can relate to. The international normalised ratio, for instance, is a measure of clotting-tendency and a level of between 2.0 and 3.0 for individuals on anticoagulant therapy, for disorders such as atrial fibrillation, is generally considered an effective therapeutic range. However, 'therapeutic range' will transmogrify into '2.5' or '*good result*' by the patient who has transformed the scientific into terms readily understood. In doing so the patient creates a social construction of the medication.

A 'lifestyle fit' is a significant predictor of medication-mediation, particularly in complex regimens, where duration is lengthy and side effects are prevalent (Wenger, et al, 1999). Chronic illness is the '*uninvited guest'* (P15), the thing that has come to the table that you do not want but have to deal with but rationalise and make the best of. Fewer medications enable a less problematic and onerous routine, and medication-taking behaviour, to be incorporated more easily into daily living, thus enabling adherence. A flexible approach to medicine taking is beneficial and lifestyle modification is also necessary for effective treatment in conditions where dietary restrictions apply (Bartlett, 2002). One principal presented a stoic approach, '*because you have to take them, so get on with it, if you want to live, it's up to you, it's your choice!*' (P6). Despite good planning and the habitual nature of medication-taking it is still possible to miss doses unintentionally, thus demonstrating the challenge of long-term therapy; '*you have to have a routine, even then I don't take them all the time, not out of intention*'(P20). On occasion events take over and the dose is missed, '*even though I've been taking them for years I sometimes forget. I get really cross with myself, I should know better, I'm not a baby*' (P17). Individuals place high expectations in their capabilities and are aware of the negative ramifications of missed doses which triggers feelings of frustration and anxiety.

Reminder devices, whilst helpful, did not negate the possibility of an unintentionally missed dosage. Principals had their particular ways of rationalising or withstanding this; an individual taking warfarin, described his recollection-strategems; the tablet box next to his bed (pills were taken nocte), he collaborated with his wife to ensure that they were the correct ones, (sometimes she would remind him to take the tablets too), a mobile phone reminder and recording the dose and time in a diary. '*I have to take them when my alarm goes off or its hopeless, I know I'll forget*' (P16). One principal gave assurances that she knew exactly what she had taken and when until her husband interjected that was not the case. She then conceded that he may be right; '*I know I am*' he retorted, '*cos I tick in on the diary!*' (P5). Occasional nonadherence or missing a dose by a few hours was felt to be acceptable, an inevitable part of the process, but more frequent omission was problematic and engendered a sense of nervousness, mainly concerning the consequences; this did not degrade with time. Principals described the relationship with the treatment regime as unwanted, and that medication adherence was borne out of necessity. The process is imbued with social constructions and contextualisations that enable the individual to adapt the regime within the limits of acceptability, also constructed by the individual, even though this was considered disobedient or '*naughty*' behaviour.

With chronic illness the affect of side effects is more significant than in acute conditions because in the latter '*you put up with because you know that your condition is going to improve but chronic are long lasting and therefore you have to make a decision to put up with the side effects*' (P29), or the symptoms of the illness; a multiplicity of side effects may lead to an increased perception of illness, of 'being ill'. What may be termed nonadherence may just be the consequence of negotiating the process of chronic illness but may relate correspondingly to relief from the burden of treatment and is temporary. Patients negotiate their way through the process; there is a juxtaposition between the positive effects of medication-taking and the negative association of therapy as a nuisance since it is preferential not to have to contend with daily pill taking.

Locating, procuring, and processing of knowledge results in perceptions and beliefs, in conjunction with other dynamics such as experiences; the illness process is a subjective experience, with unique (or so it is perceived by the individuals) characteristics peculiar to each person. '*Our body's are all different aren't they, I mean I know I have the same* [condition] *as so and so but what I do, go through isn't the same is it? And if I don't take them* [medication] *then I may feel different*' (P9). Even though the same medication is taken among many, this principal believes that the effect differs from person to person. This applied equally to consequences for missing doses - that there will be different outcomes.

Knowledge, gathered both empirically and anecdotally, is construed from various sources, from wider social interactions, media, friends, and family, or based on personal experiences and situations and assimilated by the individual into an explicable concept on which their health-behaviour is grounded. Social media offers a plethora of information and seems readily accepted by the principals even when the provenance is unknown, dubious, or potentially inaccurate. A delineation is made between self-sought information and that offered by professionals; expert information is not necessarily trusted more, due perhaps to a lack of understanding, and an element of not knowing is perceived as better because '*you don't have to face what's coming down the line'* (P13). However, there was also a sense that if a consultant suggested taking a tablet some principals would just do it without necessarily knowing what it was for or what it did. This lack of understanding regarding the medication may be one driver of a laissez-faire attitude regarding therapy; this particular factor can be remedied by the practitioner offering sufficient explanation or further education regarding the medication.

Preconceived ideas are difficult to eschew, even when faced with biomedical reasoning; a negotiation ensues between expectations, previously held beliefs, cultural values, and novel information from which the principal constructs a biometrical algorithm of medication management, which in some circumstances circumvents the need for professional intervention. HCPs are trained within the positivist biomedical model and therefore therapeutic regimes are born out of evidence-based practice; pharmaceutical advocacy is consequently considered a professional and ethical obligation of the practitioner (Wens, et al., 2005) and deviations from a regime are construed as noncompliant behaviour. The application of biometrics may lead to arbitrary targets without meaning because the individual may be oblivious as to their correlation with symptom relief; for example, the aim of the principal taking warfarin is to achieve an INR of 2.5, although he was unable to recall whether a greater level meant that his blood was thicker or thinner, the corollary of which is a greater risk of unabating bleeding. Looking through the lens of the individual allows us to see social constructions rather than just biomedical ones; '*an inter-subjective theory can explore the development of mutual recognition without equating breakdown with pathology. It does not require a normative ideal of balance*' (Benjamin, 1999, p.198). Beliefs about medication contribute to the perception of their necessity and appropriateness and account for deviations from the pharmacological regimen; they are constructed from social interactions with HCPs and knowledge acquired elsewhere throughout the illness journey.

Beliefs are partly construed by awareness which is driven by knowledge-seeking, an important component of this theme is knowing who to contact and how. Material relating to the condition and medication was procured from both official/professional contacts, such as the NHS website or the principal's consultant, together with informal routes, such as the internet. Medication knowledge, and the persona of expert witness, is a predictor of adherence (Vermeire, et al., 2001); lack of knowledge may lead to the patient's lack of prioritisation regarding treatment (Vlasnik, et al., 2005), whereas sufficient understanding is more likely to lead to informed choice regarding therapy. Information generated via friends tended to be anecdotal in nature, but the absence of an empirical foundation was not troublesome for many principals, '*my friend knew someone who had this*' (P28), and who was apparently as much an expert as the specialist. Of concern, was the principal's reluctance to question, or ask advice from, their HCPs – the '*higher up the chain*' (P10) the health care professional is the less likely principals were to inquire regarding matters which were felt not worthy of their rank, not wishing to waste their time, '*you always get a sense of, er, feel rushed, you know, they haven't got the time to see, speak to you, and they're not afraid to show it*' (P30). When asked about the risks of medication one principal was advised by his consultant, in what he felt to be an attempt to alleviate concerns, '*you let me worry about the risks, that's my job*' (P13), whereupon the principal who was not previously concerned grew worried, as it hadn't previously occurred to him that there were any risks, and he consequently had to press the consultant for further details. The assumption that the patient was either incapable or should not be troubled by the minutiae of appreciating the illness, outcomes and therapy was considered '*rather supercilious isn't it, he even patted my hand as he smarmed it*' (P18). Dissonance results from lack of education, or poor patient/practitioner relationship.

Invariably individuals would seek information informally rather than access the health care system. This contrasts with individuals in the respiratory conditions cohort, many of whom were not only comfortable talking with their HCPs but actively sought them out and were much more likely to utilise the healthcare system. In the chronic conditions group however, there was a general ambivalence to understand the dynamics of pharmacology, employment of layman's terms and understanding was preferred. Furthermore, the perception of knowledge-level contrasts between the different protagonists within the tableau, a nurse for instance would be accorded less credence than a consultant, a specialist in their field, as they are perceived to have a lower level of knowledge, and accordingly capability and status. Interactions with HCPs are therefore subject to fluctuations and many different experiences.

Principals attach negativity to irregular or interrupted therapy, considering that behaviour as outside the conventional norm which renders the principal disobedient, ill-disciplined, or mischievous; these attributes represent a challenge to socially desirable constructions of what is right and acceptable. There is a continual negotiation by the patient between articulations of HCPs and the reluctance to accept the necessity of medication on a daily basis, having reservations that you '*should just accept what you're told*' (P25), questioning the assumption of their veracity, and posing the interrogation '*what do 'they' know?*' (P25).

The older principals gave the impression that there was an expectation, an inevitability, that physiological problems are concomitant with age and there was a greater sense of acceptance than in younger principals, for whom the idea of lifelong medication may perhaps be more of a struggle. There was a sense that chronic illness was a source of '*embarrassment*' (P30), rendering them weaker or less able to contribute properly to society, '*you get a sense that they say, why should we pay for them? You know, sometimes you just can't work, you feel bad*' (P17), with the impression that their place was lower down the social scale due to limited functioning. Behaviour is constructed as a result of subjective perceptions, adding value, and meaning, generated by the individual; theories about the individual's self-concept become beliefs, whereby practices and philosophies frame the notion of adherence within the wider social context together with how the principal perceives they are situated within this context. The individual conceptualises and attaches meaning to a particular behaviour which may align with conventional policies or may be external to them, with the individual's quantification contrary to scientific evidence.

Forming an integral part of their life, when a patient shows antipathy towards medication a negotiation must ensue between the person's identity, resulting in internalisation, and the need for the medication, causing a shift in identity for some (Sidat. et al., 2007). '*I would say that being on warfarin has probably saved my life not because of the PEs* [pulmonary embolisms] *but because I thought I would have a heart attack or something, all my family has … so actually I'm lucky that they picked this up because if they hadn't I might be dead by now*' (P17). Medication-taking may be modified in congruence with an individual's medication beliefs, largely taking therapy as prescribed, whilst on occasions accommodating physical or conceptual feelings (Gamble, et al., 2007). '*If I don't need them I don't take them. But when I feel really bad again I do*' (P27). The affect of temporal variation on decision-making suggests that circumstances and emotional state are influential in the process. A divergence may be observed between experts and the patient (Laidsaar-Powell, et al., 2013) and occasionally, individuals need to be convinced as to the necessity of the medication (Sale, et al., 2011); a negotiation ensues between parameters of the construction of the self that the person identifies with. If medication-taking is perceived to be incongruous with the principals' cognitive representations of social comparisons and experiences there will be a conflict between the recommendation of the practitioner and the patient. An individual's heuristics denote the behavioural response to symptoms (Leventhal, et al., 1992a).

Attitudes are also shaped by subjective norms and influence the sequential system of medication-mediation. One patient did not want to '*bother*' (P21) the doctor unless she considered it was absolutely necessary. Furthermore, expectations derive from attitudes, '*you can't expect to be as you were, you have to make allowances and just do what you can. Make the best of it*' (P14). Perceived need and concerns about adverse somatic outcomes (Horne, et al., 2013) may lead to internal conflict and must be resolved before adherence is assumed. Intelligence-gathering affects pharmacological beliefs (Tong, et al., 2010) but may be negative if endorsing unfavourable assumptions (Contreras Muruaga, et al., 2017). The relationship with pharmacological therapy is interactional in nature; medication-therapy becomes an entity that is abstract in its external capacity even though it is part of the principal's life, in an affiliation which develops over time. Behavioural determinants, such as self-efficacy, influence the extent to which an individual is prepared to experiment with medication, to make adjustments, and highlight the reinforcing effects, or cognitive dissonance, of the personal belief system and its influence on values.

7.3.1 Personality and individual differences in the illness process

This study endorses the argument that personality should be considered as integral to the process of managing chronic conditions; some evidence of robust and consistent effects of individual differences were observed in the study, supporting previous research. Personality is an influential factor in health domains and one which affects physical health outcomes, the strength of which are clinically significant. Affects may be observed throughout the illness process, the dynamics of which are changeable throughout the development of the condition.

Clinical diagnosis is rarely predicated on a single entity and takes into account multiple, heterogeneous, organic elements (e.g., Schmidt & Rikers, 2007) however, there is benefit in directing additional attention to the psychological, as well as molecular, components of diagnosis; subsequent differential relations of associations of adherence at trait level, facet-specific variance (McCrae, 2014), and further sub-domain structures of personality traits (DeYoung, et al., 2007). The Big Five traits have been correlated with certain physiological functions such as metabolic rate and aerobic capacity (Terracciano, et al., 2013), and whilst the FFM domains form a central framework they are by no means the only personality factors studied in health and illness processes. Traits are heritable (Bouchard & Loehlin, 2001; Vukasović & Bratko, 2015), however neuro-technologies, which have introduced psychotropic medications such as selective serotonin reuptake inhibitors (SSRIs), have the potential to render enduring modifications to personality traits (Farah, et al., 2004). SSRIs generally have few side effects and are consequently the most commonly prescribed antidepressant, and they perform by essentially altering molecular events implicated in cognition, identity, and emotions - and conceivably personality. Lower scores have been observed in neuroticism (Du, et al., 2002) in response to cognitive enhancements resulting from SSRIs, although this may reflect the elimination of depressive symptomology. However, it has been argued (Brock, 1998, p.58) that '*altering a fundamental character trait or psychological feature by a "quick fix" of "popping a pill" seems to some people too easy and less admirable than changing that same trait or feature through hard-earned insight psychotherapy*'. Nonetheless many aspects of psychological functioning are potential foci for modification, including memory, mood, and personality traits (Farah, 2005), leading to bioethical debate as to impending controversial applications of health-personality research.

A distinction should be made between main effects of traits on medication-mediation and the interaction between traits to modify influences. For instance, conscientiousness is more likely to be associated with positive behaviours (such as medication adherence) (Bogg & Roberts, 2004), whilst neuroticism is affiliated with negative behaviour (Booth-Kewley & Vickers, 1994); the trait has been linked with poorer health outcomes, but a combination of conscientiousness and neuroticism results in reduced health limitations (Roberts, Smith, Jackson, & Edwards, 2009). It is imperative to understand the mechanisms by which synergistic trait effects influence cognitive health behaviour; results show inconsistencies, but one interpretation of the combination of high conscientiousness and neuroticism just mentioned could be that it preceded greater health vigilance since this permutation is also associated with compensatory health behaviours (Ferguson, 2013). To further exemplify, an individual may engage in healthy behaviours such as exercise whilst simultaneously indulging in binge drinking or smoking in the specious belief that the positive behaviour will offset the adverse effects of negative behaviour. Therefore, even though an individual may self-report good health the effects of poor habits will not be negated by healthy habits, leading to potentially worse health; this is an illustration of the consequence of compensatory belief.

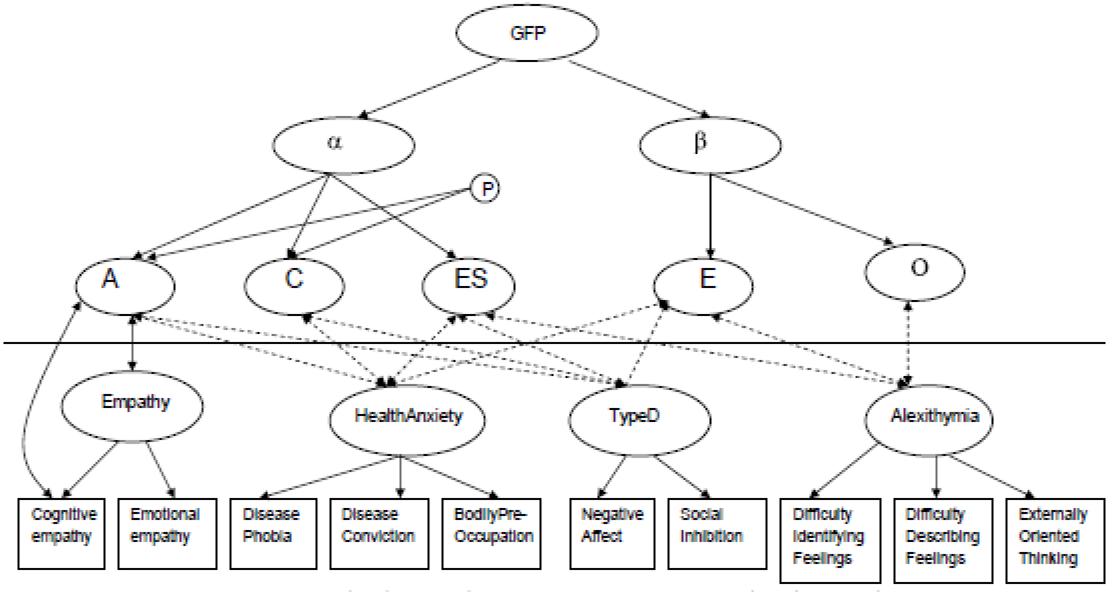


Figure 7.5 A descriptive theoretical model of personality hierarchy emanating from the General Factor of Personality (GFP) (based on Ferguson, 2013).

Personality traits have been linked consistently with health behaviours (e.g., O'Connor, et al., 2009; Raynor & Levine, 2009); for instance, donation of blood is associated with high agreeableness, (Bekkers, 2006) whilst conscientiousness, has been positively correlated with health behaviours, such as exercise, and negatively with unhealthy behaviours, such as tobacco use (Bogg & Roberts, 2004) and substance abuse (Kotov, Gamez, Schmidt & Watson, 2010). Neuroticism is positively correlated with poorer health behaviours (Booth-Kewley & Vickers, 1994) and substance abuse (Kotov, et al, 2010), whilst agreeableness and extraversion show weak negative associations. A distinction has been found between extraversion and risk-taking behaviour, which was negative in substance abuse (Kotov, et al., 2010), but positive in relation to sexual risk-taking (Vollrath, et al., 1999), but is perhaps not surprising given the pleasure-seeking tendencies of the extravert, particularly in social situations. Figure 7.5 shows a descriptive theoretical model of personality hierarchy representing how health-related traits are associated with personality factors; solid arrowed lines depict positive associations whilst dashed lines represent negative associations. The common underlying basis of the Big Five 5 enable combination into a superfactor – the General Factor of Personality (GFP) (e.g., Musek, 2007) representing a dimension of social effectiveness.

In terms of utilisation of the health care system, symptom reporting is a key outcome (Kroenke, 2001) and is indicative of the interaction of an individual (Ind) on, and with, the external (Ex) system; effects of symptom reporting have been noted in respect of conscientiousness, neuroticism and openness (Feldman, Cohen, Doyle, Skoner, & Gwaltney, 1999; Van den Bergh, Witthöft, Petersen, & Brown, 2017). A link has been suggested in the associative process between locations and aromas with symptoms and illness, particularly in neuroticism (Ferguson & Cassaday, 2002; Devriese, et al., 2000). Despite less accuracy in the reporting of bodily sensations in neuroticism (Bogaerts, et al., 2005) an increased sensitivity to pain is associated with neuroticism (Granot & Ferber, 2005; Pud, Eisenberg, Sprecher, Rogowski, & Yarnitsky, 2004), represented in both clinical and healthy population samples. The interpersonal differences in responsiveness to pain may be associated with the pursuit of clinical assistance and response to medication.

Personality traits have been correlated with physiological responses to the development or progression of a condition (Chapman, et al., 2009; LeBlanc & Ducharme, 2005) and vulnerability to infection (Totman, Kiff, Reed, & Craig, 1980; Barer, 2017); demographics (Gerritsen, et al., 2009) and stress (Burke, Davis, Otte, & Mohr, 2005) may moderate the correlation between personality and pathogenesis. Extraversion has been linked to increased vulnerability to infection, cortisol levels and reduced cytokine levels (Ironson, O'Cleirigh, Schneiderman, Weiss & Costa, 2008). High levels of conscientiousness, extraversion and openness have been associated with protracted disease progression (Ironson, et al., 2008; LeBlanc & Ducharme, 2003). Positive psychological factors such as self-esteem and positive affect have been associated with decreased production of cortisol (Chida & Steptoe, 2009), in contrast to depressive affect (a marker of neuroticism (Kotov, et al., 2010)), which has been linked with reduced cellular immune activity (Herbert & Cohen, 1993; Barry, et al., 2019) and increased proinflammatory cytokine levels (Dowlati, et al., 2010). Neuroticism is also linked to increased perceived disease susceptibility whilst agreeableness, conscientiousness and extraversion are related to lower perception (Gerend, Aiken, & West, 2004; Vollrath, et al., 1999). Agreeableness and neuroticism are linked to increased mortality, and extraversion and openness to longevity; results highlight the utility of assessing individuals who may be at risk of deteriorating health.

Conscientiousness, extraversion, and openness are linked to coping strategies, such as problem solving, that are generally beneficial to health (e.g., Carver & Connor-Smith, 2010; Ferguson, 2001), in contrast to neuroticism which is associated with deleterious practices (Connor-Smith & Flachsbart, 2007), such as substance abuse (Kotov, et al., 2010). Conscientiousness is mediated by behavioural variables such as attitudes (e.g., Conner & Abraham, 2001; de Bruijn, Brug, & van Lenthe, 2009) and higher scorers in conscientiousness are more liable to behave in accordance with their intentions (Chatzisarantis & Hagger, 2008). Furthermore, conscientious individuals are considered to engage in healthy behaviours; this has implications in terms of medication adherence since adherence is a behaviour.

In terms of illness-representations, the effects of others on an individual’s behaviour (Hilbert, Martin, Zech, Rauh, & Rief, 2010) cannot be underestimated and yet it is underexplored in health psychology (Ferguson, 2013); it has been demonstrated, for instance, that the personality of the carer can serve as a protector or risk factor of the patient’s health outcome. What has emerged is that the conscientiousness of the patient’s partner predicts positive outcomes due to compensatory conscientiousness (Roberts, et al., 2009), whereas partner neuroticism is linked with patient depression (Ruiz, Matthews, Scheier, & Schultz, 2006). It has been shown that divergences in personality between patient and partner influence relationship satisfaction (O’Rouke, Neufeld, Claxton, & Smith, 2010). An individual is subject to numerous and varied dynamic interactions during the course of the illness, which can be categorised as: dyadic, for example between the individual and their carer, or spouse or GP; triadic, that is for instance, between the individual, GP, and consultant; or societal, such as groups, or community. An affect of personality has also been observed in doctor patient interactions; conscientiousness in GPs is associated with interest in the patient’s psychosocial circumstances. However, both conscientiousness and neuroticism have been linked with increased exclusion of patients from involvement in their treatment (Chapman, Duberstein, Epstein, Fiscella, & Kravitz, 2008). Furthermore, patient conscientiousness, extraversion, openness, and neuroticism are predictors of the subject-matter in interactions with the GP whilst openness and neuroticism reflect the content of GP communication (Eaton & Tinsley, 1999; Nobile & Drotar, 2003) and individuals high in neuroticism are reassured by doctor patient interactions (Ferguson, 2000). The attribute of empathic concern, representing the capacity to experience emotions (Jolliffe & Farrington, 2006) is desirable in HCPs (Ferguson, James & Madeley, 2002; Kim, Kaplowitz & Johnston, 2004; Silvester, Patterson, Koczwara, & Ferguson, 2007); patient ratings of GP empathy is associated with patient compliance and satisfaction (Kim, et al., 2004). In terms of the patient, evidence of the GP's empathy is associated with increased pain reporting (Schieman & van Gundy, 2000). It is therefore encouraging that empathy is a component of the GP selection process and incorporated in training (Pedersen, 2009; Patterson, Ferguson, Norfolk & Lane, 2005).

The utility of not limiting investigation to FFM traits has been documented (Nielsen & Knardahl, 2014) in relation to health psychology (Saucier & Goldberg, 1998; Mayer, Salovey & Caruso, 2008; Piedmont, 2013); supplementary traits of particular significance are type D, anxiety, and alexithymia (e.g., De Fruyt & Denollet, 2002; Nettle & Liddle, 2008). The element of emotional processing, integral to these traits, is of speculative significance for health psychology (Lawton, Conner, & McEachan, 2009; Lumley, Neely, & Burger, 2007); for instance, additional traits, subsumed within the five-factor model, particularly extraversion and conscientiousness, relate to optimistic control and include optimism, self-esteem, and self-control (Marshall, Wortman, Vickers, Kusulas, & Hervig, 1994). Health specific traits, such as health anxiety, type D personality and alexithymia, are theoretically well defined in terms of their psychometric properties, have a biological basis with clinically significant effects on health, and relate to many fundamental constituents of the illness process.

Health anxiety is a heritable trait (Taylor, Thordarson, Jang, & Asmundson, 2006) linked to the attachment of health-relevant information (Ferguson, Moghaddam, & Bibby, 2007) with a prevalence rate between 5-7% (Creed & Barsky, 2004). Health anxiety is representative of fears concerning illness and preoccupation even in the absence of objective illness (Kellner, 1986; Warwick & Salkovskis, 1990; Löwe, et al., 2008) relating to poor stress and coping responses (e.g., Ferguson, 2001). Anxiety has been linked with unrealistic health beliefs (Barsky, Peekna & Borus, 2001), a focus on health goals, unexplained symptom reporting, reduced pain thresholds (Marcus, Gurley, Marchi & Bauer, 2007) and medically unexplained syndromes which, in some clinical specialities, account for 50% of hospital admission (Nimnuan, Hotopf, & Wessely, 2001). It has also been associated with increased functional somatic syndromes (e.g., Noyes, Stuart, Watson & Langebehn, 2006). Symptoms are the main motive to seek guidance from health care professionals (Kroenke, 2001) however, anxiety is linked to increased visits to GPs (Hiller & Fichter, 2004) and doctor ‘shopping’, predicated on hostility towards the doctor, critical opinion of the subjective abilities of the doctor and a lack of confidence in their competence, (Kasteler, Kane, Olsen, & Thetford, 1976; Crow et al., 2002; Cockerham, 2017), inevitably resulting in poor doctor-patient trust (Ferguson, 2000).

Similarly, type D personality is a heritable trait (Kupper, Denollet, De Geus, Boomsma, & Willemsen, 2007), the theoretical foundation of which incorporates the traits of negative affectivity and social inhibition. It has been defined as the ‘*tendency to experience negative emotions and to inhibit self-expression*’ (Denollet, et al., 2006, p.970) and identified with a number of mechanisms relating to health outcomes (e.g., Denollet, et al., 1996; Denollet, et al., 2006). Type D personality has been linked to cardiovascular conditions (Denollet, et al., 1996) and reduced emotional quality of life (Pedersen, Herrmann-Lingen, de Jonge, & Scherer, 2010). Consequences of type D personality may negatively impact on medication adherence; although there is limited research relating to the affect of type D in relation to health care utilisation it has been associated with negative perceptions of health (Mols, Holterhues, Nijsten & van de Poll-Franse, 2010), poorer stress and coping behaviour (Williams, O’Carroll, & O’Connor, 2009), inferior health behaviours (Williams, Abbott & Kerr, 2016).

Alexithymia is also a heritable trait (Jorgensen, Zachariae, Skytthe, & Kyvik, 2007) with implications for medication adherence; it is associated with limited emotional understanding and difficulties in verbalisation and interpretation of thoughts (Ferguson, 2013). Affecting up to 10% of the population alexithymia has a higher prevalence in individuals with Type 1 diabetes (Chatzi, et al., 2009), cancer (Gritti, et al., 2010), and Parkinson’s Disease (Costa, Peppe, Carlesimo, Salamone, & Callagirone, 2010). It is associated with increased negative health behaviours (Helmers & Mente, 1999; Lumley, 2004), risk taking behaviours (Ferguson, et al., 2009; Toneatto, Lecce, & Bagby, 2009), psychosomatic illness (Lumley, et al., 2007; Taylor, 2000), and mortality (Tolmunen, Lehto, Heliste, Kurl, & Kauhanen, 2010). Conversely, health outcomes are poorer (Grabe, et al., 2010), and immune system function is reduced (Dewaraja, et al., 1997). Patient practitioner communication is likely to be inadequate (Rastling, Brosig, &

Beutel, 2005) despite excessive use of healthcare services (Lumley, et al., 2007). As individuals with alexithymia are less prone to learn from negative emotional links with poor health behaviours (Ferguson, et al., 2009) affective associations to health behaviours are liable to be weaker (Kiviniemi, Voss-Humke, & Seifert, 2007), and, consequently, emotional-based interventions less effective (Lumley, 2004; O'Connor & Ashley, 2008).

7.4 Model development

Previous research has inferred possible predictive relations concerning the affect of potential variables, however, a consistent influence has not been demonstrated in literature; furthermore, studies seldom take into account influences from multi-perspectives, for instance, side effects may be considered, but rarely in relation to additional variables such as self-efficacy or support, and consequently the mechanisms and rationalisations which underpin behaviour are overlooked. Reductionist approaches have tended to consider each constitutive factor in isolation; furthermore, most studies are conducted within the context of a single illness condition and therefore little is known about the transferability across groups which is essential for a complete depiction; for instance, the question as to patient apperception between medications for multiple disease states (An & Nichol, 2013), suggesting individual medication variance between conditions. Further research is therefore needed to establish the relationship between factors in a contextualised way, with a focus on the correlation between individual characteristics and environmental factors, and the appreciation that illness is a process affected by multifarious social and behavioural factors, compounded by personal health choices, that ultimately influence adherence. No single existing model fits the research findings and consequently the development of a novel model was commended.

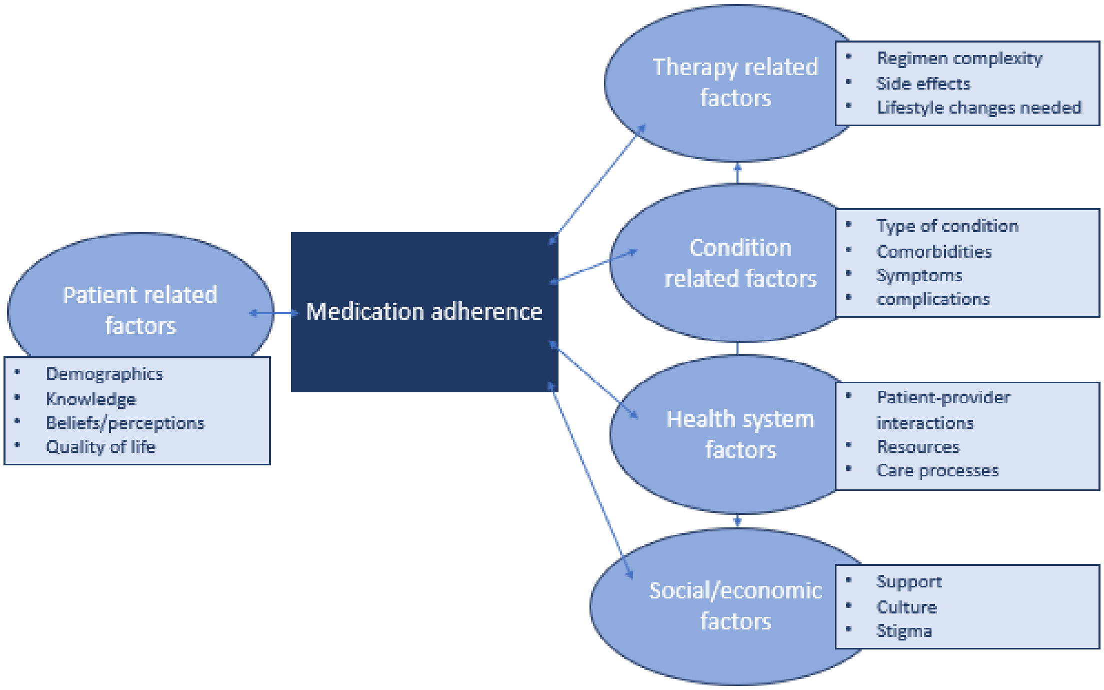


Figure 7.6 Baseline model, predicated on the World Health Organisation (2003) facets of medication adherence.

The World Health Organisation (2003) investigated frequently reported reasons for nonadherence and created an authoritative compendium of medication-adherence factors, including treatment-related concerns, such as adverse effects or fear of side effects, asymptomatic, polypharmacy, inconvenience, and cost. It was possible to exploit these to create a baseline model which serves as a useful reference point from which to proceed. The baseline model (Figure 7.6) focusses on the relationship between patient characteristics, condition-related and environmental factors that affect adherence to medication. It does not represent a dynamic process, rather, there is a presupposition that solitary and distinct factors are largely responsible for the behaviour of the individual in terms of adherence.

Understanding current frameworks may assist in illustrating the determinants of medication-mediation however, prevailing adherence models tend to be static and do not necessarily exemplify the plasticity of the complexities, idiosyncrasies, and modulating nature of medication-mediation. Therefore, this study supports the remodeling of underpinning factors. Evolution of the IndEx-MediC model was achieved with the incorporation of the exogeneous themes which characterise medication-mediation, derived from the taxonomical framework and supported by the novel quantitative and qualitative analyses, as summarised in Chapter 2. Affects, directly influenced by the individual, were condensed into a conceptual algorithm, including perceived control, beliefs and attitudes, routine, identity, and personality; additional factors were integrated, such as demographics, which may serve a predisposing, moderating role in the illness-process and are situationally contextual. Themes were initially assimilated within Andersen's Behavioural Model, (Andersen, 1968) as shown in Figure 7.7, and articulate the individuals' experience of medication-mediation, driven and created from the perspective of the medication-taker.

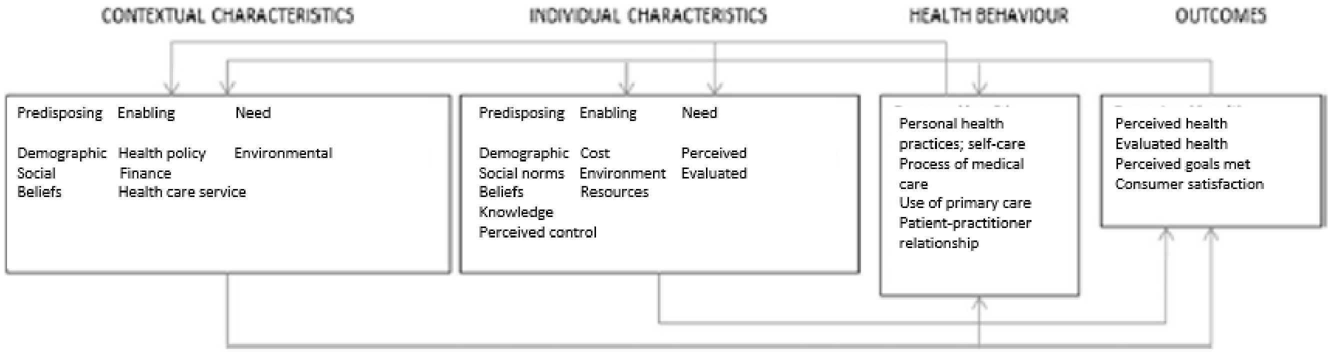


Figure 7.7 Components of medication-taking derived from extant studies and novel data, transposed to the Behavioural Model (Andersen, 1968).

Andersen's model (1968) is composed of four constructs, specifically contextual characteristics, individual characteristics, health behaviour and outcomes. Variables are situated within each construct; for instance, outcomes are affected by perceived health, evaluated health, perceived goals and consumer satisfaction.

Enabling resources include contextual and individual factors, such as positive self-management behaviour (Evans & Stoddart, 2017) and financial capacity, which has been identified as a significant predictor of medication-taking (Gellad, Grenard & Marcum, 2011); self-efficacy and locus of control are notable additional factors (Ogedegbe, et al., 2003). Regulation of health behaviours (Abraham & Sheeran, 2013) is determined by perceived control over health, perceived support, and motivation to engage in health-promoting behaviours (Atkins & Fallowfield 2006). The combination of these variables empowers the individual to take responsibility of for health and enable the performance of behaviours such as remembering to refill prescriptions before they run out, or organising medication when traveling (Aubry, et al., 2012).

The environmental component comprised social relationships, a significant predictor of medication-taking; family and social support were identified as particularly important in haemodialysis patients (Laidlaw, Beeken, Whitney, & Reyes, 1999; Terrill, 2016), and when social support is lacking negative medication-mediation may ensue (e.g., Brook, van Hout, Stalman & de Haan, 2006). A related concept is the notion of the attitude of others since illness representations are validated by an individual’s social network, such as a spouse’s attitude toward medication (Vermeire, et al., 2001).

Need factors, considered by Andersen (1995) to be the prime determinants of health care use, are differentiated between perceived and evaluated needs. Perceived needs include the individual’s perception of their own health status and functional state, illness cognitions and their experience of illness, (Hagger & Orbell, 2003), which is indicative of motivation to seek assistance. Beliefs may include perceptions of medication and appraisal of symptom relief, causes and consequences of illness and level of personal control (Ross, et al., 2004). Evaluated need represents the HCPs appraisal regarding the need for clinical care and was not investigated in this study.

Health outcomes such as consumer satisfaction with healthcare are reflected in the original model and also include outcomes and contentment with the level and quality of self-management in therapeutic maintenance. Outcomes are iteratively intertwined with regulatory feedback of predisposing factors and perceived need which affect medication-mediation.

As the Behavioural Model does not represent corresponding interconnections of factors it was further expanded to incorporate significant variables extrapolated from the literature reviews. The additional categorisations required a re-framing of the Behavioural Model and is illustrated in Figure 7.8.

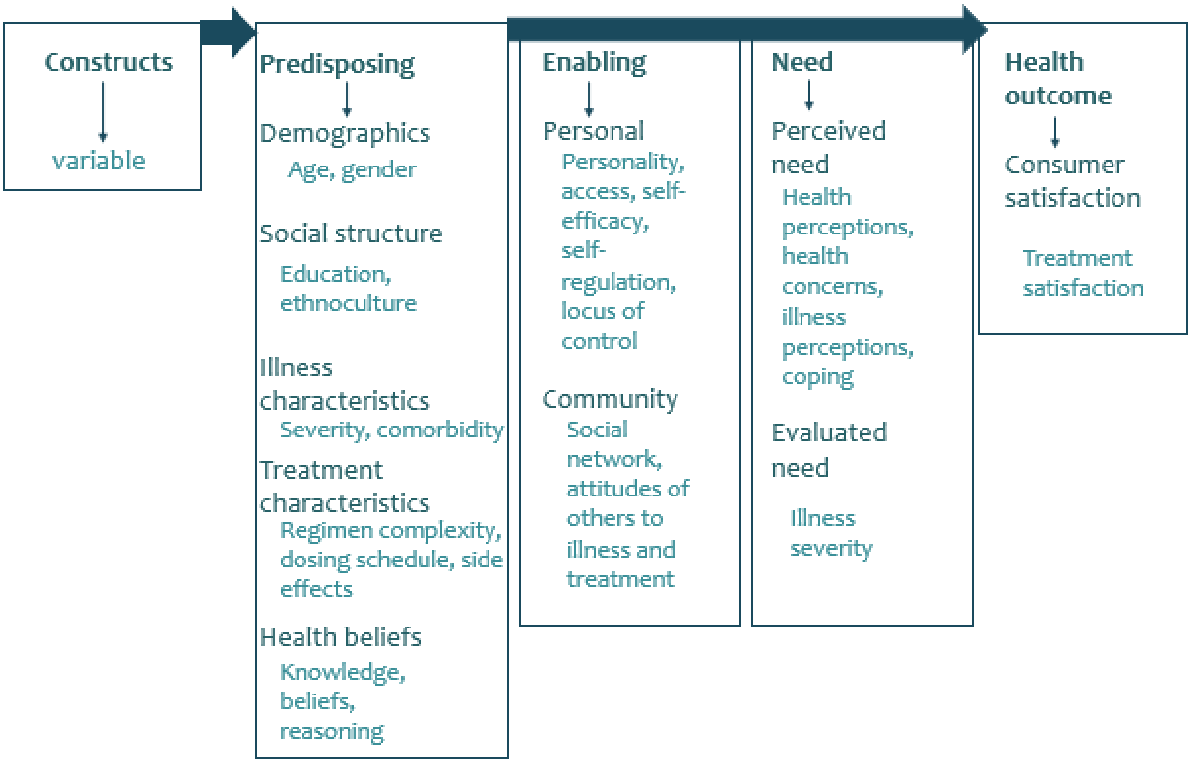


Figure 7.8 Significant constructs and variables associated with medication-taking in chronic illness.

‘*It is nearly impossible to identify the factor having the “strongest influence*”’, (Babitsch, Gohl & von Lengerke, 2012, p.14); there are inconsistencies in the direction and strength of associations in extant data due, to a certain extent as previously mentioned, to the lack of complex statistical methods (such as the testing of multivariate models) in many of the studies, rendering correlations difficult to assess. Restricted explanatory power may be the reason why studies are limited to a single indicator however, it is essential to go beyond individual variables to gain a better understanding between factors and adherence. The IndEx-MediC model of medication-taking was developed as an integrative model, taking into account cognitive and psychological theories of adherence together with extant and novel data for a comprehensive observation and organisational analysis of the topic. The attenuating affect of each influence of medication-mediation was observed and assessed; influences included in the IndEx-MediC model comprised cues and attitudes and subcategories contained the nuanced topics within each classification, contextualised bilaterally between endogenous, ‘individual’, and exogenous, ‘external’, perspectives.

Factors were systematically identified and summarised with the techniques described in Chapter 2 from which the structure of adherence could be analysed; data from the literature reviews were methodically arranged into a taxonomical framework, the psychometric data were statistically analysed and finally, phenomenological data were transcribed and consolidated into categories; a priori themes were extrapolated from extant research (for example in reviews such as Vik, et al., 2004), used as a baseline and augmented by the novel salient themes, associations and recurring foci identified in this study. Typologies, with explanatory descriptors, were developed from these classifications.

The design of the IndEx-MediC model eliminated a number of components present in Andersen’s original model; the contextual domain was not investigated for the purposes of the current research topic and supplementary research is required to establish the extent to which these influences are relevant to adherence behaviour. Andersen’s contextual domain includes health-system provision, the structure and financial accessibility of which will be differently organised dependent on, for example, the specific country of medication administration; this has a fundamental influence on health behaviours in terms of availability and convenience.

Furthermore, Andersen observed that not all of the Behavioural Model's categories are easily modifiable, the low mutability of demographics for instance, in contrast to enabling factors – a critical concern in the consideration of interventions. The IndEx-MediC model was able to capture many of the factors alluded to in statistical analyses, however further influences were ascertained in the course of qualitative investigation, which directly impact the predictive power of Andersen's model, (Porteous, Wyke, Hannaford & Bond, 2015), which to date has been relatively modest (McEachreon, Salmoni, Pong, Garg, & Viverais-Dresler, 2000).

The IndEx-MediC model is concerned with the basic mechanisms of adherence and the metrics which intersect to construe a typology. There is a recognition in the design of the framework that medication-mediation is a behavioural process of self-management impacted by many and various factors. The external environment concerns the individual's home (living conditions) and community (characteristics such as violent neighbourhood, economic status of the community) composition and the level of support derived from each; also included are supportive resources, such as financial or transportation. The infrastructure of the health care system is an additional impact, including the policies in force, organisational structure, financial arrangements, and resources influencing availability and accessibility of healthcare services, including cost of services and medication, transport to place of care; supportiveness of the health care team is also noteworthy. Patient characteristics have also been investigated and include social environment such as family and social community, spiritual or religious factors, demographics such as age, gender, and economic status; cognitive resources such as memory, health literacy and knowledge, ability to self-manage the condition, communication skills and perceptions regarding the illness and need for medication. Some characteristics have been extensively investigated to date, however there are elements which are poorly understood and require further scrutinisation.

This study revealed five main themes that describe the lived experience of medication-mediation: the personality of adherence; information versus knowledge; treatment versus beliefs; the human condition – the dichotomy between choice; and the paradox between conflicts presented by necessity of medication-taking in the illness process. Medication-taking is a dynamic experience, a mediation, affected by variations in the intensity and interaction of influences, as well as temporal and spatial affects, throughout the illness process; influences interact with differing intensities both between, and at different times for, individuals. A phenomenological approach illustrates that the interactional process is socially construed by the actors and that it is a life-long process; predisposing, or situationally contextual, factors play a moderating or modifying role in correlation with individual factors. The IndEx-MediC model was therefore designed not so much to detect arbitrary delineations between ‘adherency’ or ‘nonadherency’ but to indicate the capacity of influences, either positively affecting or encumbering medication-mediation. Medication-mediation domains related to the individual, identified from novel data, and pertain to include treatment regimen characteristics, beliefs and perceptions, knowledge, and personality factors, whilst factors in the external domain include access to the healthcare system and personnel.

It is clear that a unidimensional concept does not adequately explicate the complex variance in individual medication-taking; consequently, it can be concluded that unidirectional models are too simplistic to capture the attributional style, extent of beliefs, perceptions, and reasoning of the individual in conjunction with available external resources and the vicissitudes of additional confounding influences.

7.4.1 The IndEx-MediC model

On conclusion of attainment of factorial descriptors, the next aim was to construct the conceptual model, mapping the intervening predictive variables of medication-mediation in chronic illness conditions. Contextual contingencies, which are conditional on moderating effects of the individual, such as individual differences, may be categorised into two distinct paths: externally contextual variables and individual influences. The IndEx-MediC model considers the inter-relations between variables and subsumes the factors involved in the mediation process with medication. The hypothetical biphasic model, the IndEx-MediC, is shown in Figure 7.9.

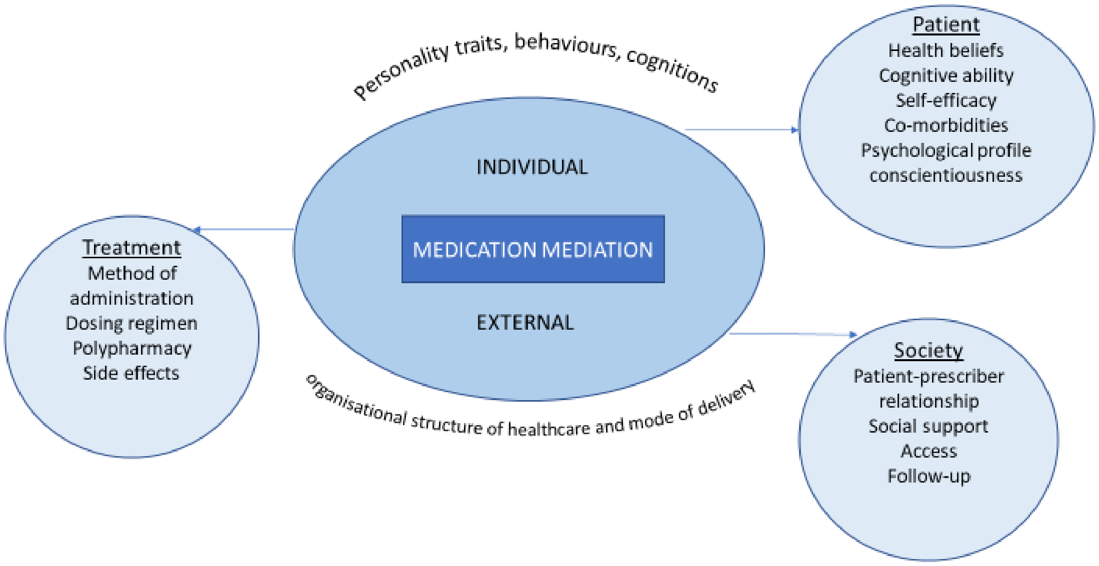


Figure 7.9 The IndEx-MediC model of medication mediation in chronic illness.

The preliminary moderators in the IndEx-MediC model are those effects categorised as relating to the individual. These incorporate beliefs, experiences and perceptions of the chronic illness condition and its treatment. Further influences relate to anticipated effects of the treatment regime, and outcome expectancies that motivate or repel an individual from positive medication-mediation; individuals foster beliefs, develop expectations, and reframe their identity. Optimal outcomes result in elevated quality of life, fewer illness exacerbations, and reduced chance of comorbidity; conversely, negative results could include side effects, complications, or becoming dependent on medication. Research has demonstrated a significant association between individual differences and medication-taking and the IndEx-MediC model illustrates the contextual influence that such differences may exert. The subsequent central moderator is represented by the situational context; the external environment, that is fundamentally distal to the control of the individual. This may, for instance, concern the health system or GP communication.

There are sections of commonality where factors intersect or are conditionally related. The adherence process is defined within the conceptual framework, described in Chapter 3, which was based on extant research and structured hierarchically; it was evident from this investigation, however, that influences are not statically positioned within this structure, rather that levels within the framework are dynamic and dependent upon mechanisms relevant to each individual. One singular, relatively insignificant factor may modify into a more germane influence depending on the interplay of other variables to which the individual is exposed.

There are essentially two features of adherence behaviour: individually motivated and externally situated. The individual component reflects all elements such as personality traits, behaviours and cognitions which construe to affect personal health outcomes; external factors feature facets such as the organisational structure of healthcare and mode of delivery. At the confluence of both are interactional influences which synergise mutual aspects, such as the patient/practitioner relationship and concomitant communication that entails. Extrapolating factors and situating them within a taxonomical structure not only enables identification of every respective factor but the level of influence of each factor on others (Raudenbush & Bryk, 2002). If responsible factors can be established and the differential effects for each individual determined it will be less problematic to devise appropriate interventions (Higashi, et al., 2013).

In addition to extant statistics this study collected novel data relating to the medication-taking process in chronic illness; this concerned the milieu in which individual health-seeking intentions to care are assimilated with environmental factors. It is apposite at this juncture to reiterate that this study is concerned with adults (excluding geriatrics) with chronic illness conditions other than psychiatric disorders, cancers, or HIV/Aids, constructed in a Western context. Essential and auxiliary categories relating to the broad concept of medication-mediation and factors which enable or preclude that behaviour, were developed. Medication-mediation is mutable over time and is therefore a continuum of behaviour which may not, in fact is unlikely to, be consistent over time. For instance, an individual may exhibit essential positive medication-mediation in their appreciation and inclination to take medication as prescribed but might encounter a barrier such as being unable to afford medication and therefore will become ‘nonadherent’ despite no intention to be. This will contrast with an individual who intentionally resolves not to take medication perhaps because of, for instance, the side effects caused, and although there are different rationalities at play in these two examples there is an equivalent corollary. Factors were extrapolated from the literature reviews, psychometric investigation and phenomenological investigation and synthesised to construct the framework. Codification was not merely a question of noting factors but, rather, formatting elements in an order reflective of their impact on each other. Extant literature is dominated by the impact of organisational, that is, health service structure and provision, however the influence of the individual's behaviour is paramount in terms of health outcomes.

7.5 Model summary

From the current research it has been demonstrated that medication-mediation is subject to mutability, resulting from the spectrum of influences; this may pertain to the timeline of illness, from inception and onward, with motives for occasional lapses in medication-taking differing essentially from persistent non-administration of pharmaceutical therapy. Observing medication-taking from the perspective of both linear and non-linear interactional influence (Imel, Baer, Martino, Ball, & Carroll, 2011), many factors intersect and associations between individual and external clusters of variables recurrently conflate. Medication-taking is influenced by assets, abilities and capacities of individuals, agencies and communities and is inextricably linked to personality factors; for instance, research into conscientiousness and its interaction with neuroticism (Roberts, et al., 2009) has developed the debate about the hierarchy of traits and whether specific traits influence specific health outcomes or whether it is the interaction with each other and additional factors that affects consequences. Certainly, predisposing factors have been explained by disease characteristics, for example depression and anxiety in psychological disorders, (Haynes, et al., 1979; DiMatteo 2004; Morrison & Wertheimer 2004; Siegel, Lopez & Meier, 2007).

Individual differences, such as self-efficacy, self-regulation and locus of control are significantly associated with adherence in chronic illness (e.g., Tobin, Wigal, Winder, Holroyd & Creer 1987; Ogedegbe, et al., 2003; Atkins & Fallowfield 2006). These factors take into consideration a patient's perception of their responsibility for health behaviour together with the ability to adhere to the therapeutic regime. Individuals try to balance between acceding to the knowledge that they have to manage their illness (although there may be knowledge deficits that the patient is unaware of) with the need to retain a sense of jurisdiction over their treatment (Affleck, Tennen, Pfeiffer & Fifield, 1987). Individuals who perceive their action determines situational outcomes are considered as exhibiting an internal locus of control whilst conversely, a person exhibiting an external locus of control may deem that a situation is out of their governance (Rotter, 1966); further dimensions dependent upon attributional style, such as stability and globality, affect the dichotomous conceptualisation of locus of control (Abramson, Seligman & Teasdale, 1978). Theorists have posited the idea that individuals may find it so frustrating not to be in control of their treatment that they experience coping-difficulties (Rothbaum, Weisz & Snyder, 1983; Dweck, 2013) and may exhibit maladaptive behaviour as a result (Burish, et al., 1984; Sharif, 2017); moreover, they may seek out situational domains over which they are still able to selectively exert control (Taylor, 1983; Tice, Bratslavsky, & Baumeister, 2018), mediation of medication represents one such area. Research has shown that individuals who perceive greater control over management of their treatment tend to have more positive mood and are better able to adjust psychosocially (Sarafino & Smith, 2014; Matthews, 1986); for example, diabetics who consider that their GP holds jurisdiction experienced poorer glucose control (White, Tata & Burns, 1996; Gherman, et al., 2011). Furthermore, the internalisation of continual failure in treatment self-management, leading to uncontrolled, unpredictable, and aversive events, may result in emotional, motivational, and cognitive deficits, known as learned helplessness (Lopez, Pedrotti & Snyder, 2018). This is especially pertinent in the case of chronic illness, where there is no eventual cure, rather emphasis centres on decelerating the progression of the disease and relief of symptoms from day to day; if, for instance, medication-mediation represents an individual's attempt to exert control, an asthmatic with pessimistic explanatory style faced with seemingly noncontingent exacerbations (e.g., Fischer, et al., 2018) may become discouraged and question the utility of treatment.

Highly resourceful individuals exploit behavioural and cognitive skills to self-regulate internal responses to maintain control (Rosenstock, et al., 1988) which may help yield positive outcomes, including the preservation of medication-mediation (Becker, 1979; George, Kong, Thoman &

Stewart, 2005). This is achieved by actively problem-solving, using cognitions to control emotions, self-regulating internal episodes and delaying immediate gratification. Beliefs, such as necessity and concern beliefs relating to treatment for instance, are valuable factors to know as they can be used to develop constructive interventions based on vicarious learning. In chronic illness, therapy is a long-term objective with a continual choice of adherence or nonadherence; this entails a paradox for the individual since the benefits of adherence are delayed, whilst nonadherent patients prefer a recompense that is more immediate (Reach, 2010). The force of our desire for a reward is exponentially higher the closer it is and conversely the ability to delay gratification. This psychological dimension has consequences for how patients consider their future and how intervention strategies are tailored.

Access to facilities is a fundamental factor in procuring healthcare. Economic issues such as income or health insurance (particularly in countries such as the United States where health care is not free) are significant predictors (Piette, Heisler & Wagner, 2004; Briesacher, Gurwitz & Soumerai, 2007). Such hindrances may be difficult to overcome as they require lifestyle modifications and invariably there is not much feasible assistance although the utility of changing treatment modality, for instance reducing polypharmacy, could be achieved. Furthermore, tangible support systems, such as reminders to to take medication or in other support capacities such as reminding the patient to collect prescriptions, could have utility in improving health outcomes. Chronic illness necessitates lifestyle adjustments, not only in terms of medication regimes but also conceivably diet and exercise activities; family and social support facilitate better observance of therapeutic regimes (e.g., Brook, et al., 2006; Simoni, Frick & Huang, 2006). Furthermore, treatment satisfaction is a significant predictor of medication-adherence (Albrecht & Hoogstraten 1998; Atkinson, Kumar, Capelleri, & Hass, 2005), since a contented patient is more likely to make lifestyle modifications to facilitate adherence. However, certain features of treatment, such as regimen complexity or side effects, judging that the medication is unnecessary or ineffective, feeling well enough in the absence of the medication, and concerns about long term effects, are all factors which tend to lead to less than optimal medication-taking. In fact, an individual’s health perceptions can have a significant effect on medication-taking through perceived need (Williams, Rodin, Ryan, Grolnick, & Deci, 1998; Nafradi, Nakamoto & Schulz, 2017). Satisfaction with health may counter-intuitively lead to nonadherence due to the perception that there is a lack of need for medication, particularly in individuals who have a poor perception of, but high concerns about, health (e.g., Hagger & Orbell, 2003; Ross, et al., 2004); patients appraise whether treatment is integrally consistent with their perceptions and illness beliefs, whether consciously or not, and decisions are influenced by evaluations relating to the therapeutic regime, such as symptom relief or illness severity.

This thesis was a mandate to critically investigate the influences of individual differences on medication-taking in chronic illness; this chapter detailed how one of the main aims, the development of a conceptual model, was accomplished. A novel model is of utility and acts as a guide to the researcher where no dominant theory exists (Imenda, 2014). The intellectual and practical synthesis of quantitative and qualitative data offered a powerful third paradigm choice, providing the optimum incarnation of informative, complete, balanced, and utilitarian research results. (Johnson, Onwuegbuzie, & Turner, 2007). The model represents the culmination of the integration of methods to offer a broader understanding of the phenomenon of medication adherence; the iterative process, driven by theory, extrapolated factors from the empirical research findings in the review data and were augmented by the lived exemplars from the principals in the phenomenological inquiry. The numerous factors take into consideration multiple viewpoints and perspectives and demonstrate the scope of the inquiry; the entire gamut of influences was synthesised and organised into a theoretically explanatory structure – the IndEx-MediC. Findings indicate the diversity of influences which the conceptual model has sought to present in a creative but rigorously structured framework, predicated on the observations resulting from this research. It was imperative to create a model of values and views about the topic (Smith, 2008) to facilitate our further understanding regarding medication adherence. Despite its parsimony the model is unique, due to the blend of components and consequently offers relative generalisablity. The development of the model achieved its intentions; the model represents not only a useful framework from which to clearly view the many variables, but also serves as a foundation for future research.

8 Development of the IndEx-MediR model

8 Development of the IndEx-MediR model

The IndE-MediC model was constructed as a result of the analysis of medication-taking experiences among individuals with chronic illnesses. Influencing factors were evaluated; positive effects were evidenced and synthesised with negative influences to create a complete representation of medication-mediation. During exploration of the data it was apparent that the respiratory conditions group were subject to diversities of experiences. Individuals with respiratory illness were therefore targeted for further inquiry and selected as a distinctive comparison from general chronic conditions from which to highlight corresponding influences and detect variances.

Respiratory illnesses represent one of the four most significant global chronic illnesses (WHO, 2003); conditions, such as COPD and asthma, are common conditions incurring substantial personal and economic cost, with increasing prevalence (WHO, 2003). Chronic respiratory conditions represent significant vexations in terms of social and economic burden together with diminishment in quality of life, due to unremitting challenges in symptom-prevention, exacerbation-control, maintenance of health and unplanned healthcare usage (Partridge, Dal Negro & Olivieri, 2011). COPD treatment may include long-acting bronchodilators for symptomatic management, whilst in asthma, inhaled corticosteroids are central. Impediments to therapy include fear of side effects, alteration in identity and perceptions relating both to illness and therapeutic intervention; additional factors include regimen complexity, polypharmacy, medication knowledge, locus of control and disease severity (Holgate, Price & Valovirta, 2006; Menckeberg, et al., 2007) together with aetiological factors, such as comorbid diagnoses which may result in additional treatment regimens and increased treatment burden. Asthma is characterised by inflammation, and obstruction, in the lower airways, often exacerbated by stress, in itself a cause of anxiety, and which may in turn trigger an asthma attack (Thoren & Petermann, 2000). Several causes have been ascribed to asthma, including genetic predisposition and epigenetic factors (Holloway, et al., 2010) together with an association of increased emotional sensitivity (Cole, Michel & Teti, 1994). Individuals with asthma may have a prevalence for an immediate need for gratification (Sharma & Nandkumar, 1980; Asaad, 2013) and impulsivity which have been associated with lower medication adherence (Axelsson, et al., 2009).

Adherence to medication among individuals with respiratory conditions is sub-optimal and has negative impacts, in terms of individualistic and economic costs both on the person and society. Patient adherence to self-management strategies is problematic, in terms of pharmaceutical therapy and also behavioural modifications, such as risk behaviours and the avoidance of aggravating factors (Nici, 2012); monitoring of the condition, therapeutic alterations and initiation of emergency action are additional features that need to be considered by the individual with a respiratory condition. The level of adherence may not only differ between individuals in general terms but also between the elements of the management strategy (Shirtcliffe, Marsh, Travers, Weatherall & Beasley, 2012), such as inhaler control. Errors in administration may occur unintentionally due to adverse, financial, social, or psychological factors, or as a possible correlation with flawed knowledge or practice; the influence of these variables may be subtle or insidiously adverse. Respiratory conditions require a complex and dynamic framework of care; pharmacotherapy, effective inhaler technique, monitoring, lifestyle moderation, education, and support. It is not surprising therefore that adherence to medication regimes is a particular challenge for individuals with respiratory conditions.

Despite frequent research into respiratory conditions there is sparse inquiry into the role of individual differences. Alexithymia, as a lack of expression, has been suggested as potentially significant in the aetiology of somatic illness conditions such as asthma (Taylor, 1984; Pollatos & Herbert, 2018), with individuals with alexithymia experiencing a higher incidence of near-fatal asthma (Serrano, et al., 2006). Personality factors commonly exhibited in individuals with respiratory conditions are anxiety (Goodwin, Jacobi & Thefeld, 2003), social introversion (Gauci, King, Saxarra, Tulloch & Husband, 1993; Cingi, Orhon & Eckler, 2020) and an inability to maintain emotional integrity (Ryden, Andersson, & Andersson, 2007), compared to the normal population. Previous studies into asthma have revealed that the most significant predictors of nonadherence were fear of, or perceived, side effects, low perceived necessity and high concern medication beliefs, and high illness perceptions (Horne & Weinman, 2002; Ulrik, et al., 2006). Self-efficacy is central as an enabling self-variable which could be utilised in adherence intervention strategies. Given the unique challenges faced by individuals with a respiratory illness the objective of this chapter is to develop a model to demonstrate the salient factors as expressed by individuals with such conditions.

8.1 The medication-mediation experience of individuals with respiratory conditions – the IndEx-MediR

The method of data assessment has been detailed in Chapter 6.1; details pertaining to respiratory conditions were extracted from the chronic conditions data to enable the development of the IndEx-MediR, (Individual/External Medication-mediation In Respiratory illness) model of medication-mediation. Phenomenological enquiry supported, and enhanced, the a priori quantitative analysis resulting from the literature reviews and psychometric testing; a constructive benefit of qualitative inquiry is that the topics emanate from the principals rather than being constrained by items fabricated on assumptions by the researcher. Interviews with principals ascertained factors which predicated optimal medication-mediation together with influences which impeded successful discharge of the treatment regimen. Motives and causes were analysed in order to develop the categories which concerned respiratory-related conditions.

Results suggest that there are fine distinctions between the two cohorts; whilst first order themes were ostensibly congruent nuanced experiences of medication-taking in long term illness were captured during phenomenological investigation. The difference of loci principally concerned the anxiety involved in coping with the daily routine of medication administration, which further indicates the utility of looking at personality traits, such as anxiety, neuroticism and hostility, as potential predictors or influencing factors. Figure 8.1 illustrates the extrapolated results in the IndEx-MediR model.

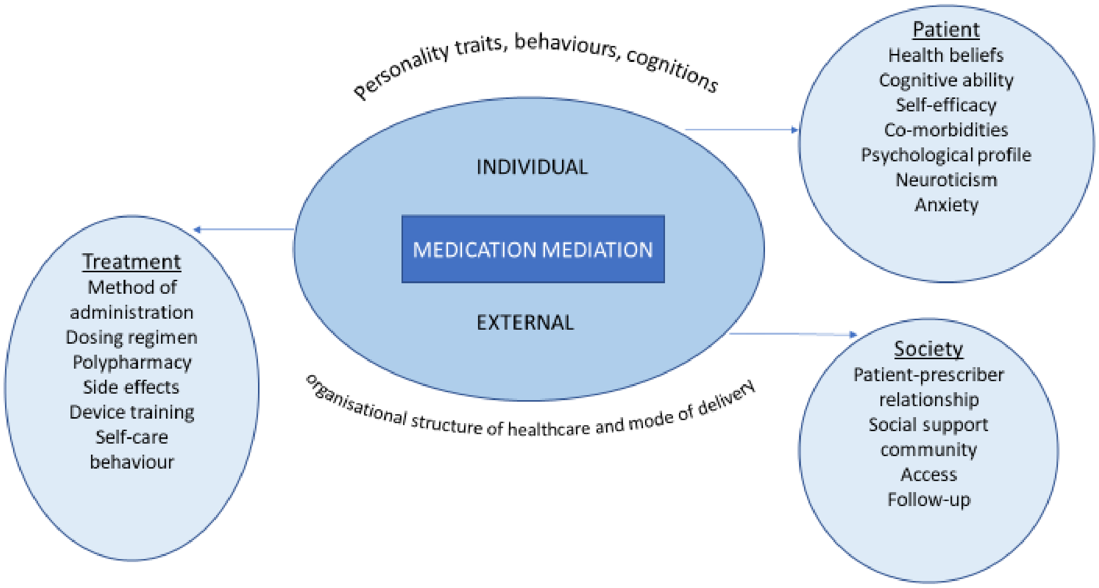


Figure 8.1 The IndEx-MediR model (the Individual/External Medication-mediation in Respiratory illness model).

A central theme disclosed by the principals was the concern of taking too much medication, including fears of addiction, or becoming dependent on medication, '*well, it doesn't do you any good to take too much does it*' (P31). The perception of beneficial effects of controller medication was identified as more influential than concerns regarding side effects but was not necessarily representative of principals' medication-use in real terms. Also noted was the apprehension that, not only may over-medication result in side effects, which are sometimes inconvenient or unpleasant, but also may potentially decrease efficacy of pharmacotherapy over time. Furthermore, there was an assumption that daily use would inexorably lead to dosage escalation to maintain efficacy; a conjecture further hindered by the bad reputation of inhaled corticosteroids, which was used as a justification for nonadherence. This may partially account for reduced adherence with the medication regime, as evidenced by results from the psychometric tests (see Chapter 6.4.1).

Principals who perceived their condition as not acutely serious reported taking less medication than was prescribed; they disparaged the significance of symptoms and consequently failed to take their medication as directed; '*they say that you take this to prevent like, but how do you know if it does?*'(P22). Furthermore, many principals did not consider that short-term episodic control is imperative for prevention of long-term sequelae; there appeared limited understanding of the preventative features of some medication which was often used in response to symptoms rather than on the maintenance basis as prescribed, and the abatement of symptoms often signaled discontinuation with treatment. In contrast, the importance of self-management to detect triggers was noted by those who had a deeper appreciation of their illness, accepted the need for use of medication as a preventer in asthma flare-up or exacerbations, and who were conversant in altering doses independently of the medical team in response to symptoms. On occasions, individuals were confident to alter doses, particularly prevalent in conditions where physiological outcomes may not be immediately noticeable. At times this was attributed to knowledge of both the illness condition and medication, particularly concerning preventer medication; it was a question of not seeing the necessity – if there were no symptoms it was felt that it was better not to overburden the body with '*unnecessary*' (P24) drugs. A contrast was noted between one participant's expression, '*my inhaler*' (P19), used to relieve breathlessness, in which possession is implicit in the phrase, something belonging to that person, in contrast to her preventer which was referred to as '*the …*', indicating a less immediate relationship with the infrequently used preventer medication.

There was a strong sense that the principals' identity was affected as a direct result of medication-taking, although the construction by the principals of the identifying features of medication-mediation were embodied almost as a separate entity, not a part of themselves but one which encroached into their lives out of necessity, '*it's the ultimate unwanted guest,* [described earlier as the '*uninvited guest'*] *but you can't get rid of* [it]' (P15). Notwithstanding that the condition remained distinct from themselves nonetheless pharmacological intervention impacted on daily lives, for example when '*not feeling yourself*' (P19), (Gamble, et al., 2007). Individuals whose views are incongruent with their peers or wider social constructs were more likely to experience difficulties in taking medication (Mann, Ponieman, Leventhal & Halm, 2009) suggesting that social beliefs are significant in constructing individual beliefs and practices. The medication is perceived to have an identity – a persona of its own; the individual symbolically conceptualises medication from a biochemical mechanism to a social entity (e.g., Molloy & Vasil, 2002; White, 2017).

Identity is constructed as integral to the social world, via interaction with protagonists such as HCPs over which the individual has little or no choice; identity is constructed by the relationship between the person, the illness, and the medication (Sharf & Vanderford, 2003). Communication is a key component to identity both orally and in additional modes, such as documentation, for example records and health literature. Seeking healthcare literature, either via the internet, friends, or support groups (Enriquez & McKinsey, 2011) was viewed as beneficial in order to establish that all relevant intelligence had been obtained, and absorbed, to give the best possible observation of the condition and treatment. Complex relationships emerge between the individual, their previous existence and the '*new life*' (P15) living with the condition, '*I'm a fit person living in a sick body that doesn't wanna know*' (P15). Difficulties in adjusting to the diagnosis and the evolution into the new identity were expressed, which sometimes prompted a sense of overwhelm; this, at times, occasioned a delay in accessing care and treatment. Changes in capacity are experienced resulting from the cyclical nature of adherence. Behaviour change is necessary to ensure that appointments are attended, knowledge about treatment and illness is obtained, initiating, and maintaining treatment, and observation of bodily signs and symptoms that treatment is efficacious.

GOLD guidelines advocate health education and HCP support as key components to optimise health (GOLDCOPD.org, 2009); a deficiency of, or inadequate, medication knowledge was reported to result in a lack of confidence and hesitancy in taking medication. Particularly prevalent were concerns regarding inappropriate inhaler technique, uncertainty as to whether the correct medication or dose was being taken, and whether prescribed medication was compatible with other therapies in the case of comorbidities; the mechanisms of medication were sometimes misunderstood. Patients who were conversant with their illness condition and were knowledgeable about their medications exhibited medication-taking corresponding to their prescription and benefitted from higher levels of confidence regarding their self-management. Conflicting information is associated with poorer outcomes (Elstad, Carpenter, Devellis &

Blalock, 2012), with patients resorting to trial and error in the absence of appropriate information. A good relationship between the HCP and patient is central to this and was viewed as so significant that it can impact (adversely or positively) the medication-taking process (Hojat, et al., 2011). A cause of tension occurs when the patient and their HCP are not in alignment, which regrettably is an all too often experience (Bryant, McDonald, Boyes, Sanson-Fisher, Paul & Melville, 2013).

The qualitative lens employed by this research has enabled the procurement of salient stakeholder responses, from which a model of medication-mediation was generated. Framing of medication-mediation within various contextualisations has, in part, enabled the present study's new perspectives. Classification of factors reflective of principals' beliefs fell essentially between two constituents; excursive factors which tended to have a digressive influence on adherence, and progressive factors which conversely inclined an individual to positive medication-mediation. Components of the IndEx-MediR model include:

- survival – physical and psychological,
- control – external and internal,
- identity in the social context,
- beliefs and the construction of medication.

Part of the construction of medication was its perceived connection with survival, '*you don't take it you die, simples*' (P22). There was a recognition that the medication in some cases is the reason for continued existence but that this was verbalised in almost a dismissive tone, '*yeah, well, keeps me alive!*' (P27). It was reflected that this was the motivation for taking medication, and accepted as such in most cases, whilst other individuals struggled with this necessity and found excuses to revise, or on occasion, dismiss instructions. Most principals, however, accepted the value of pharmacological intervention and glossed over its necessity to concentrate on the ways in which they managed the treatment regimen. This supports the argument that medication is taken due to its essential properties (Horne & Weinman, 1999; Horne, et al., 2005; Horne, et al., 2013) and that this evaluation outweighs the unfavourable features of medicine taking; however, the continual assessment is an integral component to the medication-taking process, which is relentlessly appraised throughout the duration of the chronic condition; appraisal is informed by beliefs, attitudes, and preferences. No participant conceived that their condition was terminal, as opposed to chronic, however, on occasion there was a sense of the futility of treatment, the never-endingness, particularly when the condition was asymptomatic, that is, until physical symptoms developed and grew so injurious that compelled clinical treatment. At this point some principals experienced decreased motivation, '*it's depressing in't, to think you've got be on tablets all your life*' (P18), and medication was sporadically discontinued when symptoms alleviated, particularly in individuals with asthmatic conditions.

It might be expected that necessity beliefs have an inverse association with transience or discontinuation of medication, however it is similarly conceivable that the effect of necessity beliefs is counteracted by multiple medication-taking in polypharmacy. In such cases higher medication-concern may outweigh necessity beliefs. Previous studies have shown an unexpected negative correlation between adherence and higher perceived illness consequences (Horne & Weinman, 2002). An individual's motivation, perception and support regarding health care behaviour determines self-regulation which is correlated with adherence (Kanfer, 1986; Dobber, et al., 2018). By the same token, however, individuals with high levels of self-regulation may be more inclined to control their health behaviour by consciously electing to be selective in their medication-taking in an effort to directly influence their therapy. Counterintuitively, individuals who have higher levels of motivation and involvement with their treatment have lower adherence which arguably may relate to a '*continuous internal negotiation process to accept the potentially lifelong demands of the disease*' (Schneider, Wensing, Quinzler, Bieber, & Szecsenyi, 2007, p.57).

A further affect on medication-taking is the attitude of others, grounded in the assumption that significance given to the opinions of valued associates is proportionate to the level of medication-taking, and may therefore be a constructive or adverse impact. Equally influential is the perceived attitude of others; some principals with asthma perceived a negative attitude to maintenance medications, thus increasing the likelihood of withdrawal, temporary or extended, from medication-taking, '*I don't* [take medication] *when I'm out because I think no-one wants to see that*' (P17); to improve this perception relating to social desirability (Atkins & Fallowfield

2006) an intervention directed at modifying both lifestyle and beliefs is required. A central influence on the management of medication is the patients' beliefs about their illness and medication (Horne, et al., 2005; Lehane & McCarthy, 2007), which may be more influential even than recommendations of HCPs (Horne, et al., 2005). An exploration of beliefs, however, only accounts for the dimension of intention, it cannot address unintentional nonadherence such as forgetfulness, or unintended lapses. Contingent on psychosocial contexts, beliefs may be variable, ambiguous, and paradoxical; patients take medication whilst concurrently developing strategies to diminish consumption (Pound, et al., 2005). In a study of anti-depressant use Malpass, et al., (2009) identified a process through which individuals psychologically evaluate principles and decision-making in pharmacotherapy, combining two major research traditions in adherence medication; one affect relates to clinical science relating to treatment, whilst social-ethnography correlates with social identity, and incorporates authentication of stigma and the sick-role.

The erosion of motivation was correlated temporally; a chronic condition such as asthma requires therapeutic maintenance throughout the lifespan, and one corollary is that management has a propensity to become tedious and monotonous '*you get so sick and tired of having to remember to take your *** meds. I'm not gonna lie, sometimes it gets you down*' (P31); simply the life-long commitment to medication-taking, contributed to treatment fatigue. However, a positive attitude led to proactivity which was invaluable as a facilitator for self-management, engendering a sense of initiative-taking in obtaining requisite information and resources. Establishing a routine was one component which aided a positive attitude due to a sense of achievement; daily habits mitigated the effects of forgetfulness in medication-taking.

Despite the availability of medication some patients preferred a nonpharmacological approach for illness-management, '*more farmer, not pharma*' (P25), suggesting the use of alternative medicine, and the reticence in taking prescribed medication representing a barrier to adherence. Furthermore, a preference was expressed for alternative remedies, such as breathing techniques or restriction of physical activity, and thereby reducing perceived need, as a strategy to mitigate nonadherence. In addition to intentional assessments whether to take medication as prescribed, principals also mentioned practical impediments they had encountered; inconvenience revolved around several factors such as the dosage, for instance if medication was required more than once a day this increased the likelihood of nonadherence, not just from a numerical perspective but also since it becomes more burdensome to the individual. As the number of medications increases the predisposing factor of concerns of long-term effects increases. Additionally, onerous are uncomfortable medications or techniques that require further action such as brushing teeth after use of asthma spacers; spacers are devices which create a chamber between the medication canister and the mouth to enable correct drug delivery, '*seriously, who can be arsed?!*' (P24). Adherence was therefore facilitated when a principal perceived medication to be easy and rapid. The organisation of treatment is central to the medication-taking process; certain aspects, such as the complexity of the regime, inconvenience, or prescription restrictions (such as the necessity of ingesting with food, or at a specific time), transportation and advance planning, (for instance taking sufficient medication on holiday and planning for an emergency whilst away). The continuous preparation represents a nuisance and an interference with daily routines or work.

A further barrier identified was economic constraint which was an issue with some of the principals, however many received medication on prescription (i.e., without charge), in contrast to the chronic conditions group. Some principals expressed that without this assistance they would not be able to support the medication regime. However, this also led to the wastage of a substantial amount of medication with prescriptions being filled but not utilised as principals knew that there was a continual source. '*Yeah I do, sometimes you know, get the prescription but just put it in the cupboard. It's like a pharmacy in there*' (P21); intentions are not necessarily reflective of utility. Patients frequently require supplementary treatment as a corollary of partial or incomplete adherence to prophylactic medication resulting in exacerbations. Nides (1993) assessed that 15% of patients dumped their nebuliser medication prior to a GP visit to indicate that their device was empty and therefore used as directed. Undetected noncompliance is problematic for a prescribing practitioner who may not be aware of the reason for the clinical problem and may prescribe increase dosage, a change in medication or adjoin a supplementary treatment.

The type and content of interaction with the HCP is pivotal. Language limitations are not just linguistic in nature but also pertain to jargonistic parlance relating to both the condition and medication, and in which the principals are not fluent; the lack of clear understanding is problematic in terms of medication-mediation. Furthermore, communication has an affect on health literacy (Heijmans, Waverijn, Rademakers, van der Vaart, & Rijken, 2014) and an imbalance between the protagonist and the HCP could be a negative influence on health literacy (Easton, Entwistle, & Williams, 2010), which impacts on the principal's ability to self-manage the condition; '*sometimes they say oh it's da de da, I haven't got a clue what they're talking about so I just nod my head*' (P28). Increasing health literacy and self-awareness (Nutbeam, 2000), empowering individuals to think critically and manage their condition and their existence (Anderson & Funnell, 2010), enables HCPs to advocate and concede decision-making autonomy to their patients. Patient advocacy positively influences self-care behaviours, self-efficacy, and health outcomes (Chen, Wang, Lin, Hsu & Chen, 2015).

On occasion, principals felt a lack of elucidation concerning the illness together with clarification regarding medication, '*if you was ask me what it was, I wouldn't be able to say. I knows what I can't do so that's it affecting me*' (P17). Any deficiency in instruction is liable to lead to problematic medication-mediation, in contrast to principals who felt that they had received an adequate education (in terms of illness and therapy) and consequently considered themselves better-equipped to manage their asthmatic condition. Furthermore, distrust of a clear diagnosis leads to nonadherence since the condition is misunderstood and medication is not necessarily felt to be ineludible. Moreover, lack of reported disease-severity also led principals to doubt the necessity of therapeutic intervention, for these individuals it was imperative to receive a formal objective assessment (for example, respiratory function test) to increase likelihood of medication-mediation. Repeated function tests enable patients to detect fluctuations in results, which not only enables the monitoring of changes and increases the prospects of understanding, but also aids in ascertaining the impact of therapy on the illness condition; '*I think that's handy you know, 'cos you get to know how things are doing and you can … match that with what you body's telling you*' (P17). A further impediment was lack of a structured follow up; '*after a while you're just left to your own devices, it's considered that you know everything just because you've had the condition for a while*' (P18). There was a reticence to take a long-term medication, associated with side effects, without supervisory consultations which enhanced adherence intentions.

There are few patients who do not need descriptive explanations in lay terms for a full understanding of the condition, its concomitant medication and modifying information; intelligence appropriate to the individual is essential. As one principal explained, '*yeah sure, you can read the leaflets and that but what the hell does that, any of that mean? You end up feeling like you got everything what it says. No, don't read them – you'll end up with more disease that you've got!*' (P30). Principals were generally willing to trial a variety of medications; there was a sense that it was unrealistic for a prescribed medication to be efficacious immediately without some amendments being needed, and a prosaic attitude pervaded, '*it's a bit trial and error I suppose, but we're all different aren't we and nobody's going to know exactly what you need as opposed to someone else*' (P22). A change in modality or drug-type could lead to improvements in effectiveness and result in an additional incentive to adhere.

A poor relationship resulting from antipathy for the practitioner, or their attitude, or sense that they are inattentive to the principal's condition, history or needs, leads to a less than optimal treatment decision. Sometimes principals felt that, due to time constraints, they were lent insufficient time and they felt that they were unable to say all that they had wanted, '*it's a bit like a conveyor belt – you have your time and then it's tough if you haven't got done*' (P31). They felt that under these circumstances the HCP could not be aware of all the facts necessary to determine a full diagnosis/medication audit. There was a less than flattering view of ethnically different HCPs (or those perceived as such) than the principal, due to language barriers or perceived lack of training, or interest '*they don't even look at you. They're not bothered*' (P28). There was, however, a general reluctance to express these concerns and principals were certainly disinclined of doing so to their clinicians or outside the safety of friends and family.

When disagreements occurred between the patient and HCP this generally resulted in medication hesitancy, '*if I don't agree with it I just don't take it, but I won't tell* [consultant], *no, they don't need to know*' (P22); concerns may be dissipated through communication but principals were generally reluctant to disagree or negotiate with their HCP, particularly at consultant level, those who felt they were in a partnership felt more able to challenge, with positive results. Their perceived empowerment led them to discuss frequency or modalities more openly with the HCPs, '*yeah, I'll say should I be doing this or whatever and he'll be like oh ok, let's try this. It's good, it makes it easier you know*' (P17). When it was felt that there was an exchange, a self-management strategy was easier to create, initiate and maintain.

Expressions of empathy, sufficient time for in depth explanations, enabling the patient not to feel rushed in consultations, allowing the expression of concerns and encouraging adherence were critical in the acceptance of medication and led to good relationships. This fostered a positive relationship with medication-mediation, particularly in those patients most hesitant in medication use. Patient/HCP interactions represent established societal approaches to pharmacology, however different meanings are construed by each party which could lead to misunderstanding and confusion. Furthermore, there is inconsistency of opinion and application even within divisions of clinical practice, '*you go to one and they one thing and then you see someone else and they say something completely different. What are you supposed to do?*' (P31); this variance and unpredictability is obstructive (Rathbone, et al., 2016).

A beneficial relationship fosters support in terms of self-management. A patient-centred approach was considered essential; difficulties arose when medication was perceived to be prescribed without empathy or the sense of patient incorporation and when the strategy appeared not to take into account the perspective of the principal. A feeling that pills were '*just being shoved into*' (P24) the principal does not foster a commitment towards therapy. Discordant or contradictory communications by different HCPs within the clinical team leads to the individual proceeding as to their own inclinations, perhaps by following guidelines on social media which may not be accurate. Principals rarely checked where the information came from, even which country it related to; '*never thought to check – I never knew there would be different places, I thought what you saw was how it is*' (P20). Patients with little social support may look to the HCPs for encouragement and good communication; that empathy and respect are established and maintained is particularly important for these individuals. This also has the benefit of helping to engage the patient about aetiology, understanding and managing their condition.

The ability to self-manage is, in part, dependent on the health care system in terms of resources, services, availability and accessibility. Limited or overloaded personnel, insufficient resources, resulting in restricted access to HCPs and long waiting lists were construed as impediments resulting in reduced supervision and inadequate respiratory education and treatment guidance. At times, there was a reluctance to consult the service, leading to reduced adherence to recommended therapy. Consulting the HCPs, however, invariably led to reassurance and renewed positivity about medication. An action plan whereby symptoms could be monitored was considered a useful support, particularly when information was recorded and could be referred to at leisure, and subsequently discussed with interested friends or family supporting the individual.

More prosaic factors were noted, such as difficulties in prescription renewal, inconvenience in terms of remembering to take treatment and imposition on daily schedules. A corollary of limited medication and illness knowledge is that an individual will be more prone to overlook integrating the regime into their daily living routine, thus increasing the likelihood of forgetting to take medication. Principals generally felt that a reminder system was essential in order that medications were not unnecessarily forgotten, and a variety of systems were employed, such as diary entries, phone reminder alerts or '*leaving the stuff* [medication] *out on the counter all the time so's I don't forget*' (P31). Some burden related to the financial encumbrance of medication; many principals did not receive NHS assisted prescriptions and sometimes '*you have to decide – do you want food on the table or do you want to feel a bit better*?' (P19). Support with costs assisted medication-taking. Further challenges were noted, such as navigating the health care system, in terms of both the personnel and the infrastructure; negative experiences with HCPs increase the perception of illness burden, together with negotiating differing clinicians and multiple sites, organising transport, and dealing with paperwork, '*you gotta know how to get round things so you get what you want. If I need an appointment you gotta know what to say to get one. They can save their money somewhere else*' (P25).

Belief issues such as the necessity of medication may lead to the suspension of therapy to assess its utility. Individuals with higher perceptions about their health status were less adherent. potentially due to a low perceived need for medication and a higher sense of being capable of self-management. As well as formation of the individuals' illness-identity there may be potential areas of conflict between preconceptions and reality due to societal construction of pharmacology practices, sociological perspectives, influences of cultures or social norms.

8.2 Summary discussion

The current thesis investigated adherence to pharmacological therapy in chronic illness using data collected by means of a mixed methods approach. There were four phases in the development of data collection: quantitative data resulting from two literature reviews; data arising from psychometric testing assessing personality and adherence; and finally, the incorporation of phenomenological analysis to expound results. This process was selected to supplement what is currently known with the integration of novel data to achieve a comprehensive database from which to construct the conceptual adherence models. Medication-taking in chronic illness was assessed and from findings it was possible to deliver unique models depicting significant influences, the IndEx-MediC, concerning chronic illness, and the IndEx-MediR, focussing on respiratory conditions. These models represent potentially useful podia from which to design theory-based interventions or the development of a predictive tool for patients at risk of deviating from a medication regime.

This study investigated the experience of living with a chronic respiratory illness, empirically assessing medication-taking and individual characteristics of principals. The findings of the primary research and indices from extant research were translated into explanatory metaphors which were then compared and contrasted with appraisal of similarities and differences noted between the characterisation trends depicted, and further hypothesised in relation to the nature of associations and inter-relations. A complex, personal, and idiosyncratic experience, determinants of medication-mediation depend on a range of individual differences including knowledge, attitudes, self-efficacy, capabilities/skills, and the individual's subjective perception of behavioural norms (Michie, et al., 2014).

Concepts were generated from the theoretical themes which underpinned the models; data were grounded in behavioural theory and evidenced in empirical findings. Itemisation of the determinants, developed from the synthesis of primary research findings were refined and combined for relevancy, consolidating, and clarifying what is known about the experience of medication-mediation in chronic illness. The models challenge the assumption of many previous examples that ‘adherence’ lies on a single, linear trajectory and accedes that the complexity, and plasticity, of factors forms a fluid process; individuals with a long-term condition may manifest behaviours that appear paradoxical, misguided, or detrimental to a spectator. It is simplistic and injuriously inaccurate to depict an individual as adherent versus nonadherent, since for most individuals behaviour represents a sequential cycle of micro-decisions affecting medication-mediation, balancing multiple treatment influences against nonclinical factors. A theoretical framework is obliged to respect the irrationality of human motivation and eschew the exigence of predicting health behaviours in isolation; rather, integrative factions within an individual’s decision-making illness process that is not necessarily grounded on deliberate, systematic management of information must be considered. The current investigation reviews and synthesises similarities and differences, patterns and themes identified in extant research and primary data to generate a novel theoretical presentation of data analyses, the IndEx-MediC and IndEx-MediR models.

This study identified certain factors, such as concerns relating to polypharmacy, apparently universal across chronic illness conditions, and highlighted influences specific to or exacerbated in, respiratory conditions, such as asthma or COPD. Previous research tends to concentrate on a single variable of adherence, rarely correlating factors. Furthermore, distinctions are made between the nature of medication-taking, acceding delineations between intentional or unintentional (whilst accepting the utility of nomenclatures in terms of ease of classification), and that one is not necessarily the antipathy of the other but is, rather, driven by the complex and erratic interactions between the many and diverse correlational influences; acknowledging rationales behind unwitting or, conversely, intelligent nonadherence enables enhanced and precise identification of medication-mediation domains. Purposeful, conscious decisions regarding medication-taking behaviour, such as the pros and cons were resolved by some principals manipulating their treatment regime; for others pharmacotherapy was not given precedence, resulting in running out of prescriptions or erratic and irregular administration. This research has not assumed a binary intentional/unintentional classification; the various and correlational factors are explored from the perspective that nonadherence tends to be capricious in order to develop a more robust predictive model. Simplifying adherence into intentional and unintentional may not be the most efficacious way to manage medication-mediation and classification based on the domains construed in the taxonomical framework (Chapter 4) might be more effective.

The IndEx-MediC and IndEx-MediR models illustrate the dialectical, plastic, and intertemporal complexity that characterises medication-taking in chronic illness. The main dimensions resulting from quantitative, psychometric, and phenomenological analyses are reported in the novel conceptual models; aspects are framed within biopsychosocial situational contexts and re-conceptualise the individuation of both the illness process and the treatment response. A linearly organised diagram is convenient for ease of demonstration however a less ambiguous representation of medication-mediation depicts a fluid delineation of intersecting and correlating variables, as nebulous and imprecise as they are dynamic. The conceptualised perspectives reflect the irregular trajectory of the treatment process; indicating that medication-mediation is not a static entity but temporally, situationally and liminally contextual. The models represent health behaviour that is driven by cognitive reflections regarding illness and treatment and influenced by psychosocial affects, including individual differences indicating that we should be heading towards collaborative therapy rather than notions of ‘adherent’ or ‘compliant’.
The study showed a variance in factors between and across illness conditions, and similarly in relevance. Additionally, co-morbidities are relatively common necessitating concurrently prescribed medication for each condition, with differing levels of medication-taking; furthermore, influences may contrast between single conditions and other illnesses. A contemporaneous influence, such as anxiety in asthma, may become a condition in its own right; this is an illustration highlighting the import of considering individual difference affects.

A greater burden is experienced in the management of chronic conditions than in acute medicine due to the necessity for constant administration of pharmaceutical therapy; mediation is problematic even with medication that has well-documented benefits. Ambiguity surrounding medication-taking influences has been exacerbated by a lack of integrative instruments to assess and measure ‘adherence’ constructs in chronic conditions. Taking medication appropriately is correlated with positive outcomes and disease control however ‘nonadherence’ to medication regimens represents a major impediment to treatment success and furthermore, reports of patients’ difficulties are common. Reasons vary but include demographic-related variables as well as disease- and medication-related factors, daily life demands and treatment burden, disease management, perceived consequences, lifestyle compromise and disease-specific aetiological features. Interventions have had modest or contradictory effects leading to the conclusion that the optimum intervention has yet to be devised (Vermeire, et al., 2005) – a view which has yet to be repudiated despite a decade of subsequent research. An holistic insight into the extensive entirety of factors, conceptualised into a schematic representation, such as the IndEx-MediC and IndEx-MediR, has the potential to enhance our understanding for future research and the application of intervention in adherence.

Two conceptual models, representing a novel approach to understanding medication-taking practices, were outlined from which future investigations may build. As with any novel research results should be cautiously interpreted; outcomes of the study should be considered in light of some prospective limitations. The sample size for the phenomenological component was small, consistent with the conventional characteristics of qualitative research, however further data was extracted from extant quantitative studies to incorporate as much data as feasible; furthermore, the qualitative method does allow for a nonprescriptive approach. Interviews revealed the indicators, and levels, of medication-taking from the principal’s perspective and reflected the notion of the illness experience however, selected sentiments may result from a biased or irrational basis and, despite all efforts made in interviews to accommodate a relaxed and non-judgemental atmosphere, the potential of social desirability bias should also be considered.

Further research should seek to confirm findings in order to better appreciate our understanding of medication-mediation. The models are conceptual and the descriptives therefore need to be tested for validity and reliability, particularly in relation to initial attributions and their subsequent development over the course of the illness and influencing factors. Future studies might wish to consider a longitudinal perspective, to assess the chronological impact of adherence. Validation is required to ascertain the strength of relationships and correlations dependent on circumstance. The exclusion criteria were designed to hone variables, nonetheless an expanded search is bound to highlight additional factors/priorities, though at the risk of attenuating results. Conclusions may not therefore be generalisable in other populations, such as diverse ethnocultural cohorts. Additionally, supplementary research can be undertaken in further illness conditions to validate causality. Further studies could capitalise on the findings of this research as a subjective measurement which can stratify individual factors more proficiently than at present; consolidated results may allow for the development of a clinical predictive tool for those at risk of inadequate medication-mediation to assist in the design of effective interventions to improve self-management of chronic illness and reduce treatment burden.

9 Concluding remarks

9 Concluding remarks

This thesis aimed to distinguish factors, and their mediating and mitigating influences on medication-mediation in chronic illness, with particular regard to the correlations and impact of personality variables. A new taxonomical framework was generated and two novel conceptual models (the IndEx-MediC, for chronic illness conditions and the IndEx-MediR, pertaining to respiratory conditions) were developed from which to base further research and strategise interventional approaches. Classification was driven by both extant statistical data and original phenomenological enquiry into individuals' experiential narratives of adherence to pharmaceutical therapy in chronic illness, raising the significance of many and varied moderating influences. A new descriptive nomenclature, 'medication-mediation' was also introduced, reflecting the non-binary evaluative nature of the concept. Interpretation of the findings of this research strongly suggest that there is no panacea, rather bespoke solutions congruous with an individual's particular contextual and experiential influences are key.

Pharmaceutical intervention is currently the single-most effective strategy in ameliorating symptoms in chronic illness, however, estimates of adherence to medication are variable in extant literature, ranging from 25 to 90% (Yoong, et al., 2013), blamed partly on inconsistent methods of measurement but typically on an individual's decision-making. Poor adherence to a medication regime correlates with negative consequences, such as increased diagnoses and therapeutic prescription error, amplified clinical expense, morbidity, and mortality; furthermore, poor adherence compromises treatment effectiveness. The extent of these disadvantages accentuates the gravity and significance of interventional strategies. The adherence dialogue, though, is changing: contemporary understandings have advanced from traditional definitions of conformity, compliance, or obedience to pharmaceutical recommendations of a healthcare provider. Medication-mediation is recognised as a complex phenomenon, influenced by diverse and differing factors; a continually evolving individualised process. The WHO (2003) established variables in social and economic classifications; patient, condition and therapy-related and, additionally, affiliated with the healthcare team and system; Meghani and Bruner (2013) cite that the most common reason for cessation of analgesic medication is symptom alleviation. Nonetheless, despite the substantial corpus of literature on the topic there is currently a lack of evidence between associative factors, with no definitive consensus concerning the controlling variables; furthermore, a greatly under-researched area is that of the affect of individual differences - which is remarkable since the main determinants of adherence relate to the individual's behaviour. Indeed, '*understanding … individual differences in disease may often be of equal or greater importance than is understanding the general causes of disease*' (Friedman, 2008, p.1).

Understanding of the role of individual differences has developed appreciably since the rudimentary focus as a psychosomatic antecedent in coronary-prone behaviour; contemporary research has provided insights into the nature of individual differences and health behaviour and significant associations have been constructed. This thesis provides further insight that the illness and medication-taking processes are complex phenomena, not temporally static and, together with situationally contexts, are responsive to cognitive styles, coping and motivational attitudes, further associated with physiological reactivity and homeostasis. This is useful since traditional models of adherence-factors rarely assay individual differences and are, in any case, scant. It may be, in fact, unreasonable to assume that it is even possible to capture and code the range of behaviourally causal analogues that must also be integrated within such a model.

Clinical care is predominantly equipped to treat acute conditions (Friedman, 2008) rather than chronic manifestations of illness; similarly, research tends to focus on treatment and secondary prevention (ameliorating measures, such as interventions to reduce high blood pressure, rather than primary prevention of the condition itself), eschewing longitudinal studies, generally for reasons of practicality, feasibility, or cost. Whilst a general picture can be obtained, potentially more complex causal links may be under-explored or in the extreme case, neglected. Adherence is often organised in terms of illness condition; this may result from funding for a particular disease or researchers who are experts in their particular field however, whilst this may benefit the advancement in understanding of single measures of health it fails to capture wider epidemiological constituents. It is naïve not to recognise the multiplicity, multidimensionality, and complexity of causal links simultaneously responsible for variations in health behaviour. Not surprisingly, this pushes us to the limits of research design, analysis, and model construction. The health belief model (Bandura & Simon, 1977) for instance, considers the causal role of personality in terms of unhealthy behaviours such as poor diet and its association with disease progression. As stated, singular designs in isolation should be considered with caution since the underlying biological model takes account of additional mediators, including genetic endowment and experiential stressors, which shape health behaviour, such as adherence. Traditional studies tend not to be concerned with multivariate assessment of predictors; furthermore, complex demographic factors are at risk of being controlled away and, therefore, inclusion of the psychophysiological model implicitly places adherence behaviour in a wider context and considers the development of individual differences (for instance, the affects of stress and coping on metabolism and the cardiovascular system) across time.

An exemplar of the development of personality studies in health behaviour and the importance of considering multivariate factors concerns neuroticism. In 1987, depression was linked to cardiovascular disease, in addition to hostility and anxiety, (Booth-Kewley & Friedman, 1987); this finding was viewed sceptically at the time as it flouted conventional wisdom concerning type A behaviour. The general association has since been supported in further studies (e.g., Suls & Bunde, 2005), and demonstrates that, in a broad frame, depression is a direct causal risk factor. Clinicians who consequently treated depression in an attempt to prevent development or exacerbation of the heart disease were disappointed to learn that this was unsuccessful in the reduction of secondary attacks or mortality (Berkman, et al., 2003); the answer however, rested with the assumption that depression was a medical risk factor external to the complex matrix of extraneous correlates, such as situational context. Whilst the likelihood of the experience, and interpretation, of negative events is increased in neurotic individuals two distinctive characterisations of life-paths have been associated with the trait; the first concerns pessimistic, resentful individuals who receive a lack of social support and for whom homeostasis is disrupted, increasing the risk of poor health. The alternative is characterised by neurotic vigilance, self-reports of psychological distress and adherence to treatment which increases the benefit of better health. Furthermore, there has been evidence that depression and cardiovascular disease result from a genetic vulnerability (McCaffery, et al., 2006), conclusively surmising that an intervention for one and not the other may fail to produce expected results. Conscientiousness has similarly been associated with reduced risk of illness such as tuberculosis and hypertension (Goodwin & Friedman, 2006) and an extension in the time to renal failure in diabetes (Brickman, Yount, Blaney, Rothberg & De-Nour, 1996), whilst low conscientiousness increases mortality rate (Christensen, et al., 2002). Conscientiousness-related traits appear to be negatively correlated with risky health-related behaviours and positively associated with beneficial behaviour (Bogg & Roberts, 2004).

Main findings and their context with existing literature

Lutfey and Wishner (1999) maintained that '*beyond compliance is adherence*'; this thesis addresses what lies beyond adherence. The aim of the thesis was to explore influential factors in medication-taking in chronic illness in order to develop a conceptual model of adherence; however, initial investigations evidenced that there is no definitive taxonomy of adherence influences; therefore, in the first instance a novel taxonomical framework was generated to redress this. The research was driven by a full exploration of the current state of play: databases were systematically reviewed, from inception of publication, for existing references to adherence to prescription medication-taking; a meta-analysis focussed on personality factors in chronic illness conditions; and further qualitative examination identified that there is a lack of evaluation concerned with personality factors, despite the evidence indicating that there is an urgent exigency to do so. Existing models are heterogeneous and generally concern singular factors engendering fidelity difficulties. Nonetheless, there is a clear implication of the value of individual differences within the area of adherence, supporting the premise that personality could be a useful component of predictive compliance tools; furthermore, interventions predicated on individual differences could augment efficacy in achieving reductions in nonadherence. The current research encountered novel phrases conceptualising experiential medication-mediation generated by qualitative inquiry; these reflected the illness and treatment processes and provide consequential insight into the topic.

The methodological approach

Peters and Kok (2016, p.266) contest that '*theories are reductions of reality, and one theory will never explain all aspects of a real-life problem'*, and argue that whilst all models are *wrong*, useful elements are contained within. Analytical research is challenging, and it is critical to adopt an appropriate method. Johnson and Johnson (2016), support the argument presented in this thesis that all clinical practice is behavioural and therefore by its nature, inexorably inconsistent and illogical (e.g., Björkman, Simrén, Ringström & Jakobsson Ung, 2016); indeed, various strategies have incorporated behavioural theories to inform scientific investigation (e.g., Fisher & Fisher, 1992; French, et al., 2012). It has been argued that approaches which lack a strong empirical base (Brug, Oenema & Ferreira, 2005) and applied outside the context for which they were designed (Munro, et al., 2007), systemise behaviour, neglecting individualistic variability diminishing the value of differences (Ogden, 2016), ultimately limiting their scope. The approach employed in this thesis allowed for the pragmatic application of key components from those predominantly apposite theories and thus the parameters employed prevented misapplication out-with their intended scope. This strategy enabled evidence about the influences to be gathered from existing knowledge and applied in conjunction with findings from original research.

The mixed methods approach adopted for this project enabled detection and evaluation of adherence as a complex behavioural phenomenon. Quantitative reports of adherence generated from literature reviews provided a foundation for patient narratives in which lived experiences were explicated and accounts of medication-management behaviours and decision-making were detailed. Consideration of merely quantitative data may well have precluded the salient and crucial subjective contributory factors illustrated by individuals' experiential accounts. Statistical data were retrieved from the literature reviews and further data derived from in depth semi-structured interviews with thirty individuals with chronic illness; half the population experienced a chronic illness whilst the remainder were diagnosed with respiratory conditions. Approximately 50 hours of phenomenological data were retrieved, audio-recorded, transcribed and thematically analysed. Principals contributed wide-ranging insights into management of their illness with particular focus on medication-taking, and the influences which facilitated or prevented mediation with a medication regime. Quantitative data were analysed, and synthesised supported extant knowledge predicated on pre-existing measurements, concentrating on routine or forgetfulness, and rarely from a qualitative perspective. Qualitative research was conducted using a flexible semi-structured method to enable the topic to be covered whilst addressing additional themes important to the principals. Findings were characteristically rich in nature and were formed from the individual's focus themselves. Data-evaluation enabled the development of a taxonomical framework and two original models exploring medication-taking in chronic illness: a generic model pertaining to chronic conditions and an additional model honing-in on respiratory conditions.

Original taxonomy and conceptual models of medication-taking

Data-collection from this research predicated the emergence of new insights which were synergised with extant data. Findings suggest that external and individually based factors principally influence medication-taking; it is temporally and situationally plastic. Whilst this may be insinuated in previous literature the challenges of large-scale investigation have resulted in this aspect largely being eschewed. Investigation for this thesis found that intention is affected by motivation, beliefs, and practical concerns as well as personality. A personality trait is '*a generalized and focalized neuropsychic system (peculiar to the individual), with the capacity to render many stimuli functionally equivalent, and to initiate and guide constant (equivalent) forms of adaptive and expressive behaviour',* (Allport, 1961: p386). Personality variables are accountable in terms of health not only in the aetiology and progression of the disorder but also by leading indirectly to organic disease as a result of the promotion of unhealthy behaviours such as smoking, substance abuse or poor nutrition, exacerbating the condition. Furthermore, personality factors may also influence the psychosocial responses, adaption to and coping with illness and its treatment. In this way, it can be evidenced that individual differences have a profound influence in the illness response and subsequently, adherence to medication regimes. Ultimate goals and success are contextualised by responsibility and motivation, determined by individual differences. Individuals strive for a balance between their normal life and illness. A strong sense of burden and administration issues are experienced in the management of chronic illness, fluctuating between individuals; modifiers include support, whilst lack of knowledge or motivation contribute to attrition from a medication regime. The foundation of positive medication-mediation lies with concordance, an agreement between the health care provider and patient; the notion of medical paternalism is unethical once it undermines patient autonomy and choice (Ewing, et al., 2004), but is often a result of poor patient-professional communication rather than reflecting medication nonadherence. Furthermore, expressions of concern were raised regarding potential long-term effects of medication, offset by a sense of becoming an 'illness-expert' for some. Additionally, symptom control generally represents a strong motivator, for those who put into place systems, such as charts, to ensure medication is taken correctly. This supports the presupposition that adherence behaviour results from multiple interactional determinants and that there are inherent feedback mechanisms from previous behaviour.

In the first instance, a taxonomical framework, serving as a template from which additional prospective data could be added, (i.e., subject to content-refinement) was construed; additionally, conceptual models were developed, determining the main influences of medication-mediation. The synergy between quantitative and qualitative data informed the development of the models; a creative process of translating results, underpinned by theoretical concepts, and conversion into practical models emphasising the individuals' perspectives. The models challenge the existing notion that adherence is a static issue, affected by a set of factors generically applied, and which remain constant throughout the illness process. The models highlight that it is not a question of binary adherence or nonadherence but that a process of medication-mediation occurs, subject to many mitigating and mediating influences, peculiar to each individual. An example of variance is illustrated by the external component of health care service access; motivation is displayed by some individuals with a determination to use the system, even under difficult circumstances, whilst others do not evidence this adherence intention. This substantiates the association between environmental circumstance and individual influences which are subject to situational contextualisation.

The study was not without challenges; literature was not as extensive as predicted and there was consequently a less copious number of studies from which to use as a foundation. Furthermore, existing articles tend only to report significant relationships between factors, however it is still constructive to know where a nonsignificant result is found. The corollary of this deficit of evidence, in real terms, highlighted the importance of the method used in this thesis, that is a hybrid compounded from quantitative and qualitative inquiry. The divergence from traditional positivist methods supported the dialectic, interactive and iterative technique embodied by the critical lens of phenomenological investigation. This resulted in a highly detailed and illuminating piece of research that captured the richness of experiences and indicates that the analysis is an effective method when underlying data is limited. Despite attempting to reach data saturation additional factors not contained within these studies are undoubtedly influential, for instance ethnic and cultural variables; these were not addressed directly in the research since none of the principals fell into this category. These auxiliary influences may serve as a proxy for attitudes and further research should undertake their investigation. Further factors may be found in different populations and it is important to continue to explore different populations to assess this. Qualitative analysis has been censured for being time-consuming, subject to researcher bias and criticised for fragmenting data to enable theorising; these issues have been addressed within the text of this thesis and concludes that this analysis has captured the subtleties of principals' experiential realities.

Implications for research, practice, and policy

Research in this topic is inherently challenging: this original research has highlighted the variability of the experience for individuals and the need for tailored approaches, not least in respect of the delivery of interventions. A challenge for future research is to further isolate determinants of medication-mediation and factors specific to certain individuals. To this end a measurement tool that captures the algorithm of individual influences and behaviour is essential in order to devise relevant intervention strategies. Individuals each observe the concept by virtue of their unique lens; further research would benefit from qualitative studies to grasp individual's illness- and medication-processes and their treatment goal trajectories and, furthermore, to capture subjective and individual experiences. The current data revealed differences within and between principals giving rise to a case for longitudinal studies of medication-mediation in chronic illness.

Clinical practice would profit from a predictive measurement scale of medication-mediation; the potential for such a tool is its integration into current practice systems to assist in determining those at potential risk of nonadherence. Competing demands are placed on limited resources and rigorously designed solutions are of interest to policymakers to address the disparity between the potential efficacy of pharmaceuticals and what is actually achieved. As highlighted in this thesis the improvement of adherence is a key target in the recution of comorbidity and promotion of quality of life. Enhanced understanding of individual's management of symptom trajectories, illness type and demographics might enable patterns of medication-mediation to be predicted.

Future directions

The aim of this study was to devise a theoretically driven, conceptual model of medication-mediation to consolidate what is currently known and append novel data, from which to optimise future research; impacts of the research included the development of a taxonomical framework of medication adherence, together with two original conceptual models predicated on important findings from patient interviews. This thesis has advanced the topic by employing a more explicit use of behavioural sciences and situating individual differences to inform the debate. Going forward, this data could be utilised to develop a novel predictive tool establishing the idiosyncratic psychometric properties of the descriptive medication-mediation models; this would have utility in a clinical setting since current measures represent shortcomings not merely in their conceptualisation of adherence but also ‘poor psychometric properties caused by too simplistic items and an arbitrary scoring procedure’, (Koschak, Marx, Schnakenberg, Kochen & Himmel, 2010, p.30). The conceptual models go some way to address the need for a shift in focus to ‘*think more about, do more about, and write more about the validity of the data we produce and less about the validity of specific instruments’* (Sechrest, 2005, p.1602) and concern ourselves more with the emotional cognitive affects and behaviour - in short, to rethink the conceptual framework of medication adherence (Koschak, et al.) and capitalise on practical validated measures with optimal sensitivity and specificity relating to psychosocial factors and multi-stage statistical modelling that were endorsed even two decades ago (Bradley, et al., 2002).

Literature review and key stakeholder opinion confirmed that little attention is paid to the issue of medication-mediation within the clinical confines of their regime; inception of further research is therefore crucial to redress this. The development of a predictive measurement would highlight those most at risk of ineffective medication-mediation and precede the design of bespoke interventions of interest to members of the clinical healthcare team, of benefit to patient-care by way of optimisation of care and drug efficacy, and in more general terms to advance our understanding. In order to achieve this, further individuals from various demographics and illness conditions could be recruited, (resolving the acknowledged potential limitation of small numbers to the feasibility of any qualitative study), and data used to refine present results. The notion of utility of a scale as a foundational measure lies in its capacity to identify chronically-ill patients with potential challenges to medication-mediation, from which to match strategies to individual motivation, individual differences, and situational contexts. There is then the opportunity to enhance positive mediation with medication, resulting in economic savings as well as biologic effectiveness of treatment and psychological improvement to the individual.

Concluding comments

Adherence is not a self-contained subject, a matter to be examined in its own sphere, rather, the dichotomous nature of adherence is demonstrated by its occupation of its own space whilst feeling the force of other influences together with the subjugation within these bounds. It forms part of a larger system of health behaviour, contextual influences, and environmental constraints. The subject of this thesis was to demonstrate the role of adherence, or medication-mediation, within the general sphere of the individual's life; the objective was to consider the possibility of adherence as a syndrome, whether various components have a common mechanism, or set of homologous characteristics and to provide the foundation for a physiology of adherence. Exploration of themes principally concerned individual's motivational influences within the environmental context, both of which are indicative of the likelihood of adherence. Phenomenological explications of adherence were considered and form the conclusive interpretation of the construct presented. The concept of self-management incorporates the notion that the patient is an active participant in their care regime, once thought outside the purview of a lay person, and as a result power is extended to the individual, who is apparently, at least to some extent, in control of the complex and elaborate gamut of associations and influences affecting their illness and medication trajectories. The aim of the thesis was to use the cumulative body of findings generated to create a new paradigm; the utility of which is to inform clinimetric detection of individuals at risk of poor medication-mediation and thus to improve clinical practice by the design of interventions to help to prevent negative clinical outcomes.

Illness penetrates every corner of human experience however, whilst the literature review uncovered 329, 728 articles concerning medication adherence, few represented the patients' perspectives in terms of their own understanding and idiomatic form of expression. Indeed, the potential impact of 'nonadherence' may be gauged by the growth of interest in publications; in a single year (for instance 2016) perhaps 2,000 papers will be relentlessly published, on top of which is unprinted research. In spite of this, interventions to tackle nonadherence are often researched without much reflection as to the underlying causes, taken somewhat for granted. The essence is encapsulated by independent doctors taking heed of their Hippocratic oath to deploy an informative service from which the individual can decide the type of care that they wish to receive as much or as little in conjunction with their health care provider. What is meant by this phrase ‘medication adherence’ that is so readily bandied about, is it no more than a euphemism for adhering to the empiric and conventional power of doctors in the absence of a relationship that is open enough to admit to nonadherence without fear of recrimination in the interests of the correct adherence?; social absolutism from the medical profession for conformity where pharmaceutical intervention is the prime instrument representative of spontaneous action to pervasive externalities. This exemplifies the vast expansion in the paradox between the individual’s perceived right for independence and respect together with their expectations to indulge in that entitlement and the need for professional insight of the clinician as a provider and regulator of clinical administration; but is also reflective of pervasive changes in society. A moral absolutism has emerged which looks to the medical profession for conformity whilst eschewing the loss of personal liberty. Contemporary collective sense-making and identity is under strain; social media encourages a resort to easy answers, outwith the endorsement of the medical domain, implying that conformity is not necessary but rather endorsing personal judgement, situating the autonomy of the individual. This is illustrative of a more general point, that is the demonstration that it is impossible to impose uniform solutions or absolute values and that a corresponding solicitude should be employed, and tacit consent obtained to avoid the cultivation of a fissiparous tendency between healthcare providers and patients. Public opinion and collective attitudes are powerful motivators and influences in how things are dealt with, the dilemma however rests with the juxtaposition between object intrusiveness and perceived arrogance of clinical agents and the perceived need for pharmaceutical intervention; the acknowledgement of need leads to legitimacy and an instinct to accept authority, which is a vital part of the medication process. Furthermore, the individual is required to take a view that transcends proximate rewards, ‘*the incurable narrowness of soul that makes people prefer the immediate to the remote*’ (Hume, 1907, p.118), and the role of the healthcare provider is pivotal to ensure that the patient does not feel disenfranchised. Healthcare professionals should strive to find a balance between extreme beneficence (paternalism) and immoderate autonomy (consumerism) and be diligent not to appear impenetrable nor present opacity to their clients, but employ reason and collaborative judgement making to ensure mutual resolution; focusing on patient satisfaction throughout the process rather than traditional predetermined outcome of biomarkers. It is critical that investigation continues since there remains much uncertainty around the topic, and in the meantime potentially beneficial medication is mis- or unused.

This thesis, guided by phenomenological philosophy, has provided insight into medication-taking in chronic illness and portrayed the individual's participatory mediation in the process. Understanding the perception of individual's experience, the interaction with healthcare professionals and the strive for meaning after diagnosis and initiation of treatment, is embodied in subsequent behaviour. An individual's interpretations, understanding and meaning-making are experiential and referenced within the perspectives of a social environment, including significant others and the healthcare team; temporal and spatial perspectives are critical in understanding the individual's perspectives. It is hoped that the novel concepts of medication-taking defined in this thesis will contribute to further appreciation of the process of pharmaceutical medication-mediation in chronic illness.

References

Abedian, M., Howard, J., Rawle, H., & Thomas, V. (2010). A qualitative study of perceptions of using prophylactic penicillin in patients with sickle cell disease. *Primary Health Care*, *20*(7).

Abercrombie, H. C., Giese-Davis, J., Sephton, S., Epel, E. S., Turner-Cobb, J. M., & Spiegel, D. (2004). Flattened cortisol rhythms in metastatic breast cancer patients. *Psychoneuroendocrinology*, *29*(8), 1082-1092.

Abraham, C., & Sheeran, P. (2013). Understanding and changing health behaviour: From health beliefs to self-regulation. In *Understanding and changing health behaviour* (pp. 19-40). Psychology Press.

Abraham, J. (2009). Partial progress: governing the pharmaceutical industry and the NHS, 1948–2008. *Journal of Health Politics, Policy and Law*, *34*(6), 931-977.

Abraham, J. (2010). Pharmaceuticalization of society in context: theoretical, empirical and health dimensions. *Sociology*, *44*(4), 603-622.

Abramson, L. Y., Seligman, M. E., & Teasdale, J. D. (1978). Learned helplessness in humans: critique and reformulation. *Journal of Abnormal Psychology*, *87*(1), 49.

Abrar, S., Shoka, A., Arain, N., & Widuch-Mert, C. (2012). Landing on the MARS!!!. *British Journal of Medical Practitioners*, *5*(3), 9-13.

Achille, M. A., Ouellette, A., Fournier, S., Vachon, M., & Hébert, M. J. (2006). Impact of stress, distress and feelings of indebtedness on adherence to immunosuppressants following kidney transplantation. *Clinical Transplantation*, *20*(3), 301-306.

Ackerknecht, E. H. (1982). The history of psychosomatic medicine. *Psychological Medicine*, *12*(1), 17-24.

Ader, R., & Cohen, N. (1982). Behaviorally conditioned immunosuppression and murine systemic lupus erythematosus. *Science*, *215*(4539), 1534-1536.

Affleck, G., Tennen, H., Pfeiffer, C., & Fifield, J. (1987). Appraisals of control and predictability in adapting to a chronic disease. *Journal of Personality and Social Psychology*, *53*(2), 273.

Afilalo, J., Marinovich, A., Afilalo, M., Colacone, A., Leger, R., Unger, B., & Giguere, C. (2004). Nonurgent emergency department patient characteristics and barriers to primary care. *Academic Emergency Medicine*, *11*(12), 1302-1310.

Ajzen, I. (2005). *Attitudes, personality, and behavior*. McGraw-Hill Education (UK).

Albrecht, G., & Hoogstraten, J. (1998). Satisfaction as a determinant of compliance. *Community Dentistry and Oral Epidemiology*, *26*(2), 139-146.

Albus, C., Jordan, J., & Herrmann-Lingen, C. (2004). Screening for psychosocial risk factors in patients with coronary heart disease-recommendations for clinical practice. *European Journal of Cardiovascular Prevention & Rehabilitation*, *11*(1), 75-79.

Alexander, F. (1950). Psychosomatic medicine its principles and application Norton. *New York*.

Allport, G. W. (1937). Personality: A psychological interpretation. *Holt*.

Allport, G. W. (1947). The genius of Kurt Lewin. *Journal of Personality*, *16*(1), 1-10.

Allport, G. W. (1961). Pattern and growth in personality.

Allport, G. W., & Odbert, H. S. (1936). Trait-names: A psycho-lexical study. *Psychological Monographs*, *47*(1), i.

An, J., & Nichol, M. B. (2013). Multiple medication adherence and its effect on clinical outcomes among patients with comorbid type 2 diabetes and hypertension. *Medical Care*, *51*(10), 879-887.

Andalo, D. (2015). NHS drug spending rises by 8% to£ 15.5 bn in England. *The Pharmaceutical Journal*, *295*(7883). *Available online: https://www.pharmaceutical-journal.com/news-and-analysis/nhs-drug-spending-rises-by-8-to-155bn-in-england/20200096.article?firstPass=false (accessed 20th November 2018).*

Andersen, R. (1968). *A behavioral model of families' use of health services* (Research Series No. 25). Chicago, IL: Center for Health Administration Studies, University of Chicago.

Andersen, R. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior*, 36(1), 1-10.

Andersen, R. M. (2008). National health surveys and the behavioral model of health services use. *Medical Care*, *46*(7), 647-653.

Andersen, R. M., Yu, H., Wyn, R., Davidson, P. L., Brown, E. R., & Teleki, S. (2002). Access to medical care for low-income persons: how do communities make a difference?. *Medical Care Research and Review*, *59*(4), 384-411.

Anderson, R. M., & Funnell, M. M. (2010). Patient empowerment: myths and misconceptions. *Patient Education and Counseling*, *79*(3), 277-282.

Ani, C., Bazargan, M., Bazargan-Hejazi, S., Andersen, R. M., Hindman, D. W., & Baker, R. S. (2008). Correlates of self-diagnosis of chronic medical and mental health conditions in under-served African American and Latino populations. *Ethnicity & Disease*, *18*(2 Suppl 2), S2-105.

Annells, M. (1996). Grounded theory method: Philosophical perspectives, paradigm of inquiry, and postmodernism. *Qualitative Health Research*, *6*(3), 379-393.

Arcury, T. A., Quandt, S. A., & Bell, R. A. (2001). Staying healthy: the salience and meaning of health maintenance behaviors among rural older adults in North Carolina. *Social Science & Medicine*, *53*(11), 1541-1556.

Arici, C., Ripamonti, D., Maggiolo, F., Rizzi, M., Finazzi, M., Pezzotti, P., & Suter, F. (2002). Factors associated with the failure of HIV-positive persons to return for scheduled medical visits. *HIV Clinical Trials*, *3*(1), 52-57.

Armitage, C. J., & Conner, M. (2000). Social cognition models and health behaviour: A structured review. *Psychology and Health*, *15*(2), 173-189.

Árnason, V. (2012). The personal is political: ethics and personalized medicine. *Ethical Perspectives*, *19*(1), 103-122.

Aroni, R., Goeman, D., Stewart, K., Sawyer, S., Abramson, M., & Thein, F. (1999, July). Concepts of rigour: When methodological, clinical and ethical issues intersect. In *Association for Qualitative Research Conference, Melbourne*.

Aronson, J. K., & Hardman, M. (1992). Patient compliance. *BMJ*, *305*(6860), 1009-11.

Asaad, G. (2013). *Psychosomatic disorders: Theoretical and clinical aspects*. Routledge.

Asch, S. M., Kerr, E. A., Keesey, J., Adams, J. L., Setodji, C. M., Malik, S., & McGlynn, E. A. (2006). Who is at greatest risk for receiving poor-quality health care?. *New England Journal of Medicine*, *354*(11), 1147-1156.

Asche, C., LaFleur, J., & Conner, C. (2011). A review of diabetes treatment adherence and the association with clinical and economic outcomes. *Clinical Therapeutics*, *33*(1), 74-109.

Ashing-Giwa, K. (1999). Health behavior change models and their socio-cultural relevance for breast cancer screening in African American women. *Women & Health*, *28*(4), 53-71.

Atherton, O. E., Robins, R. W., Rentfrow, P. J., & Lamb, M. E. (2014). Personality correlates of risky health outcomes: Findings from a large Internet study. *Journal of Research in Personality*, *50*, 56-60.

Atkins, L., & Fallowfield, L. (2006). Intentional and non-intentional non-adherence to medication amongst breast cancer patients. *European Journal of Cancer*, *42*(14), 2271-2276.

Atkinson, M. J., Kumar, R., Cappelleri, J. C., & Hass, S. L. (2005). Hierarchical construct validity of the treatment satisfaction questionnaire for medication (TSQM version II) among outpatient pharmacy consumers. *Value in Health, Vol 8* (Supp 1)

Attia, A. (2005). Why should researchers report the confidence interval in modern research. *Middle East Fertility Society Journal*, *10*(1), 78-81.

Aubry, C., Gaudart, J., Gaillard, C., Delmont, J., Parola, P., Brouqui, P., & Gautret, P. (2012). Demographics, health and travel characteristics of international travellers at a pre-travel clinic in Marseille, France. *Travel Medicine and Infectious Disease, 10*(5-6), 247-256.

Axelsson, M. (2013). Report on personality and adherence to antibiotic therapy: a population-based study. *BMC Psychology*, *1*(1), 24.

Axelsson, M., Brink, E., & Lötvall, J. (2014). A personality and gender perspective on adherence and health-related quality of life in people with asthma and/or allergic rhinitis. *Journal of the American Association of Nurse Practitioners*, *26*(1), 32-39.

Axelsson, M., Brink, E., Lundgren, J., & Lötvall, J. (2011). The influence of personality traits on reported adherence to medication in individuals with chronic disease: an epidemiological study in West Sweden. *PloS one*, *6*(3), e18241.

Axelsson, M., Emilsson, M., Brink, E., Lundgren, J., Torén, K., & Lötvall, J. (2009). Personality, adherence, asthma control and health-related quality of life in young adult asthmatics. *Respiratory medicine*, *103*(7), 1033-1040.

Axelsson, M., Lötvall, J., Cliffordson, C., Lundgren, J., & Brink, E. (2013). Self-efficacy and adherence as mediating factors between personality traits and health-related quality of life. *Quality of Life Research*, *22*(3), 567-575.

Babitsch, B., Gohl, D., & von Lengerke, T. (2012). Re-revisiting Andersen's Behavioral Model of Health Services Use: a systematic review of studies from 1998–2011. *GMS Psycho-Social-Medicine*, *9*, (1-15)

Bäckström, M., & Björklund, F. (2016). Is reliability compromised towards the end of long personality inventories? *European Journal of Psychological Assessment, 35*(1), 14–21.

Balint, G. P., Buchanan, W. W., & Dequeker, J. (2006). A brief history of medical taxonomy and diagnosis. *Clinical Rheumatology*, *25*(2), 132-135.

Balkrishnan, R. (1998). Predictors of medication adherence in the elderly. *Clinical Therapeutics*, *20*(4), 764-771.

Balkrishnan, R. (2005). The importance of medication adherence in improving chronic-disease related outcomes: what we know and what we need to further know. *Medical Care*, *43*(6), 517-520

Balkrishnan, R., Rajagopalan, R., Camacho, F. T., Huston, S. A., Murray, F. T., & Anderson, R. T. (2003). Predictors of medication adherence and associated health care costs in an older population with type 2 diabetes mellitus: a longitudinal cohort study. *Clinical Therapeutics*, *25*(11), 2958-2971.

Balmer, C., Griffiths, F., & Dunn, J. (2015). A ‘new normal’: exploring the disruption of a poor prognostic cancer diagnosis using interviews and participant-produced photographs. *Health*, *19*(5), 451-472.

Bandura, A. (1971). Social learning theory. Palo Alto.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological review*, *84*(2), 191.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. Macmillan.

Bandura, A. (1999). Freeman WH Lightsey R Self-efficacy: the exercise of control. *Journal of Cognitive Psychotherapy*, *132*, 158-166.

Bandura, A., & Simon, K. M. (1977). The role of proximal intentions in self-regulation of refractory behavior. *Cognitive therapy and research*, *1*(3), 177-193.

Banton, M. (2005). Finding, and correcting, my mistakes. *Sociology*, *39*(3), 463-479.

Banton, M. (2013). The naming of social categories. *Theoria*, *60*(136), 1-14.

Barber, J. P., Foltz, C., Crits-Christoph, P., & Chittams, J. (2004). Therapists' adherence and competence and treatment discrimination in the NIDA Collaborative Cocaine Treatment Study. *Journal of Clinical Psychology*, *60*(1), 29-41.

Barclay, T. R., Hinkin, C. H., Castellon, S. A., Mason, K. I., Reinhard, M. J., Marion, S. D., ... & Durvasula, R. S. (2007). Age-associated predictors of medication adherence in HIV-positive adults: Health beliefs, self-efficacy, and neurocognitive status. *Health Psychology*, *26*(1), 40-49.

Barer, M. (2017). *Why are some people healthy and others not?*. Routledge.

Barnestein-Fonseca, P., Leiva-Fernández, J., Vidal-España, F., García-Ruiz, A., Prados-Torres, D., & Leiva-Fernández, F. (2011). Is it possible to diagnose the therapeutic adherence of patients with COPD in clinical practice? A cohort study. *BMC Pulmonary Medicine*, *11*(1), 6.

Baroletti, S., & Dell'Orfano, H. (2010). Medication adherence in cardiovascular disease. *Circulation*, *121*(12), 1455-1458.

Barroso, J. (1995). Self-care activities of long-term survivors of acquired immunodeficiency syndrome. *Holistic Nursing Practice*, *10*(1), 44-53.

Barry, V., Stout, M. E., Lynch, M. E., Mattis, S., Tran, D. Q., Antun, A., ... & Kempton, C. L. (2020). The effect of psychological distress on health outcomes: A systematic review and meta-analysis of prospective studies. *Journal of Health Psychology*, *25*(2), 227-239.

Barsky, A. J., Peekna, H. M., & Borus, J. F. (2001). Somatic symptom reporting in women and men. *Journal of General Internal Medicine*, *16*(4), 266-275.

Bartlett, J. A. (2002). Addressing the challenges of adherence. *Journal of Acquired Immune Deficiency Syndromes*, *29*, S2-10.

Bates, B. (1992). *Bargaining for life: a social history of tuberculosis, 1876-1938*. University of Pennsylvania Press.

Bauer, A. M., Schillinger, D., Parker, M. M., Katon, W., Adler, N., Adams, A. S., ... & Karter, A. J. (2013). Health literacy and antidepressant medication adherence among adults with diabetes: the diabetes study of Northern California (DISTANCE). *Journal of General Internal Medicine*, *28*(9), 1181-1187.

Beattie, P. F., & Nelson, R. M. (2008). Preserving the quality of the patient-therapist relationship: an important consideration for value-centered physical therapy care. *Journal of Orthopaedic & Sports Physical Therapy, 38* (2), 34-35

Becker, M. H. (1979). Patient perceptions and compliance: Recent studies of health belief model. *Compliance in health care*. Johns Hopkins University Press.

Bekkers, R. (2006). Traditional and health-related philanthropy: The role of resources and personality. *Social Psychology Quarterly*, *69*(4), 349-366.

Bell, S. E., & Figert, A. E. (2012). Medicalization and pharmaceuticalization at the intersections: Looking backward, sideways and forward. *Social Science & Medicine*, *75*(5), 775-783.

Benjamin, J. (1999). Recognition and destruction: An outline of intersubjectivity. In S.A. Mitchell, & L. Aron, (Eds.), *Relational psychoanalysis: the emergence of a tradition*. The Analytic Press.

Berkman, L. F., Blumenthal, J., Burg, M., Carney, R. M., Catellier, D., Cowan, M. J., ... & Kaufmann, P. G. (2003). Effects of treating depression and low perceived social support on clinical events after myocardial infarction: the Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD) Randomized Trial. *JAMA: Journal of the American Medical Association*. *289*(23), 3106-3116

Bernard, C. (1880). *Leçons de pathologie expérimentale: Et leçons sur les propriétés de la moelle épinière*. J.-B. Baillière et fils.

Berns, G. S., Laibson, D., & Loewenstein, G. (2007). Intertemporal choice–toward an integrative framework. *Trends in cognitive sciences*, *11*(11), 482-488.

Bezuidenhoudt, C., Elago, H., Kalenga, E., Klazen, S., Nghipondoka, K., & Ashton, D. (2011). The Psychological Impact of HIV/AIDS: People are more than statistics. *Future Lead Summit*.

Bhopal, R. (2002). Revisiting race/ethnicity as a variable in health research. *American Journal of Public Health*, *92*(2), 156-a.

Bhui, K., & Bhugra, D. (2002). Mental illness in Black and Asian ethnic minorities: Pathways to care and outcomes. *Advances in Psychiatric Treatment*, *8*(1), 26-33.

Biggs, H. M. (1904). Preventive Medicine: Its achievements, scope, and possibilities. *Medical Record (1866-1922)*, *65*(24), 954.

Björkman, I., Simrén, M., Ringström, G., & Jakobsson Ung, E. (2016). Patients' experiences of healthcare encounters in severe irritable bowel syndrome: an analysis based on narrative and feminist theory. *Journal of clinical nursing*, *25*(19-20), 2967-2978.

Blackwell, B. (1997). From compliance to alliance: A quarter century of research. In B. Blackwell (Ed.), *Chronic Mental Illness, Vol. 5. Treatment compliance and the therapeutic alliance* (p. 1–15). Harwood Academic Publishers.

Blackwell, D. L., Martinez, M. E., Gentleman, J. F., Sanmartin, C., & Berthelot, J. M. (2009). Socioeconomic status and utilization of health care services in Canada and the United States: findings from a binational health survey. *Medical Care*, *47*(11), 1136-1146.

Bleicher, J. (2017). *Contemporary hermeneutics: Hermeneutics as method, philosophy and critique* (Vol. 2). Routledge.

Block, J. (1995). A contrarian view of the five-factor approach to personality description. *Psychological Bulletin*, *117*(2), 187.

Bloor, M. (1995). A user's guide to contrasting theories of HIV-related risk behaviour. *Sociology of Health & Illness Monograph Series*, 19-30.

Bogaerts, K., Notebaert, K., Van Diest, I., Devriese, S., De Peuter, S., & Van den Bergh, O. (2005). Accuracy of respiratory symptom perception in different affective contexts. *Journal of Psychosomatic Research*, *58*(6), 537-543.

Bogg, T., & Roberts, B. W. (2004). Conscientiousness and health-related behaviors: a meta-analysis of the leading behavioral contributors to mortality. *Psychological Bulletin*, *130*(6), 887-919.

Bogg, T., & Roberts, B. W. (2013). Duel or diversion? Conscientiousness and executive function in the prediction of health and longevity. *Annals of Behavioral Medicine*, *45*(3), 400-401.

Booth-Kewley, S., & Friedman, H. S. (1987). Psychological predictors of heart disease: a quantitative review. *Psychological Bulletin*, *101*(3), 343-362.

Booth-Kewley, S., & Vickers Jr, R. R. (1994). Associations between major domains of personality and health behavior. *Journal of Personality*, *62*(3), 281-298.

Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2011). *Introduction to meta-analysis*. John Wiley & Sons.

Bouchard, T. J., & Loehlin, J. C. (2001). Genes, evolution, and personality. *Behavior Genetics, 31*(3), 243-273.

Boulet, L. P., Boulet, V., & Milot, J. (2002). How should we quantify asthma control?: A proposal. *Chest*, *122*(6), 2217-2223.

Bournes, D. A. (2000). A commitment to honoring people's choices. *Nursing Science Quarterly, 13*(1), 18-23.

Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*. Sage.

Bradley, E. H., McGraw, S. A., Curry, L., Buckser, A., King, K. L., Kasl, S. V., & Andersen, R. (2002). Expanding the Andersen model: The role of psychosocial factors in long-term care use. *Health Services Research, 37*(5), 1221-1242.

Brandes, K., & Mullan, B. (2014). Can the common-sense model predict adherence in chronically ill patients? A meta-analysis. *Health Psychology Review*, *8*(2), 129-153.

Brankin, E., Walker, M., Lynch, N., Aspray, T., Lis, Y., & Cowell, W. (2006). The impact of dosing frequency on compliance and persistence with bisphosphonates among postmenopausal women in the UK: evidence from three databases. *Current Medical Research and Opinion*, *22*(7), 1249-1256.

Braun, V., & Clarke, V. (2013). *Successful qualitative research: A practical guide for beginners*. Sage.

Brazil, K., Ozer, E., Cloutier, M. M., Levine, R., & Stryer, D. (2005). From theory to practice: improving the impact of health services research. *BMC Health Services Research*, *5*(1), 1-5.

Breitscheidel, L., Stamenitis, S., Dippel, F. W., & Schöffski, O. (2009). PDB62 Economic impact of compliance and persistence to treatment with antidiabetes medication in T2DM – A systematic review. *Value in Health*, *12*(7), A413.

Brickman, A. L., Yount, S. E., Blaney, N. T., Rothberg, S. T., & De-Nour, A. K. (1996). Personality traits and long-term health: Status the influence of neuroticism and conscientiousness on renal deterioration in type-1 diabetes. *Psychosomatics*, *37*(5), 459-468.

Briesacher, B. A., Gurwitz, J. H., & Soumerai, S. B. (2007). Patients at-risk for cost-related medication nonadherence: a review of the literature. *Journal of General Internal Medicine*, *22*(6), 864-871.

Bright, C. E. (2017). Measuring medication adherence in patients with schizophrenia: an integrative review. *Archives of Psychiatric Nursing*, *31*(1), 99-110.

Brockie, J. (2000). Compliance or concordance?. *British Menopause Society Journal*, *6*(1), 23-26.

Brook, O. H., van Hout, H. P., Stalman, W. A., & de Haan, M. (2006). Nontricyclic antidepressants: predictors of nonadherence. *Journal of Clinical Psychopharmacology*, *26*(6), 643-647.

Brown, C., Battista, D. R., Bruehlman, R., Sereika, S. S., Thase, M. E., & Dunbar-Jacob, J. (2005). Beliefs about antidepressant medications in primary care patients: relationship to self-reported adherence. *Medical Care*, *43*(12), 1203-1207.

Brown, M. T., & Bussell, J. K. (2011, April). Medication adherence: WHO cares?. In *Mayo clinic proceedings*, *86*(4), 304-314.

Broyles, R. W., McAuley, W. J., & Baird-Holmes, D. (1999). The medically vulnerable: their health risks, health status, and use of physician care. *Journal of Health Care for the Poor and Underserved*, *10*(2), 186-200.

Bruce, J. M., Hancock, L. M., Arnett, P., & Lynch, S. (2010). Treatment adherence in multiple sclerosis: association with emotional status, personality, and cognition. *Journal of Behavioral Medicine*, *33*(3), 219-227.

Brug, J., Oenema, A., & Ferreira, I. (2005). Theory, evidence and Intervention Mapping to improve behavior nutrition and physical activity interventions. *International Journal of Behavioral Nutrition and Physical Activity*, *2*(1), 1-7.

Bryant, J., McDonald, V. M., Boyes, A., Sanson-Fisher, R., Paul, C., & Melville, J. (2013). Improving medication adherence in chronic obstructive pulmonary disease: a systematic review. *Respiratory Research*, *14*(1), 109.

Buchanan, T., Johnson, J. A., & Goldberg, L. R. (2005). Implementing a five-factor personality inventory for use on the internet. *European Journal of Psychological Assessment*, *21*(2), 115-127.

Burisch, M. (1984). Approaches to personality inventory construction: a comparison of merits. *American Psychologist*, *39*(3), 214-237.

Burish, T. G., Carey, M. P., Wallston, K. A., Stein, M. J., Jamison, R. N., & Lyles, J. N. (1984). Health locus of control and chronic disease: An external orientation may be advantageous. *Journal of Social and Clinical Psychology*, *2*(4), 326-332.

Burke, H. M., Davis, M. C., Otte, C., & Mohr, D. C. (2005). Depression and cortisol responses to psychological stress: a meta-analysis. *Psychoneuroendocrinology*, *30*(9), 846-856.

Bury, M. (1982). Chronic illness as biographical disruption. *Sociology of health & illness*, *4*(2), 167-182.

Bury, M. (2001). Illness narratives: fact or fiction?. *Sociology of Health & Illness*, *23*(3), 263-285.

Buus, N., Johannessen, H., & Stage, K. B. (2012). Explanatory models of depression and treatment adherence to antidepressant medication: a qualitative interview study. *International Journal of Nursing Studies*, *49*(10), 1220-1229.

Byrne-Armstrong, H., Higgs, J., & Horsfall, D. (2001). *Critical moments in qualitative research*. Butterworth-Heinemann Medical.

Callaghan, D., & Williams, A. (1994). Living with diabetes: issues for nursing practice. *Journal of Advanced Nursing*, *20*(1), 132-139.

Cameron, L. D., Booth, R. J., Schlatter, M., Ziginskas, D., Harman, J. E., & Benson, S. R. (2005). Cognitive and affective determinants of decisions to attend a group psychosocial support program for women with breast cancer. *Psychosomatic Medicine*, *67*(4), 584-589.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, *56*(2), 81-105.

Campbell, L. C., Clauw, D. J., & Keefe, F. J. (2003). Persistent pain and depression: a biopsychosocial perspective. *Biological Psychiatry*, *54*(3), 399-409.

Cane, J., O'Connor, D., & Michie, S. (2012). Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implementation science*, *7*(1), 37.

Cannon, W. B. (1916). *Bodily changes in pain, hunger, fear, and rage: An account of recent researches into the function of emotional excitement*. D. Appleton.

Cannon, W. B. (1932). *The wisdom of the body*. New York 1932.

Capewell, S., Hayes, D. K., Ford, E. S., Critchley, J. A., Croft, J. B., Greenlund, K. J., & Labarthe, D. R. (2009). Life-years gained among US adults from modern treatments and changes in the prevalence of 6 coronary heart disease risk factors between 1980 and 2000. *American Journal of Epidemiology*, *170*(2), 229-236.

Carlick, A., & Biley, F. C. (2004). Thoughts on the therapeutic use of narrative in the promotion of coping in cancer care. *European Journal of Cancer Care*, *13*(4), 308-317.

Carls, G. S., Roebuck, M. C., Brennan, T. A., Slezak, J. A., Matlin, O. S., & Gibson, T. B. (2012). Impact of medication adherence on absenteeism and short-term disability for five chronic diseases. *Journal of Occupational and Environmental Medicine*, *54*(7), 792-805.

Carpenter, R. (2005). Perceived threat in compliance and adherence research. *Nursing Inquiry*, *12*(3), 192-199.

Carpenter, D. M., DeVellis, R. F., Fisher, E. B., DeVellis, B. M., Hogan, S. L., & Jordan, J. M. (2010). The effect of conflicting medication information and physician support on medication adherence for chronically ill patients. *Patient Education and Counseling*, *81*(2), 169-176.

Carret, M. L., Fassa, A. G., & Kawachi, I. (2007). Demand for emergency health service: factors associated with inappropriate use. *BMC Health Services Research*, *7*(1), 131.

Carroll, M. E., Mach, J. L., La Nasa, R. M., & Newman, J. L. (2009). Impulsivity as a behavioral measure of withdrawal of orally delivered PCP and nondrug rewards in male and female monkeys. *Psychopharmacology*, *207*(1), 85.

Carver, C. S., & Connor-Smith, J. (2010). Personality and coping. *Annual Review of Psychology*, *61*, 679-704.

Caspi, A., Sugden, K., Moffitt, T. E., Taylor, A., Craig, I. W., Harrington, H., ... & Poulton, R. (2003). Influence of life stress on depression: moderation by a polymorphism in the 5-HTT gene. *Science*, *301*(5631), 386-389.

Cattell, R. B. (1943). The description of personality: Basic traits resolved into clusters. *The Journal of Abnormal and Social Psychology*, *38*(4), 476-506.

Cattell, R. B. (1946). *Description and measurement of personality*. World Book Company.

Centers for Disease Control and Prevention. (2013). Health, United States, 2012: With special feature on emergency care. *National Center for Health Statistics: Hyattsville, MD, USA. Available online: http://www. cdc. gov/nchs/data/hus/hus12 (accessed on 21 November 2018)*.

Chabrol, H., Leeuwen, N. V., Rodgers, R., & Sejourne, N. (2009). Contributions of psychopathic, narcissistic, Machiavellian, and sadistic personality traits to juvenile delinquency. *Personality and Individual Differences*, *47*, 734–739.

Chacko, A., H Newcorn, J., Feirsen, N., & Z Uderman, J. (2010). Improving medication adherence in chronic pediatric health conditions: a focus on ADHD in youth. *Current Pharmaceutical Design*, *16*(22), 2416-2423.

Chan, A. H. Y., Horne, R., Hankins, M., & Chisari, C. (2020). The Medication Adherence Report Scale: A measurement tool for eliciting patients' reports of nonadherence. *British Journal of Clinical Pharmacology*, *86*(7), 1281-1288.

Chapman, B., Duberstein, P., & Lyness, J. M. (2007). Personality traits, education, and health-related quality of life among older adult primary care patients. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *62*(6), P343-P352.

Chapman, B., Duberstein, P. R., Epstein, R., Fiscella, K., & Kravitz, R. L. (2008). Patient Centered Communication During Primary Care Visits for Depressive Symptoms: What is the Role of Physician Personality?. *Medical Care*, *46*(8), 806-812.

Chapman, B., Roberts, B., & Duberstein, P. (2011). Personality and longevity: knowns, unknowns, and implications for public health and personalized medicine. *Journal of Aging Research*, *2011*.

Chapman, B., Shah, M., Friedman, B., Drayer, R., Duberstein, P. R., & Lyness, J. M. (2009). Personality traits predict emergency department utilization over 3 years in older patients. *The American Journal of Geriatric Psychiatry*, *17*(6), 526-535.

Chapman, B., Weiss, A., Barrett, P., & Duberstein, P. (2013). Hierarchical structure of the Eysenck Personality Inventory in a large population sample: Goldberg’s trait-tier mapping procedure. *Personality and Individual Differences*, *54*(4), 479-484.

Charney, E., Bynum, R., Eldredge, D., Frank, D., MacWhinney, J. B., McNabb, N., ... & Iker, H. (1967). How well do patients take oral penicillin? A collaborative study in private practice. *Pediatrics*, *40*(2), 188-195.

Chatzi, L., Bitsios, P., Solidaki, E., Christou, I., Kyrlaki, E., Sfakianaki, M., ... & Pappas, A. (2009). Type 1 diabetes is associated with alexithymia in nondepressed, non-mentally ill diabetic patients: a case-control study. *Journal of Psychosomatic Research*, *67*(4), 307-313.

Chatzisarantis, N. L., & Hagger, M. S. (2008). Influences of personality traits and continuation intentions on physical activity participation within the theory of planned behaviour. *Psychology & Health*, *23*(3), 347-367.

Chen, C. C., Tseng, C. H., & Cheng, S. H. (2013). Continuity of care, medication adherence, and health care outcomes among patients with newly diagnosed type 2 diabetes: a longitudinal analysis. *Medical care*, *51*(3), 231-237.

Chen, M. F., Wang, R. H., Lin, K. C., Hsu, H. Y., & Chen, S. W. (2015). Efficacy of an empowerment program for Taiwanese patients with type 2 diabetes: A randomized controlled trial. *Applied Nursing Research*, *28*(4), 366-373.

Chernyshenko OS. Unpublished doctoral dissertation. University of Illinois; Urbana-Champaign: 2002. Applications of ideal point approaches to scale construction and scoring in personality measurement: The development of a six-faceted measure of conscientiousness.

Chesney, M. (2003). Adherence to HAART regimens. *AIDS Patient Care and STDs*, *17*(4), 169-177.

Chesney, M. A., Ickovics, J., Hecht, F. M., Sikipa, G., & Rabkin, J. (1999). Adherence: a necessity for successful HIV combination therapy. *AIDS (London, England)*, *13*, S271-8.

Chetley, A., Hardon, A., Hodgkin, C., Haaland, A., & Fresle, D. (2007). How to improve the use of medicines by consumers. In *How to improve the use of medicines by consumers*. OMS.

Chia, L. R., Schlenk, E. A., & Dunbar-Jacob, J. (2006). Effect of personal and cultural beliefs on medication adherence in the elderly. *Drugs & Aging*, *23*(3), 191-202.

Chida, Y., & Steptoe, A. (2009). The association of anger and hostility with future coronary heart disease: a meta-analytic review of prospective evidence. *Journal of the American College of Cardiology*, *53*(11), 936-946.

Childress, J. F., & Beauchamp, T. L. (2001). *Principles of biomedical ethics*. New York: Oxford University Press.

Chobanian, A. V., Bakris, G. L., Black, H. R., Cushman, W. C., Green, L. A., Izzo Jr, J. L., ... & Roccella, E. J. (2003). The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure: the JNC 7 report. *JAMA*, *289*(19), 2560-2571.

Chrisman, J. J., Hofer, C. W., & Boulton, W. B. (1988). Toward a system for classifying business strategies. *Academy of Management Review*, *13*(3), 413-428.

Christensen, A. J., Ehlers, S. L., Wiebe, J. S., Moran, P. J., Raichle, K., Ferneyhough, K., & Lawton, W. J. (2002). Patient personality and mortality: A 4-year prospective examination of chronic renal insufficiency. *Health Psychology*, *21*(4), 315-320.

Christensen, A. J., & Smith, T. W. (1995). Personality and patient adherence: correlates of the five-factor model in renal dialysis. *Journal of Behavioral Medicine*, *18*(3), 305-313.

Christensen, A. J., Smith, T. W., Turner, C. W., & Cundick, K. E. (1994). Patient adherence and adjustment in renal dialysis: a person x treatment interactive approach. *Journal of Behavioral Medicine*, *17*(6), 549-566.

Cialdini, R. B., Brown, S. L., Lewis, B. P., Luce, C., & Neuberg, S. L. (1997). Reinterpreting the empathy–altruism relationship: When one into one equals oneness. *Journal of Personality and Social Psychology*, *73*(3), 481-494.

Cingi, C. C., Orhon, N., & Eckler, P. (2020). Role of allergic rhinitis in personal communication. In: C. Cingi, & N. Bayar Muluk (Eds.), *All Around the Nose* (p.343-345). Springer.

Clark, L. A., & Watson, D. (1991). General affective dispositions in physical and psychological health. *Handbook of Social and Clinical Psychology*, *12*, 221-245.

Clarke, B. (1962). Balanced polymorphism and the diversity of sympatric species. In: Nichols, D. (ed.) *Taxonomy and Geography* (47-70). Systematics Association, Oxford.

Clarke Jr, E. R., Zahn, D. W., & Holmes, T. H. (1954). The relationship of stress, adrenocortical function, and tuberculosis. *American Review of Tuberculosis*, *69*(3), 351-369.

Clayton, A. M., & Thorne, T. (2000). Diary data enhancing rigour: Analysis framework and verification tool. *Journal of Advanced Nursing*, *32*(6), 1514-1521.

Clifford, S., Barber, N., & Horne, R. (2008). Understanding different beliefs held by adherers, unintentional nonadherers, and intentional nonadherers: application of the necessity–concerns framework. *Journal of Psychosomatic Research*, *64*(1), 41-46.

Cloninger, C. R. (2005). How does personality influence mortality in the elderly?. *Psychosomatic Medicine*, *67*(6), 839-840.

Coates, V. E., & Boore, J. R. (1998). The influence of psychological factors on the self-management of insulin-dependent diabetes mellitus. *Journal of Advanced Nursing*, *27*(3), 528-537.

Cockerham, W. C. (2017). *Medical sociology*. Routledge.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, *20*(1), 37-46.

Cohen, N. L., Ross, E. C., Bagby, R. M., Farvolden, P., & Kennedy, S. H. (2004). The 5-factor model of personality and antidepressant medication compliance. *The Canadian Journal of Psychiatry*, *49*(2), 106-113.

Cohen, S., Alper, C. M., Doyle, W. J., Treanor, J. J., & Turner, R. B. (2006). Positive emotional style predicts resistance to illness after experimental exposure to rhinovirus or influenza A virus. *Psychosomatic Medicine*, *68*(6), 809-815.

Cohen, S., Frank, E., Doyle, W. J., Skoner, D. P., Rabin, B. S., & Gwaltney Jr, J. M. (1998). Types of stressors that increase susceptibility to the common cold in healthy adults. *Health Psychology*, *17*(3), 214-223.

Cohen, S., Janicki-Deverts, D., Crittenden, C. N., & Sneed, R. S. (2012). Personality and human immunity. In *The Oxford Handbook of Psychoneuroimmunology*.

Cole, P. M., Michel, M. K., & Teti, L. O. D. (1994). The development of emotion regulation and dysregulation: A clinical perspective. *Monographs of the society for research in child development*, *59*(2-3), 73-102.

Cole, S. W. (2008). Psychosocial influences on HIV-1 disease progression: Neural, endocrine, and virologic mechanisms. *Psychosomatic Medicine*, *70*(5), 562-568.

Conner, M., & Abraham, C. (2001). Conscientiousness and the theory of planned behavior: Toward a more complete model of the antecedents of intentions and behavior. *Personality and Social Psychology Bulletin*, *27*(11), 1547-1561.

Connor-Smith, J. K., & Flachsbart, C. (2007). Relations between personality and coping: a meta-analysis. *Journal of personality and social psychology*, *93*(6), 1080-1107.

Conrad, P. (1985). The meaning of medications: another look at compliance. *Social Science & Medicine*, *20*(1), 29-37.

Conrad, P. (1987). The noncompliant patient in search of autonomy. *Hastings Center Report*, *17*(4), 15-17.

Conrad, P., & Barker, K. K. (2010). The social construction of illness: Key insights and policy implications. *Journal of Health and Social Behavior*, *51*(1_suppl), S67-S79.

Contreras Muruaga, M. D. M., Vivancos, J., Reig, G., González, A., Cardona, P., Ramírez-Moreno, J. M., ... & ALADIN Study Investigators. (2017). Satisfaction, quality of life and perception of patients regarding burdens and benefits of vitamin K antagonists compared with direct oral anticoagulants in patients with nonvalvular atrial fibrillation. *Journal of Comparative Effectiveness Research*, *6*(4), 303-312.

Cooper, C., Carpenter, I., Katona, C., Schroll, M., Wagner, C., Fialova, D., & Livingston, G. (2005). The AdHOC study of older adults' adherence to medication in 11 countries. *The American Journal of Geriatric Psychiatry*, *13*(12), 1067-1076.

Corr, P. J. (2004). Reinforcement sensitivity theory and personality. *Neuroscience & Biobehavioral Reviews*, *28*(3), 317-332.

Costa, A., Peppe, A., Carlesimo, G. A., Salamone, G., & Caltagirone, C. (2010). Prevalence and characteristics of alexithymia in Parkinson's disease. *Psychosomatics*, *51*(1), 22-28.

Costa, P. T., & McCrae, R. R. (1992). Normal personality assessment in clinical practice: The NEO Personality Inventory. *Psychological Assessment*, *4*(1), 5-13.

Costa Jr, P. T., & McCrae, R. R. (2002). *Looking backward: Changes in the mean levels of personality traits from 80 to 12*. Guilford Press.

Costa Jr, P. T., McCrae, R. R., & Dye, D. A. (1991). Facet scales for agreeableness and conscientiousness: A revision of the NEO Personality Inventory. *Personality and Individual Differences*, *12*(9), 887-898.

Costa Jr, P. T., Terracciano, A., & McCrae, R. R. (2001). Gender differences in personality traits across cultures: robust and surprising findings. *Journal of Personality and Social Psychology*, *81*(2), 322-331.

Courneya, K. S., Friedenreich, C. M., Sela, R. A., Quinney, H. A., & Rhodes, R. E. (2002). Correlates of adherence and contamination in a randomized controlled trial of exercise in cancer survivors: an application of the theory of planned behavior and the five factor model of personality. *Annals of Behavioral Medicine*, *24*(4), 257-268.

Coyne, J. C., & de Voogd, J. N. (2012). Are we witnessing the decline effect in the Type D personality literature? What can be learned?. *Journal of Psychosomatic Research*, *73*(6), 401-407.

Crabtree, B. F., & Miller, W. L. (1999). *Doing qualitative research*. Sage publications.

Craik, F. I., & Byrd, M. (1982). Aging and cognitive deficits. In F. I. Craik & S. Trehub (Eds.), *Aging and cognitive processes.* Boston, MA: Springer.

Cramer, J. A. (1995). Microelectronic systems for monitoring and enhancing patient compliance with medication regimens. *Drugs*, *49*(3), 321-327.

Cramer, J. A., Mattson, R. H., Prevey, M. L., Scheyer, R. D., & Ouellette, V. L. (1989). How often is medication taken as prescribed?: a novel assessment technique. *JAMA*, *261*(22), 3273-3277.

Cramer, J. A., Rosenheck, R., Kirk, G., Krol, W., & Krystal, J. VA Naltrexone Study Group 425. (2003). Medication compliance feedback and monitoring in a clinical trial: predictors and outcomes. *Value in Health*, *6*(5), 566-573.

Cramer, J. A., Roy, A., Burrell, A., Fairchild, C. J., Fuldeore, M. J., Ollendorf, D. A., & Wong, P. K. (2008). Medication compliance and persistence: terminology and definitions. *Value in Health*, *11*(1), 44-47.

Creed, F., & Barsky, A. (2004). A systematic review of the epidemiology of somatisation disorder and hypochondriasis. *Journal of Psychosomatic Research*, *56*(4), 391-408.

Creswell, J. W. (2007). *Qualitative inquiry and research method: Choosing among five approaches.* Sage.

Creswell, J. W., Hanson, W. E., Clark Plano, V. L., & Morales, A. (2007). Qualitative research designs: Selection and implementation. *The Counseling Psychologist*, *35*(2), 236-264.

Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process*. Sage.

Crow, H., Gage, H., Hampson, S., Hart, J., Kimber, A., Storey, L., & Thomas, H. (2002). Measurement of satisfaction with health care: Implications for practice from a systematic review of the literature. *Health Technology Assessment, 6*(32).

Cuijpers, P., Smit, F., Penninx, B. W., de Graaf, R., ten Have, M., & Beekman, A. T. (2010). Economic costs of neuroticism: a population-based study. *Archives of General Psychiatry, 67*(10), 1086-1093.

Cummings, M., & Kang, M. (2012). Youth health services: improving access to primary care. *Australian Family Physician*, *41*(5), 339-341.

Currie, C. J., Peyrot, M., Morgan, C. L., Poole, C. D., Jenkins-Jones, S., Rubin, R. R., ... & Evans, M. (2013). The impact of treatment non-compliance on mortality in people with type 1 diabetes. *Journal of Diabetes and its Complications*, *27*(3), 219-223.

Daly, J., Kellehear, A., & Gliksman, M. (1997). *The public health researcher: A methodological guide*. Oxford University Press.

Davidoff, F., Haynes, B., Sackett, D., & Smith, R. (1995). Evidence based medicine. *BMJ*, 310.

Davies, R. (1954). Isolating the recalcitrants. *Bulletin of the National Tuberculosis Association*, *10*, 121-122.

Davis, M. S., & Eichhorn, R. L. (1963). Compliance with medical regimens: A panel study. *Journal of Health & Human Behavior*. 240-249.

Davis, M. S. (1966). Variations in patients' compliance with doctors' orders: analysis of congruence between survey responses and results of empirical investigations. *Academic Medicine*, *41*(11), 1037-48.

Davis, R., Campbell, R., Hildon, Z., Hobbs, L., & Michie, S. (2015). Theories of behaviour and behaviour change across the social and behavioural sciences: a scoping review. *Health Psychology Review*, *9*(3), 323-344.

Davis, T. C., Wolf, M. S., Bass, P. F., Thompson, J. A., Tilson, H. H., Neuberger, M., & Parker, R. M. (2006). Literacy and misunderstanding prescription drug labels. *Annals of Internal Medicine*, *145*(12), 887-894.

Deary, I. J., Weiss, A., & Batty, G. D. (2010). Intelligence and personality as predictors of illness and death: How researchers in differential psychology and chronic disease epidemiology are collaborating to understand and address health inequalities. *Psychological Science in the Public Interest*, *11*(2), 53-79.

de Bruijn, G. J., Brug, J., & Van Lenthe, F. J. (2009). Neuroticism, conscientiousness and fruit consumption: Exploring mediator and moderator effects in the theory of planned behaviour. *Psychology and Health*, *24*(9), 1051-1069.

De Fruyt, F., & Denollet, J. (2002). Type D personality: A five-factor model perspective. *Psychology and Health*, *17*(5), 671-683.

De Geest, S., Abraham, I., Gemoets, H., & Evers, G. (1994). Development of the long-term medication behaviour self-efficacy scale: qualitative study for item development. *Journal of Advanced Nursing*, *19*(2), 233-238.

de Klerk, E. (2001). Measurement of patient compliance on drug therapy: an overview. *Advances in Behavioral Medicine Assessment.* Harwood: Academic Publishers, 215-244.

De Smet, B. D., Erickson, S. R., & Kirking, D. M. (2006). Self-reported adherence in patients with asthma. *Annals of Pharmacotherapy*, *40*(3), 414-420.

DeFulio, A., & Silverman, K. (2012). The use of incentives to reinforce medication adherence. *Preventive medicine*, *55*, S86-S94.

Delmar, C., Bøje, T., Dylmer, D., Forup, L., Jakobsen, C., Møller, M., ... & Pedersen, B. D. (2005). Achieving harmony with oneself: life with a chronic illness. *Scandinavian Journal of Caring Sciences*, *19*(3), 204-212.

Dembroski, T. M., & Costa Jr, P. T. (1987). Coronary prone behavior: Components of the Type A pattern and hostility. *Journal of Personality*, *55*(2), 211-235.

Denissen, J. J., & Penke, L. (2008). Motivational individual reaction norms underlying the Five-Factor model of personality: First steps towards a theory-based conceptual framework. *Journal of Research in Personality*, *42*(5), 1285-1302.

Denollet, J. (1998). Personality and coronary heart disease: the type-D scale-16 (DS16). *Annals of Behavioral Medicine*, *20*(3), 209-215.

Denollet, J. (2005). DS14: standard assessment of negative affectivity, social inhibition, and Type D personality. *Psychosomatic Medicine*, *67*(1), 89-97.

Denollet, J., & Kupper, N. (2007). Type-D personality, depression, and cardiac prognosis. *Journal of Psychosomatic Research*, *62*, 607-609.

Denollet, J., Pedersen, S. S., Vrints, C. J., & Conraads, V. M. (2006). Usefulness of type D personality in predicting five-year cardiac events above and beyond concurrent symptoms of stress in patients with coronary heart disease. *The American Journal of Cardiology*, *97*(7), 970-973.

Denollet, J., Vaes, J., & Brutsaert, D. L. (2000). Inadequate response to treatment in coronary heart disease: adverse effects of type D personality and younger age on 5-year prognosis and quality of life. *Circulation*, *102*(6), 630-635.

Denton, W. (2003). How to make a faceted classification and put it on the web. Available on: *http://www. miskatonic. org/library/facet-web-howto. html*. (accessed on 5th August 2017).

Department of Health. (2008). *Pharmacy in England: Building on strengths-delivering the future* (Vol. 7341). The Stationery Office.

Depue, R. A., & Collins, P. F. (1999). Neurobiology of the structure of personality: Dopamine, facilitation of incentive motivation, and extraversion. *Behavioral and Brain Sciences*, *22*(3), 491-517.

Derogatis, L. R., & Spencer, P. M. (1982). The Brief Symptom lnventory (BSI): Administration and Procedures Manual-I. Baltimore. *MD: Johns Hopkins University School of Medicine, Clinical Psychometric Research Unit*.

Desai, N. R., & Choudhry, N. K. (2013). Impediments to adherence to post myocardial infarction medications. *Current Cardiology Reports*, *15*(1), 322.

Deverts, D. J., Cohen, S., DiLillo, V. G., Lewis, C. E., Kiefe, C., Whooley, M., & Matthews, K. A. (2010). Depressive symptoms, race, and circulating C-reactive protein: the Coronary Artery Risk Development in Young Adults (CARDIA) study. *Psychosomatic Medicine*, *72*(8), 734-741.

Devriese, S., Winters, W., Stegen, K., Van Diest, I., Veulemans, H., Nemery, B., ... & Van den Bergh, O. (2000). Generalization of acquired somatic symptoms in response to odors: a pavlovian perspective on multiple chemical sensitivity. *Psychosomatic Medicine*, *62*(6), 751-759.

Dew, M. A., DiMartini, A. F., Dabbs, A. D. V., Myaskovsky, L., Steel, J., Unruh, M., ... & Greenhouse, J. B. (2007). Rates and risk factors for nonadherence to the medical regimen after adult solid organ transplantation. *Transplantation*, *83*(7), 858-873.

Dewaraja, R., Tanigawa, T., Araki, S., Nakata, A., Kawamura, N., Ago, Y., & Sasaki, Y. (1997). Decreased cytotoxic lymphocyte counts in alexithymia. *Psychotherapy and Psychosomatics*, *66*(2), 83-86.

De Witt, L., & Ploeg, J. (2006). Critical appraisal of rigour in interpretive phenomenological nursing research. *Journal of Advanced Nursing*, *55*(2), 215-229.

DeYoung, C. G. (2006). Higher-order factors of the Big Five in a multi-informant sample. *Journal of Personality and SocialPpsychology*, *91*(6), 1138-1151.

DeYoung, C. G. (2010). Personality neuroscience and the biology of traits. *Social and Personality Psychology Compass*, *4*(12), 1165-1180.

DeYoung, C. G., Hirsh, J. B., Shane, M. S., Papademetris, X., Rajeevan, N., & Gray, J. R. (2010). Testing predictions from personality neuroscience: Brain structure and the big five. *Psychological Science*, *21*(6), 820-828.

DeYoung, C. G., Peterson, J. B., & Higgins, D. M. (2002). Higher-order factors of the Big Five predict conformity: Are there neuroses of health?. *Personality and Individual Differences*, *33*(4), 533-552.

DeYoung, C. G., Quilty, L. C., & Peterson, J. B. (2007). Between facets and domains: 10 aspects of the Big Five. *Journal of Personality and Social Psychology*, *93*(5), 880-896.

Dhingra, S. S., Zack, M., Strine, T., Pearson, W. S., & Balluz, L. (2010). Determining prevalence and correlates of psychiatric treatment with Andersen's behavioral model of health services use. *Psychiatric Services*, *61*(5), 524-528.

Diefenbach, M. A., & Leventhal, H. (1996). The common-sense model of illness representation: Theoretical and practical considerations. *Journal of Social Distress and the Homeless*, *5*(1), 11-38.

Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology*, *41*(1), 417-440.

Digman, J. M. (1997). Higher-order factors of the Big Five. *Journal of Personality and Social psychology*, *73*(6), 1246.

DiMatteo, M. R. (2004). Variations in patients' adherence to medical recommendations: a quantitative review of 50 years of research. *Medical Care*, *42*(3), 200-209.

DiMatteo, M. R., & Friedman, H. S. (1982). *Social psychology and medicine*. Cambridge, MA.

DiMatteo, M. R., Giordani, P. J., Lepper, H. S., & Croghan, T. W. (2002). Patient adherence and medical treatment outcomes a meta-analysis. *Medical Care*, *40*(9), 794-811.

DiMatteo, M. R., Haskard, K. B., & Williams, S. L. (2007). Health beliefs, disease severity, and patient adherence: a meta-analysis. *Medical Care*, *45*(6), 521-528.

Dingemanse, N. J., Kazem, A. J., Réale, D., & Wright, J. (2010). Behavioural reaction norms: animal personality meets individual plasticity. *Trends in Ecology & Evolution*, *25*(2), 81-89.

Dobber, J., Latour, C., de Haan, L., op Reimer, W. S., Peters, R., Barkhof, E., & van Meijel, B. (2018). Medication adherence in patients with schizophrenia: a qualitative study of the patient process in motivational interviewing. *BMC Psychiatry*, *18*(1), 135.

Dolce, J. J., Crisp, C., Manzella, B., Richards, J. M., Hardin, J. M., & Bailey, W. C. (1991). Medication adherence patterns in chronic obstructive pulmonary disease. *Chest*, *99*(4), 837-841.

Donnelly, G. F. (1993). Chronicity: Concept and reality. *Holistic nursing practice*, *8*(1), 1-7.

Donovan, J. L. (1995). Patient decision making: the missing ingredient in compliance research. *International Journal of Technology Assessment in Health Care*, *11*(3), 443-455.

Donovan, J. L., & Blake, D. R. (1992). Patient non-compliance: deviance or reasoned decision-making?. *Social Science & Medicine*, *34*(5), 507-513.

Donyai, P. (2012). *Social and cognitive pharmacy: theory and case studies*. Pharmaceutical Press.

Dowell, J., & Hudson, H. (1997). A qualitative study of medication-taking behaviour in primary care. *Family Practice*, *14*(5), 369-375.

Dowell, J., Jones, A., & Snadden, D. (2002). Exploring medication use to seek concordance with 'non-adherent' patients: a qualitative study. *British Journal of General Practice*, *52*(474), 24-32.

Dowell, J., Williams, B., & Snadden, D. (2007). *Patient-Centred Prescribing*. Oxford: Radcliffe Press.

Dowlati, Y., Herrmann, N., Swardfager, W., Liu, H., Sham, L., Reim, E. K., & Lanctôt, K. L. (2010). A meta-analysis of cytokines in major depression. *Biological Psychiatry*, *67*(5), 446-457.

Driscoll, K. A., Johnson, S. B., Hogan, J., Gill, E., Wright, N., & Deeb, L. C. (2013). Insulin bolusing software: the potential to optimize health outcomes in type 1 diabetes mellitus. *Journal of Diabetes Science and Technology*, *7*(3), 646-652.

Dublin, L. (1946) The problem of the tuberculous veteran. *Transactions of the National Tuberculosis Association 40*, 151-154.

Dumit, J., & Greenslit, N. (2006). Pharmaceutical cultures. *Culture, Medicine, and Psychiatry*, *30*(2) 127-134.

Dunbar, F. (1947). *Mind and body: Psychosomatic medicine*. Random. New York.

Dunbar, J.M., Marshall, G.D., Hovell, M.F. (1979). Behavioural strategies for improving compliance. Compliance in health care. In R.B. Haynes, D.W. Taylor, & D.L. Sackett, (Eds.), (1979). *Compliance in health care*, (p.174-190).

Dunlay, S. M., Shah, N. D., Shi, Q., Morlan, B., VanHouten, H., Hall Long, K., & Roger, V. L. (2011). Lifetime costs of medical care after heart failure diagnosis. *Circulation: Cardiovascular Quality and Outcomes*, *4*(1), 68-75.

Dweck, C. S. (2013). *Self-theories: Their role in motivation, personality, and development*. Psychology press.

Easthall, C., Song, F., & Bhattacharya, D. (2013). A meta-analysis of cognitive-based behaviour change techniques as interventions to improve medication adherence. *BMJ Open*, *3*(8).

Easton, P., Entwistle, V. A., & Williams, B. (2010). Health in the 'hidden population' of people with low literacy. A systematic review of the literature. *BMC Public Health*, *10*(1), 1-10.

Eaton, C. B., Galliher, J. M., McBride, P. E., Bonham, A. J., Kappus, J. A., & Hickner, J. (2006). Family physician's knowledge, beliefs, and self-reported practice patterns regarding hyperlipidemia: a National Research Network (NRN) survey. *The Journal of the American Board of Family Medicine*, *19*(1), 46-53.

Eaton, L. G., & Tinsley, B. J. (1999). Maternal personality and health communication in the pediatric context. *Health Communication*, *11*(1), 75-96.

Eberle, T. S. (2007). Phenomenology and sociology: Divergent interpretations of a complex relationship. In H. Nasu, & F.C. Waksler, (Eds.), (2012) *Interaction and Everyday Life: Phenomenological and Ethnomethodological Essays in Honor of George Psathas*, (p.151-167).

Eccles, M., Grimshaw, J., Walker, A., Johnston, M., & Pitts, N. (2005). Changing the behavior of healthcare professionals: the use of theory in promoting the uptake of research findings. *Journal of Clinical Epidemiology*, *58*(2), 107-112.

Edgar, K. A., & Skinner, T. C. (2003). Illness representations and coping as predictors of emotional well-being in adolescents with type 1 diabetes. *Journal of Pediatric Psychology*, *28*(7), 485-493.

Ediger, J. P., Walker, J. R., Graff, L., Lix, L., Clara, I., Rawsthorne, P., ... & Bernstein, C. N. (2007). Predictors of medication adherence in inflammatory bowel disease. *The American Journal of Gastroenterology*, *102*(7), 1417-1426.

Edmonds, G. W., Bogg, T., & Roberts, B. W. (2009). Are personality and behavioral measures of impulse control convergent or distinct predictors of health behaviors?. *Journal of Research in Personality*, *43*(5), 806-814.

Egan, B. M., Lackland, D. T., & Cutler, N. E. (2003). Awareness, knowledge, and attitudes of older Americans about high blood pressure: implications for health care policy, education, and research. *Archives of Internal Medicine, 163*(6), 681-687.

Eldred, L. J., Wu, A. W., Chaisson, R. E., & Moore, R. D. (1998). Adherence to antiretroviral and pneumocystis prophylaxis in HIV disease. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology: Official Publication of the International Retrovirology Association*, *18*(2), 117-125.

Eldredge, L. K. B., Markham, C. M., Ruiter, R. A., Fernández, M. E., Kok, G., & Parcel, G. S. (2016). *Planning health promotion programs: an intervention mapping approach*. John Wiley & Sons.

Elfhag, K., & Lundh, L. G. (2007). TAS-20 alexithymia in obesity, and its links to personality. *Scandinavian Journal of Psychology*, *48*(5), 391-398.

Elliott, R. (2009). Non-adherence to medicines: not solved but solvable. *Journal of Health Services Research & Policy*, *14*(1), 58-61.

Elliott, R. A., Ross-Degnan, D., Adams, A. S., Safran, D. G., & Soumerai, S. B. (2007). Strategies for coping in a complex world: adherence behavior among older adults with chronic illness. *Journal of General Internal Medicine*, *22*(6), 805-810.

Elliott, R. A., Shinogle, J. A., Peele, P., Bhosle, M., & Hughes, D. A. (2008). Understanding medication compliance and persistence from an economics perspective. *Value in Health*, *11*(4), 600-610.

Ellis, C., Petrie, K., Cameron, L., Buick, D., & Weinman, J. (2001). A positive change in patients' perception of their illness and earlier return to work follows an early psychological intervention programme post-myocardial infarction. In *Circulation,* 104 (17), 799-799.

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced nursing*, *62*(1), 107-115.

Elstad, E., Carpenter, D. M., Devellis, R. F., & Blalock, S. J. (2012). Patient decision making in the face of conflicting medication information. *International Journal of Qualitative Studies on Health and Well-being*, *7*(1), 18523.

Elwyn, G., Edwards, A., & Britten, N. (2003). “Doing prescribing”: how doctors can be more effective. *BMJ*, *327*(7419), 864-867.

Emden, C., & Sandelowski, M. (1998). The good, the bad and the relative, part one: Conceptions of goodness in qualitative research. *International Journal of Nursing Practice*, *4*(4), 206-212.

Emilsson, M., Berndtsson, I., Lötvall, J., Millqvist, E., Lundgren, J., Johansson, Å., & Brink, E. (2011). The influence of personality traits and beliefs about medicines on adherence to asthma treatment. *Primary Care Respiratory Journal*, *20*(2), 141-147.

Engel, G. L. (1977). The need for a new medical model: a challenge for biomedicine. *Science*, *196*(4286), 129-136.

Enriquez, M., & McKinsey, D. S. (2011). Strategies to improve HIV treatment adherence in developed countries: clinical management at the individual level. *HIV/AIDS (Auckland, NZ)*, *3*, 45-51.

Entwistle, V. A., Carter, S. M., Cribb, A., & McCaffery, K. (2010). Supporting patient autonomy: the importance of clinician-patient relationships. *Journal of General Internal Medicine*, *25*(7), 741-745.

Eriksson, I., Undén, A. L., & Elofsson, S. (2001). Self-rated health. Comparisons between three different measures. Results from a population study. *International Journal of Epidemiology*, *30*(2), 326-333.

Erlingsson, C., & Brysiewicz, P. (2013). Orientation among multiple truths: An introduction to qualitative research. *African Journal of Emergency Medicine*, *3*(2), 92-99.

Evangelista, L. S., Berg, J., & Dracup, K. (2001). Relationship between psychosocial variables and compliance in patients with heart failure. *Heart & Lung*, *30*(4), 294-301.

Evans, R. G., & Stoddart, G. L. (2017). Producing health, consuming health care. In *Why are some people healthy and others not?* (pp. 27-64). Routledge.

Ewing, G., Rogers, M., Barclay, S., McCabe, J., Martin, A., & Todd, C. (2004). Recruiting patients into a primary care based study of palliative care: why is it so difficult?. *Palliative Medicine*, *18*(5), 452-459.

Eysenck, H. J. (1947). *Dimensions of personality: A record of research carried out in collaboration with HT Himmelweit [and others]*. K. Paul, Trench, Trubner.

Eysenck, H. J. (1950). *Dimensions of personality* (Vol. 5). Transaction Publishers.

Eysenck, H. J. (1952). *The scientific study of personality*. MacMillan.

Eysenck, H. J. (1966). Personality and experimental psychology. *Bulletin of the British Psychological Society*.

Eysenck, H. J. (1990). Type A behaviour and coronary heart disease: The third stage. *Journal of Social Behavior and Personality*, *5*(1), 25-44.

Eysenck, H. J. (1992a). A reply to Costa and McCrae. P or A and C—the role of theory. *Personality and Individual Differences*, *13*(8), 867-868.

Eysenck, H. J. (1992b). The definition and measurement of psychoticism. *Personality and Individual Differences*, *13*(7), 757-785.

Eysenck, H. J., & Eysenck, S. B. (1967). On the unitary nature of extraversion. *Acta Psychologica, Amsterdam*.

Eysenck, H. J., & Eysenck, S. B. (1971). The orthogonality of psychoticism and neuroticism: a factorial study. *Perceptual and Motor Skills*, *33*(2), 461-462.

Eysenck, H. J., & Eysenck, S. B. G. (1975). *EPQ (Eysenck personality questionnaire)*. Educational and Industrial Testing Service.

Eysenck, S. B., Eysenck, H. J., & Barrett, P. (1985). A revised version of the psychoticism scale. *Personality and individual differences*, *6*(1), 21-29.

Farah, M. J. (2005). Neuroethics: the practical and the philosophical. *Trends in cognitive sciences*, *9*(1), 34-40.

Farmer, K. C. (1999). Methods for measuring and monitoring medication regimen adherence in clinical trials and clinical practice. *Clinical Therapeutics*, *21*(6), 1074-1090.

Fausto-Sterling, A. (2008). The bare bones of race. *Social Studies of Science*, *38*(5), 657-694.

Fayers, P. M., & Sprangers, M. A. (2002). Understanding self-rated health. *The Lancet*, *359*(9302), 187-188.

Feldman, P. J., Cohen, S., Doyle, W. J., Skoner, D. P., & Gwaltney Jr, J. M. (1999). The impact of personality on the reporting of unfounded symptoms and illness. *Journal of Personality and Social Psychology*, *77*(2), 370-378.

Feldman, R., Bacher, M., Campbell, N., Drover, A., & Chockalingam, A. (1998). Adherence to pharmacologic management of hypertension. *Canadian Journal of Public Health*, *89*(5), I16-I18.

Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods*, *5*(1), 80-92.

Ferguson, E. (2000). Hypochondriacal concerns and the five factor model of personality. *Journal of Personality*, *68*(4), 705-724.

Ferguson, E. (2001). Intellect and somatic health: Associations with hypochondriacal concerns, perceived threat and fainting. *Psychotherapy and Psychosomatics*, *70*(6), 319-327.

Ferguson, E. (2008). Health anxiety moderates the daytime cortisol slope. *Journal of Psychosomatic Research*, *64*(5), 487-494.

Ferguson, E. (2009). A taxometric analysis of health anxiety. *Psychological Medicine*, *39*(2), 277-285.

Ferguson, E. (2013). Personality is of central concern to understand health: towards a theoretical model for health psychology. *Health Psychology Review*, *7*(sup1), S32-S70.

Ferguson, E., & Bibby, P. A. (2012). Openness to experience and all-cause mortality: A meta-analysis and equivalent from risk ratios and odds ratios. *British Journal of Health Psychology*, *17*(1), 85-102.

Ferguson, E., & Cassaday, H. J. (2002). Theoretical accounts of Gulf War Syndrome: from environmental toxins to psychoneuroimmunology and neurodegeneration. *Behavioural Neurology*, *13*(3-4), 133-147.

Ferguson, E., James, D., & Madeley, L. (2002). Factors associated with success in medical school: systematic review of the literature. *BMJ*, *324*(7343), 952-957.

Ferguson, E., Moghaddam, N. G., & Bibby, P. A. (2007). Memory bias in health anxiety is related to the emotional valence of health-related words. *Journal of Psychosomatic Research*, *62*(3), 263-274.

Ferguson, E., Williams, L., O’Connor, R. C., Howard, S., Hughes, B. M., Johnston, D. W., ... & O’Carroll, R. E. (2009). A taxometric analysis of type-D personality. *Psychosomatic medicine*, *71*(9), 981-986.

Ferguson, H. (2006). *Phenomenological sociology: Experience and insight in modern society*. Sage.

Field, C. A., & O'Keefe, G. (2004). Behavioral and psychological risk factors for traumatic injury. *The Journal of Emergency Medicine*, *26*(1), 27-35.

Fife, B. L. (1994). The conceptualization of meaning in illness. *Social Science & Medicine*, *38*(2), 309-316.

Fineman, N. (1991). The social construction of noncompliance: Implications for cross-cultural geriatric practice. *Journal of Cross-cultural Gerontology*, *6*(2), 219-227.

Finfgeld, D. L. (1995). Becoming and being courageous in the chronically III elderly. *Issues in Mental Health Nursing*, *16*(1), 1-11.

Fischer, W., Brandstetter, S., Brandl, M., Finger, T., Böhmer, M. M., Pfeifer, M., & Apfelbacher, C. (2018). Specific, but not general beliefs about medicines are associated with medication adherence in patients with COPD, but not asthma: cohort study in a population of people with chronic pulmonary disease. *Journal of Psychosomatic Research*, *107*, 46-52.

Fishbein, M. (2008). A reasoned action approach to health promotion. *Medical Decision Making*, *28*(6), 834-844.

Fishbein, M. A., & Ajzen, I. (1975). *Belief, attitude, intention and behaviour: An introduction to theory and research*. Reading, Addison-Wesley.

Fishbein, M., & Ajzen, I. (1980). *Understanding attitudes and predicting social behavior*. Prentice Hall, New York.

Fisher, J. D., & Fisher, W. A. (1992). Changing AIDS-risk behavior. *Psychological bulletin*, *111*(3), 455-474.

Fiske, D. W. (1949). Consistency of the factorial structures of personality ratings from different sources. *The Journal of Abnormal and Social Psychology*, *44*(3), 329-344.

Fitzgerald, J. T., Davis, W. K., Connell, C. M., Hess, G. E., Funnell, M. M., & Hiss, R. G. (1996). Development and validation of the Diabetes Care Profile. *Evaluation & the Health Professions*, *19*(2), 208-230.

Flay, B. R., & Petraitis, J. (1994). A new theory of health behavior with implications for preventive interventions. *Advances in Medical Sociology*, *4*, 19-44.

Flynn, K. E., & Smith, M. A. (2007). Personality and health care decision-making style. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *62*(5), P261-P267.

Foley, K., Carls, G., & Roberto, P. (2012). PHP42 Medication Adherence and Medical Cost Offsets: A Review of the Literature. *Value in Health*, *15*(4), A20.

Foley, K., & Hansen, L. (2006). Understanding patient beliefs to design medication adherence messaging. *Value in Health*, *9*(3), A137-A138.

Fond, G., Boyer, L., Boucekine, M., Aden, L. A., Schürhoff, F., Tessier, A., ... & Chereau, I. (2017). Validation study of the Medication Adherence Rating Scale. Results from the FACE-SZ national dataset. *Schizophrenia Research*, *182*, 84-89.

Fongwa, M. N., Evangelista, L. S., Hays, R. D., Martins, D. S., Elashoff, D., Cowan, M. J., & Morisky, D. E. (2008). Adherence treatment factors in hypertensive African American women. *Vascular health and risk management*, *4*(1), 157-166.

Ford, E. S., & Capewell, S. (2011). Proportion of the decline in cardiovascular mortality disease due to prevention versus treatment: public health versus clinical care. *Annual Review of Public Health*, *32*, 5-22.

Foster, J. P. (1905). Detention institutes for ignorant and vicious consumptives. *Transaction of the National Association for the Study and Prevention of Tuberculosis*, *1*, 333-8.

Fox, N. J., Ward, K. J., & O'Rourke, A. J. (2005). The 'expert patient': empowerment or medical dominance? The case of weight loss, pharmaceutical drugs and the Internet. *Social Science & Medicine*, *60*(6), 1299-1309.

Francis, J. J., Johnston, M., Robertson, C., Glidewell, L., Entwistle, V., Eccles, M. P., & Grimshaw, J. M. (2010). What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *Psychology and Health*, *25*(10), 1229-1245.

Francis, J. J., O'Connor, D., & Curran, J. (2012). Theories of behaviour change synthesised into a set of theoretical groupings: introducing a thematic series on the theoretical domains framework. *Implementation Science*, *7*(1), 35.

Frank, J. W., Cohen, R., Yen, I., Balfour, J., & Smith, M. (2003). Socioeconomic gradients in health status over 29 years of follow-up after midlife: the Alameda county study. *Social Science & Medicine*, *57*(12), 2305-2323.

Franken, R. E., Gibson, K. J., & Mohan, P. (1990). Sensation seeking and disclosure to close and casual friends. *Personality and Individual Differences*, *11*(8), 829-832.

Frankfurt, H. (1971). Free Will and the Concept of a Person. *Journal of Philosophy*, *68*(1), 5-20.

Freidson, E. (1970). Influence du client sur l’exercice de la médecine. *Herlich, C., Médecine, Maladie et société. France: Ed. Mouton*.

French, S. D., Green, S. E., O’Connor, D. A., McKenzie, J. E., Francis, J. J., Michie, S., ... & Grimshaw, J. M. (2012). Developing theory-informed behaviour change interventions to implement evidence into practice: a systematic approach using the Theoretical Domains Framework. *Implementation Science*, *7*(1), 38.

Freud, S. (1959). Inhibitions, symptoms and anxiety. V J. Strachey (ur.). *The standard edition of the complete psychological works of Sigmund Freud, 20*, 1925-1926. (Original work published 1926).

Friedman, H. S. (2000). Long-term relations of personality and health: Dynamisms, mechanisms, tropisms. *Journal of Personality*, *68*(6), 1089-1107.

Friedman, H. S. (2000). *The self-healing personality: Why some people achieve health and others succumb to illness*. iUniverse.

Friedman, H. S. (2008). The multiple linkages of personality and disease. *Brain, Behavior, and Immunity*, *22*(5), 668-675.

Friedman, H. S. (2011). *Personality, disease, and self-healing.* In H. S. Friedman (Ed.), *Oxford library of psychology. The Oxford handbook of health psychology* (p. 215–240). Oxford University Press.

Friedman, H. S., & Adler, N. E. (2007). The history and background of health psychology. In H.S. Friedman, & R.C. Silver, (Eds.), *Foundations of Health Psychology*, (p. 3-18). Oxford University Press.

Friedman, H. S., & Booth-Kewley, S. (1987). The "disease-prone personality": A meta-analytic view of the construct. *American Psychologist*, *42*(6), 539-555.

Friedman, H. S., & Martin, L. R. (2011). *The longevity project: surprising discoveries for health and long life from the landmark eight decade study*. Hay House, Inc.

Friedman, M., & Rosenman, R. H. (1959). Association of specific overt behavior pattern with blood and cardiovascular findings: blood cholesterol level, blood clotting time, incidence of arcus senilis, and clinical coronary artery disease. *Journal of the American Medical Association, 169*(12), 1286-1296.

Fu, A. Z., Qiu, Y., & Radican, L. (2009). Impact of fear of insulin or fear of injection on treatment outcomes of patients with diabetes. *Current Medical Research and Opinion*, *25*(6), 1413-1420.

Fuller, R. H., Perel, P., Navarro-Ruan, T., Nieuwlaat, R., Haynes, R. B., & Huffman, M. D. (2018). Improving medication adherence in patients with cardiovascular disease: a systematic review. *Heart*, *104*(15), 1238-1243.

Furnham, A., Richards, S. C., & Paulhus, D. L. (2013). The Dark Triad of personality: A 10 year review. *Social and Personality Psychology Compass*, *7*(3), 199-216.

Gadamer, H. G. (1960). *Wahrheit und method: Grundzuge einer philosophischen Hermeneutik*. JCB Mohr.

Gadamer, H. G. (1976). *Philosophical hermeneutics* (DE Linge, Trans.). Berkeley, CA: University of California.

Gadamer, H. G. (1994). *Heidegger's ways*. SUNY Press.

Gaffney, A. W., White, A. C., Woolhandler, S., Himmelstein, D., Christiani, D. C., & McCormick, D. (2019). Effect of High-Deductible Health Plans on Healthcare Access, Financial Strain, Medication Adherence, and Outcomes for Patients with COPD: Findings from the

National Health Interview Survey. In *D93. Paying for Care in Pulmonary Diseases* (p. A7033-A7033). American Thoracic Society.

Galvin, K., & Todres, L. (2009). Poetic inquiry & phenomenological research: The practice of 'embodied interpretation'. In *Poetic Inquiry* (pp. 307-316). Brill Sense.

Gamble, J., Fitzsimons, D., Lynes, D., & Heaney, L. G. (2007). Difficult asthma: people's perspectives on taking corticosteroid therapy. *Journal of Clinical Nursing*, *16*(3a), 59-67.

Gangestad, S. W., Haselton, M. G., & Buss, D. M. (2006). Evolutionary foundations of cultural variation: Evoked culture and mate preferences. *Psychological Inquiry*, *17*(2), 75-95.

Gannon, K., Glover, L., O'Neill, M., & Emberton, M. (2004). Men and chronic illness: a qualitative study of LUTS. *Journal of Health Psychology*, *9*(3), 411-420.

Garber, M. C., Nau, D. P., Erickson, S. R., Aikens, J. E., & Lawrence, J. B. (2004). The concordance of self-report with other measures of medication adherence: a summary of the literature. *Medical Care*, *42*(7), 649-652.

García, S., Martínez-Cengotitabengoa, M., López-Zurbano, S., Zorrilla, I., López, P., Vieta, E., & González-Pinto, A. (2016). Adherence to antipsychotic medication in bipolar disorder and schizophrenic patients: a systematic review. *Journal of Clinical Psychopharmacology*, *36*(4), 355-371.

Gauci, M., King, M. G., Saxarra, H., Tulloch, B. J., & Husband, A. J. (1993). A Minnesota Multiphasic Personality Inventory profile of women with allergic rhinitis. *Psychosomatic Medicine*, *55*(6), 533-540.

Gebhardt, W. A., & Maes, S. (2001). Integrating social-psychological frameworks for health behavior research. *American Journal of Health Behavior*, *25*(6), 528-536.

Geertz, C. (1973). *The interpretation of cultures* (Vol. 5019). Basic books.

Geest, S. V. D., Whyte, S. R., & Hardon, A. (1996). The anthropology of pharmaceuticals: a biographical approach. *Annual Review of Anthropology*, *25*(1), 153-178.

Gellad, W. F., Grenard, J. L., & Marcum, Z. A. (2011). A systematic review of barriers to medication adherence in the elderly: looking beyond cost and regimen complexity. *The American Journal of Geriatric Pharmacotherapy*, *9*(1), 11-23.

George, E., & Engel, L. (1980). The clinical application of the biopsychosocial model. *American Journal of Psychiatry*, *137*(5), 535-544.

George, J., Kong, D. C., Thoman, R., & Stewart, K. (2005). Factors associated with medication nonadherence in patients with COPD. *Chest*, *128*(5), 3198-3204.

Gerend, M. A., Aiken, L. S., & West, S. G. (2004). Personality factors in older women's perceived susceptibility to diseases of aging. *Journal of Personality*, *72*(2), 243-270.

German, P. S., Klein, L. E., McPhee, S. J., & Smith, C. R. (1982). Knowledge of and compliance with drug regimens in the elderly. *Journal of the American Geriatrics Society*, *30*(9), 568-571.

Gerritsen, L., Geerlings, M. I., Bremmer, M. A., Beekman, A. T., Deeg, D. J., Penninx, B. W., & Comijs, H. C. (2009). Personality characteristics and hypothalamic-pituitary-adrenal axis regulation in older persons. *The American Journal of Geriatric Psychiatry*, *17*(12), 1077-1084.

Gherman, A., Schnur, J., Montgomery, G., Sassu, R., Veresiu, I., & David, D. (2011). How are adherent people more likely to think? A meta-analysis of health beliefs and diabetes self-care. *The Diabetes Educator*, *37*(3), 392-408.

Gillibrand, W., & Flynn, M. (2001). Forced externalization of control in people with diabetes: a qualitative exploratory study. *Journal of Advanced Nursing*, *34*(4), 501-510.

Giorgi, A. (2009). *The descriptive phenomenological method in psychology: A modified Husserlian approach*. Duquesne University Press.

Glanz, K., Rimer, B. K., & Viswanath, K. (Eds.), (2015). *Health behavior: Theory, research, and practice*. John Wiley & Sons.

Glidden, D. V., Amico, K. R., Liu, A. Y., Hosek, S. G., Anderson, P. L., Buchbinder, S. P., ... & Grinsztejn, B. (2016). Symptoms, side effects and adherence in the iPrEx open-label extension. *Clinical Infectious Diseases*, *62*(9), 1172-1177.

Goffman, E. (1959). The moral career of the mental patient. *Psychiatry*, *22*(2), 123-142.

Goffman, E. (1967). *Interaction ritual: essays on face-to-face interaction*. Aldine.

Goldacre, B. (2012). *Bad pharma: how medicine is broken, and how we can fix it*. HarperCollins UK.

Goldacre, B., & Smith, R. (2012). Bad medicine. *London: Fourth*, 1-99.

Goldberg, L. R. (1993). The structure of phenotypic personality traits. *American Psychologist*, *48*(1), 26-34.

Goldberg, L. R. (1999). A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor models. *Personality Psychology in Europe*, *7*(1), 7-28.

Goldberg, R. J., & Katz, J. (2007). A meta-analysis of the analgesic effects of omega-3 polyunsaturated fatty acid supplementation for inflammatory joint pain. *Pain*, *129*(1-2), 210-223.

The Global Initiative for Chronic Obstructive Lung Disease (GOLD). *Available on: https://goldcopd.org/ (accessed 17th April 2019).*

Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. *Advances in Experimental Social Psychology*, *38*, 69-119.

Gonzalez, J. S., Penedo, F. J., Antoni, M. H., Durán, R. E., McPherson-Baker, S., Ironson, G., ... & Schneiderman, N. (2004). Social support, positive states of mind, and HIV treatment adherence in men and women living with HIV/AIDS. *Health Psychology*, *23*(4), 413-418.

González-Moreno, M., Saborido, C., & Teira, D. (2015). Disease-mongering through clinical trials. *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences, 51*, 11-18.

Goodwin, D., Mays, N., & Pope, C. (2006). *Ethical Issues: Qualitative Research in Health Care 3rd Edn*. Blackwell publishing.

Goodwin, R. D., Cox, B. J., & Clara, I. (2006). Neuroticism and physical disorders among adults in the community: results from the National Comorbidity Survey. *Journal of Behavioral Medicine*, *29*(3), 229-238.

Goodwin, R., & Engstrom, G. (2002). Personality and the perception of health in the general population. *Psychological Medicine*, *32*(2), 325-332.

Goodwin, R. D., & Friedman, H. S. (2006). Health status and the five-factor personality traits in a nationally representative sample. *Journal of Health Psychology*, *11*(5), 643-654.

Goodwin, R. D., Jacobi, F., & Thefeld, W. (2003). Mental disorders and asthma in the community. *Archives of General Psychiatry*, *60*(11), 1125-1130.

Gordis, L. (1979). Conceptual and methodologic problems in measuring patient compliance. *Compliance in Health Care*, *1*, 23-45.

Gore-Felton, C., & Koopman, C. (2008). Behavioral mediation of the relationship between psychosocial factors and HIV disease progression. *Psychosomatic Medicine*, *70*(5), 569-574.

Gore–Felton, C., Rotheram–Borus, M. J., Weinhardt, L. S., Kelly, J. A., Lightfoot, M., Kirshenbaum, S. B., ... & Remien, R. H. (2005). The Healthy Living Project: An individually tailored, multidimensional intervention for HIV–infected persons. *AIDS Education & Prevention*, *17*(Supplement A), 21-39.

Gorevski, E., Succop, P., Sachdeva, J., Cavanaugh, T. M., Volek, P., Heaton, P., ... & Martin-Boone, J. E. (2013). Is there an association between immunosuppressant therapy medication adherence and depression, quality of life, and personality traits in the kidney and liver transplant population?. *Patient Preference and Adherence*, *7*, 301-7.

Gosling, S. D., Rentfrow, P. J., & Swann Jr, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, *37*(6), 504-528.

Grabe, H. J., Schwahn, C., Barnow, S., Spitzer, C., John, U., Freyberger, H. J., ... & Völzke, H. (2010). Alexithymia, hypertension, and subclinical atherosclerosis in the general population. *Journal of Psychosomatic Research*, *68*(2), 139-147.

Granot, M., & Ferber, S. G. (2005). The roles of pain catastrophizing and anxiety in the prediction of postoperative pain intensity: a prospective study. *The Clinical Journal of Pain*, *21*(5), 439-445.

Gray, J. A. (1970). The psychophysiological basis of introversion-extraversion. *Behaviour Research and Therapy*, *8*(3), 249-266.

Gray, J. A. (1982). Précis of The neuropsychology of anxiety: An enquiry into the functions of the septo-hippocampal system. *Behavioral and Brain Sciences*, *5*(3), 469-484.

Gray, J. A. (1987). *The psychology of fear and stress* (Vol. 5). CUP Archive.

Green, J. A., O'Connor, D. B., Gartland, N., & Roberts, B. W. (2016). The Chernyshenko conscientiousness scales: A new facet measure of conscientiousness. *Assessment*, *23*(3), 374-385.

Greenglass, E. R., & Julkunen, J. (1991). Cook-Medley hostility, anger, and the Type A behavior pattern in Finland. *Psychological Reports*, *68*(3_suppl), 1059-1066.

Grégoire, J. P., Moisan, J., Guibert, R., Ciampi, A., Milot, A., Côté, I., & Gaudet, M. (2001). Tolerability of antihypertensive drugs in a community-based setting. *Clinical Therapeutics*, *23*(5), 715-726.

Griffin, S. J., Kinmonth, A. L., Veltman, M. W., Gillard, S., Grant, J., & Stewart, M. (2004). Effect on health-related outcomes of interventions to alter the interaction between patients and practitioners: a systematic review of trials. *The Annals of Family Medicine*, *2*(6), 595-608.

Grime, J., & Pollock, K. (2003). Patients' ambivalence about taking antidepressants: a qualitative study. *Pharmaceutical Journal*, *271*(7270), 516-519.

Grime, J., & Pollock, K. (2004). Information versus experience: a comparison of an information leaflet on antidepressants with lay experience of treatment. *Patient Education and Counseling*, *54*(3), 361-368.

Gritti, P., Lombardi, S., Nobile, B., Trappoliere, P., Gambardella, A., Di Caprio, E. L., & Resicato, G. (2010). Alexithymia and cancer-related fatigue: A controlled cross-sectional study. *Tumori Journal*, *96*(1), 131-137.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *Handbook of Qualitative Research*, *2*(163-194), 105.

Guba, E. G., & Lincoln, Y. S. (2005). Paradigmatic controversies, contradictions, and emerging confluences. In: N.K. Denzin, & Y.S. Lincoln (Eds.), *The Sage Handbook of Qualitative Research*, 3rd Edition (p. 191-215). Thousand Oaks, CA: Sage.

Guyll, M., & Madon, S. J. (2004). Effects of trait hostility and self-relevance on social information processing. *Basic and Applied Social Psychology*, *26*(4), 263-276.

Ha, J. F., & Longnecker, N. (2010). Doctor-patient communication: a review. *Ochsner Journal*, *10*(1), 38-43.

Hagger, M. S., & Orbell, S. (2003). A meta-analytic review of the common-sense model of illness representations. *Psychology and Health*, *18*(2), 141-184.

Hahn, E., Gottschling, J., & Spinath, F. M. (2012). Short measurements of personality–Validity and reliability of the GSOEP Big Five Inventory (BFI-S). *Journal of Research in Personality*, *46*(3), 355-359.

Hajjar, E. R., Cafiero, A. C., & Hanlon, J. T. (2007). Polypharmacy in elderly patients. *The American Journal of Geriatric Pharmacotherapy*, *5*(4), 345-351.

Halbert, R. J., Isonaka, S., George, D., & Iqbal, A. (2003). Interpreting COPD prevalence estimates: what is the true burden of disease?. *Chest*, *123*(5), 1684-1692.

Hamer, H. M., De Preter, V., Cloetens, L., Vandermeulen, G., Courtin, C. M., Broekaert, W. F., ... & Verbeke, K. (2010). T2026 A Dietary Intervention With Arabinoxylan Oligosaccharides Reduces Colonic Protein Fermentation in Healthy Subjects: Results From Faecal Metabolite Fingerprint Analysis. *Gastroenterology*, *138*(5), S-616.

Hammersley, M. (2018). *Routledge Revivals: The Dilemma of Qualitative Method (1989): Herbert Blumer and the Chicago Tradition*. Routledge.

Hammond, W. P., Matthews, D., & Corbie-Smith, G. (2010). Psychosocial factors associated with routine health examination scheduling and receipt among African American men. *Journal of the National Medical Association*, *102*(4), 276-289.

Hammond, W. P., Matthews, D., Mohottige, D., Agyemang, A., & Corbie-Smith, G. (2010). Masculinity, medical mistrust, and preventive health services delays among community-dwelling African-American men. *Journal of General Internal Medicine*, *25*(12), 1300-1308.

Hampson, S. E., Goldberg, L. R., Vogt, T. M., & Dubanoski, J. P. (2007). Mechanisms by which childhood personality traits influence adult health status: Educational attainment and healthy behaviors. *Health Psychology*, *26*(1), 121-125.

Hanchak, N. A., Patel, M. B., Berlin, J. A., & Strom, B. L. (1996). Patient misunderstanding of dosing instructions. *Journal of General Internal Medicine*, *11*(6), 325-328.

Hansen, N. B., Vaughan, E. L., Cavanaugh, C. E., Connell, C. M., & Sikkema, K. J. (2009). Health-related quality of life in bereaved HIV-positive adults: Relationships between HIV symptoms, grief, social support, and Axis II indication. *Health Psychology*, *28*(2), 249-257.

Happ, M. B., Naylor, M. D., & Roe-Prior, P. (1997). Factors contributing to rehospitalization of elderly patients with heart failure. *The Journal of Cardiovascular Nursing*, *11*(4), 75-84.

Harrison, J. A., Mullen, P. D., & Green, L. W. (1992). A meta-analysis of studies of the health belief model with adults. *Health Education Research*, *7*(1), 107-116.

Hartrick, G. A. (1998). The meaning of diabetes: Significance for holistic nursing practice. *Journal of Holistic Nursing*, *16*(1), 76-87.

Hartling, L., Guise, J. M., Kato, E., Anderson, J., Belinson, S., Berliner, E., ... & Noorani, H. (2015). A taxonomy of rapid reviews links report types and methods to specific decision-making contexts. *Journal of Clinical Epidemiology*, *68*(12), 1451-1462.

Hauser, K., & Matthes, J. (2017). Medical students' medication communication skills regarding drug prescription—a qualitative analysis of simulated physician-patient consultations. *European Journal of Clinical Pharmacology*, *73*(4), 429-435.

Haynes, R. B. (1979). Determinant of compliance: The disease and the mechanics of treatment. *Compliance in health care*. Johns Hopkins University Press.

Haynes, R. B. (2001). Improving patient adherence: state of the art, with a special focus on medication taking for cardiovascular disorders. *Compliance in Healthcare and Research.* Amonk NY: Futura Publishing Company, 3-21.

Haynes, R. B. (2005). Interventions for enhancing medication adherence systematic review. *Cochrane library*, *4*(11), 1858-1864

Haynes, R. B., McDonald, H. P., & Garg, A. X. (2002). Helping patients follow prescribed treatment: clinical applications. *JAMA, 288*(22), 2880-2883.

Haynes, R. B., McDonald, H. P., Garg, A., & Montague, P. (2002). Interventions for helping patients to follow prescriptions for medications. *Cochrane Database of Systematic Reviews*, (2).

Haynes, R. B., McKibbon, K. A., & Kanani, R. (1996). Systematic review of randomised trials of interventions to assist patients to follow prescriptions for medications. *The Lancet*, *348*(9024), 383-386.

Haynes, R. B., Taylor, D. W., & Sackett, D. L. (1979). *Adherence in health care*. Baltimore & London: Johns Hopkins University Press 1979: xvi, 516.

Haynes, R. B., Taylor, D. W., Sackett, D. L., Gibson, E. S., Bernholz, C. D., & Mukherjee, J. (1980). Can simple clinical measurements detect patient noncompliance?. *Hypertension*, *2*(6), 757-764.

Haynes, R. B., Yao, X., Degani, A., Kripalani, S., Garg, A. X., & McDonald, H. P. (2008). Interventions for enhancing medical adherence. *Cochrane Database of Systemic Reviews*, (2), 383-386.

Heaton, P. C., Tundia, N. L., & Luder, H. R. (2013). US emergency departments visits resulting from poor medication adherence: 2005–07. *Journal of the American Pharmacists Association*, *53*(5), 513-519.

Heijmans, M., Waverijn, G., Rademakers, J., van der Vaart, R., & Rijken, M. (2015). Functional, communicative and critical health literacy of chronic disease patients and their importance for self-management. *Patient Education and Counseling*, *98*(1), 41-48.

Heisler, M., Hogan, M. M., Hofer, T. P., Schmittdiel, J. A., Pladevall, M., & Kerr, E. A. (2008). Clinical Perspective. *Circulation*, *117*(22), 2884-2892.

Helmers, K. F., & Mente, A. (1999). Alexithymia and health behaviors in healthy male volunteers. *Journal of Psychosomatic Research*, *47*(6), 635-645.

Herbert, T. B., & Cohen, S. (1993). Stress and immunity in humans: a meta-analytic review. *Psychosomatic Medicine*, *55*(4), 364-379.

Hernandez, C. A. (1996). Integration: the experience of living with insulin dependent (Type 1) diabetes. *Canadian Journal of Nursing Research Archive*, *28*(4), 37-56.

Herttua, K., Tabák, A. G., Martikainen, P., Vahtera, J., & Kivimäki, M. (2013). Adherence to antihypertensive therapy prior to the first presentation of stroke in hypertensive adults: population-based study. *European Heart Journal*, *34*(38), 2933-2939.

Hess, D. J. (2004). Medical modernisation, scientific research fields and the epistemic politics of health social movements. *Sociology of Health & Illness*, *26*(6), 695-709.

Hess, L. M., Raebel, M. A., Conner, D. A., & Malone, D. C. (2006). Measurement of adherence in pharmacy administrative databases: a proposal for standard definitions and preferred measures. *Annals of Pharmacotherapy*, *40*(7-8), 1280-1288.

Hibbert, D., Bissell, P., & Ward, P. R. (2002). Consumerism and professional work in the community pharmacy. *Sociology of Health & Illness*, *24*(1), 46-65.

Higashi, K., Medic, G., Littlewood, K. J., Diez, T., Granström, O., & De Hert, M. (2013). Medication adherence in schizophrenia: factors influencing adherence and consequences of nonadherence, a systematic literature review. *Therapeutic Advances in Psychopharmacology*, *3*(4), 200-218.

Higgins, N., & Regan, C. (2004). A systematic review of the effectiveness of interventions to help older people adhere to medication regimes. *Age and Ageing*, *33*(3), 224-229.

Higgs, J. (1997). Thinking about clinical practice-how well do you reason?. *The Australian Journal of Physiotherapy*, *43*(3), 161-161.

Higgs, J. (2001). Charting standpoints in qualitative research. *Critical moments in qualitative research*, *14*(1), 44-67.

Hilbert, A., Martin, A., Zech, T., Rauh, E., & Rief, W. (2010). Patients with medically unexplained symptoms and their significant others: illness attributions and behaviors as predictors of patient functioning over time. *Journal of Psychosomatic Research*, *68*(3), 253-262.

Hill, P. L., & Roberts, B. W. (2011). The role of adherence in the relationship between conscientiousness and perceived health. *Health Psychology*, *30*(6), 797-804.

Hill, J. C., Lewis, M., Sim, J., Hay, E. M., & Dziedzic, K. (2007). Predictors of poor outcome in patients with neck pain treated by physical therapy. *The Clinical Journal of Pain*, *23*(8), 683-690.

Hiller, W., & Fichter, M. M. (2004). High utilizers of medical care: a crucial subgroup among somatizing patients. *Journal of Psychosomatic Research*, *56*(4), 437-443.

Hlatky, M. A., Solomon, M. D., Shilane, D., Leong, T. K., Brindis, R., & Go, A. S. (2013). Use of medications for secondary prevention after coronary bypass surgery compared with percutaneous coronary intervention. *Journal of the American College of Cardiology*, *61*(3), 295-301.

Ho, P. M., Magid, D. J., Shetterly, S. M., Olson, K. L., Maddox, T. M., Peterson, P. N., ... & Rumsfeld, J. S. (2008a). Medication nonadherence is associated with a broad range of adverse outcomes in patients with coronary artery disease. *American Heart Journal*, *155*(4), 772-779.

Ho, P. M., Magid, D. J., Shetterly, S. M., Olson, K. L., Peterson, P. N., Masoudi, F. A., & Rumsfeld, J. S. (2008b). Importance of therapy intensification and medication nonadherence for blood pressure control in patients with coronary disease. *Archives of Internal Medicine*, *168*(3), 271-276.

Hoberman, S. (2008). Ontology and Taxonomy. *Information Management*, *18*(5), 8.

Hochhausen, L., Le, H. N., & Perry, D. F. (2011). Community-based mental health service utilization among low-income Latina immigrants. *Community Mental Health Journal*, *47*(1), 14-23.

Hofmann, W., Friese, M., & Wiers, R. W. (2008). Impulsive versus reflective influences on health behavior: A theoretical framework and empirical review. *Health Psychology Review*, *2*(2), 111-137.

Hogan, T. P., Awad, A. G., & Eastwood, R. (1983). A self-report scale predictive of drug compliance in schizophrenics: reliability and discriminative validity. *Psychological Medicine, 13*(1), 177-183.

Hojat, M., Louis, D. Z., Markham, F. W., Wender, R., Rabinowitz, C., & Gonnella, J. S. (2011). Physicians' empathy and clinical outcomes for diabetic patients. *Academic Medicine*, *86*(3), 359-364.

Holgate, S. T., Price, D., & Valovirta, E. (2006). Asthma out of control? A structured review of recent patient surveys. *BMC Pulmonary Medicine*, *6*(1), S2.

Holloway, J. W., Yang, I. A., & Holgate, S. T. (2010). Genetics of allergic disease. *Journal of Allergy and Clinical Immunology*, *125*(2), S81-S94.

Holmes, J. (2018). *A practical psychoanalytic guide to reflexive research: the reverie research method*. Routledge.

Holt, M. (2007). Agency and dependency within treatment: Drug treatment clients negotiating methadone and antidepressants. *Social Science & Medicine*, *64*(9), 1937-1947.

Hook, M. L. (2006). Partnering with patients–a concept ready for action. *Journal of Advanced Nursing*, *56*(2), 133-143.

Hooker, C. I., Verosky, S. C., Miyakawa, A., Knight, R. T., & D’Esposito, M. (2008). The influence of personality on neural mechanisms of observational fear and reward learning. *Neuropsychologia*, *46*(11), 2709-2724.

Hope, C. J., Wu, J., Tu, W., Young, J., & Murray, M. D. (2004). Association of medication adherence, knowledge, and skills with emergency department visits by adults 50 years or older with congestive heart failure. *American Journal of Health-System Pharmacy*, *61*(19), 2043-2049.

Horan, M. L., Kim, K. K., Gendler, P., Froman, R. D., & Patel, M. D. (1998). Development and evaluation of the osteoporosis self-efficacy scale. *Research in Nursing & Health*, *21*(5), 395-403.

Horne, R. (2006). Compliance, adherence, and concordance: implications for asthma treatment. *Chest*, *130*(1), 65S-72S.

Horne, R., Chapman, S. C., Parham, R., Freemantle, N., Forbes, A., & Cooper, V. (2013). Understanding patients’ adherence-related beliefs about medicines prescribed for long-term conditions: a meta-analytic review of the Necessity-Concerns Framework. *PloS one, 8*(12), e80633.

Horne, R., & Weinman, J. (1998). *Predicting treatment adherence*. Adherence to Treatment in Medical Conditions, edited by Lynn Myers and Kenny Midence, 25-50.

Horne, R., & Weinman, J. (1999). Patients' beliefs about prescribed medicines and their role in adherence to treatment in chronic physical illness. *Journal of Psychosomatic Research*, *47*(6), 555-567.

Horne, R., & Weinman, J. (2002). Self-regulation and self-management in asthma: exploring the role of illness perceptions and treatment beliefs in explaining non-adherence to preventer medication. *Psychology and Health*, *17*(1), 17-32.

Horne, R., Weinman, J., Barber, N., Elliott, R., Morgan, M., Cribb, A., & Kellar, I. (2005). *Concordance, adherence and compliance in medicine taking*. London: NCCSDO, (pp. 40-6).

Horne, R., Weinman, J., & Hankins, M. (1999). The beliefs about medicines questionnaire: the development and evaluation of a new method for assessing the cognitive representation of medication. *Psychology and Health*, *14*(1), 1-24.

Hornsten, A., Lundman, B., Selstam, E. K., & Sandstrom, H. (2005). Patient satisfaction with diabetes care. *Journal of Advanced Nursing*, *51*(6), 609-617.

House of Commons Health Committee. *The influence of the pharmaceutical industry*. Available online*: http://www.parliament.the-stationery-office.co.uk/pa/cm200405/cmselect/cmhealth/42/42 pdf (*accessed 17th December 2017*).*

Hu, Y., Zhong, X. N., Peng, B., Zhang, Y., Liang, H., Dai, J. H., ... & Huang, A. L. (2018). Associations between perceived barriers and benefits of using HIV pre-exposure prophylaxis and medication adherence among men who have sex with men in Western China. *BMC Infectious Diseases*, *18*(1), 1-8.

Huang, E. S., Gorawara-Bhat, R., & Chin, M. H. (2005). Self-reported goals of older patients with type 2 diabetes mellitus. *Journal of the American Geriatrics Society*, *53*(2), 306-311.

Hume, D. (1907). *Essays: Moral, political, and literary* (Vol. 1). Longmans, Green, and Company.

Huntington, S. P. (1996). *The Clash of Civilizations and the Remaking of World Order*. New York.

Huovinen, E., Kaprio, J., & Koskenvuo, M. (2001). Asthma in relation to personality traits, life satisfaction, and stress: a prospective study among 11 000 adults. *Allergy*, *56*(10), 971-977.

Husserl, E. (1939). *Experience and judgement*. Churchill, J.S. & Ameriks, K., (Trans.), 1973. Northwestern University.

Husserl, E. (1999). *The essential Husserl: Basic writings in transcendental phenomenology*. Indiana University Press.

Husserl, E., Ricoeur, P., Merleau-Ponty, M., & Sartre, J. P. (1954). Idées directrices pour une phénoménologie. *Revue Philosophique de la France Et de l'Etranger* 144, 474-479.

Hutchison, L. C., Jones, S. K., West, D. S., & Wei, J. Y. (2006). Assessment of medication management by community-living elderly persons with two standardized assessment tools: a cross-sectional study. *The American Journal of Geriatric Pharmacotherapy*, *4*(2), 144-153.

Hutton, H. E., & Treisman, G. (2008). *The role of personality in HIV risk behaviors: implications for treatment*. Comprehensive textbook of AIDS psychiatry, (pp. 141-149).

Hyre, A. D., Krousel-Wood, M. A., Muntner, P., Kawasaki, L., & DeSalvo, K. B. (2007). Prevalence and predictors of poor antihypertensive medication adherence in an urban health clinic setting. *The Journal of Clinical Hypertension*, *9*(3), 179-186.

Ickovics, J. R., & Meade, C. S. (2002). Adherence to HAART among patients with HIV: breakthroughs and barriers. *AIDS Care*, *14*(3), 309-318.

Imel, Z. E., Baer, J. S., Martino, S., Ball, S. A., & Carroll, K. M. (2011). Mutual influence in therapist competence and adherence to motivational enhancement therapy. *Drug and Alcohol Dependence*, *115*(3), 229-236.

Imenda, S. (2014). Is there a conceptual difference between theoretical and conceptual frameworks?. *Journal of Social Sciences*, *38*(2), 185-195.

Ingersoll, K. S., & Cohen, J. (2008). The impact of medication regimen factors on adherence to chronic treatment: a review of literature. *Journal of Behavioral Medicine*, *31*(3), 213-224.

Ingham, R., Woodcock, A., & Stenner, K. (2004). *The limitations of rational decision-making models as applied to young people's sexual behaviour*. In AIDS: Rights, risk and reason (pp. 171-181). Taylor & Francis.

Ingledew, D. K., & Markland, D. (2008). The role of motives in exercise participation. *Psychology and Health*, *23*(7), 807-828.

Insaf, T. Z., Jurkowski, J. M., & Alomar, L. (2010). Sociocultural factors influencing delay in seeking routine health care among Latinas: a community-based participatory research study. *Ethnicity and Disease*, *20*(2), 148-154.

Insel, K., Morrow, D., Brewer, B., & Figueredo, A. (2006). Executive function, working memory, and medication adherence among older adults. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *61*(2), P102-P107.

Insel, K. C., Reminger, S. L., & Hsiao, C. P. (2006). The negative association of independent personality and medication adherence. *Journal of Aging and Health*, *18*(3), 407-418.

Ioannidis, J. P. (2012). Why science is not necessarily self-correcting. *Perspectives on Psychological Science*, *7*(6), 645-654.

Ironside, P. M., Scheckel, M., Wessels, C., Bailey, M. E., Powers, S., & Seeley, D. K. (2003). Experiencing chronic illness: cocreating new understandings. *Qualitative Health Research*, *13*(2), 171-183.

Ironson, G. H., O'Cleirigh, C., Schneiderman, N., Weiss, A., & Costa Jr, P. T. (2008). Personality and HIV disease progression: Role of NEO-PI-R openness, extraversion, and profiles of engagement. *Psychosomatic medicine*, *70*(2), 245-253.

Irwing, P. (2013). The general factor of personality: Substance or artefact?. *Personality and Individual Differences*, *55*(3), 234-242.

Iskedjian, M., Einarson, T. R., MacKeigan, L. D., Shear, N., Addis, A., Mittmann, N., & Ilersich, A. L. (2002). Relationship between daily dose frequency and adherence to antihypertensive pharmacotherapy: evidence from a meta-analysis. *Clinical Therapeutics*, *24*(2), 302-316.

Janis, I. L. (2016). *Psychological stress: Psychoanalytic and behavioral studies of surgical patients*. Academic Press.

Jeffery, M. M., Shah, N. D., Karaca-Mandic, P., Ross, J. S., & Rank, M. A. (2018). Trends in omalizumab utilization for asthma: evidence of suboptimal patient selection. *The Journal of Allergy and Clinical Immunology: In Practice*, *6*(5), 1568-1577.

Jha, V., Wang, A. Y. M., & Wang, H. (2012). The impact of CKD identification in large countries: the burden of illness. *Nephrology Dialysis Transplantation*, *27*(suppl_3), iii32-iii38.

John, E., Farris, K., & Brooks, J. M. (2006). PHP28 The effect of high risk medications on visit time with physicians: Results from the NAMCS survey. *Value in Health*, *9*(3), A152-A153.

John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm shift to the integrative big five trait taxonomy. *Handbook of personality: Theory and research*, *3*(2), 114-158.

John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. *Handbook of personality: Theory and research*, *2*, 102-138.

Johnson, J. E., & Johnson, K. E. (2006). Ambiguous chronic illness in women: community health nursing concern. *Journal of Community Health Nursing*, *23*(3), 159-167.

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L.A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, *1*(2): 112-133.

Jolliffe, D., & Farrington, D. P. (2006). Development and validation of the Basic Empathy Scale. *Journal of Adolescence*, *29*(4), 589-611.

Jonassaint, C. R., Boyle, S. H., Williams, R. B., Mark, D. B., Siegler, I. C., & Barefoot, J. C. (2007). Facets of openness predict mortality in patients with cardiac disease. *Psychosomatic Medicine*, *69*(4), 319-322.

Jonassaint, C. R., Siegler, I. C., Barefoot, J. C., Edwards, C. L., & Williams, R. B. (2011). Low life course socioeconomic status (SES) is associated with negative NEO PI-R personality patterns. *International Journal of Behavioral Medicine*, *18*(1), 13-21.

Jonsdottir, H., Litchfield, M., & Pharris, M. D. (2004). The relational core of nursing practice as partnership. *Journal of Advanced Nursing*, *47*(3), 241-248.

Joplin, S., van der Zwan, R., Joshua, F., & Wong, P. K. (2015). Medication adherence in patients with rheumatoid arthritis: the effect of patient education, health literacy, and musculoskeletal ultrasound. *BioMed Research international*.

Jørgensen, M. M., Zachariae, R., Skytthe, A., & Kyvik, K. (2007). Genetic and environmental factors in alexithymia: a population-based study of 8,785 Danish twin pairs. *Psychotherapy and Psychosomatics*, *76*(6), 369-375.

Joyce, A. S., Piper, W. E., & Ogrodniczuk, J. S. (2007). Therapeutic alliance and cohesion variables as predictors of outcome in short–term group psychotherapy. *International Journal of Group Psychotherapy*, *57*(3), 269-296.

Kagan, J.(1994). *Galen's prophecy: Temperament in human nature*. New York: Basic Books.

Kanfer, F. H. (1986). *Implications of a self-regulation model of therapy for treatment of addictive behaviors*. In Treating addictive behaviors (pp. 29-47). Springer, Boston, MA.

Kanfer, F. H., & Gaelick-Buys, L. (1991). Self-management methods. In F. H. Kanfer & A. P. Goldstein (Eds.), *Pergamon general psychology series, Vol. 52. Helping people change: A textbook of methods* (p. 305–360). Pergamon Press.

Kangethe, A., Polson, M., Lord, T. C., Evangelatos, T., & Oglesby, A. (2019). Real-World Health Plan Data Analysis: Key Trends in Medication Adherence and Overall Costs in Patients with HIV. *Journal of Managed Care & Specialty Pharmacy*, *25*(1), 88-93.

Kano, M., & Fukudo, S. (2013). The alexithymic brain: the neural pathways linking alexithymia to physical disorders. *BioPsychoSocial Medicine*, *7*(1), 1.

Kant, I. (1977). *Prolegomena to Any Future Metaphysics That Will Be Able to Come Forward as Science: The Paul Carus translation*. Hackett.

Kaplan, R. M., & Simon, H. J. (1990). Compliance in medical care: Reconsideration of self-predictions. *Annals of Behavioral Medicine*, *12*(2), 66-71.

Kaplan, S. C., Levinson, C. A., Rodebaugh, T. L., Menatti, A., & Weeks, J. W. (2015). Social anxiety and the Big Five personality traits: The interactive relationship of trust and openness. *Cognitive Behaviour Therapy*, *44*(3), 212-222.

Kardas, P. (2002). Patient compliance with antibiotic treatment for respiratory tract infections. *Journal of Antimicrobial Chemotherapy*, *49*(6), 897-903.

Karp, D. A. (1993). Taking anti-depressant medications: Resistance, trial commitment, conversion, disenchantment. *Qualitative Sociology*, *16*(4), 337-359.

Karp, D. A. (2017). *Speaking of sadness: Depression, disconnection, and the meanings of illness*. Oxford University Press.

Kasteler, J., Kane, R. L., Olsen, D. M., & Thetford, C. (1976). Issues underlying prevalence of "doctor-shopping" behavior. *Journal of Health and Social Behavior*, 17(4), 328-339.

Kastrissios, H., Suárez, J. R., Hammer, S., Katzenstein, D., & Blaschke, T. F. (1998). The extent of non-adherence in a large AIDS clinical trial using plasma dideoxynucleoside concentrations as a marker. *Aids*, *12*(17), 2305-2311.

Katz, J. (1984). Symptom prescription: A review of the clinical outcome literature. *Clinical Psychology Review*, *4*(6), 703-717.

Katz, M. B. (1986). *In the Shadow of the Poorhouse: A Social History of Welfare in America*. New York: Basic.

Keeling, D. I., Price, P. E., Jones, E., & Harding, K. G. (1996). Social support: some pragmatic implications for health care professionals. *Journal of Advanced Nursing*, *23*(1), 76-81.

Keen, E. (1975). *A primer in phenomenological psychology*. University Press of America.

Kellner, R. (1994). Psychosomatic syndromes, somatization and somatoform disorders. *Psychotherapy and Psychosomatics*, *61*(1-2), 4-24.

Kelly, M., McCarthy, S., & Sahm, L. J. (2014). Knowledge, attitudes and beliefs of patients and carers regarding medication adherence: a review of qualitative literature. *European Journal of Clinical Pharmacology*, *70*(12), 1423-1431.

Kelly, R. B., Zyzanski, S. J., & Alemagno, S. A. (1991). Prediction of motivation and behavior change following health promotion: Role of health beliefs, social support, and self-efficacy. *Social Science & Medicine*, *32*(3), 311-320.

Kern, M. L., & Friedman, H. S. (2008). Do conscientious individuals live longer? A quantitative review. *Health Psychology*, *27*(5), 505-512.

Kessels, R. P. (2003). Patients' memory for medical information. *Journal of the Royal Society of Medicine*, *96*(5), 219-222.

Khan, M. U., Kohn, M., & Aslani, P. (2019). The need for a paradigm shift in adherence research: The case of ADHD. *Research in Social and Administrative Pharmacy*, *15*(3), 318-320.

Khangura, S., Polisena, J., Clifford, T. J., Farrah, K., & Kamel, C. (2014). Rapid review: an emerging approach to evidence synthesis in health technology assessment. *International Journal of Technology Assessment in Health Care*, *30*(1), 20-27.

Kim, S. S., Kaplowitz, S., & Johnston, M. V. (2004). The effects of physician empathy on patient satisfaction and compliance. *Evaluation & the Health Professions*, *27*(3), 237-251.

Kinon, B. J., Ascher-Svanum, H., Adams, D. H., & Chen, L. (2008). The temporal relationship between symptom change and treatment discontinuation in a pooled analysis of 4 schizophrenia trials. *Journal of Clinical Psychopharmacology*, *28*(5), 544-549.

Kiviniemi, M. T., Voss-Humke, A. M., & Seifert, A. L. (2007). How do I feel about the behavior? The interplay of affective associations with behaviors and cognitive beliefs as influences on physical activity behavior. *Health Psychology*, *26*(2), 152-158.

Kleinman, A. (1988). *The Illness Narratives: Suffering, healing and the human condition*. Encyclopedia of Human Biology. Basic Books.

Kleppe, M., Lacroix, J., Ham, J., & Midden, C. (2017). ‘A necessary evil’: associations with taking medication and their relationship with medication adherence. *Psychology, Health & Medicine*, *22*(10), 1217-1223.

Kline, P. (1993). *Personality: the psychometric view Routledge*. New York.

Knapp, P., Gardner, P., McMillan, B., Raynor, D. K., & Woolf, E. (2013). Evaluating a combined (frequency and percentage) risk expression to communicate information on medicine side effects to patients. *International Journal of Pharmacy Practice*, *21*(4), 226-232.

Koch, T. (1996). Implementation of a hermeneutic inquiry in nursing: Philosophy, rigour and representation. *Journal of Advanced Nursing*, *24*(1), 174-184.

Koch, T. (1998). Story telling: is it really research?. *Journal of Advanced Nursing*, *28*(6), 1182-1190.

Koch, T., Jenkin, P., & Kralik, D. (2004). Chronic illness self-management: locating the 'self'. *Journal of Advanced Nursing*, *48*(5), 484-492.

Koch, T., Kralik, D., & Taylor, J. (2000). Men living with diabetes: minimizing the intrusiveness of the disease. *Journal of Clinical Nursing*, *9*(2), 247-254.

Koschack, J., Marx, G., Schnakenberg, J., Kochen, M. M., & Himmel, W. (2010). Comparison of two self-rating instruments for medication adherence assessment in hypertension revealed insufficient psychometric properties. *Journal of Clinical Epidemiology, 63*(3), 299-306.

Kotov, R., Gamez, W., Schmidt, F., & Watson, D. (2010). Linking "big" personality traits to anxiety, depressive, and substance use disorders: a meta-analysis. *Psychological bulletin*, *136*(5), 768-821.

Kreatsoulas, C., & Anand, S. S. (2010). The impact of social determinants on cardiovascular disease. *Canadian Journal of Cardiology*, *26*, 8C-13C.

Krigsman, K., Nilsson, J. L. G., & Ring, L. (2007). Adherence to multiple drug therapies: refill adherence to concomitant use of diabetes and asthma/COPD medication. *Pharmacoepidemiology and Drug Safety*, *16*(10), 1120-1128.

Kripalani, S., Henderson, L. E., Jacobson, T. A., & Vaccarino, V. (2008). Medication use among inner-city patients after hospital discharge: patient-reported barriers and solutions. *Mayo Clinic Proceedings*, *83* (5), 529-535.

Kripalani, S., LeFevre, F., Phillips, C. O., Williams, M. V., Basaviah, P., & Baker, D. W. (2007). Deficits in communication and information transfer between hospital-based and primary care physicians: implications for patient safety and continuity of care. *JAMA*, *297*(8), 831-841.

Kroenke, K. (2001). Studying symptoms: sampling and measurement issues. *Annals of internal medicine*, *134*(9, Part 2), 844-853.

Krousel-Wood, M., Hyre, A., Muntner, P., & Morisky, D. (2005). Methods to improve medication adherence in patients with hypertension: current status and future directions. *Current Opinion in Cardiology*, *20*(4), 296-300.

Krousel-Wood, M. A., Muntner, P., Islam, T., Morisky, D. E., & Webber, L. S. (2009). Barriers to and determinants of medication adherence in hypertension management: perspective of the cohort study of medication adherence among older adults. *Medical Clinics of North America*, *93*(3), 753-769.

Krousel-Wood, M., Thomas, S., Muntner, P., & Morisky, D. (2004). Medication adherence: a key factor in achieving blood pressure control and good clinical outcomes in hypertensive patients. *Current Opinion in Cardiology*, *19*(4), 357-362.

Krueger, K. P., Berger, B. A., & Felkey, B. (2005). Medication adherence and persistence: a comprehensive review. *Advances in Therapy*, *22*(4), 313-356.

Kruse, W. (1992). Patient compliance with drug treatment—new perspectives on an old problem. *The Clinical Investigator*, *70*(2), 163-166.

Kucukarslan, S. N. (2012). A review of published studies of patients' illness perceptions and medication adherence: lessons learned and future directions. *Research in Social and Administrative Pharmacy*, *8*(5), 371-382.

Kulik, A., Shrank, W. H., Levin, R., & Choudhry, N. K. (2011). Adherence to statin therapy in elderly patients after hospitalization for coronary revascularization. *The American Journal of Cardiology*, *107*(10), 1409-1414.

Kupper, N., Denollet, J., De Geus, E. J., Boomsma, D. I., & Willemsen, G. (2007). Heritability of type-D personality. *Psychosomatic Medicine*, *69*(7), 675-681.

Kvale, S. (1996). *InterViews: an introduction to qualitive research interviewing*. Sage.

Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research interviewing*. Sage.

Kwasnicka, D., Dombrowski, S. U., White, M., & Sniehotta, F. (2016). Theoretical explanations for maintenance of behaviour change: a systematic review of behaviour theories. *Health Psychology Review*, *10*(3), 277-296.

Kwasnik, B. H. (1999). The role of classification in knowledge representation and discovery. *Library Trends, 48*(1), 22-47.

Kyngäs, H. (1999). A theoretical model of compliance in young diabetics. *Journal of Clinical Nursing*, *8*(1), 73-80.

Kyngäs, H., Duffy, M. E., & Kroll, T. (2000). Conceptual analysis of compliance. *Journal of Clinical Nursing*, *9*(1), 5-12.

Laba, T. L., Brien, J. A., & Jan, S. (2012). Understanding rational non-adherence to medications. A discrete choice experiment in a community sample in Australia. *BMC Family Practice*, *13*(1), 61.

Lafferty, K. D. (2006). Can the common brain parasite, Toxoplasma gondii, influence human culture?. *Proceedings of the Royal Society B: Biological Sciences, 273*(1602), 2749-2755.

Lahey, B. B. (2009). Public health significance of neuroticism. *American Psychologist*, *64*(4), 241-256.

Laidlaw, J. K., Beeken, J. E., Whitney, F. W., & Reyes, A. A. (1999). Contracting with outpatient hemodialysis patients to improve adherence to treatment. *Nephrology Nursing Journal*, *26*(1), 37-40.

Laidsaar-Powell, R. C., Butow, P. N., Bu, S., Charles, C., Gafni, A., Lam, W. W., ... & Juraskova, I. (2013). Physician–patient–companion communication and decision-making: a systematic review of triadic medical consultations. *Patient Education and Counseling*, *91*(1), 3-13.

Lang, F. R., John, D., Lüdtke, O., Schupp, J., & Wagner, G. G. (2011). Short assessment of the Big Five: Robust across survey methods except telephone interviewing. *Behavior Research Methods*, *43*(2), 548-567.

Langer, N. (2008). Integrating compliance, communication, and culture: Delivering health care to an aging population. *Educational Gerontology*, *34*(5), 385-396.

Larson, E. (1998). Reframing the meaning of disability to families: The embrace of paradox. *Social Science & Medicine*, *47*(7), 865-875.

Lather, P. (2017). Validity, qualitative (2007). In *(Post) Critical Methodologies: The Science Possible After the Critiques* (pp. 75-80). Routledge.

Lau, J. T. F., Lau, M., Cheung, A., & Tsui, H. Y. (2008). A randomized controlled study to evaluate the efficacy of an Internet-based intervention in reducing HIV risk behaviors among men who have sex with men in Hong Kong. *AIDS Care*, *20*(7), 820-828.

Laufs, U. (2011). Medication adherence in patients with chronic diseases: Significance and new approaches. *Der Nervenarzt*, *82*(2), 153-4.

Lawrence, C., & Hodgkins, E. (2009). Personality influences on interpretations of aggressive behavior: The role of provocation sensitivity and trait aggression. *Personality and Individual Differences*, *46*(3), 319-324.

Lawton, R., Conner, M., & McEachan, R. (2009). Desire or reason: predicting health behaviors from affective and cognitive attitudes. *Health Psychology*, *28*(1), 56-65.

LeBlanc, J., Ducharme, M. B., Pasto, L., & Thompson, M. (2003). Response to thermal stress and personality. *Physiology & Behavior*, *80*(1), 69-74.

LeBlanc, J., & Ducharme, M. B. (2005). Influence of personality traits on plasma levels of cortisol and cholesterol. *Physiology & Behavior*, *84*(5), 677-680.

Leclerc, E., Noto, C., Bressan, R. A., & Brietzke, E. (2015). Determinants of adherence to treatment in first-episode psychosis: a comprehensive review. *Revista Brasileira de Psiquiatria*, *37*(2), 168-176.

Lee, D., de Leon, C. F. M., Jenkins, C. D., Croog, S. H., Levine, S., & Sudilovsky, A. (1992). Relation of hostility to medication adherence, symptom complaints, and blood pressure reduction in a clinical field trial of antihypertensive medication. *Journal of Psychosomatic Research*, *36*(2), 181-190.

Lee, J. K., Grace, K. A., & Taylor, A. J. (2006). Effect of a pharmacy care program on medication adherence and persistence, blood pressure, and low-density lipoprotein cholesterol: a randomized controlled trial. *JAMA*, *296*(21), 2563-2571.

Lee, K., & Ashton, M. C. (2004). The HEXACO Personality Inventory: A new measure of the major dimensions of personality. *Multivariate Behavioral Research*, *39*(2), 329-358.

Lee, W. E., Wadsworth, M. E. J., & Hotopf, M. (2006). The protective role of trait anxiety: a longitudinal cohort study. *Psychological Medicine*, *36*(3), 345-351.

Leganger, A., Kraft, P., & Roysamb, E. (2000). Perceived self-efficacy in health behaviour research: Conceptualisation, measurement and correlates. *Psychology and Health, 15*(1), 51-69.

Lehane, E., & McCarthy, G. (2007). Intentional and unintentional medication non-adherence: a comprehensive framework for clinical research and practice? A discussion paper. *International Journal of Nursing Studies*, *44*(8), 1468-1477.

Leigh, D. (1957). *Personality, stress and tuberculosis*. P. J. Sparer (ed.), International Universities Press, Inc., New York.

Leleu-Merviel, S. (2018). *Informational Tracking*. John Wiley & Sons.

Lemos-Giráldez, S., & Fidalgo-Aliste, A. M. (1997). Personality dispositions and health-related habits and attitudes: a cross-sectional study. *European Journal of Personality*, *11*(3), 197-209.

Lerner, B. H. (1996). Temporarily detained: tuberculous alcoholics in Seattle, 1949 through 1960. *American Journal of Public Health, 86*(2), 257-265.

Lerner, B. H. (1997). From careless consumptives to recalcitrant patients: The historical construction of non-compliance. *Social Science and Medicine, 45*, 1423-1431.

Levensky, E. R., O'Donohue, W. T., & William, T. (2006). *Patient adherence and nonadherence to treatments*. Promoting treatment adherence: A practical handbook for health care providers (pp. 3-14). Sage.

Leventhal, H., Brissette, I., & Leventhal, E. A. (2003). *The common-sense model of health and illness behavior*. The self-regulation of health and illness behavior, (pp. 42-66). Routledge.

Leventhal, H., & Cameron, L. (1987). Behavioral theories and the problem of compliance. *Patient Education and Counseling*, *10*(2), 117-138.

Leventhal, H., Diefenbach, M., & Leventhal, E. A. (1992b). Illness cognition: using common sense to understand treatment adherence and affect cognition interactions. *Cognitive Therapy and Research*, *16*(2), 143-163.

Leventhal, H., Leventhal, E. A., & Schaefer, P. M. (1992a). Vigilant coping and health behavior. In M. G. Ory, R. P. Abeles, & P. D. Lipman (Eds.), *Aging, health, and behavior* (p. 109–140). Sage Publications, Inc.

Leventhal, H., Meyer, D., & Nerenz, D. (1980). The common sense representation of illness danger. *Contributions to Medical Psychology, 2*, 7-30.

Leventhal, H., Nerenz, D. R., & Steele, D. J. (1984). Illness representations and coping with health threats. In: A, Baum, S.E. Taylor, & J.E. Singer, (Eds.), *Handbook of Psychology and Health. Volume IV: Social Psychological Aspects of Health* (pp. 219-252).

Lewin, S., Skea, Z., Entwistle, V. A., Zwarenstein, M., & Dick, J. (2001). Interventions for providers to promote a patient-centred approach in clinical consultations. *Cochrane Database of Systematic Reviews*, (4).

Ley, P. (1979). Memory for medical information. *British Journal of Social and Clinical Psychology*, *18*(2), 245-255.

Ley, P. (1988). *Communicating with patients: Improving communication, satisfaction and compliance*. Croom Helm.

Ley, P., Llewellyn, S., Broome, A., & Llewellyn, S. (1995). *Healthy psychology: Processes and applications*, (p. 75-98). Chapman and Hall.

Lindamer, L. A., Liu, L., Sommerfeld, D. H., Folsom, D. P., Hawthorne, W., Garcia, P., ... & Jeste, D. V. (2012). Predisposing, enabling, and need factors associated with high service use in a public mental health system. *Administration and Policy in Mental Health and Mental Health Services Research*, *39*(3), 200-209.

Linden, K., Jormanainen, V., Swigonski, N. L., & Pietilä, K. (2005). Self-medication among Finnish young men in the beginning of common military service. *Pharmacoepidemiology and Drug Safety*, *14*(3), 193-201.

Lindenmeyer, A., Hearnshaw, H., Vermeire, E., Van Royen, P., Wens, J., & Biot, Y. (2006). Interventions to improve adherence to medication in people with type 2 diabetes mellitus: a review of the literature on the role of pharmacists. *Journal of Clinical Pharmacy and Therapeutics*, *31*(5), 409-419.

Lindsey, M. A., Brandt, N. E., Becker, K. D., Lee, B. R., Barth, R. P., Daleiden, E. L., & Chorpita, B. F. (2014). Identifying the common elements of treatment engagement interventions in children's mental health services. *Clinical Child and Family Psychology Review*, *17*(3), 283-298.

Lloyd, G. (2007). Pneuma between body and soul. *Journal of the Royal Anthropological Institute*, *13,* S135-S146.

Loades, M. E., Rimes, K. A., Lievesley, K., Ali, S., & Chalder, T. (2018). Illness beliefs of adolescents with CFS and their parents: The perceived causes of illness and beliefs about recovery. *International Journal of Adolescent Medicine and Health*, *32*(4).

Loewenstein, G., Asch, D. A., Friedman, J. Y., Melichar, L. A., & Volpp, K. G. (2012). Can behavioural economics make us healthier?. *BMJ*, *344*, e3482.

Loghman-Adham, M. (2003). Medication noncompliance in patients with chronic disease: issues in dialysis and renal transplantation. *American Journal of Managed Care*, *9*(2), 155-173.

Loomis, M. E., & Conco, D. (1991). Patients' perceptions of health, chronic illness, and nursing diagnoses. *International Journal of Nursing Terminologies and Classifications*, *2*(4), 162-170.

Lopez, S. J., Pedrotti, J. T., & Snyder, C. R. (2018). *Positive psychology: The scientific and practical explorations of human strengths*. Sage Publications.

Löwe, B., Spitzer, R. L., Williams, J. B., Mussell, M., Schellberg, D., & Kroenke, K. (2008). Depression, anxiety and somatization in primary care: syndrome overlap and functional impairment. *General Hospital Psychiatry*, *30*(3), 191-199.

Lowry, K. P., Dudley, T. K., Oddone, E. Z., & Bosworth, H. B. (2005). Intentional and unintentional nonadherence to antihypertensive medication. *Annals of Pharmacotherapy*, *39*(7-8), 1198-1203.

Luchetti, M., Barkley, J. M., Stephan, Y., Terracciano, A., & Sutin, A. R. (2014). Five-factor model personality traits and inflammatory markers: New data and a meta-analysis. *Psychoneuroendocrinology*, *50*, 181-193.

Lucock, M. P., & Morley, S. (1996). The health anxiety questionnaire. *British Journal of Health Psychology*, *1*(2), 137-150.

Lumley, M. A. (2004). Alexithymia, emotional disclosure, and health: A program of research. *Journal of Personality*, *72*(6), 1271-1300.

Lumley, M. A., Neely, L. C., & Burger, A. J. (2007). The assessment of alexithymia in medical settings: implications for understanding and treating health problems. *Journal of Personality Assessment*, *89*(3), 230-246.

Lumley, M. A., Stettner, L., & Wehmer, F. (1996). How are alexithymia and physical illness linked? A review and critique of pathways. *Journal of Psychosomatic Research*, *41*(6), 505-518.

Lupu, A. L., Rădoi, M., & Cojocaru, D. (2014). The Role of Acting Participants, Definitions, and the Determining Factors of Adherence to Treatment from Two Perspectives: The Biomedical Model and the Chronic Care Model. *Postmodern Openings/Deschideri Postmoderne*, *5*(4).

Lutfey, K. (2005). On practices of ‘good doctoring’: reconsidering the relationship between provider roles and patient adherence. *Sociology of Health & Illness*, *27*(4), 421-447.

Lutfey, K. E., & Wishner, W. J. (1999). Beyond "compliance" is "adherence". Improving the prospect of diabetes care. *Diabetes Care*, *22*(4), 635-639.

Lwin, M. O., Vijaykumar, S., Foo, S., Fernando, O. N. N., Lim, G., Panchapakesan, C., & Wimalaratne, P. (2015). Social media-based civic engagement solutions for dengue prevention in Sri Lanka: results of receptivity assessment. *Health Education Research*, *31*(1), 1-11.

McAdams, D. P., & Pals, J. L. (2006). A new Big Five: fundamental principles for an integrative science of personality. *American Psychologist*, *61*(3), 204.

McAiney, C. A., Hillier, L. M., Paul, J., Wilson, J. M., Phelan, A. T., Wagner, F., & O'Connor, S. (2017). Improving the seniors’ transition from hospital to the community: a case for intensive geriatric service workers. *International Psychogeriatrics*, *29*(1), 149-163.

McCaffery, J. M., Frasure-Smith, N., Dubé, M. P., Théroux, P., Rouleau, G. A., Duan, Q., & Lespérance, F. (2006). Common genetic vulnerability to depressive symptoms and coronary artery disease: a review and development of candidate genes related to inflammation and serotonin. *Psychosomatic Medicine*, *68*(2), 187-200.

McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality*, *60*(2), 175-215.

McCullough, A. R., Tunney, M. M., Elborn, J. S., Bradley, J. M., & Hughes, C. M. (2015). ‘All illness is personal to that individual’: a qualitative study of patients’ perspectives on treatment adherence in bronchiectasis. *Health Expectations*, *18*(6), 2477-2488.

McDonald, H. P., Garg, A. X., & Haynes, R. B. (2002). Interventions to enhance patient adherence to medication prescriptions: scientific review. *JAMA*, *288*(22), 2868-2879.

Mcdonald-Miszczak, L., Maris, P., Fitzgibbon, T., & Ritchie, G. (2004). A pilot study examining older adults’ beliefs related to medication adherence: the BERMA survey. *Journal of Aging and Health*, *16*(5), 591-614.

McEachreon, S., Salmoni, A., Pong, R., Garg, R., & Viverais-Dresler, G. (2000). Anticipated choices among self-, informal, and formal care by older Canadians. *Journal of Health Psychology*, *5*(4), 457-472.

McKinlay, J. B., & Marceau, L. D. (2002). The end of the golden age of doctoring. *International Journal of Health Services*, *32*(2), 379-416.

Maier, H., & Smith, J. (1999). Psychological predictors of mortality in old age. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *54*(1), P44-P54.

Maiman, L. A., & Becker, M. H. (1974). The health belief model: Origins and correlates in psychological theory. *Health Education Monographs*, *2*(4), 336-353.

Mair, F. S., & May, C. R. (2014). Thinking about the burden of treatment. *BMJ*, 349

Malik, P. (2006). Won’t or don’t: Studying medication adherence. *The Canadian Journal of Cardiology*, *22*(7), 549.

Malouff, J. M., Thorsteinsson, E. B., Rooke, S. E., & Schutte, N. S. (2007). Alcohol involvement and the five-factor model of personality: A meta-analysis. *Journal of Drug Education*, *37*(3), 277-294.

Malpass, A., Shaw, A., Sharp, D., Walter, F., Feder, G., Ridd, M., & Kessler, D. (2009). "Medication career" or "moral career"? The two sides of managing antidepressants: a meta-ethnography of patients' experience of antidepressants. *Social Science & Medicine*, *68*(1), 154-168.

Mann, D. M., Ponieman, D., Leventhal, H., & Halm, E. A. (2009). Predictors of adherence to diabetes medications: the role of disease and medication beliefs. *Journal of Behavioral Medicine*, *32*(3), 278-284.

Mann, D. M., Woodward, M., Muntner, P., Falzon, L., & Kronish, I. (2010). Predictors of nonadherence to statins: a systematic review and meta-analysis. *Annals of Pharmacotherapy*, *44*(9), 1410-1421.

Mann, M., Eliasson, O., Patel, K., & ZuWallack, R. L. (1992). A comparison of the effects of bid and qid dosing on compliance with inhaled flunisolide. *Chest*, *101*(2), 496-499.

Mannheimer, S., Friedland, G., Matts, J., Child, C., Chesney, M., & Terry Beirn Community Programs for Clinical Research on AIDS. (2002). The consistency of adherence to antiretroviral therapy predicts biologic outcomes for Human Immunodeficiency Virus—infected persons in clinical trials. *Clinical Infectious Diseases*, *34*(8), 1115-1121.

Mantani, T., Okamoto, Y., Shirao, N., Okada, G., & Yamawaki, S. (2005). Reduced activation of posterior cingulate cortex during imagery in subjects with high degrees of alexithymia: a functional magnetic resonance imaging study. *Biological Psychiatry*, *57*(9), 982-990.

Marcus, D. K., Gurley, J. R., Marchi, M. M., & Bauer, C. (2007). Cognitive and perceptual variables in hypochondriasis and health anxiety: A systematic review. *Clinical Psychology Review*, *27*(2), 127-139.

Marentette, M. A., Gerth, W. C., Billings, D. K., & Zarnke, K. B. (2002). Antihypertensive persistence and drug class. *The Canadian Journal of Cardiology*, *18*(6), 649-656.

Marinker, M. (1997a). From compliance to concordance. *Achieving Shared Goals in Medicine Taking, Royal Pharmaceutical Society of Great Britain, London, UK*.

Marinker, M. (1997b). Personal paper: writing prescriptions is easy. *BMJ*, *314*(7082), 747.

Markon, K. E., Krueger, R. F., & Watson, D. (2005). Delineating the structure of normal and abnormal personality: an integrative hierarchical approach. *Journal of Personality and Social Psychology*, *88*(1), 139-157.

Marks, D. F. (2019). The Hans Eysenck affair: Time to correct the scientific record. *Journal of Health Psychology*, *24*(4), 1-5

Marshall, C., & Rossman, G. B. (2014). *Designing qualitative research*. Sage publications.

Marshall, I. J., Wolfe, C. D., & McKevitt, C. (2012). Lay perspectives on hypertension and drug adherence: systematic review of qualitative research. *BMJ*, *345*.

Marshall, G. N., Wortman, C. B., Vickers, R. R., Kusulas, J. W., & Hervig, L. K. (1994). The five-factor model of personality as a framework for personality-health research. *Journal of Personality and Social Psychology*, *67*(2), 278-286.

Martin, D. J., Garske, J. P., & Davis, M. K. (2000). Relation of the therapeutic alliance with outcome and other variables: a meta-analytic review. *Journal of Consulting and Clinical Psychology*, *68*(3), 438-450.

Martin, E. (2006). Pharmaceutical virtue. *Culture, Medicine and Psychiatry*, *30*(2), 157-174.

Matsumura, K., Arima, H., Tominaga, M., Ohtsubo, T., Sasaguri, T., Fujii, K., ... & Otonari, T. (2013). Impact of antihypertensive medication adherence on blood pressure control in hypertension: the COMFORT study. *QJM: An International Journal of Medicine*, *106*(10), 909-914.

Matthews, G., Deary, I. J., & Whiteman, M. C. (2003). *Personality Traits*. Cambridge University Press.

Matthews, G., & Gilliland, K. (1999). The personality theories of HJ Eysenck and JA Gray: A comparative review. *Personality and Individual Differences*, *26*(4), 583-626.

Matthews, W. S. (1986). *Psychopathology in epilepsy: social dimensions*. Oxford University Press.

Mayer, J. D., Salovey, P., & Caruso, D. R. (2008). Emotional intelligence: New ability or eclectic traits?. *American Psychologist*, *63*(6), 503-517.

Mead, G. H. (1934). *Mind, self and society* (Vol. 111). University of Chicago Press.: Chicago.

Mechanic, D. (1986). The concept of illness behaviour: culture, situation and personal predisposition. *Psychological Medicine*, *16*(1), 1-7.

Meddings, J., Kerr, E. A., Heisler, M., & Hofer, T. P. (2012). Physician assessments of medication adherence and decisions to intensify medications for patients with uncontrolled blood pressure: still no better than a coin toss. *BMC Health Services Research*, *12*(1), 270.

Meehl, P. E. (1975). Hedonic capacity: Some conjectures. *Bulletin of the Menninger Clinic*, *39*(4), 295-307.

Meghani, S. H., & Bruner, D. W. (2013). A pilot study to identify correlates of intentional versus unintentional nonadherence to analgesic treatment for cancer pain. *Pain Management Nursing*, *14*(2), e22-e30.

Meichenbaum, D., & Turk, D. C. (1987). *Facilitating treatment adherence: A practitioner's guidebook*. Plenum Press.

Melnikow, J., & Kiefe, C. (1994). Patient compliance and medical research. *Journal of General Internal Medicine*, *9*(2), 96-105.

Meltzer, E. O., & Bukstein, D. A. (2011). The economic impact of allergic rhinitis and current guidelines for treatment. *Annals of Allergy, Asthma & Immunology*, *106*(2), S12-S16.

Menckeberg, T. T., Belitser, S. V., Bouvy, M. L., Bracke, M., Lammers, J. W. J., Raaijmakers, J. A., & Leufkens, H. G. (2007). Distinguishing patterns in the dynamics of long-term medication use by Markov analysis: beyond persistence. *BMC Health Services Research*, *7*(1), 106.

Mensing, C., Boucher, J., Cypress, M., Weinger, K., Mulcahy, K., Barta, P., ... & Mangan, M. (2006). National standards for diabetes self-management education. *Diabetes Care*, *29*(suppl 1), s78-s85.

Messing, K., Punnett, L., Bond, M., Alexanderson, K., Pyle, J., Zahm, S., ... & de Grosbois, S. (2003). Be the fairest of them all: challenges and recommendations for the treatment of gender in occupational health research. *American Journal of Industrial Medicine*, *43*(6), 618-629.

Meyer, R. J., & Haggerty, R. J. (1962). Streptococcal infections in families: Factors altering individual susceptibility. *Pediatrics*, *29*(4), 539-549.

Miller, A. (1991). Personality types, learning styles and educational goals. *Educational Psychology*, *11*(3-4), 217-238.

Miller, N. H., Hill, M., Kottke, T., & Ockene, I. S. (1997). The multilevel compliance challenge: recommendations for a call to action: a statement for healthcare professionals. *Circulation, 95*(4), 1085-1090.

Mischel, W. (1968). Consistency and specificity in behavior. *Personality and Assessment*, 13-19.

Mischel, W., & Shoda, Y. (1995). A cognitive-affective system theory of personality: reconceptualizing situations, dispositions, dynamics, and invariance in personality structure. *Psychological Review*, *102*(2), 246-268.

Mischel, W., & Shoda, Y. (1999). Integrating dispositions and processing dynamics within a unified theory of personality: The cognitive-affective personality system. *Handbook of Personality: Theory and Research*, *2*, 197-218.

Mischel, W., Shoda, Y., & Ayduk, O. (2007). *Introduction to personality: Toward an integrative science of the person*. John Wiley & Sons.

Moch, S. D. (1989). Health within illness: Conceptual evolution and practice possibilities. *Advances in nursing science*, *11*(4), 23-31.

Michie, S., & Abraham, C. (2004). Interventions to change health behaviours: evidence-based or evidence-inspired?. *Psychology & Health*, *19*(1), 29-49.

Michie, S., Atkins, L., & West, R. (2014). The behaviour change wheel. *A guide to designing interventions. 1st ed. Great Britain: Silverback Publishing*, 1003-1010.

Michie, S., Carey, R. N., Johnston, M., Rothman, A. J., De Bruin, M., Kelly, M. P., & Connell, L. E. (2017). From theory-inspired to theory-based interventions: A protocol for developing and testing a methodology for linking behaviour change techniques to theoretical mechanisms of action. *Annals of Behavioral Medicine, 52*(6), 501-512.

Michie, S., Johnston, M., Abraham, C., Lawton, R., Parker, D., & Walker, A. (2005). Making psychological theory useful for implementing evidence based practice: a consensus approach. *BMJ Quality & Safety*, *14*(1), 26-33.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of Internal Medicine*, *151*(4), 264-269.

Mohler, D. N., Wallin, D. G., & Dreyfus, E. G. (1955). Studies in the home treatment of streptococcal disease: failure of patients to take penicillin by mouth as prescribed. *New England Journal of Medicine*, *252*(26), 1116-1118.

Molloy, G. J., O'Carroll, R. E., & Ferguson, E. (2013). Conscientiousness and medication adherence: a meta-analysis. *Annals of Behavioral Medicine*, *47*(1), 92-101.

Molloy, G. J., Randall, G., Wikman, A., Perkins-Porras, L., Messerli-Bürgy, N., & Steptoe, A. (2012). Type D personality, self-efficacy, and medication adherence following an acute coronary syndrome. *Psychosomatic Medicine*, *74*(1), 100-106.

Molloy, H., & Vasil, L. (2002). The social construction of Asperger syndrome: The pathologising of difference?. *Disability & Society*, *17*(6), 659-669.

Mols, F., Holterhues, C., Nijsten, T., & van de Poll-Franse, L. V. (2010). Personality is associated with health status and impact of cancer among melanoma survivors. *European Journal of Cancer*, *46*(3), 573-580.

Mondesir, F. L., Carson, A. P., Durant, R. W., Lewis, M. W., Safford, M. M., & Levitan, E. B. (2018). Association of functional and structural social support with medication adherence among individuals treated for coronary heart disease risk factors: Findings from the REasons for Geographic and Racial Differences in Stroke (REGARDS) study. *PloS one*, *13*(6), e0198578.

Montano, D. E., & Kasprzyk, D. (2015). *Theory of reasoned action, theory of planned behavior, and the integrated behavioral model.* Health behavior: Theory, Research and Practice. Wiley.

Moran, P. J., Christensen, A. J., & Lawton, W. J. (1997). Social support and conscientiousness in hemodialysis adherence. *Annals of Behavioral Medicine, 19*(4), 333-338.

Morisky, D. E., Ang, A., Krousel-Wood, M., & Ward, H. J. (2008). Predictive validity of a medication adherence measure in an outpatient setting. *The Journal of Clinical Hypertension*, *10*(5), 348-354.

Morisky, D. E., Green, L. W., & Levine, D. M. (1986). Concurrent and predictive validity of a self-reported measure of medication adherence. *Medical Care*, *24*(10, 67-74.

Morrell, R. W., Park, D. C., Kidder, D. P., & Martin, M. (1997). Adherence to antihypertensive medications across the life span. *The Gerontologist*, *37*(5), 609-619.

Morris, L. S., & Schulz, R. M. (1992). Patient compliance—an overview. *Journal of Clinical Pharmacy and Therapeutics*, *17*(5), 283-295.

Morris, M., Schindehutte, M., & Allen, J. (2005). The entrepreneur's business model: toward a unified perspective. *Journal of Business Research*, *58*(6), 726-735.

Morrison, A., & Wertheimer, A. I. (2004). Compilation of quantitative overviews of studies of adherence. *Drug Information Journal*, *38*(2), 197-210.

Moss-Morris, R., Weinman, J., Petrie, K., Horne, R., Cameron, L., & Buick, D. (2002). The revised illness perception questionnaire (IPQ-R). *Psychology and Health*, *17*(1), 1-16.

Mõttus, R., Realo, A., Allik, J., Deary, I. J., Esko, T., & Metspalu, A. (2012). Personality traits and eating habits in a large sample of Estonians. *Health Psychology*, *31*(6), 806-814.

Moustakas, C. (1994). *Phenomenological research methods*. Sage.

Mroczek, D. K. (2014). Personality plasticity, healthy aging, and interventions. *Developmental Psychology*, *50*(5), 1470–1474.

Mroczek, D. K., & Almeida, D. M. (2004). The effect of daily stress, personality, and age on daily negative affect. *Journal of Personality*, *72*(2), 355-378.

Muir, A. J., Sanders, L. L., Wilkinson, W. E., & Schmader, K. (2001). Reducing medication regimen complexity. *Journal of General Internal Medicine*, *16*(2), 77-82.

Muir-Cochrane, E. (2006). Medical co-morbidity risk factors and barriers to care for people with schizophrenia. *Journal of Psychiatric and Mental Health Nursing*, *13*(4), 447-452.

Mullen, P. D., Hersey, J. C., & Iverson, D. C. (1987). Health behavior models compared. *Social Science & Medicine*, *24*(11), 973-981.

Munro, S., Lewin, S., Swart, T., & Volmink, J. (2007). A review of health behaviour theories: how useful are these for developing interventions to promote long-term medication adherence for TB and HIV/AIDS?. *BMC Public Health*, *7*(1), 104.

Murata, G. H., Shah, J. H., Adam, K. D., Wendel, C. S., Bokhari, S. U., Solvas, P. A., ... & Duckworth, W. C. (2003). Factors affecting diabetes knowledge in Type 2 diabetic veterans. *Diabetologia*, *46*(8), 1170-1178.

Murmann, J. P., & Frenken, K. (2005). Toward a Systematic Framework for Research on Dominant Designs. *Technological Innovations, and Industrial Change" Northwestern University Working Paper*.

Murphy, J., Wulff, K., Catmur, C., & Bird, G. (2018). Alexithymic traits, independent of depression and anxiety, are associated with reduced sleep quality. *Personality and Individual Differences*, *129*, 175-178.

Murray, A. L., & Booth, T. (2015). Personality and physical health. *Current Opinion in Psychology*, *5*, 50-55.

Murray, M. D., & Callahan, C. M. (2003). Improving medication use for older adults: an integrated research agenda. *Annals of Internal Medicine*, *139*(5, Part 2), 425-429.

Murray, M. D., Morrow, D. G., Weiner, M., Tu, W., Deer, M. M., Brater, D. C., & Weinberger, M. (2004). A conceptual framework to study medication adherence in older adults. *The American Journal of Geriatric Pharmacotherapy*, *2*(1), 36-43.

Musek, J. (2007). A general factor of personality: Evidence for the Big One in the five-factor model. *Journal of Research in Personality*, *41*(6), 1213-1233.

Myrtek, M. (2001). Meta-analyses of prospective studies on coronary heart disease, type A personality, and hostility. *International Journal of Cardiology*, *79*(2-3), 245-251.

Nabalamba, A., & Millar, W. J. (2007). Going to the doctor. *Health Reports-Statistics Canada*, *18*(1), 23-35.

Nafradi, L., Nakamoto, K., & Schulz, P. J. (2017). Is patient empowerment the key to promote adherence? A systematic review of the relationship between self-efficacy, health locus of control and medication adherence. *PloS one*, *12*(10).

Nelson, L. D., Drebing, C., Satz, P., & Uchiyama, C. (1998). Personality change in head trauma: A validity study of the Neuropsychology Behaviour and Affect Profile. *Archives of Clinical Neuropsychology*, *13*(6), 549-560.

Nettle, D. (2005). An evolutionary approach to the extraversion continuum. *Evolution and Human Behavior*, *26*(4), 363-373.

Nettle, D. (2006). The evolution of personality variation in humans and other animals. *American Psychologist*, *61*(6), 622-631.

Nettle, D. (2009). Ecological influences on human behavioural diversity: A review of recent findings. *Trends in Ecology & Evolution*, *24*(11), 618-624.

Nettle, D., & Liddle, B. (2008). Agreeableness is related to social-cognitive, but not social-perceptual, theory of mind. *European Journal of Personality: Published for the European Association of Personality Psychology*, *22*(4), 323-335.

Nici, L. (2012). Adherence to a pulmonary rehabilitation program: start by understanding the patient. *COPD: Journal of Chronic Obstructive Pulmonary Disease*, *9*(5), 445-446.

Nides, M. A., Tashkin, D. P., Simmons, M. S., Wise, R. A., Li, V. C., & Rand, C. S. (1993). Improving inhaler adherence in a clinical trial through the use of the nebulizer chronolog. *Chest*, *104*(2), 501-507.

Nielsen, M. B., & Knardahl, S. (2014). Coping strategies: A prospective study of patterns, stability, and relationships with psychological distress. *Scandinavian Journal of Psychology*, *55*(2), 142-150.

Nieuwlaat, R., Wilczynski, N., Navarro, T., Hobson, N., Jeffery, R., Keepanasseril, A., ... & Sivaramalingam, B. (2014). Interventions for enhancing medication adherence. *Cochrane Database of Systematic Reviews*, (11).

Nimnuan, C., Hotopf, M., & Wessely, S. (2001). Medically unexplained symptoms: an epidemiological study in seven specialities. *Journal of Psychosomatic Research*, *51*(1), 361-367.

Noar, S. M., Benac, C. N., & Harris, M. S. (2007). Does tailoring matter? Meta-analytic review of tailored print health behavior change interventions. *Psychological Bulletin*, *133*(4), 673-693.

Nobile, C., & Drotar, D. (2003). Research on the quality of parent-provider communication in pediatric care: implications and recommendations. *Journal of Developmental & Behavioral Pediatrics*, *24*(4), 279-290.

Nolan, P., & Badger, F. (2005). Aspects of the relationship between doctors and depressed patients that enhance satisfaction with primary care. *Journal of Psychiatric and Mental Health Nursing*, *12*(2), 146-153.

Norell, S. E. (1981). Accuracy of patient interviews and estimates by clinical staff in determining medication compliance. *Social Science & Medicine. Part E: Medical Psychology*, *15*(1), 57-61.

Norman, W. T. (1967). *2800 Personality trait descriptors- normative operating characteristics for a university population*. Office of Research Administration.

Noyes, R., Stuart, S., Watson, D. B., & Langbehn, D. R. (2006). Distinguishing between hypochondriasis and somatization disorder: a review of the existing literature. *Psychotherapy and Psychosomatics*, *75*(5), 270-281.

Nunes, V., Neilson, J., O'Flynn, N., Calvert, N., Kuntze, S., Smithson, H., ... & Crome, P. (2009). *Medicines Adherence: Involving Patients in Decisions About Prescribed Medicines and Supporting Adherence*. NICE: National Institute for Health and Clinical Excellence, London, UK.

Nutbeam, D. (2000). Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century. *Health Promotion International*, *15*(3), 259-267.

O'Cleirigh, C., Ironson, G., Weiss, A., & Costa Jr, P. T. (2007). Conscientiousness predicts disease progression (CD4 number and viral load) in people living with HIV. *Health Psychology*, *26*(4), 473-480.

O'Connor, D. B., & Ashley, L. (2008). Are alexithymia and emotional characteristics of disclosure associated with blood pressure reactivity and psychological distress following written emotional disclosure. *British Journal of Health Psychology*, *13*(3), 495-512.

O'Connor, D. B., Conner, M., Jones, F., McMillan, B., & Ferguson, E. (2008). Effects of conscientiousness and daily hassles on health behaviours. In *Psychology & Health*, *23*, 48-48.

O'Connor, D. B., Conner, M., Jones, F., McMillan, B., & Ferguson, E. (2009). Exploring the benefits of conscientiousness: An investigation of the role of daily stressors and health behaviors. *Annals of Behavioral Medicine*, *37*(2), 184-196.

O'Leary, A. (1985). Self-efficacy and health. *Behaviour Research and Therapy*, *23*(4), 437-451.

Ogden, J. (2016). Celebrating variability and a call to limit systematisation: the example of the Behaviour Change Technique Taxonomy and the Behaviour Change Wheel. *Health Psychology Review*, *10*(3), 245-250.

Ogedegbe, G., Harrison, M., Robbins, L., Mancuso, C. A., & Allegrante, J. P. (2004). Barriers and facilitators of medication adherence in hypertensive African Americans: a qualitative study. *Ethnicity & Disease*, *14*(1), 3-12.

Ogedegbe, G., Mancuso, C. A., Allegrante, J. P., & Charlson, M. E. (2003). Development and evaluation of a medication adherence self-efficacy scale in hypertensive African-American patients. *Journal of Clinical Epidemiology*, *56*(6), 520-529.

Öhman, M., Söderberg, S., & Lundman, B. (2003). Hovering between suffering and enduring: The meaning of living with serious chronic illness. *Qualitative Health Research*, *13*(4), 528-542.

Olsen, S., Smith, S., & Oei, T. P. (2008). Adherence to continuous positive airway pressure therapy in obstructive sleep apnoea sufferers: a theoretical approach to treatment adherence and intervention. *Clinical Psychology Review*, *28*(8), 1355-1371.

O'Rouke, N., Neufeld, E., Claxton, A., & Smith, J. Z. (2010). Knowing me knowing you: Reported personality and trait discrepancies as predictors of marital idealization between long-wed spouses. *Psychology and Aging*, *26*, 412-421.

Osterberg, L., & Blaschke, T. (2005). Adherence to medication. *New England Journal of Medicine*, *353*(5), 487-497.

Otsuki, E., Rand, A.S., Riekert, K.A. (2008). Measuring adherence to medication regimens in clinical care and research. In: J.K. Shumaker, & K.A. Riekert, (Eds), *The handbook of health behavior change*, 3rd ed. (pp. 309-325) New York: Springer.

Oxford English Dictionary, (1989). Oxford English Dictionary. *Simpson, JA & Weiner, ESC*.

Paes, A. H., Bakker, A., & Soe-Agnie, C. J. (1997). Impact of dosage frequency on patient compliance. *Diabetes Care*, *20*(10), 1512-1517.

Paliadelis, P. S., Parmenter, G., Parker, V., Giles, M., & Higgins, I. (2012). The challenges confronting clinicians in rural acute care settings: a participatory research project. *Rural & Remote Health*, *12*(2).

Panchenko, A. V. (2012). On the need for a multi-faceted taxonomy for health information exchange. *Scholar Archive*, 746

Pantalone, D. W., Hessler, D. M., & Simoni, J. M. (2010). Mental health pathways from interpersonal violence to health-related outcomes in HIV-positive sexual minority men. *Journal of Consulting and Clinical Psychology*, *78*(3), 387-397.

Pantuzza, L. L., Ceccato, M. D. G. B., Silveira, M. R., Junqueira, L. M. R., & Reis, A. M. M. (2017). Association between medication regimen complexity and pharmacotherapy adherence: a systematic review. *European Journal of Clinical Pharmacology*, *73*(11), 1475-1489.

Parens, E. (2013). On good and bad forms of medicalization. *Bioethics*, *27*(1), 28-35.

Park, D. C. (1999). Aging and the controlled and automatic processing of medical information and medical intentions. In *Processing of medical information in aging patients* (pp. 13-34). Psychology Press.

Parnas, J., & Henriksen, M. G. (2014). Disordered self in the schizophrenia spectrum: a clinical and research perspective. *Harvard Review of Psychiatry*, *22*(5), 251-265.

Parslow, R., Jorm, A., Christensen, H., & Jacomb, P. (2002). Factors associated with young adults' obtaining general practitioner services. *Australian Health Review*, *25*(6), 109-118.

Partridge, M. R., Dal Negro, R. W., & Olivieri, D. (2011). Understanding patients with asthma and COPD: insights from a European study. *Primary Care Respiratory Journal*, *20*(3), 315-323.

Pasma, A., Schenk, C. V., Timman, R., Busschbach, J. J., van den Bemt, B. J., Molenaar, E., ... & Hazes, J. M. (2015). Non-adherence to disease-modifying antirheumatic drugs is associated with higher disease activity in early arthritis patients in the first year of the disease. *Arthritis Research & Therapy*, *17*(1), 281.

Pasma, A., van’t Spijker, A., Luime, J. J., Walter, M. J., Busschbach, J. J., & Hazes, J. M. (2015). Facilitators and barriers to adherence in the initiation phase of disease-modifying antirheumatic drug (DMARD) use in patients with arthritis who recently started their first DMARD treatment. *The Journal of Rheumatology*, *42*(3), 379-385.

Paterson, B. L. (2001a). The shifting perspectives model of chronic illness. *Journal of Nursing Scholarship*, *33*(1), 21-26.

Paterson, B. (2001b). Myth of empowerment in chronic illness. *Journal of Advanced Nursing*, *34*(5), 574-581.

Paterson, B., & Thorne, S. (2000). Developmental evolution of expertise in diabetes self-management. *Clinical Nursing Research*, *9*(4), 402-419.

Paterson, B., Thorne, S., Crawford, J., & Tarko, M. (1999). Living with diabetes as a transformational experience. *Qualitative Health Research*, *9*(6), 786-802.

Paterson, D. L., Swindells, S., Mohr, J., Brester, M., Vergis, E. N., Squier, C., ... & Singh, N. (2000). Adherence to protease inhibitor therapy and outcomes in patients with HIV infection. *Annals of Internal Medicine*, *133*(1), 21-30.

Patterson, F., Ferguson, E., Norfolk, T., & Lane, P. (2005). A new selection system to recruit general practice registrars: preliminary findings from a validation study. *BMJ*, *330*(7493), 711-714.

Patton, M. Q. (2002). *Qualitative research and evaluation methods*. Sage Publications.
Paulhus, D. L, & Buckels, E. E. (2011, February). The Dark Tetrad of Personality: Relevance to Terrorist Groups. Presented to the Defense Research and Development Canada (DRDC) agency, Toronto, Canada.

Paulhus, D. L, & Williams, K. M. (2002). The Dark Triad of personality: Narcissism, Machiavellianism, and psychopathy. *Journal of Research in Personality, 36*, 556–563.

Paunonen, S. V., & Ashton, M. C. (2001). Big five factors and facets and the prediction of behavior. *Journal of Personality and Social Psychology*, *81*(3), 524-539.

Pearlin, L., Lieberman, M., Menaghan, E., & Mullan, J. (1981). *Mastery scale*. Measures of Personality and Social Psychological Attitudes. San Diego: Academic Press, Inc.

Pedersen, R. (2009). Empirical research on empathy in medicine—A critical review. *Patient education and counseling*, *76*(3), 307-322.

Pedersen, S. S., & Denollet, J. (2006). Is Type D personality here to stay? Emerging evidence across cardiovascular disease patient groups. *Current Cardiology Reviews*, *2*(3), 205-213.

Pedersen, S. S., Herrmann-Lingen, C., de Jonge, P., & Scherer, M. (2010). Type D personality is a predictor of poor emotional quality of life in primary care heart failure patients independent of depressive symptoms and New York Heart Association functional class. *Journal of Behavioral Medicine*, *33*(1), 72-80.

Pelosi, A. J. (2019). Personality and fatal diseases: Revisiting a scientific scandal. *Journal of Health Psychology*, *24*(4), 421-439.

Penke, L., Denissen, J. J., & Miller, G. F. (2007). The evolutionary genetics of personality. *European Journal of Personality: Published for the European Association of Personality Psychology*, *21*(5), 549-587.

Perkins, D. O. (1999). Adherence to antipsychotic medications. *The Journal of Clinical Psychiatry*, *60*, 25-30.

Perkins, D. O., Johnson, J. L., Hamer, R. M., Zipursky, R. B., Keefe, R. S., Centorrhino, F., ... & Tohen, M. (2006). Predictors of antipsychotic medication adherence in patients recovering from a first psychotic episode. *Schizophrenia Research*, *83*(1), 53-63.

Pervin, L. A., John, O. P., & Cervone, D. (2008). *Personality: Theory and Research*. Hoboken.

Peters, G. J. Y., & Kok, G. (2016). All models are wrong, but some are useful: a comment on Ogden (2016). *Health Psychology Review*, *10*(3), 265-268.

Peters-Klimm, F., Campbell, S., Hermann, K., Kunz, C. U., Müller-Tasch, T., Szecsenyi, J., & Competence Network Heart Failure. (2010). Case management for patients with chronic systolic heart failure in primary care: the HICMan exploratory randomised controlled trial. *Trials*, *11*(1), 56.

Peterson, A. M., Takiya, L., & Finley, R. (2003). Meta-analysis of trials of interventions to improve medication adherence. *American Journal of Health-System Pharmacy*, *60*(7), 657-665.

Peyrot, M., McMurray Jr, J. F., & Kruger, D. F. (1999). A biopsychosocial model of glycemic control in diabetes: stress, coping and regimen adherence. *Journal of Health and Social Behavior*, *40*(2), 141-158.

Phatak, H. M., & Thomas III, J. (2006). Relationships between beliefs about medications and nonadherence to prescribed chronic medications. *Annals of Pharmacotherapy*, *40*(10), 1737-1742.

Phillips, A. C., Batty, G. D., Weiss, A., Deary, I., Gale, C. R., Thomas, G. N., & Carroll, D. (2010). Neuroticism, cognitive ability, and the metabolic syndrome: The Vietnam Experience Study. *Journal of Psychosomatic Research*, *69*(2), 193-201.

Phillips, C. J., Marshall, A. P., Chaves, N. J., Jankelowitz, S. K., Lin, I. B., Loy, C. T., ... & Wilkinson, S. A. (2015). Experiences of using the Theoretical Domains Framework across diverse clinical environments: a qualitative study. *Journal of Multidisciplinary Healthcare*, *8*, 139-146.

Phillips, K. A., Morrison, K. R., Andersen, R., & Aday, L. A. (1998). Understanding the context of healthcare utilization: assessing environmental and provider-related variables in the behavioral model of utilization. *Health Services Research*, *33*(3 Pt 1), 571-596.

Piedmont, R. L. (2013). *The revised NEO Personality Inventory: Clinical and research applications*. Springer Science & Business Media.

Pierret, J. (2003). The illness experience: state of knowledge and perspectives for research. *Sociology of Health & Illness*, *25*(3), 4-22.

Piette, J. D., Heisler, M., & Wagner, T. H. (2004). Cost-related medication underuse among chronically III adults: the treatments people forgo, how often, and who is at risk. *American Journal of Public Health*, *94*(10), 1782-1787.

Plager, K. (1994). *Hermeneutic phenomenology*. *Interpretive phenomenology: Embodiment, caring, and ethics in health and illness*, (pp. 65-83). Sage.

Playle, J. F., & Keeley, P. (1998). Non-compliance and professional power. *Journal of Advanced Nursing*, *27*(2), 304-311.

Pollatos, O., & Herbert, B. M. (2018). *Alexithymia and Body Awareness. Alexithymia: Advances in Research, Theory, and Clinical Practice*, (pp. 321-333). Cambridge Medicine.

Pollock, A., & Jones, D. S. (2015). Coronary artery disease and the contours of pharmaceuticalization. *Social Science & Medicine*, *131*, 221-227.

Ponieman, D., Wisnivesky, J. P., Leventhal, H., Musumeci-Szabó, T. J., & Halm, E. A. (2009). Impact of positive and negative beliefs about inhaled corticosteroids on adherence in inner-city asthmatic patients. *Annals of Allergy, Asthma & Immunology*, *103*(1), 38-42.

Porteous, T., Wyke, S., Hannaford, P., & Bond, C. (2015). Self-care behaviour for minor symptoms: can Andersen's Behavioral Model of Health Services Use help us to understand it?. *International Journal of Pharmacy Practice*, *23*(1), 27-35.

Pound, P., Britten, N., Morgan, M., Yardley, L., Pope, C., Daker-White, G., & Campbell, R. (2005). Resisting medicines: a synthesis of qualitative studies of medicine taking. *Social Science & Medicine*, *61*(1), 133-155.

Powell, R. C. (1977). Helen Flanders Dunbar (1902–1959) and a holistic approach to psychosomatic problems. I. The rise and fall of a medical philosophy. *Psychiatric Quarterly*, *49*(2), 133-152.

Primožič, S., Avbelj, M., Dernovšek, M. Z., & Oblak, M. R. (2012). Specific cognitive abilities are associated with diabetes self-management behavior among patients with type 2 diabetes. *Diabetes Research and Clinical Practice*, *95*(1), 48-54.

Pud, D., Eisenberg, E., Sprecher, E., Rogowski, Z., & Yarnitsky, D. (2004). The tridimensional personality theory and pain: harm avoidance and reward dependence traits correlate with pain perception in healthy volunteers. *European Journal of Pain*, *8*(1), 31-38.

Price, D., Lee, A. J., Sims, E. J., Kemp, L., Hillyer, E. V., Chisholm, A., ... & Williams, A. (2013). Characteristics of patients preferring once-daily controller therapy for asthma and COPD: a retrospective cohort study. *Primary Care Respiratory Journal*, *22*(2), 161-168.

Psytoolkit. *Available online: https://www.psytoolkit.org/ (last accessed 3rd November 2019).*

Radomski, M. V. (2011). More than good intentions: Advancing adherence to therapy recommendations. *American Journal of Occupational Therapy*, *65*(4), 471-477.

Radwin, L. E., & Alster, K. (2002). Individualized nursing care: an empirically generated definition. *International nursing review*, *49*(1), 54-63.

Raebel, M. A., Schmittdiel, J., Karter, A. J., Konieczny, J. L., & Steiner, J. F. (2013). Standardizing terminology and definitions of medication adherence and persistence in research employing electronic databases. *Medical Care*, *51*(8 0 3), S11-S21.

Rajaram, S. S., & Rashidi, A. (1998). Minority women and breast cancer screening: the role of cultural explanatory models. *Preventive Medicine*, *27*(5), 757-764.

Raleigh, E. D. (1992). Sources of hope in chronic illness. In *Oncology nursing forum, 19*(3), 443-448.

Rasting, M., Brosig, B., & Beutel, M. E. (2005). Alexithymic characteristics and patient-therapist interaction: a video analysis of facial affect display. *Psychopathology*, *38*(3), 105-111.

Rather, L. J. (1957). Rudolph Virchow and scientific medicine. *AMA Archives of Internal Medicine*, *100*(6), 1007-1014.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (Vol. 1). Sage.

Raynor, D. K. (1992). Patient compliance: the pharmacist's role. *International Journal of Pharmacy Practice*, *1*(3), 126-135.

Raynor, D. A., & Levine, H. (2009). Associations between the five-factor model of personality and health behaviors among college students. *Journal of American College Health*, *58*(1), 73-82.

Reach, G. (2010). Is there an impatience genotype leading to non-adherence to long-term therapies?. *Diabetologia*, *53*(8), 1562-1567.

Redding, C. A., Rossi, J. S., Rossi, S. R., Velicer, W. F., & Prochaska, J. O. (2000). Health behavior models. In *International Electronic Journal of Health Education*.

Redman, B. K. (2005). The ethics of self-management preparation for chronic illness. *Nursing Ethics*, *12*(4), 360-369.

Remien, R. H., Bastos, F. I., Terto Jnr, V., Raxach, J. C., Pinto, R. M., Parker, R. G., ... & Hacker, M. A. (2007). Adherence to antiretroviral therapy in a context of universal access, in Rio de Janeiro, Brazil. *AIDS Care, 19*(6), 740-748.

Remien, R. H., Carballo-Dieguez, A., & Wagner, G. (1995). Intimacy and sexual risk behaviour in serodiscordant male couples. *Aids Care*, *7*(4), 429-438.

Revelle, W., & Wilt, J. (2013). The general factor of personality: A general critique. *Journal of Research in Personality*, *47*(5), 493-504.

Rhodes, R. E., & Smith, N. E. I. (2006). Personality correlates of physical activity: a review and meta-analysis. *British Journal of Sports Medicine*, *40*(12), 958-965.

Rhodes, R. E., & Pfaeffli, L. A. (2012). Personality and physical activity. *The Oxford Handbook of Exercise Psychology*, 195-223.

Rice, P. L., & Ezzy, D. (1999). *Qualitative research methods: A health focus*. Melbourne, Australia.

Richards, H., & Emslie, C. (2000). The 'doctor'or the 'girl from the University'? Considering the influence of professional roles on qualitative interviewing. *Family Practice, 17*(1), 71-75.

Rickles, N. M. (2010). A multi-theoretical approach to linking medication adherence levels and the comparison of outcomes. *Research in Social and Administrative Pharmacy*, *6*(1), 49-62.

Riekert, K. A. (2006). *Integrating regimen adherence assessment into clinical practice*. Promoting treatment adherence: A practical handbook for health care providers, (pp. 17-34). Sage.

Ritchie, J., Lewis, J., & Elam, G. (2003). *Designing and selecting samples* (pp. 77-108). London: Sage.

Ritholz, M. D., & Jacobson, A. M. (1998). Living with hypoglycemia. *Journal of General Internal Medicine*, *13*(12), 799-804.

Robbins, J. A. (1980). Patient compliance. *Primary Care-Clinics in Office Practice*, *7*(4), 703-711.

Roberson, M. H. (1992). The meaning of compliance: patient perspectives. *Qualitative Health Research*, *2*(1), 7-26.

Roberts, B. W., Chernyshenko, O. S., Stark, S., & Goldberg, L. R. (2005). The structure of conscientiousness: An empirical investigation based on seven major personality questionnaires. *Personnel Psychology, 58*(1), 103-139.

Roberts, B. W., & Jackson, J. J. (2008). Sociogenomic personality psychology. *Journal of Personality*, *76*(6), 1523-1544.

Roberts, B. W., Kuncel, N. R., Shiner, R., Caspi, A., & Goldberg, L. R. (2007). The power of personality: The comparative validity of personality traits, socioeconomic status, and cognitive ability for predicting important life outcomes. *Perspectives on Psychological Science*, *2*(4), 313-345.

Roberts, B. W., Smith, J., Jackson, J. J., & Edmonds, G. (2009). Compensatory conscientiousness and health in older couples. *Psychological Science*, *20*(5), 553-559.

Robins, R. W., Hendin, H. M., & Trzesniewski, K. H. (2001). Measuring global self-esteem: Construct validation of a single-item measure and the Rosenberg Self-Esteem Scale. *Personality and Social Psychology Bulletin*, *27*(2), 151-161.

Robinson, G. E. (2004). Beyond nature and nurture. *Science, 304*(5669), 397-399.

Robinson, G. E., Grozinger, C. M., & Whitfield, C. W. (2005). Sociogenomics: social life in molecular terms. *Nature Reviews Genetics*, *6*(4), 257-270.

Rogers, A., Kennedy, A., Nelson, E., & Robinson, A. (2005). Uncovering the limits of patient-centeredness: implementing a self-management trial for chronic illness. *Qualitative Health Research*, *15*(2), 224-239.

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *The Journal of Psychology*, *91*(1), 93-114.

Rokeach, M. (1973). *The nature of human values*. Free press.

Rokeach, M. (1979). Some unresolved issues in theories of beliefs, attitudes, and values. In *Nebraska symposium on motivation*. University of Nebraska Press.

Roley, S. S., Barrows, C. J., Susan Brownrigg OTR, L., Sava, D. I., Vibeke Talley OTR, L., Kristi Voelkerding, B. S., ... & Deborah Lieberman, M. H. S. A. (2008). Occupational therapy practice framework: domain & process 2nd edition. *The American Journal of Occupational Therapy*, *62*(6), 625-683.

Rolfe, A., Cash-Gibson, L., Car, J., Sheikh, A., & McKinstry, B. (2014). Interventions for improving patients' trust in doctors and groups of doctors. *Cochrane Database of Systematic Reviews*, (3).

Rosenberg, C. E. (1977). The therapeutic revolution: Medicine, meaning, and social change in nineteenth-century America. *Perspectives in Biology and Medicine*, *20*(4), 485-506.

Rosenberg, E. E. (1997). Lessons for Clinicians From Physician-Patient. *Archives of Family Medicine*, *6*, 279-283.

Rosenberg, M. (1979). *Conceiving the Self*. New York: Basic Book.

Rosenman, R. H., & Chesney, M. A. (Eds.), (1985). *Anger and hostility in cardiovascular and behavioral disorders*. Hemisphere Publishing Corporation.

Rosenstock, I. M. (1974). Historical origins of the health belief model. *Health Education Monographs*, *2*(4), 328-335.

Rosenstock, I. M. (1990). The Health Belief Model: explaining health behavior through experiences. In K. Glanz, F.M. Lewis, F., & B.K. Rimer, (Eds.), *Health behavior and health education: Theory, research and practice*, (pp. 39-63). Jossey-Bass Publishers.

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. *Health Education Quarterly*, *15*(2), 175-183.

Rosmalen, J. G., Neeleman, J., Gans, R. O., & de Jonge, P. (2007). The association between neuroticism and self-reported common somatic symptoms in a population cohort. *Journal of Psychosomatic Research*, *62*(3), 305-311.

Ross, E., & Deverell, A. (2004). *Psychosocial approaches to health, illness and disability: A reader for health care professionals*. Van Schaik Publishers.

Ross, D. J., & Guggenheim, F. G. (1983). Compliance and the health belief model: a challenge for the liaison psychiatrist. *General Hospital Psychiatry*, *5*(1), 31-35.

Ross, S., Walker, A., & MacLeod, M. J. (2004). Patient compliance in hypertension: role of illness perceptions and treatment beliefs. *Journal of Human Hypertension*, *18*(9), 607-613.

Rosellini, A. J., & Brown, T. A. (2011). The NEO Five-Factor Inventory: Latent structure and relationships with dimensions of anxiety and depressive disorders in a large clinical sample. *Assessment*, *18*(1), 27-38.

Rothbaum, F., Weisz, J. R., & Snyder, S. S. (1982). Changing the world and changing the self: A two-process model of perceived control. *Journal of Personality and Social Psychology*, *42*(1), 5-37.

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological monographs: General and applied*, *80*(1), 1-28.

Rouse, C. (2010). Patient and practitioner noncompliance: rationing, therapeutic uncertainty, and the missing conversation. *Anthropology & Medicine*, *17*(2), 187-200.

Rudd, P. (1994). Compliance with antihypertensive therapy: a shifting paradigm. *Cardiology in Review*, *2*(5), 230-240.

Ruddy, K., Mayer, E., & Partridge, A. (2009). Patient adherence and persistence with oral anticancer treatment. *CA: a cancer journal for clinicians*, *59*(1), 56-66.

Ruiz, J. M., Matthews, K. A., Scheier, M. F., & Schulz, R. (2006). Does who you marry matter for your health? Influence of patients' and spouses' personality on their partners' psychological well-being following coronary artery bypass surgery. *Journal of Personality and Social Psychology*, *91*(2), 255-267.

Rüsch, N., Müller, M., Ajdacic-Gross, V., Rodgers, S., Corrigan, P. W., & Rössler, W. (2014). Shame, perceived knowledge and satisfaction associated with mental health as predictors of attitude patterns towards help-seeking. *Epidemiology and Psychiatric Sciences*, *23*(2), 177-187.

Rushton, J. P., & Irwing, P. (2009). A general factor of personality (GFP) from the Multidimensional Personality Questionnaire. *Personality and Individual Differences*, *47*(6), 571-576.

Rushton, J. P., Jackson, D. N., & Paunonen, S. V. (1981). *Personality: Nomothetic or idiographic?* A response to Kenrick and Stringfield.

Russell, C. L., Cetingok, M., Hamburger, K. Q., Owens, S., Thompson, D., Hathaway, D., ... & Wakefield, M. R. (2010). Medication adherence in older renal transplant recipients. *Clinical Nursing Research*, *19*(2), 95-112.

Ryan, G. W., & Wagner, G. J. (2003). Pill taking 'routinization': a critical factor to understanding episodic medication adherence. *AIDS Care*, *15*(6), 795-806.

Rydén, O., Andersson, M., & Andersson, B. (2007). Personality: A vulnerability factor in rhinitis?. *Psychology, Health & Medicine*, *12*(3), 328-333.

Sabaté, E., & Sabaté, E. (Eds.), (2003). *Adherence to long-term therapies: evidence for action*. World Health Organization.

Sackett, D. L., & Haynes, R. B. (1976). *Compliance with therapeutic regimens*. John Hopkins University Press.

Sale, J. E., Gignac, M. A., Hawker, G., Frankel, L., Beaton, D., Bogoch, E., & Elliot-Gibson, V. (2011). Decision to take osteoporosis medication in patients who have had a fracture and are 'high'risk for future fracture: a qualitative study. *BMC Musculoskeletal Disorders*, *12*(1), 92.

Sandelowski, M. (1997). "To be of use": Enhancing the utility of qualitative research. *Nursing Outlook*, *45*(3), 125-132.

Sandelowski, M. (2006). "Meta-Jeopardy": The crisis of representation in qualitative metasynthesis. *Nursing Outlook*, *54*(1), 10-16.

Sandelowski, M. (2010). What's in a name? Qualitative description revisited. *Research in Nursing & Health*, *33*(1), 77-84.

Sanders, M. J., & Van Oss, T. (2013). Using daily routines to promote medication adherence in older adults. *American Journal of Occupational Therapy*, *67*(1), 91-99.

Sarafino, E. P., & Smith, T. W. (2014). *Health psychology: Biopsychosocial interactions*. John Wiley & Sons.

Saravanan, B., Jacob, K. S., Johnson, S., Prince, M., Bhugra, D., & David, A. S. (2007). Belief models in first episode schizophrenia in South India. *Social Psychiatry and Psychiatric Epidemiology*, *42*(6), 446-451.

Saucier, G. (2003). An alternative multi-language structure for personality attributes. *European Journal of Personality*, *17*(3), 179-205.

Saucier, G., & Goldberg, L. R. (1998). What is beyond the Big Five?. *Journal of Personality*, *66*, 495-524.

Schaller, M., & Murray, D. R. (2008). Pathogens, personality, and culture: Disease prevalence predicts worldwide variability in sociosexuality, extraversion, and openness to experience. *Journal of Personality and Social Psychology, 95*(1), 212-221.

Schapiro, T. (2009). The nature of inclination. *Ethics*, *119*(2), 229-256.

Scheier, M. F., & Carver, C. S. (1985). Optimism, coping, and health: assessment and implications of generalized outcome expectancies. *Health Psychology*, *4*(3), 219-247.

Scheier, M. F., Weintraub, J. K., & Carver, C. S. (1986). Coping with stress: divergent strategies of optimists and pessimists. *Journal of Personality and Social Psychology*, *51*(6), 1257-1264.

Schmidt, H. G., & Rikers, R. M. (2007). How expertise develops in medicine: knowledge encapsulation and illness script formation. *Medical Education*, *41*(12), 1133-1139.

Schneider, A., Wensing, M., Quinzler, R., Bieber, C., & Szecsenyi, J. (2007). Higher preference for participation in treatment decisions is associated with lower medication adherence in asthma patients. *Patient Education and Counseling*, *67*(1-2), 57-62.

Schonlau, M., Zapert, K., Simon, L. P., Sanstad, K. H., Marcus, S. M., Adams, J., ... & Berry, S. H. (2004). A comparison between responses from a propensity-weighted web survey and an identical RDD survey. *Social Science Computer Review*, *22*(1), 128-138.

Schroeder, K., Fahey, T., Hollinghurst, S., & Peters, T. J. (2005). Nurse-led adherence support in hypertension: a randomized controlled trial. *Family Practice*, *22*(2), 144-151.

Schutz, A. (1967). *The phenomenology of the social world*. Northwestern University Press.

Schwandt, T. A. (1994). Constructivist, interpretivist approaches to human inquiry. *Handbook of Qualitative Research*, *1*, 118-137.

Schwartz, G. F., & Quigley, H. A. (2008). Adherence and persistence with glaucoma therapy. *Survey of Ophthalmology*, *53*(6), S57-S68.

Schwarz, N. (1999). Self-reports: how the questions shape the answers. *American Psychologist*, *54*(2), 93-105.

Schwarzer, R., & Fuchs, R. (1996). Self-efficacy and health behaviours. *Predicting health behavior: Research and practice with social cognition models*, *163*, 196.

Sechrest, L. (2005). Validity of measures is no simple matter. *Health Services Research*, *40*(5p2), 1584-1604.

Selye, H. (1950). Stress and the general adaptation syndrome. *British Medical Journal*, *1*(4667), 1383.

Selye, H. (1956). Recent progress in stress research, with reference to tuberculosis. *Personality, Stress and Tuberculosis*.

Selye, H. (1976). The stress concept. *Canadian Medical Association Journal*, *115*(8), 718.

Selye, H. (1985). The nature of stress. *Basal facts*, *7*(1), 3-11.

Seng, E. K., & Holroyd, K. A. (2013). Optimal use of acute headache medication: a qualitative examination of behaviors and barriers to their performance. *Headache: The Journal of Head and Face Pain*, *53*(9), 1438-1450.

Serrano, J., Plaza, V., Sureda, B., De Pablo, J., Picado, C., Bardagi, S., ... & Sanchis, J. (2006). Alexithymia: a relevant psychological variable in near-fatal asthma. *European Respiratory Journal*, *28*(2), 296-302.

Sewitch, M. J., Abrahamowicz, M., Barkun, A., Bitton, A., Wild, G. E., Cohen, A., & Dobkin, P. L. (2003). Patient nonadherence to medication in inflammatory bowel disease. *The American Journal of Gastroenterology*, *98*(7), 1535-1544.

Sharf, B. F., & Vanderford, M. L. (2003). Illness narratives and the social construction of health. In *The Routledge Handbook of Health Communication* (pp. 23-48). Routledge.

Sharif, S. P. (2017). Locus of control, quality of life, anxiety, and depression among Malaysian breast cancer patients: The mediating role of uncertainty. *European Journal of Oncology Nursing*, *27*, 28-35.

Sharma, S., & Nandkumar, V. K. (1980). Personality structure and adjustment pattern in bronchial asthma. *Acta Psychiatrica Scandinavica*, *61*(2), 81-88.

Shaul, M. P. (1995). From early twinges to mastery: the process of adjustment in living with rheumatoid arthritis. *Arthritis & Rheumatism: Official Journal of the American College of Rheumatology*, *8*(4), 290-297.

Shekelle, R. B., Hulley, S. B., Neaton, J. D., Billings, J. H., Borhani, N. O., Gerace, T. A., ... & Multiple Risk Factor Intervention Trial Research Group. (1985). The MRFIT behavior pattern study: II. Type A behavior and incidence of coronary heart disease. *American Journal of Epidemiology*, *122*(4), 559-570.

Shekelle, R. B., Vernon, S. W., & Ostfeld, A. M. (1991). Personality and coronary heart disease. *Psychosomatic Medicine*, *53*(2), 176-184.

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, *22*(2), 63-75.

Sherman, P. W., & Billing, J. (1999). Darwinian gastronomy: why we use spices: spices taste good because they are good for us. *BioScience*, *49*(6), 453-463.

Shi, L., Liu, J., Fonseca, V., Walker, P., Kalsekar, A., & Pawaskar, M. (2010a). Correlation between adherence rates measured by MEMS and self-reported questionnaires: a meta-analysis. *Health and Quality of Life Outcomes*, *8*(1), 99.

Shi, L., Liu, J., Koleva, Y., Fonseca, V., Kalsekar, A., & Pawaskar, M. (2010b). Concordance of adherence measurement using self-reported adherence questionnaires and medication monitoring devices. *Pharmacoeconomics*, *28*(12), 1097-1107.

Shirtcliffe, P., Marsh, S., Travers, J., Weatherall, M., & Beasley, R. (2012). Childhood asthma and GOLD-defined chronic obstructive pulmonary disease. *Internal Medicine Journal*, *42*(1), 83-88.

Shoemaker, S. J., & De Oliveira, D. R. (2008). Understanding the meaning of medications for patients: the medication experience. *Pharmacy World & Science*, *30*(1), 86-91.

Sholl, J. (2017). The muddle of medicalization: pathologizing or medicalizing?. *Theoretical Medicine and Bioethics*, *38*(4), 265-278.

Sidat, M., Fairley, C., & Grierson, J. (2007). Experiences and perceptions of patients with 100% adherence to highly active antiretroviral therapy: a qualitative study. *AIDS Patient Care and STDs*, *21*(7), 509-520.

Siegel, D., Lopez, J., & Meier, J. (2007). Antihypertensive medication adherence in the Department of Veterans Affairs. *The American Journal of Medicine*, *120*(1), 26-32.

Sifneos, P. E. (1973). The prevalence of 'alexithymic'characteristics in psychosomatic patients. *Psychotherapy and Psychosomatics*, *22*(2-6), 255-262.

Silvester, J., Patterson, F., Koczwara, A., & Ferguson, E. (2007). "Trust me...": psychological and behavioral predictors of perceived physician empathy. *Journal of Applied Psychology*, *92*(2), 519-527.

Simoni, J. M., Frick, P. A., & Huang, B. (2006). A longitudinal evaluation of a social support model of medication adherence among HIV-positive men and women on antiretroviral therapy. *Health Psychology*, *25*(1), 74-81.

Simpson, S. H., Eurich, D. T., Majumdar, S. R., Padwal, R. S., Tsuyuki, R. T., Varney, J., & Johnson, J. A. (2006). A meta-analysis of the association between adherence to drug therapy and mortality. *BMJ*, *333*(7557), 15.

Singh, M., & Kansra, S. (2006). Adherence issues in asthma. *Indian Pediatrics*, *43*(12), 1050-1055.

Singh, V., Jaiswal, A., Porter, J. D. H., Ogden, J. A., Sarin, R., Sharma, P. P., ... & Jain, R. C. (2002). TB control, poverty, and vulnerability in Delhi, India. *Tropical Medicine & International Health*, *7*(8), 693-700.

Skallová, A., Novotná, M., Kolbeková, P., Gasova, Z., Vesely, V., Sechovska, M., & Flegr, J. (2005). Decreased level of novelty seeking in blood donors infected with Toxoplasma. *Neuroendocrinology Letters*, *26*(5), 480-486.

Smalls, B. L., Walker, R. J., Hernandez-Tejada, M. A., Campbell, J. A., Davis, K. S., & Egede, L. E. (2012). Associations between coping, diabetes knowledge, medication adherence and self-care behaviors in adults with type 2 diabetes. *General Hospital Psychiatry*, *34*(4), 385-389.

Smith, B. R., & Blumstein, D. T. (2008). Fitness consequences of personality: a meta-analysis. *Behavioral Ecology*, *19*(2), 448-455.

Smith, D., Lovell, J., Weller, C., Kennedy, B., Winbolt, M., Young, C., & Ibrahim, J. (2017). A systematic review of medication non-adherence in persons with dementia or cognitive impairment. *PLoS One*, *12*(2).

Smith, M. J. (2008). Disciplinary perspectives linked to middle range theory. In: M.J. Smith, & P.R. Liehr (Eds.), *Middle Range Theory for Nursing*, 2nd Edition, (pp. 3-14). New York: Springer Publishing Company.

Smith, T. W. (2006). Personality as risk and resilience in physical health. *Current Directions in Psychological Science*, *15*(5), 227-231.

Smith, T. W., & Gallo, L. C. (2001). Personality traits as risk factors for physical illness. In A Baum, T. Revenson, & J. Singer, (Eds.), Handbook of Health Psychology, (pp. 139-172).

Smith, T. W., & Williams, P. G. (1992). Personality and health: Advantages and limitations of the five-factor model. *Journal of Personality*, *60*(2), 395-425.

Smolderen, K. G., Vingerhoets, A. J., Croon, M. A., & Denollet, J. (2007). Personality, psychological stress, and self-reported influenza symptomatology. *BMC Public Health*, *7*(1), 339.

Sokal, R. R. (1962). Typology and empiricism in taxonomy. *Journal of Theoretical Biology*, *3*(2), 230-267.

Sontag, S. (1978). *Illness as metaphor*. New York: Farrar. Strauss and Giroux.

Sontag, S. (1989). *Illness as metaphor and AIDS and its metaphors*. New York: Picador.

Soumerai, S. B., Pierre-Jacques, M., Zhang, F., Ross-Degnan, D., Adams, A. S., Gurwitz, J., ... & Safran, D. G. (2006). Cost-related medication nonadherence among elderly and disabled medicare beneficiaries: a national survey 1 year before the medicare drug benefit. *Archives of Internal Medicine*, *166*(17), 1829-1835.

Sparer, P. J. (Ed.). (1956). *Personality, stress, and tuberculosis*. International Universities Press.

Spearman, C. (1904). Measurement of association, Part II. Correction of ‘systematic deviations’. *American Journal of Psychology*, *15*, 88-101.

Spielberger, C., Crane, R. S., Kearns, W. D., Pellegrin, K. L., Rickman, R. L., & Johnson, E. H. (1991). Anger and anxiety in essential hypertension. *Stress and Emotion*, *14*, 266-283.

Stansfeld, S. A. (2002). Commentary: The problem with stress: minds, hearts and disease. *International Journal of Epidemiology*, *31*(6), 1113-1116.

Stansfeld, S. A., Marmot, M., & Wilkinson, R. (2006). Social support and social cohesion. *Social Determinants of Health*, *2*, 148-71.

Steiner, J. F., & Earnest, M. A. (2000). The language of medication-taking. *Annals of Internal Medicine*, *132*(11), 926-930.

Steinman, M. A., Sands, L. P., & Covinsky, K. E. (2001). Self-restriction of Medications Due to Cost in Seniors without Prescription Coverage: A National Survey. *Journal of General Internal Medicine*, *16*(12), 793-799.

Stephenson, B. J., Rowe, B. H., Haynes, R. B., Macharia, W. M., & Leon, G. (2009). Is this patient taking the treatment as prescribed?. In: D.L. Simel, D. Rennie, & S.A. Keitz (Eds.), *The Rational Clinical Examination: Evidence-Based Clinical Diagnosis*, (pp 173–182). New York: McGraw Hill Medical.

Stern, P. N., & Porr, C. J. (2011). *The Essentials of Grounded Theory*. Walnut Creek, CA.

Stilley, C. S., Sereika, S., Muldoon, M. F., Ryan, C. M., & Dunbar-Jacob, J. (2004). Psychological and cognitive function: predictors of adherence with cholesterol lowering treatment. *Annals of Behavioral Medicine*, *27*(2), 117-124.

Stockdale, S. E., Tang, L., Zhang, L., Belin, T. R., & Wells, K. B. (2007). The effects of health sector market factors and vulnerable group membership on access to alcohol, drug, and mental health care. *Health Services Research*, *42*(3p1), 1020-1041.

Stone, M. S., Bronkesh, S. J., Gerbarg, Z. B., & Wood, S. D. (1998). Meshing patient and physician goals. *Strategic medicine*. *The HSM Group - improving Patient Compliance. Available online: http://www.hsmgroup.com/info (accessed on 21 February 2018)*.

Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychology Review, 8*(3), 220-247.

Strauss, A. L., & Corbin, J. M. (1988). *Shaping a new health care system: The explosion of chronic illness as a catalyst for change*. San Francisco, CA.

Stroebe, W. (2011). *Social psychology and health*. McGraw-Hill Education (UK).

Stroebe, W., & de Wit, J. (1996) Health-impairing behaviours. In G.R. Semin and K. Fiedler (Eds.), *Applied Social Psychology*, (pp. 113–44). London: Sage.

Strom, J. L., & Egede, L. E. (2012). The impact of social support on outcomes in adult patients with type 2 diabetes: a systematic review. *Current Diabetes Reports*, *12*(6), 769-781.

Strus, W., Cieciuch, J., & Rowiński, T. (2014). The circumplex of personality metatraits: A synthesizing model of personality based on the big five. *Review of General Psychology*, *18*(4), 273-286.

Stuckey, H. L. (2009). Creative expression as a way of knowing in diabetes adult health education: An action research study. *Adult Education Quarterly, 60*(1), 46-64.

Stuifbergen, A. K., Becker, H., & Sands, D. (1990). Barriers to health promotion for individuals with disabilities. *Family & Community Health: The Journal of Health Promotion & Maintenance, 13*(1), 11-22.

Suls, J., & Bunde, J. (2005). Anger, anxiety, and depression as risk factors for cardiovascular disease: the problems and implications of overlapping affective dispositions. *Psychological Bulletin*, *131*(2), 260.

Sumartojo, E. (1993). When tuberculosis treatment fails. *American Review of Respiratory Disease*, *147*(1311), e20.

Sutin, A. R., Terracciano, A., Deiana, B., Naitza, S., Ferrucci, L., Uda, M., ... & Costa, P. T. (2010). High neuroticism and low conscientiousness are associated with interleukin-6. *Psychological Medicine*, *40*(9), 1485-1493.

Svansdottir, E., van den Broek, K. C., Karlsson, H. D., Olason, D. T., Thorgilsson, H., & Denollet, J. (2013). The distressed (Type D) and Five-Factor Models of personality in young, healthy adults and their association with emotional inhibition and distress. *Personality and Individual Differences*, *55*(2), 123-128.

Taylor, G. J. (1984). Alexithymia: concept, measurement, and implications for treatment. *The American Journal of Psychiatry, 141*(6), 725–732.

Taylor, G. J. (2000). Recent developments in alexithymia theory and research. *The Canadian Journal of Psychiatry*, *45*(2), 134-142.

Taylor, R. B. (1956). Patients who disregard medical recommendations. *Public Health Reports (1896-1970)*, 904-907.

Taylor, S. E. (1983). Adjustment to threatening events: A theory of cognitive adaptation. *American Psychologist*, *38*(11), 1161-1173.

Taylor, S., Thordarson, D. S., Jang, K. L., & Asmundson, G. J. (2006). Genetic and environmental origins of health anxiety: A twin study. *World Psychiatry*, *5*(1), 47-50.

Teller, M. E. (1988). *The tuberculosis movement: A public health campaign in the Progressive Era*. Greenwood Press.

Telles-Correia, D., Barbosa, A., Mega, I., & Monteiro, E. (2009). Importance of depression and active coping in liver transplant candidates' quality of life. *Progress in Transplantation*, *19*(1), 85-89.

Teng, H. L., Yen, M., Fetzer, S., Sung, J. M., & Hung, S. Y. (2013). Effects of targeted interventions on lifestyle modifications of chronic kidney disease patients: Randomized controlled trial. *Western Journal of Nursing Research*, *35*(9), 1107-1127.

Ten Thoren, C., & Petermann, F. (2000). Reviewing asthma and anxiety. *Respiratory Medicine*, *94*(5), 409-415.

Terracciano, A., & Costa Jr, P. T. (2004). Smoking and the Five-Factor Model of personality. *Addiction*, *99*(4), 472-481.

Terracciano, A., Löckenhoff, C. E., Zonderman, A. B., Ferrucci, L., & Costa Jr, P. T. (2008). Personality predictors of longevity: activity, emotional stability, and conscientiousness. *Psychosomatic Medicine*, *70*(6), 621-627.

Terracciano, A., Schrack, J. A., Sutin, A. R., Chan, W., Simonsick, E. M., & Ferrucci, L. (2013). Personality, metabolic rate and aerobic capacity. *PloS One*, *8*(1), e54746.

Terrill, B. (2016). *Renal nursing: a guide to practice*. Routledge.

Terwee, C. B., Mokkink, L. B., Knol, D. L., Ostelo, R. W., Bouter, L. M., & de Vet, H. C. (2012). Rating the methodological quality in systematic reviews of studies on measurement properties: a scoring system for the COSMIN checklist. *Quality of Life Research*, *21*(4), 651-657.

Thode, N., Bergmann, E., Kamtsiuris, P., & Kurth, B. M. (2005). Predictors for ambulatory medical care utilization in Germany. *Bundesgesundheitsblatt, Gesundheitsforschung, Gesundheitsschutz*, *48*(3), 296-306.

Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, *8*(1), 45.

Thompson, K., Kulkarni, J., & Sergejew, A. A. (2000). Reliability and validity of a new Medication Adherence Rating Scale (MARS) for the psychoses. *Schizophrenia Research*, *42*(3), 241-247.

Thompson, W., & Farrell, B. (2013). Deprescribing: what is it and what does the evidence tell us?. *The Canadian Journal of Hospital Pharmacy*, *66*(3), 201-202.

Thorne, S. E. (1990). Constructive noncompliance in chronic illness. *Holistic Nursing Practice*, *5*(1), 62-69.

Thorne, S. E. (1993). *Negotiating health care: The social context of chronic illness*. Sage Publications.

Thorne, S. (1994). Secondary analysis in qualitative research: Issues and implications. *Critical Issues in Qualitative Research Methods*, *1*, 263-279.

Thorne, S., & Paterson, B. (1998). Shifting images of chronic illness. *Image: The Journal of Nursing Scholarship*, *30*(2), 173-178.

Thorne, S., Paterson, B., & Russell, C. (2003). The structure of everyday self-care decision making in chronic illness. *Qualitative Health Research*, *13*(10), 1337-1352.

Tice, D. M., Bratslavsky, E., & Baumeister, R. F. (2018). *Emotional distress regulation takes precedence over impulse control: if you feel bad, do it!*. In Self-regulation and Self-control (pp. 275-306). Routledge.

Tilson, H. H. (2004). Adherence or compliance? Changes in terminology. *Annals of Pharmacotherapy*, *38*(1), 161-162.

Tobin, G. A., & Begley, C. M. (2004). Methodological rigour within a qualitative framework. *Journal of Advanced Nursing*, *48*(4), 388-396.

Tobin, D. L., Wigal, J. K., Winder, J. A., Holroyd, K. A., & Creer, T. L. (1987). The "Asthma Self-Efficacy Scale". *Annals of Allergy*, *59*(4), 273-277.

Tolmunen, T., Lehto, S. M., Heliste, M., Kurl, S., & Kauhanen, J. (2010). Alexithymia is associated with increased cardiovascular mortality in middle-aged Finnish men. *Psychosomatic Medicine*, *72*(2), 187-191.

Tomkowiak, J., & Gunderson, A. (2004). When patients teach their doctors: A curriculum for geriatric education. *Educational Gerontology*, *30*(9), 785-790.

Toneatto, T., Lecce, J., & Bagby, M. (2009). Alexithymia and pathological gambling. *Journal of Addictive Diseases*, *28*(3), 193-198.

Tong, A., Howell, M., Wong, G., Webster, A. C., Howard, K., & Craig, J. C. (2010). The perspectives of kidney transplant recipients on medicine taking: a systematic review of qualitative studies. *Nephrology Dialysis Transplantation*, *26*(1), 344-354.

Tooby, J., & Cosmides, L. (1992). The psychological foundations of culture. In J.H. Barkow, L. Cosmides, & J. Tooby, (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture*, (pp. 19).

Totman, R., Kiff, J., Reed, S. E., & Craig, J. W. (1980). Predicting experimental colds in volunteers from different measures of recent life stress. *Journal of Psychosomatic Research*, *24*(3-4), 155-163.

Townsend, A., Backman, C. L., Adam, P., & Li, L. C. (2013). A qualitative interview study: patient accounts of medication use in early rheumatoid arthritis from symptom onset to early postdiagnosis. *BMJ Open*, *3*(2), e002164.

Traylor, A. H., Schmittdiel, J. A., Uratsu, C. S., Mangione, C. M., & Subramanian, U. (2010). Adherence to cardiovascular disease medications: does patient-provider race/ethnicity and language concordance matter?. *Journal of General Internal Medicine*, *25*(11), 1172-1177.

Trostle, J. A. (1988). Medical compliance as an ideology. *Social Science & Medicine*, *27*(12), 1299-1308.

Tsenkova, V. K., Carr, D., Coe, C. L., & Ryff, C. D. (2012). Synergistic effect of neuroticism and body mass index on glucose metabolism in nondiabetic adults. *Psychotherapy and Psychosomatics*, *81*(5), 327-328.

Tupes, E. C., & Christal, R. E. (1992). Recurrent personality factors based on trait ratings. *Journal of Personality*, *60*(2), 225-251.

Turiano, N. A., Mroczek, D. K., Moynihan, J., & Chapman, B. P. (2013). Big 5 personality traits and interleukin-6: Evidence for “healthy Neuroticism” in a US population sample. *Brain, Behavior, and Immunity, 28,* 83-89.

Turk, D. C., & Meichenbaum, D. (1991). Adherence to self-care regimens. In *Handbook of clinical psychology in medical settings* (pp. 249-266). Springer, Boston, MA.

Turk, D. C., & Monarch, E. S. (2018). Biopsychosocial perspective on chronic pain. In D. C. Turk & R. J. Gatchel (Eds.), *Psychological approaches to pain management: A practitioner's handbook* (pp. 3–29). Guilford Press.

Turner, R. H. (1968). The self-conception in social interaction. In C. Gordon & K. J. Gergen (Eds.), *The Self in Social Interaction. Vol. I: Classic and Contemporary Perspectives*. (pp. 93-106). New York: Wiley.

Turner, R. H. (1976). The real self: From institution to impulse. *American Journal of Sociology*, *81*(5), 989-1016.

Turner, S. (1986). *The search for a methodology of social science*. Dordrecht: Reidel.

Ulrik, C. S., Backer, V., Søes-Petersen, U., Lange, P., Harving, H., & Plaschke, P. P. (2006). The patient's perspective: adherence or non-adherence to asthma controller therapy?. *Journal of Asthma*, *43*(9), 701-704.

Urquhart, J. (1996). Patient non-compliance with drug regimens: measurement, clinical correlates, economic impact. *European Heart Journal*, *17*(suppl A), 8-15.

US Department of Health and Human Services. (2006). Agency for Healthcare Research and Quality.(2003). *Creating Partnerships, Improving Health: The Role of Community-Based Participatory Research*, 03-0037.

Van den Bergh, O., Witthöft, M., Petersen, S., & Brown, R. J. (2017). Symptoms and the body: taking the inferential leap. *Neuroscience & Biobehavioral Reviews*, *74*, 185-203.

Van Egeren, L. F. (2009). A cybernetic model of global personality traits. *Personality and Social Psychology Review*, *13*(2), 92-108.

van Eijken, M., Tsang, S., Wensing, M., de Smet, P. A., & Grol, R. P. (2003). Interventions to improve medication compliance in older patients living in the community. *Drugs & Aging*, *20*(3), 229-240.

Van Houdenhove, B., & Luyten, P. (2008). Customizing treatment of chronic fatigue syndrome and fibromyalgia: the role of perpetuating factors. *Psychosomatics*, *49*(6), 470-477.

Van Manen, M. (2011). Orientations in phenomenology. *Phenomonologyonline: A resource for phenomenological inquiry*.

Van Manen, M. (2019). Uniqueness and Novelty in Phenomenological Inquiry. *Qualitative Inquiry*, *26*(5).

Van Oers, K., De Jong, G., Van Noordwijk, A. J., Kempenaers, B., & Drent, P. J. (2005). Contribution of genetics to the study of animal personalities: a review of case studies. *Behaviour*, *142*(9-10), 1185-1206.

Van Wijk, B. L., Klungel, O. H., Heerdink, E. R., & De Boer, A. (2005). Rate and determinants of 10-year persistence with antihypertensive drugs. *Journal of Hypertension*, *23*(11), 2101-2107.

Verbeek-Heida, P. M., & Mathot, E. F. (2006). Better safe than sorry—why patients prefer to stop using selective serotonin reuptake inhibitor (SSRI) antidepressants but are afraid to do so: results of a qualitative study. *Chronic Illness*, *2*(2), 133-142.

Vermeire, E., Hearnshaw, H., Van Royen, P., & Denekens, J. (2001). Patient adherence to treatment: three decades of research. A comprehensive review. *Journal of Clinical Pharmacy and Therapeutics, 26*(5), 331-342.

Vermeire, E. I., Wens, J., Van Royen, P., Biot, Y., Hearnshaw, H., & Lindenmeyer, A. (2005). Interventions for improving adherence to treatment recommendations in people with type 2 diabetes mellitus. *Cochrane Database of Systematic Reviews*, (2).

Vervoort, S. C., Grypdonck, M. H., Dijkstra, B. M., Hazelzet, E. E., Fledderus, B., Borleffs, J. C., & Hoepelman, A. I. (2010). Strategies to promote adherence to antiretroviral therapy applied by Dutch HIV nurse consultants: a descriptive qualitative study. *Journal of the Association of Nurses in AIDS Care*, *21*(6), 489-502.

Vik, S. A., Maxwell, C. J., & Hogan, D. B. (2004). Measurement, correlates, and health outcomes of medication adherence among seniors. *Annals of Pharmacotherapy, 38*(2), 303-312.

Viller, F., Guillemin, F., Briancon, S., Moum, T., & Suurmeijer, T. (1999). Compliance to drug treatment of patients with rheumatoid arthritis: a 3 year longitudinal study. *The Journal of Rheumatology*, *26*(10), 2114-2122.

Vincent, A., Kaelber, D. C., Pan, E., Shah, S., Johnston, D., & Middleton, B. (2008). A patient-centric taxonomy for personal health records (PHRs). In *AMIA Annual Symposium Proceedings, 2008*, 763.

Vlasnik, J. J., Aliotta, S. L., & DeLor, B. (2005). Medication adherence: factors influencing compliance with prescribed medication plans. *The Case Manager*, *16*(2), 47-51.

Vollrath, M., Knoch, D., & Cassano, L. (1999). Personality, risky health behaviour, and perceived susceptibility to health risks. *European Journal of Personality*, *13*(1), 39-50.

Von Korff, M., Gruman, J., Schaefer, J., Curry, S. J., & Wagner, E. H. (1997). Collaborative management of chronic illness. *Annals of Internal Medicine*, *127*(12), 1097-1102.

Vrijens, B., De Geest, S., Hughes, D. A., Przemyslaw, K., Demonceau, J., Ruppar, T., ... & Matyjaszczyk, M. (2012). A new taxonomy for describing and defining adherence to medications. *British Journal of Clinical Pharmacology*, *73*(5), 691-705.

Vrijens, B., & Urquhart, J. (2005). Patient adherence to prescribed antimicrobial drug dosing regimens. *Journal of Antimicrobial Chemotherapy*, *55*(5), 616-627.

Vukasović, T., & Bratko, D. (2015). Heritability of personality: a meta-analysis of behavior genetic studies. *Psychological Bulletin*, *141*(4), 769.

Wagner, G. G., Frick, J. R., & Schupp, J. (2007). The German Socio-Economic Panel study (SOEP)-evolution, scope and enhancements. SOEP paper 1.

Walker, R. J., Gebregziabher, M., Martin-Harris, B., & Egede, L. E. (2015). Understanding the influence of psychological and socioeconomic factors on diabetes self-care using structured equation modeling. *Patient Education and Counseling*, *98*(1), 34-40.

Waller, N. G. (2006). Carving nature at its joints: Paul Meehl's development of taxometrics. *Journal of Abnormal Psychology*, *115*(2), 210.

Wamala, S., Merlo, J., Bostrom, G., Hogstedt, C., & Agren, G. (2007). Socioeconomic disadvantage and primary non-adherence with medication in Sweden. *International Journal for Quality in Health Care*, *19*(3), 134-140.

Wang, P. S., Avorn, J., Brookhart, M. A., Mogun, H., Schneeweiss, S., Fischer, M. A., & Glynn, R. J. (2005). Effects of noncardiovascular comorbidities on antihypertensive use in elderly hypertensives. *Hypertension*, *46*(2), 273-279.

Wang, P. S., Bohn, R. L., Knight, E., Glynn, R. J., Mogun, H., & Avorn, J. (2002). Noncompliance with antihypertensive medications. *Journal of General Internal Medicine, 17*(7), 504-511.

Ward, B. W. (2016). State and regional prevalence of diagnosed multiple chronic conditions among adults aged ≥ 18 years - United States, 2014. *MMWR. Morbidity and mortality weekly report*, *65*(29), 735-738.

Warwick, H. M., & Salkovskis, P. M. (1990). Hypochondriasis. *Behaviour Research and Therapy*, *28*(2), 105-117.
Warnke, G. (2013). *Gadamer: Hermeneutics, tradition and reason*. John Wiley & Sons.

Watson, D. (2013). Toward a comprehensive hierarchical structure of personality traits: commentary on Ferguson (2011). *Health Psychology Review*, *7*(sup1), S71-S74.

Watson, D., & Pennebaker, J. W. (1989). Health complaints, stress, and distress: exploring the central role of negative affectivity. *Psychological Review*, *96*(2), 234-254.

Webb, T. L., & Sheeran, P. (2006). Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. *Psychological Bulletin*, *132*(2), 249-268.

Weil, A. (2012). Psychotherapy at the Crossroads-An alternative to the old talking cure is expanding the knowledge base of psychotherapy as we recognize the role that exercise, nutrition, spirituality, mind-body approaches, and lifestyle can play in enhancing our clinical effectiveness. *Psychotherapy Networker*, *36*(1), 44.

Weinberg, R. S., & Gould, D. (1999). *Personality and sport*. Foundations of sport and exercise psychology. Human Kinetics. (pp. 25-46).

Weinstein, N. D. (1988). The precaution adoption process. *Health Psychology*, *7*(4), 355.

Weinstein, N. D. (1993). Testing four competing theories of health-protective behavior. *Health Psychology*, *12*(4), 324.

Weiss, A., & Costa Jr, P. T. (2005). Domain and facet personality predictors of all-cause mortality among Medicare patients aged 65 to 100. *Psychosomatic Medicine*, *67*(5), 724-733.

Weiss, J., & Hutchinson, S. A. (2000). Warnings about vulnerability in clients with diabetes and hypertension. *Qualitative Health Research*, *10*(4), 521-537.

Wellard, S. (1998). Constructions of chronic illness. *International Journal of Nursing Studies*, *35*(1-2), 49-55.

Wenger, N., Gifford, A., Liu, H., Chesney, M., Golin, C., Crystal, S., ... & Shapiro, M. (1999, January). Patient characteristics and attitudes associated with antiretroviral adherence. In *6th Conference on Retroviruses and Opportunistic Infections, Chicago*.

Wens, J., Vermeire, E., Van Royen, P., Sabbe, B., & Denekens, J. (2005). GPs' perspectives of type 2 diabetes patients' adherence to treatment: A qualitative analysis of barriers and solutions. *BMC Family Practice*, *6*(1), 20.

Wertz, F. J. (2005). Phenomenological research methods for counseling psychology. *Journal of Counseling Psychology*, *52*(2), 167-177.

Whipple, B., Richards, E., Tepper, M., & Komisaruk, B. R. (1996). Sexual response in women with complete spinal cord injury. *Sexuality and Disability*, *14*(3), 191-201.

White, K. (2017). *The social construction of mental illness*. Routledge International Handbook of Critical Mental Health, (pp. 48-54).

White, R., Tata, P., & Burns, T. (1996). Mood, learned resourcefulness and perceptions of control in type 1 diabetes mellitus. *Journal of Psychosomatic Research*, *40*(2), 205-212.

Whitmarsh, I. (2009). Medical Schismogenics: Compliance and "Culture" in Caribbean Biomedicine. *Anthropological Quarterly*, *82*(2), 447-475.

Whittemore, R., & Dixon, J. (2008). Chronic illness: the process of integration. *Journal of Clinical Nursing*, *17*(7b), 177-187.

Whyte, S. R., Van der Geest, S., & Hardon, A. (2002). *Social lives of medicines*. Cambridge University Press.

Wiebe, J. S., & Christensen, A. J. (1996). Patient adherence in chronic illness: Personality and coping in context. *Journal of Personality*, *64*(4), 815-835.

Wiebe, J. S., & Christensen, A. J. (1997). Health beliefs, personality, and adherence in hemodialysis patients: An interactional perspective. *Annals of Behavioral Medicine*, *19*(1), 30-35.

Wilberg, P. (2011). From Existential Psychotherapy to Existential Medicine. *Existential Analysis: Journal of the Society for Existential Analysis*, *22*(2), 303-317.

Wild, H. (2012). The economic rationale for adherence in the treatment of type 2 diabetes mellitus. *The American Journal of Managed Care, 18*(3 Suppl), S43-8.

Williams, G. C., Rodin, G. C., Ryan, R. M., Grolnick, W. S., & Deci, E. L. (1998). Autonomous regulation and long-term medication adherence in adult outpatients. *Health Psychology*, *17*(3), 269-276.

Williams, L., Abbott, C., & Kerr, R. (2016). Health behaviour mediates the relationship between Type D personality and subjective health in the general population. *Journal of Health Psychology*, *21*(10), 2148-2155.

Williams, L., O’Carroll, R. E., & O’Connor, R. C. (2009). Type D personality and cardiac output in response to stress. *Psychology and Health*, *24*(5), 489-500.

Williams, S. J., Martin, P., & Gabe, J. (2011). The pharmaceuticalisation of society? A framework for analysis. *Sociology of Health & Illness*, *33*(5), 710-725.

Wilson, K. E., & Dishman, R. K. (2015). Personality and physical activity: A systematic review and meta-analysis. *Personality and Individual Differences*, *72*, 230-242.

Wilson, P. M. (2001). A policy analysis of the expert patient in the United Kingdom: self-care as an expression of pastoral power?. *Health & Social Care in the Community*, *9*(3), 134-142.

Wilson, R. S., Krueger, K. R., Gu, L., Bienias, J. L., de Leon, C. F. M., & Evans, D. A. (2005). Neuroticism, extraversion, and mortality in a defined population of older persons. *Psychosomatic Medicine*, *67*(6), 841-845.

Wojnar, D. M., & Swanson, K. M. (2007). Phenomenology: an exploration. *Journal of Holistic Nursing*, *25*(3), 172-180.

Wolfe, S. C., & Schirm, V. (1992). Medication counseling for the elderly: effects on knowledge and compliance after hospital discharge. *Geriatric Nursing*, *13*(3), 134-138.

World Health Organization, Public Health Agency of Canada, & Canada. Public Health Agency of Canada. (2005). *Preventing chronic diseases: a vital investment*. World Health Organization.

World Health Organization. (2015). *Investing to overcome the global impact of neglected tropical diseases: third WHO report on neglected tropical diseases 2015* (Vol. 3). World Health Organization.

World Health Organization. (2017). WHO tools to prevent and control noncommunicable diseases. *Available on: http://www. who. int/topics/noncommunicable_diseases/en (accessed 17th April 2018).*

Wrench, J. S., & Booth-Butterfield, M. (2003). Increasing patient satisfaction and compliance: An examination of physician humor orientation, compliance-gaining strategies, and perceived credibility. *Communication Quarterly*, *51*(4), 482-503.

Wright, A. G. (2017). The current state and future of factor analysis in personality disorder research. *Personality Disorders: Theory, Research, and Treatment*, *8*(1), 14-25.

Wroe, A. L. (2002). Intentional and unintentional nonadherence: a study of decision making. *Journal of Behavioral Medicine*, *25*(4), 355-372.

Wu, J. R., & Moser, D. K. (2014). Type D personality predicts poor medication adherence in patients with heart failure in the USA. *International Journal of Behavioral Medicine*, *21*(5), 833-842.

Wu, J. R., Lennie, T. A., Chung, M. L., Frazier, S. K., Dekker, R. L., Biddle, M. J., & Moser, D. K. (2012). Medication adherence mediates the relationship between marital status and cardiac event-free survival in patients with heart failure. *Heart & Lung*, *41*(2), 107-114.

Wu, J. R., Moser, D. K., Lennie, T. A., & Burkhart, P. V. (2008). Medication adherence in patients who have heart failure: a review of the literature. *Nursing Clinics of North America*, *43*(1), 133-153.

Yeaw, J., Benner, J. S., Walt, J. G., Sian, S., & Smith, D. B. (2009). Comparing adherence and persistence across 6 chronic medication classes. *Journal of Managed Care Pharmacy*, *15*(9), 728-740.

Yoong, J., Park, E. R., Greer, J. A., Jackson, V. A., Gallagher, E. R., Pirl, W. F., ... & Temel, J. S. (2013). Early palliative care in advanced lung cancer: a qualitative study. *JAMA Internal Medicine*, *173*(4), 283-290.

York Health Economics Consortium. (2011). School of Pharmacy University of London. Evaluation of the scale, causes and costs of waste medicines, 2010. *Available on: http://eprints.pharmacy.ac.uk/2605/1/ Evaluation_of_NHS_Medicines_Waste__web_ publication_version.pdf (accessed 8 February 2018).*

Young, H. N., Len-Rios, M. E., Brown, R., Moreno, M. M., & Cox, E. (2017). How does patient-provider communication influence adherence to asthma medications?. *Patient Education and Counseling*, *100*(4), 696-702.

Zarafonitis-Müller, S., Kuhr, K., & Bechdolf, A. (2014). The relationship between therapist's competence and adherence to outcome in cognitive-behavioural therapy-results of a metaanalysis. *EuropePMC, 82*(9), 502-510.

Zoffmann, V., & Kirkevold, M. (2005). Life versus disease in difficult diabetes care: conflicting perspectives disempower patients and professionals in problem solving. *Qualitative Health Research*, *15*(6), 750-765.

Zolnierek, K. B. H., & DiMatteo, M. R. (2009). Physician communication and patient adherence to treatment: a meta-analysis. *Medical Care*, *47*(8), 826-834.

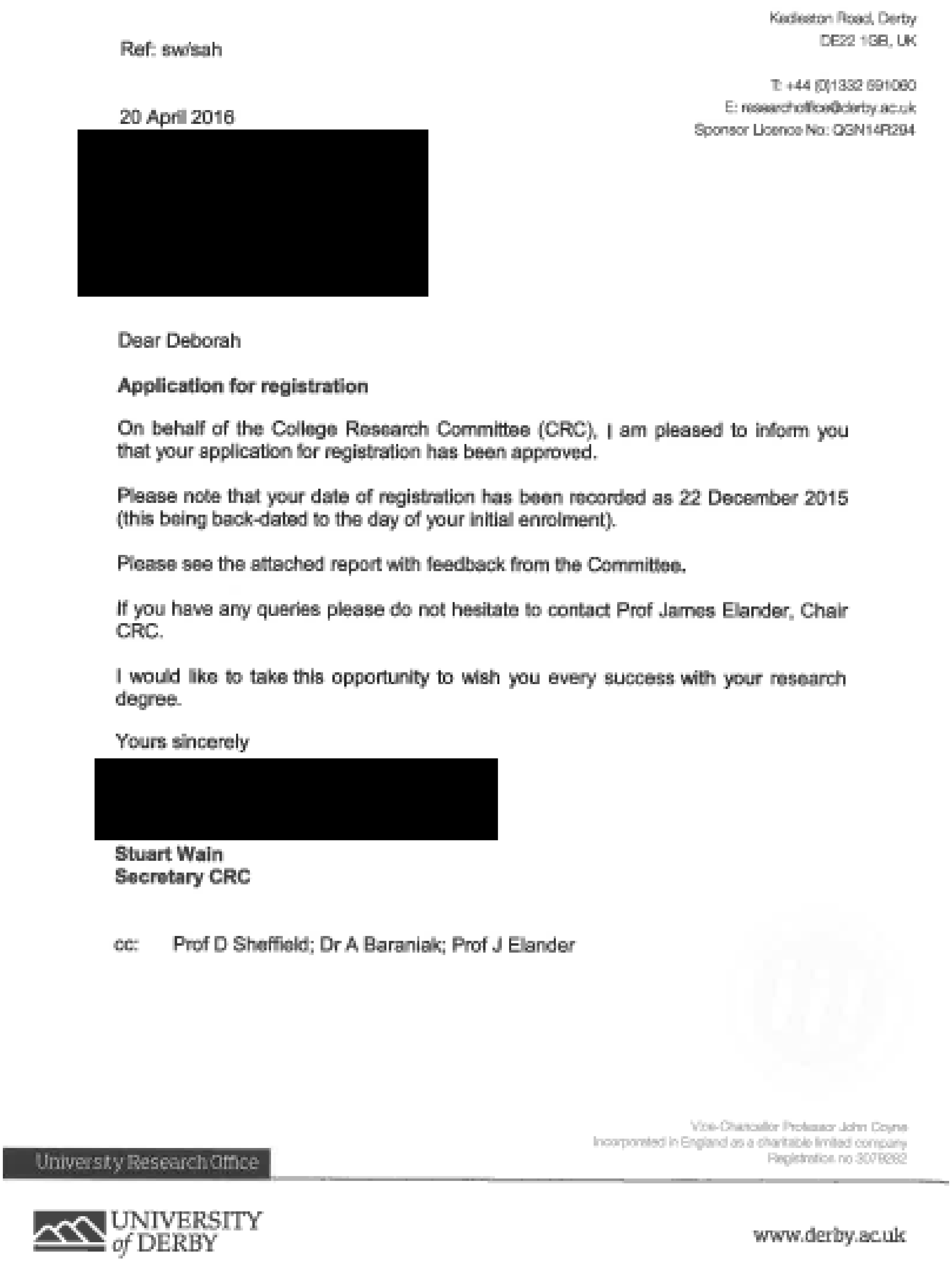
Žugelj, U., Zupančič, M., Komidar, L., Kenda, R., Varda, N. M., & Gregorič, A. (2010). Self-reported adherence behavior in adolescent hypertensive patients: the role of illness representations and personality. *Journal of Pediatric Psychology, 35*(9), 1049-1060.

Zweig, D., & Webster, J. (2004). What are we measuring? An examination of the relationships between the big-five personality traits, goal orientation, and performance intentions. *Personality and Individual Differences*, *36*(7), 1693-1708.

Zwikker, H. E., van den Bemt, B. J., Vriezekolk, J. E., van den Ende, C. H., & van Dulmen, S. (2014). Psychosocial predictors of non-adherence to chronic medication: systematic review of longitudinal studies. *Patient Preference and Adherence, 8*, 519.

Appendices

Appendix A University of Derby ethical approval



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Ref: sw/sah

20 April 2016

[redacted]

Dear Deborah

Application for registration

On behalf of the College Research Committee (CRC), I am pleased to inform you that your application for registration has been approved.

Please note that your date of registration has been recorded as 22 December 2015 (this being back-dated to the day of your initial enrolment).

Please see the attached report with feedback from the Committee.

If you have any queries please do not hesitate to contact Prof James Elander, Chair CRC.

I would like to take this opportunity to wish you every success with your research degree.

Yours sincerely

[redacted]

Stuart Wain
Secretary CRC

cc: Prof D Sheffield; Dr A Baraniak; Prof J Elander

Vice-Chancellor Professor John Coyne
Incorporated in England as a charitable limited company
Registration no 3079282

University Research Office

UNIVERSITY of DERBY

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Appendix B Invitation and Information Sheet

Human Sciences Research Ethics Committee (H S REC)
College of Life and Natural Sciences

UNIVERSITY of DERBY

An exploration of personality affects on medication adherence in long-term illness

UNIVERSITY of DERBY

Invitation and information Sheet

You are invited to take part in this research study. To help you decide whether you would like to participate this sheet details why the research is being performed and what it would involve for you. Please take the time to read it through carefully and ask if there is anything that is not clear or that you would like more information about.

Who is conducting the research? The study is being conducted by Deborah J Owen, a PhD student from the Department of Life and Social Sciences, University of Derby. The study has been reviewed and approved by the University's Research Ethics Committee.

What is the research about? The study is investigating the possibility that adherence to treatment regimes may be influenced by a person's personality. This is a very important area of research because if we can understand more about the factors which enable, or equally impede, the likelihood of sustaining medication regimens it will assist clinical staff to offer optimal treatment interventions.

Why have I been invited to take part? This research applies to any adult (who does not have a mental-health diagnosis) with a long-term illness (excluding HIV/Aids).

Do I have to take part? There is no obligation to participate - it is entirely your decision. *Your future treatment and standard of medical care will not be affected in any way should you decline to take part*. If you do decide to participate the study will be fully described to you and you will be asked to sign a consent form to show your agreement to participate. You are welcome to ask any questions throughout the process. Furthermore, you are free to withdraw up to 14 days after the interview has taken place, and you do not have to provide a reason.

So, what happens if I decide to take part? You will complete a short questionnaire about how and when you take your medications and some general information about yourself. Then you will be asked to complete a further, longer multiple choice survey. These can be completed at a time and place to suit you and should take no more than 20 minutes. Finally, we'll have a conversation about some of your answers in the surveys - this gives you an opportunity to talk about your choices in further detail. This is really useful as it indicates what is important to you and what influences your decisions. This conversation can take place face to face where your patient group is held (in a separate quiet room) or via Skype® and will last between 30 to 40 minutes. It is important to remember that there are no right or wrong answers and you are free to decline to answer any question that you do not feel happy about.

At a later stage in the research I will meet with a focus group from one of the patient groups to discuss factors that have been highlighted as a result of discussions with individual participants - *no personal information will be disclosed.* At this stage the focus group will discuss factors which have been identified as significant barriers or facilitators of medication adherence as a consequence of the individual interviews. Participants have the choice whether to take part in the focus group or to participate individually.

Will my involvement be kept confidential? Each participant will be asked to generate a unique identifying code and information will be stored using this code rather than your name. I will, with your permission, audio-record our discussion and then transcribe it. On completion of the transcription the recordings will be deleted to ensure that no other person has access to raw data. The recording will only be used for the purposes of this research – in the event that any of your comments are quoted when the research is written up any personal information which could identify you or others will be changed. Your data will only be reviewed by the researcher, supervisors and external examiners.

What happens to the information? Your identity and personal information is treated with the strictest confidentiality. Information will remain confidential and stored appropriately in accordance with the Data Protection Act, 1988, which means that it must be kept safely and not revealed to other parties, without your permission. The results will be written up in my doctoral thesis, after this summary data may be presented as a journal article to a wider academic audience, or disseminated at conferences – but your identity will never be revealed. Data is normally stored for 6 years in compliance with University of Derby policy.

Are there any risks in taking part and what are the benefits? There are no direct risks from taking part but it is hoped that by participating you will provide valuable information which could be used not only to support others in your situation but which may also be of benefit to yourself.

I would like to take part – what should I do next? If you would like to take part, or would like further information on the study, please contact me, Deborah J Owen, at the email address given below.

Thank you very much for your time

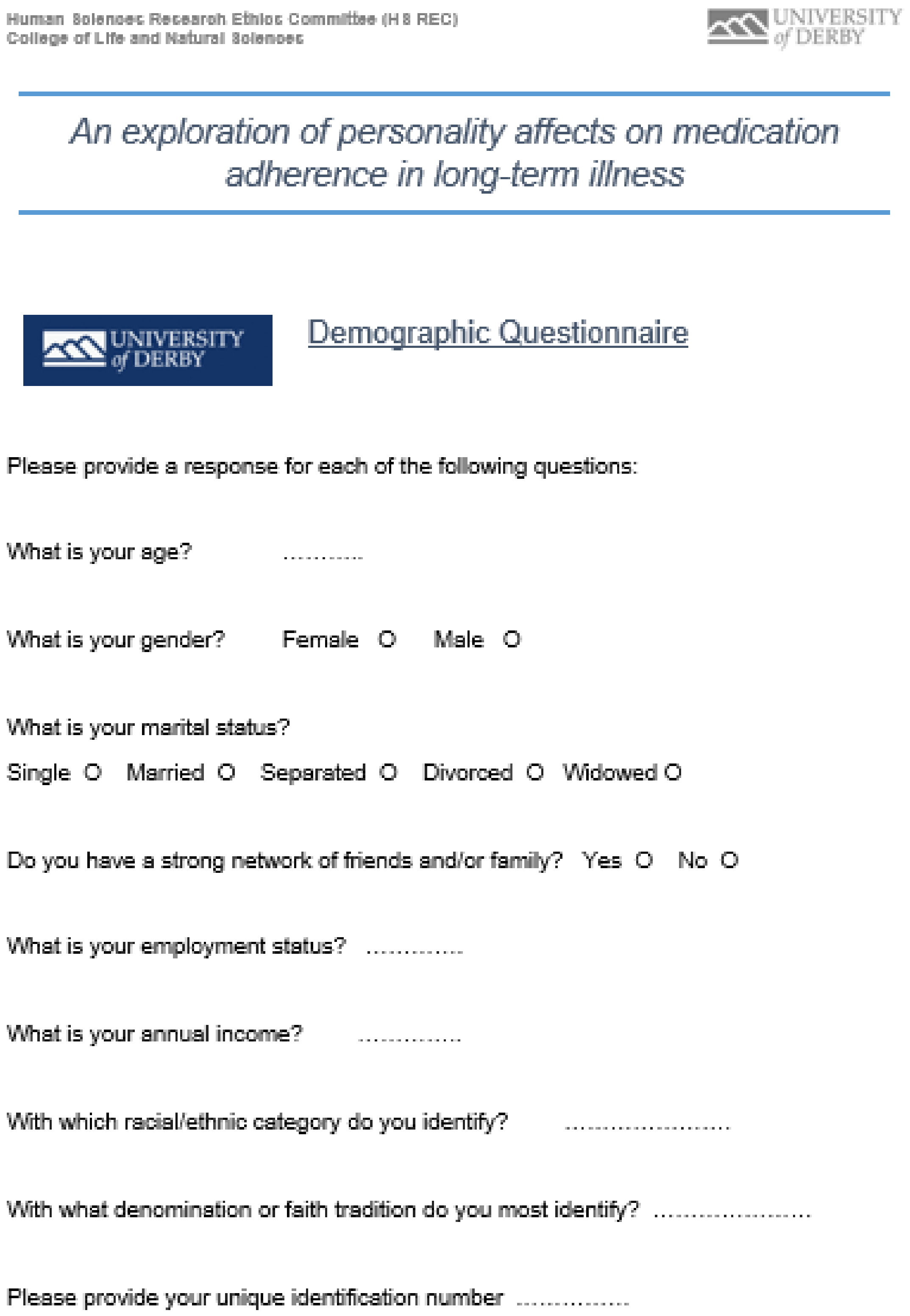
Deborah J Owen, BSc (Hons), MSc

d.owen1@unimail.derby.ac.uk

Questions and complaints - If you have any questions or concerns about any aspect of this study please contact the researcher, Deborah J Owen, or the Supervisors of the study:

Professor David Sheffield (D.Sheffield@derby.ac.uk, 01332 592038), or Dr Amy Baraniak (A.Baraniak@derby.ac.uk), University of Derby, Kedleston Road, Derby, DE22 1GB.

Appendix C Demographic Questionnaire



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An exploration of personality affects on medication adherence in long-term illness

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Demographic Questionnaire

Please provide a response for each of the following questions:

What is your age? …………

What is your gender? Female ○ Male ○

What is your marital status?

Single ○ Married ○ Separated ○ Divorced ○ Widowed ○

Do you have a strong network of friends and/or family? Yes ○ No ○

What is your employment status? ……………

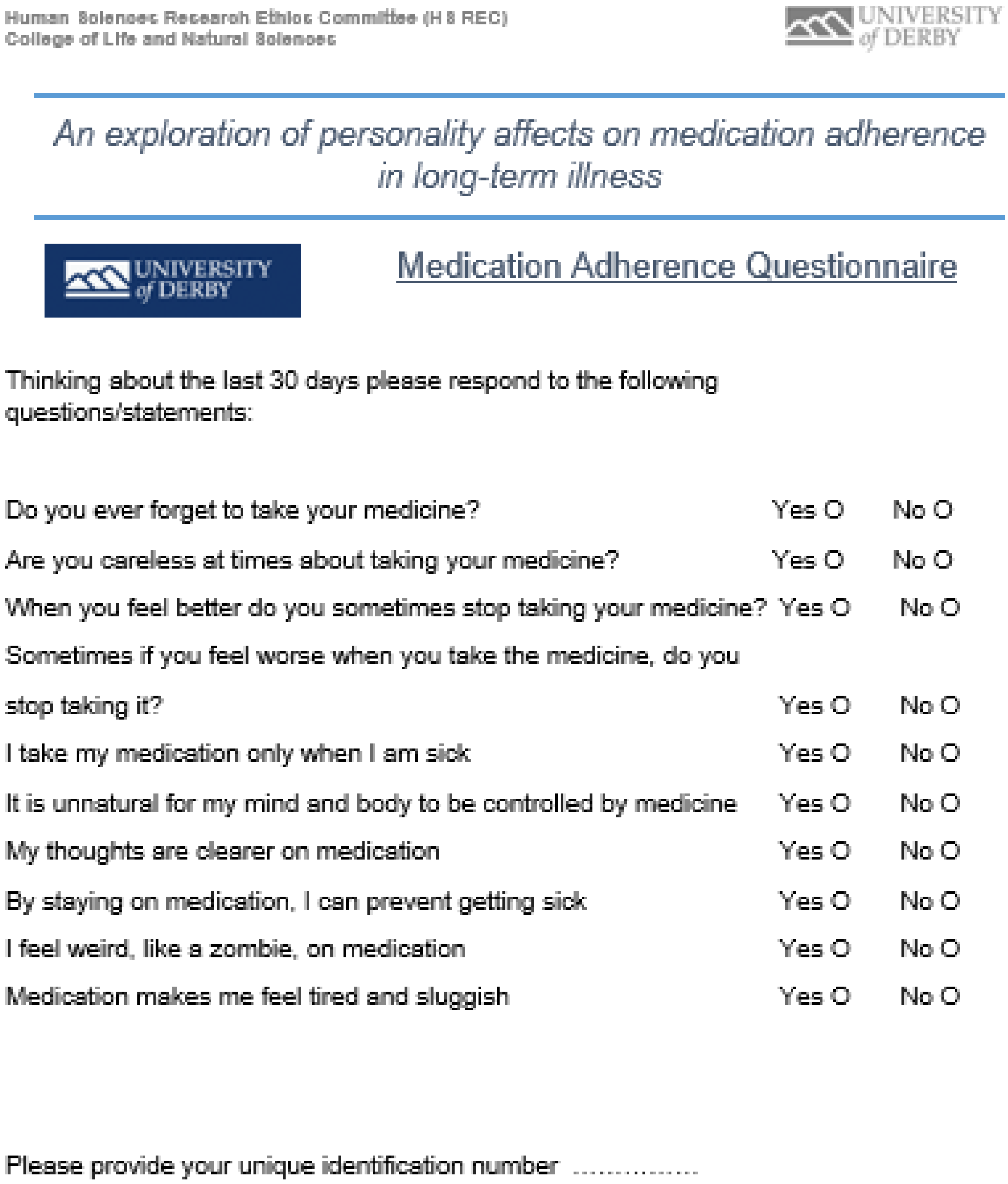
What is your annual income? ……………

With which racial/ethnic category do you identify? ……………………

With what denomination or faith tradition do you most identify? ……………………

Please provide your unique identification number ……………

Appendix D Medication Adherence Questionnaire



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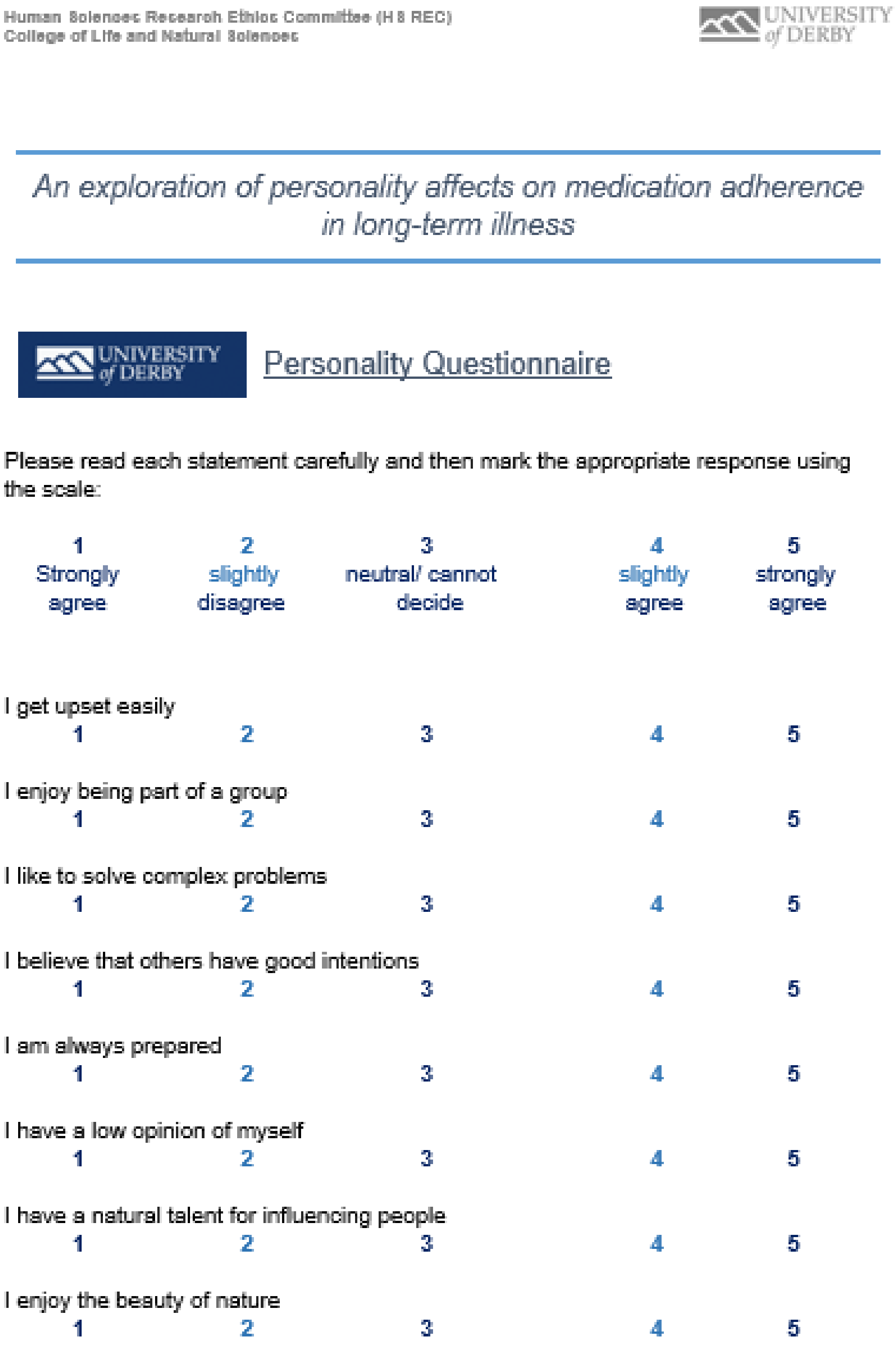
Medication Adherence Questionnaire

Thinking about the last 30 days please respond to the following questions/statements:

Do you ever forget to take your medicine?	Yes ○	No ○
Are you careless at times about taking your medicine?	Yes ○	No ○
When you feel better do you sometimes stop taking your medicine?	Yes ○	No ○
Sometimes if you feel worse when you take the medicine, do you stop taking it?	Yes ○	No ○
I take my medication only when I am sick	Yes ○	No ○
It is unnatural for my mind and body to be controlled by medicine	Yes ○	No ○
My thoughts are clearer on medication	Yes ○	No ○
By staying on medication, I can prevent getting sick	Yes ○	No ○
I feel weird, like a zombie, on medication	Yes ○	No ○
Medication makes me feel tired and sluggish	Yes ○	No ○

Please provide your unique identification number ....

Appendix E Personality Questionnaire



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Personality Questionnaire

Please read each statement carefully and then mark the appropriate response using the scale:

1	2	3	4	5
Strongly agree	slightly disagree	neutral/ cannot decide	slightly agree	strongly agree

I get upset easily
1 2 3 4 5

I enjoy being part of a group
1 2 3 4 5

I like to solve complex problems
1 2 3 4 5

I believe that others have good intentions
1 2 3 4 5

I am always prepared
1 2 3 4 5

I have a low opinion of myself
1 2 3 4 5

I have a natural talent for influencing people
1 2 3 4 5

I enjoy the beauty of nature
1 2 3 4 5

I try to anticipate the needs of others
1 2 3 4 5

I can be trusted to keep my promises
1 2 3 4 5

I get irritated easily
1 2 3 4 5

I have a lot of fun
1 2 3 4 5

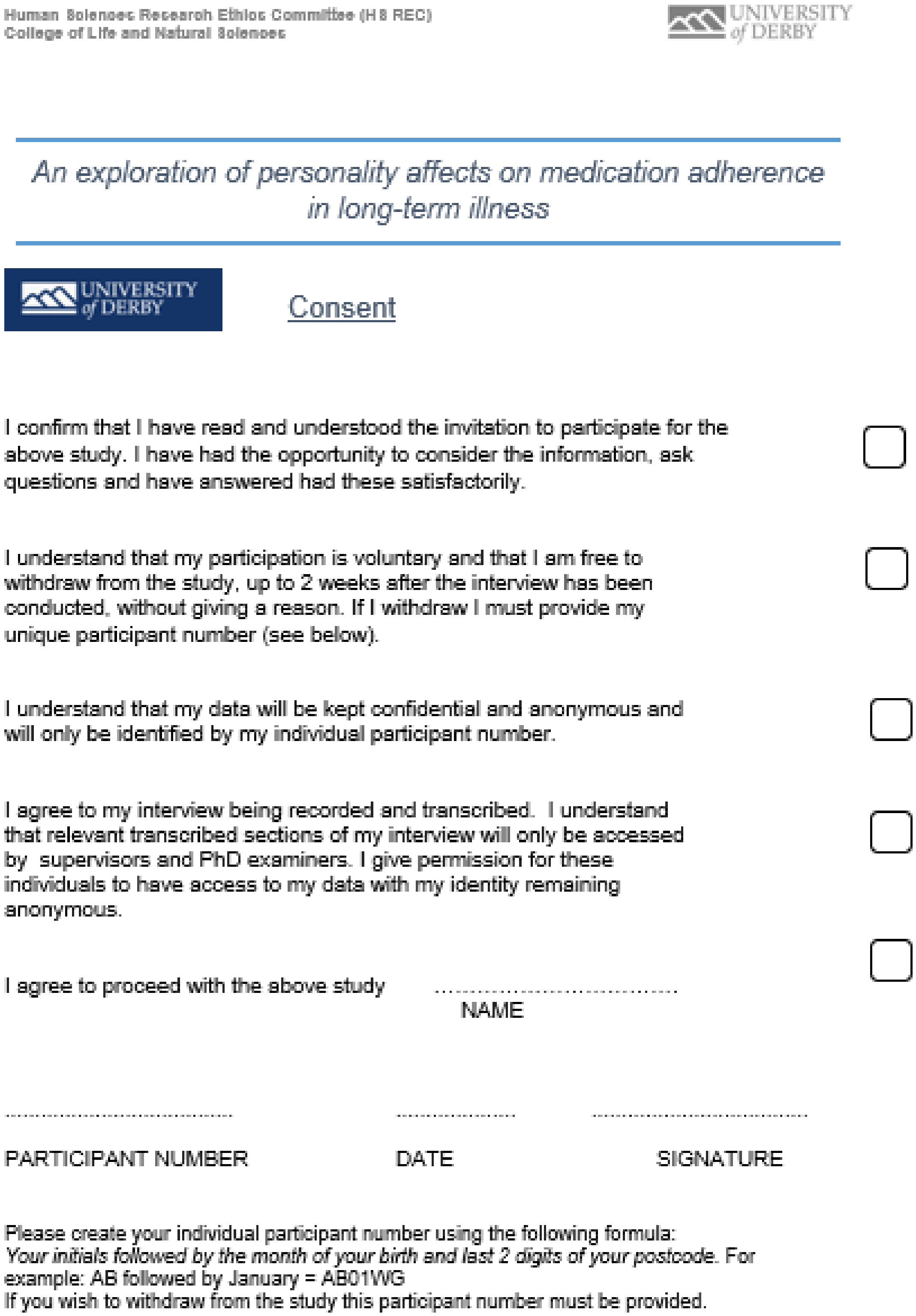
I like to visit new places
1 2 3 4 5

I love to help others
1 2 3 4 5

I set high standards for myself and others
1 2 3 4 5

Please provide your unique identification number ....

Appendix F Consent



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An exploration of personality affects on medication adherence in long-term illness

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Consent

I confirm that I have read and understood the invitation to participate for the above study. I have had the opportunity to consider the information, ask questions and have answered had these satisfactorily. ☐

I understand that my participation is voluntary and that I am free to withdraw from the study, up to 2 weeks after the interview has been conducted, without giving a reason. If I withdraw I must provide my unique participant number (see below). ☐

I understand that my data will be kept confidential and anonymous and will only be identified by my individual participant number. ☐

I agree to my interview being recorded and transcribed. I understand that relevant transcribed sections of my interview will only be accessed by supervisors and PhD examiners. I give permission for these individuals to have access to my data with my identity remaining anonymous. ☐

I agree to proceed with the above study ……………………………… ☐
NAME

……………………………………… ………………… ……………………………………
PARTICIPANT NUMBER DATE SIGNATURE

Please create your individual participant number using the following formula:
Your initials followed by the month of your birth and last 2 digits of your postcode. For example: AB followed by January = AB01WG
If you wish to withdraw from the study this participant number must be provided.

Appendix G Debrief

Human Sciences Research Ethics Committee (HS REC)
College of Life and Natural Sciences

An exploration of personality affects on medication adherence in long-term illness

Debrief

This study investigated the relationship between personality and medication adherence. The World Health Organisation (2003; p.136) defined adherence as 'the extent to which a person's behaviour – taking medication, following a diet, and/or executing lifestyle changes - corresponds with agreed recommendations from a health care provider'. Adherence to treatment regimes forms a critical component of the successful management of chronic disease. However, adherence rates vary dramatically, not only between illness conditions but also between individuals. This research addresses the need to understand who may be at increased risk in terms of non-adherence.

Participants completed two surveys: the first evaluated the rate of adherence to medication whilst the second considered particular personality traits. Participants then took part in an interview and you had the opportunity to discuss attitudes, approach to medication and consider any further issues that have arisen during the study. All the data will be analysed to draw comparisons or differences between each personality type. From this analysis it is hoped that a short scale will be able to be developed – this scale could be used by clinicians at the diagnosis of their patient's chronic illness in order to detect those individuals who are most at risk at non-adherence of medication.

Thank you very much again for your time

Deborah J Owen, BSc (Hons), MSc
d.owen1@unimail.derby.ac.uk

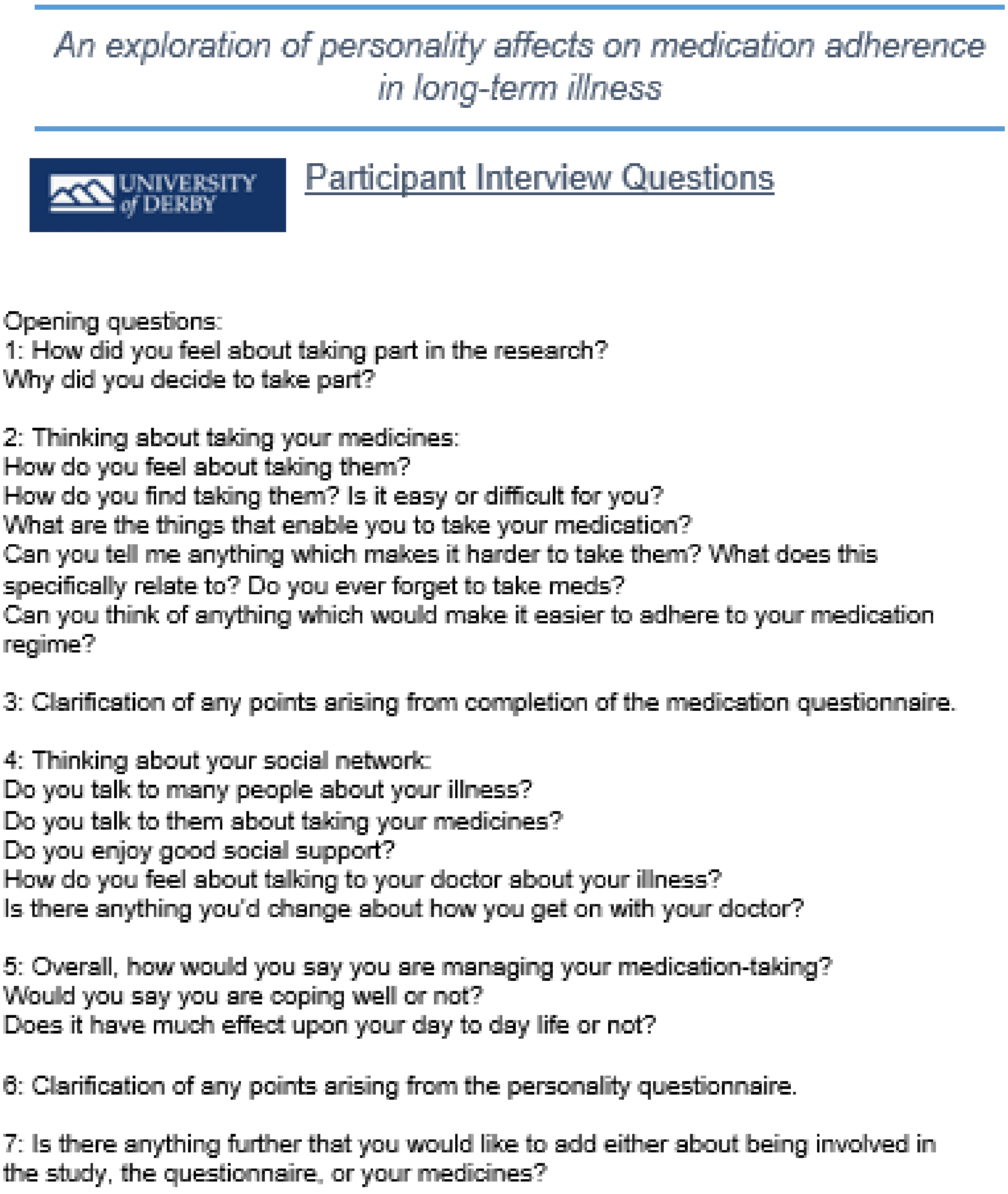
I hope that you have enjoyed participating in this important research but if you have any questions or concerns about your medical care please contact your GP. If you have a query about any aspect of this study please contact the researcher, Deborah J Owen, or the Supervisors of the study:

Professor David Sheffield – D.Sheffield@derby.ac.uk or (01332) 592038
Dr Amy Baraniak - A.Baraniak@derby.ac.uk

University of Derby, Kedleston Road, Derby, DE22 1GB.

Remember – your participation is voluntary and you are free to withdraw from the study, up to 2 weeks after the interview has been conducted, without giving a reason. If you do withdraw you will be asked for your unique participation number.

Appendix H Participant Interview Questions



An exploration of personality affects on medication adherence in long-term illness

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Participant Interview Questions

Opening questions:
1: How did you feel about taking part in the research?
Why did you decide to take part?

2: Thinking about taking your medicines:
How do you feel about taking them?
How do you find taking them? Is it easy or difficult for you?
What are the things that enable you to take your medication?
Can you tell me anything which makes it harder to take them? What does this specifically relate to? Do you ever forget to take meds?
Can you think of anything which would make it easier to adhere to your medication regime?

3: Clarification of any points arising from completion of the medication questionnaire.

4: Thinking about your social network:
Do you talk to many people about your illness?
Do you talk to them about taking your medicines?
Do you enjoy good social support?
How do you feel about talking to your doctor about your illness?
Is there anything you'd change about how you get on with your doctor?

5: Overall, how would you say you are managing your medication-taking?
Would you say you are coping well or not?
Does it have much effect upon your day to day life or not?

6: Clarification of any points arising from the personality questionnaire.

7: Is there anything further that you would like to add either about being involved in the study, the questionnaire, or your medicines?