The Enosis Method: An Alternative Mixed Method to Analyse Qualitative Information

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by

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ABSTRACT

Purpose: Qualitative methods, mainly, do not use numbers to present and interpret the qualitative data but through themes, quotes, and transcript extracts. A comprehensive systematic literature review was undertaken to explore how qualitative information from semi-structured and unstructured interviews has been analysed using quantitative methods and by which methods. The aim of this research was to bridge the identified knowledge gap in the literature for developing a method, which can analyse complex relationships among qualitative data, as well as between qualitative and quantitative data by taking into account the measurement error and the small sample size of the qualitative dataset.

Method: A new mixed method, called Enosis, was developed that consisted of two steps: quantifying the qualitative data (themes) based on a scoring system and analysing the scores using Structural Equation Modelling (SEM). The feasibility of the Enosis method was tested in a pilot study using one qualitative dataset that had primary been analysed with Interpretive Phenomenology Analysis . Its transferability was, then, explored using another two qualitative datasets, which had been analysed with Grounded Theory and Thematic Analysis.

Findings: The results from the pilot study suggested that that the Enosis method is feasible for quantifying qualitative data and analysing them with SEM. Three scoring systems, the 'Frequency', the 'Proportion', and the 'References', were developed for quantifying the qualitative data. The final structural models were adjusted for the small sample size and the measurement error that incurred due to imperfect quantification of rich qualitative information into numbers was quantified. The transferability of the Enosis method was evident as new associations that were not identified by the primary qualitative analysis were revealed in all three datasets. The Enosis method also produced results that had been identified through the qualitative analysis or were present in the literature. Thus, the results of the Enosis method were used for initiation, complementary and triangulation, and expansion purposes. Five essential requirements were developed for planning appropriately the methodology of a research project so that to be suitable for applying the Enosis method.

Conclusion: This research evidences that the Enosis method is a useful secondary analysis method for analysing complex relationships among qualitative data, as well as between qualitative and quantitative data, by taking into account the measurement error occurred through the quantification process and the small sample size of the qualitative dataset. The Enosis method contributed in strengthening the collaboration between the qualitative and quantitative researchers, and making the results and conclusions of the primary qualitative research appealing to a wider audience.

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My sincere thanks also goes to my supervisor, Dr Helen Stoneley, for being the supportive link for me between the qualitative and the quantitative areas. Her role and in-depth knowledge in mixed methods were crucial to me for my better understanding of the qualitative methodology and integrating appropriately the two areas as part of the Enosis mixed method.

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LIST OF ABBREVIATIONS

ADHD Attention Deficit Hyperactivity Disorder

AIC Akaike Information Criterion

AMOS Asset Management Operating System

APA American Psychological Association

DCTSU Derby Clinical Trials Support Unit

DHFT Derby Hospitals NHS Foundation Trust

FRRDC Faculty Research and Research Degrees Committee

IPA Interpretative Phenomenological Analysis

NCRM National Centre for Research Methods

PP Psychopathological Perfectionism

RCT Randomised Controlled Trial

REC Research Ethics Committee

SEM Structural Equation Modelling

SPSS Statistical Package for Social Sciences

TLI Tucker-Lewis Index

UoD University of Derby

1. INTRODUCTION

This chapter presents the rationale and the background for undertaking this research. It specifies the overall aim and the objectives of this research, as well as any challenges identified through the development and implementation of a new method. Finally, it explains the structure of the thesis and what information is presented in each chapter.

1.1 Background to Research Rationale

Qualitative methods have been used for many years in the design and analysis of research projects. Several qualitative methods, including but not limited to Grounded Theory, Interpretive Phenomenological Analysis, Content Analysis, Discourse Analysis, Narrative Analysis, and Thematic Analysis, have been developed to such high standards that these are regarded as valid analysis methods for answering primary research questions (Berelson 1952, Harris 1952, Glaser & Strauss 1967, Smith 1996, Abbott 2002, Braun & Clarke 2006). Qualitative research is currently used in various research areas such as social policy, health sciences, art, education, history, political science, business, and communications (Fitzpatrick & Boulton 1994, Lincoln & Denzin 2000, Bowling 2002).

Qualitative research aims to understand people's behaviour and perceptions of reality, to discover the meaning of people's experiences and to explore sensitive or complex subjects (Bowling 2002). It is an inductive process of collecting information, processing the data through coding and creating categories for developing hypotheses, patterns and theories (Creswell 2014). Its purpose is not to explain (causation) or predict phenomena as with quantitative research and, therefore, the results from the qualitative analysis are usually reported in a number of ways including themes, pictures, and diagrams rather than numbers.

1.1.1 Quantitative Analysis of Qualitative Information

Abbott (2002) supports the view that qualitative methods, mainly, do not use numbers to

present and interpret the qualitative findings. Qualitative data are collected through interviews, texts, pictures, and videos and not through quantitative outcomes, as the key point of interest is the participants' beliefs, perception of events, and story, which they believe to be true and important. Some qualitative methods use themes, quotes, and transcript extracts to interpret qualitative data collected and analysed in qualitative research. In this way, the results are linked to participants' life experiences together with evidence in the data as proof for the reader (Smith et al. 2009).

Although numerical approaches, including frequencies and statistical tests, do not have a prominent place in qualitative research, they have been used in various formats for interpreting qualitative data. For example, content analysis has been used to quantify the text and then apply quantitative methods of analysis, e.g. Chi-squared test, multiple regression analysis, and factor analysis (Krippendorff 2004). Q methodology is another method where qualitative statements have been scored and analysed (Stephenson 1935, 1985).

In addition, researchers have used simple quantitative strategies (frequency and counts of themes) for presenting results from qualitative analysis in tables such as Boyatzis (1998), Seale (1999), Ryan & Bernard (2000), Tashakkori & Teddlie (2003), O'Connell & Skevington (2005). Counts of themes and their tabular presentation have also been used for verification of qualitative findings, recognition of patterns within the qualitative results and deviation from these patterns (Sandelowski 2001). Others have used the quantitative presentation of themes for triangulating qualitative findings with quantitative in mixed methods research (Jick 1979, Bryman 2006, Oleinik 2011).

The development of Qualitative Solutions and Research (QSR) software, including NVIVO and ATLAS.ti, has also contributed to the quantitative analysis of qualitative data (Bazeley 1999). NVIVO allows qualitative researchers to explore relationships between categories and codes through a matrix. Latest versions of QSR software have the ability to import demographic or other quantitative data, which can be used to explore patterns between different groups (e.g. males and females). The matrices can also be converted to numerical tables with 1 indicating the presence and 0 the absence of a theme (or code) in the manuscript, which can then be exported to statistical software (e.g. Statistical Package for Social Sciences) for performing statistical analysis, such as Chi-squared test (Bazeley 2002).

1.1.2 The Identified Gap in the Literature

A scoping literature search was initially undertaken and identified the need for a method that will be able to explore the complex relationships between qualitative data, which are collected through interviews and quantitative data (e.g. participants' demographics). Hanbury et al. (2011) emphasised that future research in the mixed methods area should aim to explore further the potential of advanced modelling for synthesising contextual information, collected and analysed with qualitative methods, taking into account the measurement error. A comprehensive systematic literature search will be undertaken and as it will be demonstrated within Chapter 2, there has not been a suitable method that takes into account the measurement error and the small sample size of the qualitative dataset, when applying quantitative analysis on qualitative data.

1.1.3 Personal Interest

Given my profession as a medical statistician and dealing daily with quantitative data, I was fascinated with the idea of developing a method, which would be able to fill this gap. While it is unusual for statisticians to get involved with qualitative research, I found the possibility of combining the qualitative and quantitative research areas and bringing the investigators from both areas closer exciting. This research was then undertaken to explore in detail the development of a new method through a pilot study, its application on multiple qualitative datasets, the challenges encountered through its implementation and how the method can be used by future researchers.

The personal motivation for undertaking this innovative research also derived from the research I completed as part of the Master in Medical Statistics (Fakis 2010). The research undertaken as part of the dissertation used quantitative methods of analysis, such as Factor Analysis and Structural Equation Modelling (SEM), on the collected behavioural scores from children's story-interviews. The scores had been developed following structured story-interviews and a scoring proforma. This experience contributed positively to my decision in undertaking this research and exploring whether a new method can be developed to address the existing knowledge gap in the literature.

1.2 Research Aim and Objectives

The overall aim of this research is to develop a new method that can analyse complex relationships between qualitative data, which are collected through interviews and quantitative data (e.g. participants' demographics) by taking into account the measurement error, which occurred due to imperfect quantification of rich qualitative information into numbers, and the small sample size of the qualitative dataset. The new method will be called, and hereafter referred to as, the 'Enosis' method [1]. The Enosis method will be explained in detail in Chapter 4.

The specific research objectives are:

- to develop the Enosis method and test its feasibility (Chapter 4),
- to explore the transferability of the Enosis method to different qualitative datasets (Chapter 5),
- to determine the nature of the required collaboration between the quantitative and qualitative researchers (Section 6.3.3),
- to explore the key aspects of secondary analysis of already collected and analysed data with qualitative methods (Section 6.3.4),
- to identify any added benefit of applying the Enosis method (Section 7.8).

The main focus of this research is on qualitative data derived from the interviewees' answers to open questions in unstructured and semi-structured interviews. The focus is not on structured interviews using structured questionnaires and closed questions that lead into the calculation of a score. There is a plethora of structured, validated, and not validated questionnaires, which are routinely used in surveys or other quantitative research and are analysed using statistical methods. However, the data from these questionnaires are categorised as quantitative rather than qualitative data and are not subject to this research.

Other qualitative data collection methods, such as focus groups, video, audio, books, narrative, images or photos, were not considered in this research. While these data collection

[1] 'Enosis' [*énosis*] is a Greek word which means 'union'. This term was used to describe the new mixed method so as to emphasise the synthesis of the qualitative and quantitative methods. (See Section 8.4 about how the name was decided)

methods are also used in qualitative and mixed methods research, interviews are the most popular method used in a variety of research areas. Using the most popular data collection method provides the opportunity for the new method to be used by a wide spread of researchers and be applied in several research areas. Thus, unstructured and semi-structured interviews is the main focus in this research.

1.3 Challenges Faced

The development and application of a quantitative method to analyse qualitative data has its own challenges. These challenges were identified during the development and implementation of the Enosis method through my participation in conferences, forums, and meetings together with the feedback received from Journal's peer reviewers when results were submitted for publications. The identified challenges are:

- the epistemology, theoretical perspective, and methodology that will underpin the Enosis method (Section 6.4.1),
- the quantification of the qualitative data, and the potential loss of qualitative information during the quantification process (Section 6.4.2 and 6.4.3.2),
- the choice of an appropriate statistical technique for analysing the qualitative data (Section 6.4.3),
- the application of the Enosis method on small sample size (Section 6.4.3.2).

While the analysis of qualitative data with statistical techniques is controversial for some researchers, it has already been used and reported in the literature (Chapter 2). I acknowledge that the Enosis method might be challenging but I aim to demonstrate its feasibility, transferability, and usefulness, while dealing with these challenges.

1.4 Structure of Thesis

This thesis is structured in eight chapters and each chapter has multiple sections. Each chapter starts with an 'Introduction' section and concludes with a 'Summary' section, and both are written in present tense. The only exception is the 'Results' Chapter 5 where the Enosis method

is applied in three separate datasets, and therefore an additional 'Summary' sub-section linked to each dataset is included. Information flows from one chapter to another so as to give the full story to the reader. Chapters and sections are referenced within other chapters or sections when relevant information is linked.

There is a wide debate among students and their supervisors whether they should write in first person, 'I', or the more formal third person, 'the author', when they are writing about themselves (Remenyi & Bannister 2013, Oliver 2014). It tends to be that positivists and quantitative researchers are writing in third person so as to distance themselves from the research and adopt a position of an objective researcher. On the other hand, the expansion of qualitative approaches, such as phenomenology, indicated that the researchers are integrated within the study conduct and interpretation of results. The use of the first person became then more acceptable in such circumstances. Following discussions with my supervisors, we agreed to use the first person in sentences that are not related to the integrity of the research design, conduct, analysis, and interpretation of results, but only when a personal activity, view or feeling was expressed (Remenyi & Bannister 2013).

There are two approaches about what tense to use for writing a thesis (Oliver 2014). One approach is that a thesis is written chapter by chapter at the same time that the research is undertaken. In this case, the Methodology and the Method Chapters will be written in future tense and the Results Chapter in past tense. The opposite approach is to assume that the majority of a thesis is written following the collection of data and, therefore, it will be written in past tense. Following discussion with my supervisors, we agreed to follow the first approach, where the Methodology and the Methods Chapters are written in future tense, as I started writing them before the completion of the data collection. The specific tense that will be used in each chapter is detailed within the following bullet points.

- Chapter 2 presents the systematic literature review process, its results and conclusions that led to identification of the gap in the literature and the need for developing a new method. It also presents existing quantitative methods, which have been used to analyse qualitative data derived from semi-structured or unstructured interviews. This chapter is written in future tense for the aim and method of the systematic literature review and in past tense for its findings and results.

- Chapter 3 presents the epistemology, the theoretical perspective and the methodology that underpin the Enosis method. It also explains why Structural Equation Modelling (SEM) will be chosen as the appropriate statistical technique for the Enosis method. This chapter gives an overview of what other methods have been used to analyse with quantitative techniques qualitative information from semi-structured and unstructured interviews and presents the qualitative methods, where the Enosis method can be applied. It concludes with the advantages of using it as secondary method of analysis and how any disadvantages will be addressed. This chapter is written in present tense when it refers to literature and in future tense when it refers to the Enosis method.

- Chapter 4 introduces and explains in detail the Enosis method. It explores the feasibility of the Enosis method on a qualitative dataset, which has primarily been analysed using Interpretive Phenomenology Analysis (IPA). It presents the findings from the pilot study related to quantification ('scores') of qualitative information and the application of SEM on these scores. It also elaborates around the challenges of using small sample size and quantifying rich qualitative information. It concludes with a list of the essential requirements for using this novel method and emphases the importance of a collaboration between the qualitative and quantitative researcher. The aim and methods of the pilot study are written in future tense and the results in future tense.

- Chapter 5 presents the transferability of the Enosis method on two additional qualitative datasets, which have been primarily analysed with different qualitative methods, Grounded Theory and Thematic Analysis. The results and findings from the application of the Enosis method in three datasets and the interpretation of the results within a clinical framework will be detailed. The added value of the Enosis method to the existing results will also be presented. The methods of applying the Enosis method in each dataset in this chapter are written in future tense and the results from the analysis in past tense.

- Chapter 6 is the discussion of the research findings with regards to study aim and objectives together with the challenges faced. It presents the contribution of the Enosis method, references previous sections for clarity, and highlights any limitations or possibilities for future research. This chapter is written in past tense when it refers to previous

findings and results, in present tense when the results are merged with existing literature and in future when future work is mentioned.

- Chapter 7 summarises the conclusions that can be drawn from the research findings and the application of the Enosis method with regards to the research aim and objectives. It also presents the main conclusions about the challenges faced during the development and application of the Enosis method. It concludes with the added benefits of applying the Enosis method. This chapter is written in past tense when it refers to previous findings and results, in present tense when the conclusions are presented and in future when future work is mentioned.

- Chapter 8 highlights the dissemination plan and the impact of the research. This chapter is written in past, current, and future tense depending if the presented dissemination activity has been completed, is ongoing or planned for future.

1.5 Summary

This research was initiated following the identified gap in the literature and the opportunity to develop a new method, which will be able to deal with the challenges other methods faced when they analysed qualitative information using quantitative techniques. My professional statistical background and my personal interest in mixed methods contributed to the development, testing, and implementation of the Enosis method.

Prior to presenting the development, testing, and implementation of the Enosis method, a thorough systematic literature review will be undertaken to explore any research in which qualitative information from semi-structured and unstructured interviews had been analysed using statistical methods and highlight any gaps in the literature. Chapter 2 describes the aims, methods, results, and conclusions of this systematic literature review.

2. SYSTEMATIC LITERATURE REVIEW

2.1 Introduction

This chapter presents the findings of the systematic literature review, which explores and critics when quantitative methods have been used to analyse qualitative data derived from semi-structured or unstructured interviews, which quantitative methods have been used and why. It also identifies any gap in the literature that will lead into the development of the Enosis method.

2.2 Aims of the Systematic Literature Review

A comprehensive systematic literature review was undertaken following a structured methodology (Aveyard 2010). The aim of the review was to explore how qualitative information from interviews has been analysed using quantitative methods and by which methods (Fakis et al. 2014). As it is explained in the 'Research Aim and Objectives' Section 1.2, only unstructured and semi-structured interviews will be used as a data collection method in this study, and hence, other data collection methods, e.g. videos, photos, and structured questionnaires, have not been included in this literature review. Specifically, the objectives were:

1. When has qualitative information been analysed by quantitative methods? The circumstances under which the qualitative information was analysed by quantitative methods and the type of qualitative sources identified.

2. What were the quantitative methods used to analyse qualitative information? The methods used to quantify the qualitative information and the statistical methods, utilised for analysing the quantified data, were searched.

3. Why qualitative information has been analysed by quantitative methods? The benefits and advantages of quantifying qualitative information from interviews and performing

statistical analysis were explored.

2.3 Method of the Systematic Literature Review

A structured contemporary methodology was followed for identifying articles suitable for review (Aveyard 2010). The systematic review was conducted using specific inclusion and exclusion criteria based on the aim and objectives of the review, and predefined keywords, as shown in Tables 2.1 and 2.2 respectively (Fakis et al. 2014). Eleven separate searches were performed in each website. For each search, all the keywords (Table 2.2) were included following the format 'keyword1 AND keyword2 AND keyword3 AND keyword4'. There were no restrictions about the type of participants included in each study or the intervention that was used. The references were managed using a Reference Management software, the EndNote Web. The first review was undertaken in 2014 and recently updated in July 2018.

Table 2.1: Inclusion and Exclusion Criteria of Systematic Literature Review

Inclusion Criteria
1. *Qualitative information from interviews:* This included the transcripts from semi-structured and unstructured interviews, together with those that used open-ended questions. The results were produced by qualitative analysis and presented as themes. Any information derived from structured interviews using questionnaires with closed questions was not included. 2. *Quantitative analysis of qualitative information:* Any type of statistical analysis that was used to analyse the qualitative information described in Point 1 was included.
Exclusion criteria
1. *Not written in English or Greek:* References written only in these languages were considered, as the majority of research is written in English and the author has the knowledge of English and Greek languages only. References were excluded online before being transferred to Management Reference software, except if the abstract was written in English. 2. *Duplications:* References that were identified more than once from different sources were excluded in the Management Reference software. 3. *Unobtainable references:* Any reference that could not be obtained by inter-library loan, searching online, purchasing it, or contacting the authors was not included in the review. 4. *Written before 2000.*

Table 2.2: List of key words included in each of the eleven searches in each website

1. Quantitative analysis, qualitative themes, interviews
2. Integrate, quantitative analysis, qualitative analysis, interviews
3. Transform qualitative data, quantitative analysis, interviews
4. Statistical, modelling, qualitative, interviews
5. Scoring system, qualitative data, interviews
6. Structural Equation Modelling, analysis, qualitative, interviews
7. SEM, analysis, qualitative, interviews
8. Quantitative analysis, interviews, content analysis
9. Statistical analysis, interviews, content analysis
10, Quantitative analysis, qualitative analysis, interviews, validation
11. Statistical analysis, qualitative analysis, interviews, validation

Ten websites were used for searching reports, book chapters, conference abstracts, theses, and peer-reviewed articles covering wide variety of research areas such as clinical, educational, statistical and general without excluding any research area (Table 2.3). In all websites, the keywords were searched in 'any field' except for JSTOR and Science Direct where they were searched only in title, abstract, and keywords fields, otherwise the number of identified articles in these two websites was more than 6,000 and 35,000, respectively. In ProQuest the keywords were searched in 'any field', except in 'text' due to the high volume of returned references. The key terms were searched only in 'title' in Google Scholar due to an extremely high number of articles, around a million, obtained when more fields were used.

Table 2.3: The websites searched for identifying articles based on predefined key words

Name of website	Total number of articles identified
Web of Science (Medline, Biopsis Citation Index)	1227
IngentaConnect	687
PubMed	647
ProQuest (Dissertations or thesis)	393
Cochrane Reviews Library	369
JSTOR	349
Journal of Mixed Method	336
Science Direct	300
PsycInfo	134
Google Scholar	2
Total	4444

The highest number of references was identified in the Web of Science as several search databases were linked to this website. The websites that identified the least number of references

were Science Direct, PsycInfo, and Google Scholar. Thirty abstracts, which were not written in English language, were excluded during the online search. The total number of articles found, including the duplications, was 4444.

All references were entered in a Management References software, the EndNote Web version. It was preferable to use Management References software instead of a manual way of managing references since it is more efficient and quicker (Aveyard 2010). A data extraction instrument was developed within EndNote Web for recording detailed information from the references included in the review (Hughes et al. 2005, Galvan 2009). The information captured was:

- *Biographical information*: Author name, title of article, year of publication, reference name, and abstract.
- *Location*: The place where the study was conducted and written.
- *Type of study*: If the study was based on a qualitative or mixed methods.
- *Sample size and sampling method*: The number of subjects participating in the qualitative part and used for quantitative analysis of the qualitative information was captured. The sampling method was also noted.
- *When*: Information was captured related to 'when qualitative information was analysed by quantitative methods; what qualitative sources were used and under which circumstances; if qualitative analysis was performed by a team or individuals, reviewed independently and experts were consulted'.
- *What*: The quantitative method used to quantify and analyse qualitative information.
- *Why*: The reasons for transforming qualitative data to quantitative and benefits of analysing them quantitatively.
- *Limitations*: Any limitation relating to transformation of qualitative data or to quantitative analysis as it was reported by the articles' authors or identified by the author of this review.
- *Recommendations*: Recommendations or future research proposals mentioned by the authors of each article.

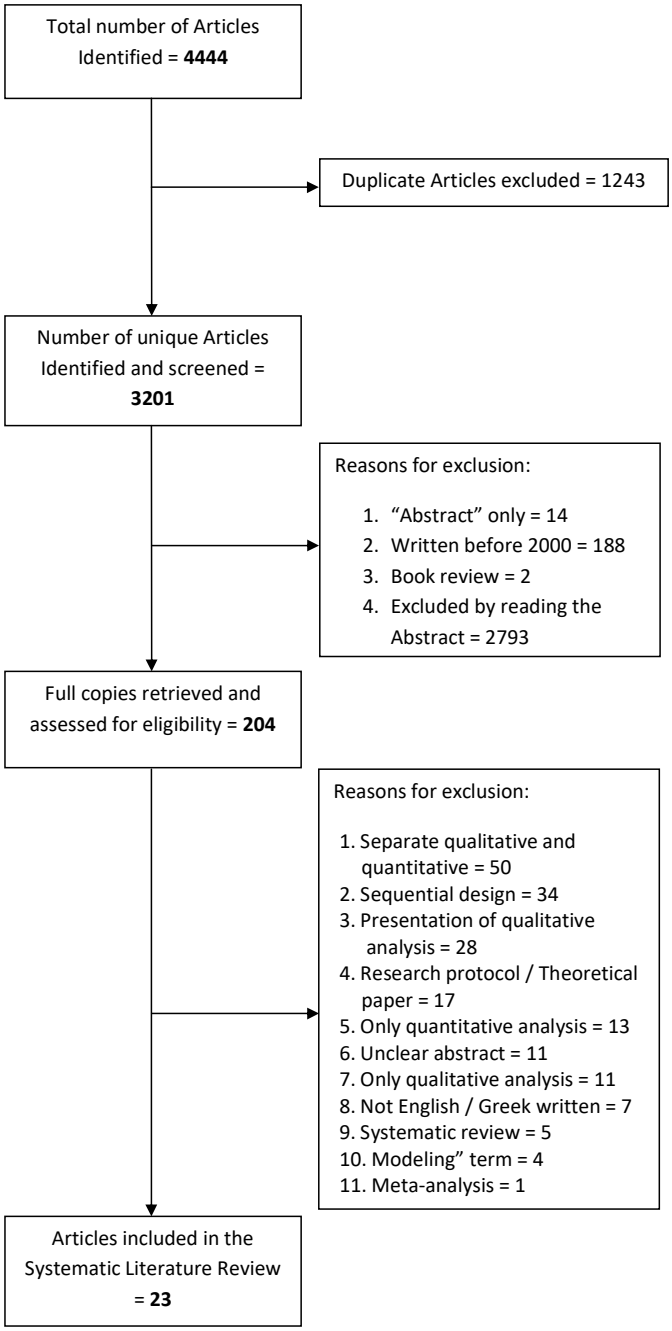
Meta-analysis has not been undertaken in this review as it is not a systematic review of health interventions, which is usually based on specific quantitative outcomes (Cen 2009). This review aims to synthesise the results, identify gaps, deficiencies, and trends in the current literature and make recommendations for future research (Munn et al. 2018). The information captured through the data extraction instrument was synthesised so as to identify common themes among the references. The synthesis of the literature was done objectively without the author's personal influences and only the discussion of the findings is critically presented.

2.4 Findings of the Systematic Literature Review

Following the literature search, 4444 articles were identified and entered into EndNote Web. All duplications were removed and the abstracts of 3201 unique articles were reviewed (Figure 2.1). Fourteen articles were excluded as they were only abstracts and 188 because they were written before 2000. Another two were excluded as they were book reviews. The main reasons for excluding the majority of articles following the abstract review were:

- quantitative and qualitative analysis were done separately without any integration,
- qualitative and quantitative methods were applied sequentially. The qualitative analysis was either undertaken first to inform the development of a structured questionnaire or second to explain in more depth the findings from the quantitative analysis but without the qualitative data being analysed with quantitative methods,
- only a research protocol was presented and the research had not yet been completed or reported,
- they were using statistical modelling (e.g. Structural Equation Modelling) in quantitative data but not on qualitative data,
- surveys and studies including only closed questionnaires.

Figure 2.1: Systematic Literature Review diagram of study selection process.



The remaining 204 articles were read in full as it was not possible to decide their inclusion by reading only the abstract. One hundred eighty three articles were excluded and the reasons

for excluding them are presented in Table 2.4. Twenty three articles were finally included in the synthesis of the systematic literature review. Out of these 23, 14 articles were identified during the first literature search from 2000 to 2014, while 9 articles were identified through the latest search between 2014 and 2018. This highlights the expansion of mixed method research and the higher acceptability of Journals to publish mixed method research in recent years. It also emphasises the importance of updating the review that was undertaken in 2014, and making current the need for this research and the development of a new method, as described in Section 1.2.

Table 2.4: Exclusion Criteria of Systematic Review

Main reason	**Description**	**References**
Unclear abstract	Named 'qualitative' variables, questions in closed questionnaire. Quantitative methods were not used on qualitative data as mentioned in the abstract	(Enochsson 2005, Tlebere et al. 2007, Tobias & Tietje 2007, Correia & Wirasinghe 2008, Walker et al. 2009, Brenner 2011, Beber et al. 2015, Cherian 2015, Berger-Gonzalez et al. 2016, Lundgren & Wallentin 2016, Hruby et al. 2018)
'Modelling'	This term was not used for statistical modelling but context charts, theoretical models, conceptual framework model, and graphical presentation of themes	(Scott 2000, Briggs 2007, Bradley et al. 2010, Fassler & Naleppa 2011)

Research protocol or Theoretical paper	Research protocol without any analysis. Presenting only quantitative or mixed methods from paradigm point of view, or new theoretical model / method	(Masse et al. 2002, Wing et al. 2008, Lessard et al. 2009, Sandelowski et al. 2009, Ling et al. 2010, Hanbury et al. 2011, Hodson et al. 2011, Sommer Harrits 2011, Fielding 2012, Indulska et al. 2012, Collins et al. 2015, Cronenberg 2018, Kesten et al. 2015, Maxwell 2015, Ramlo 2015, Shannon-Baker 2016, Woods et al. 2016)
Systematic Review	Mixed methods review without presenting method for quantitative analysis of qualitative data	(Creswell et al. 2004, O'Cathain et al. 2008, Sosulski & Lawrence 2008, Scammell 2010, De Block & Vis 2018)

Separate qualitative and quantitative analysis	Results integrated only in discussion or interpretation phase. No quantitative analysis of qualitative interview data	(Al-Amer 2001, Mat Saad 2001, Dabholkar & Overby 2005, Waller & Swisher 2006, Scott et al. 2007, Nguyen et al. 2007, Seal et al. 2007, Tlebere et al. 2007, Williamson 2007, Srikrishna et al. 2008, Benn et al. 2009, Jahic 2009, Schoell & Binder 2009, Woolley 2009, Buchanan Turner 2010, Robertson et al. 2010, Niederbacher et al. 2012, Yang 2012, Abdal et al. 2015, Agadjanian et al. 2015, Al-Amer 2015, Boltz et al. 2015, Crabb et al. 2015, Cuenca et al. 2015, Fleischer 2015, Hansen 2015, Huffman et al. 2015, Berge et al. 2016, Bicudo et al. 2016, Enimil et al. 2016, Fortunato & Alter 2016, Amadi & Higham 2017, Ajalafshar 2017, Al Sadi & Basit 2017, Badran et al. 2017, Bustamante 2017, Carter et al. 2017, Chavira et al. 2017, Davis et al. 2017, Ellison et al. 2017, Ganzer et al. 2017, Hirschey et al. 2017, Low-Choy et al. 2017, Maciel et al. 2017, Mateu-Gelabert et al. 2017, Abdulrashid et al. 2018, Albareda-Tiana et al. 2018, Engvall et al. 2018, Getachew et al. 2018, Holland et al. 2018)

Only qualitative analysis	Only qualitative analysis without quantitative analysis of qualitative interview data. Themes linked to text fragments	(Smith et al. 2006, Baudrant et al. 2007, Maudsley et al. 2008, Ferguson et al. 2011, Latour et al. 2011, Ahmed et al. 2015, Hiekel & Keizer 2015, Flynn et al. 2016, Gray et al. 2017, Gul et al. 2017, Blayney et al. 2018)
Only quantitative analysis	Analysis based on data from surveys, closed or structured questionnaires, observations, and concept mapping	(Premkumar et al. 2005, Wilcox et al. 2007, Gibbons 2008, Weeks et al. 2009, Borre et al. 2010, Sandler 2010, Astuti & Bintang 2015, Ashraf et al. 2016, Cragun et al. 2016, Hernandez 2016, Burt et al. 2017, Hanifzadeh et al. 2017, Majekodunmi et al. 2018)

Sequential design	Qualitative results were used for developing quantitative instrument or survey, or vice versa for explaining the quantitative information in more depth	(Gill & Walker 2005, Sawyer 2008, Yount & Gittelsohn 2008, Ogletree 2009, Ryan 2009, Warren 2010, Ungar & Liebenberg 2011, Auer et al. 2015, Esmi et al. 2015, Friesen 2015, Liu 2015, Arredondo et al. 2016, Broaddus & Dickson-Gomez 2016, Dadgaran et al. 2016, David et al. 2016, Gunn 2016, Hesse-Biber 2016, Kaawaase et al. 2016, Koppman 2016, Lockenvitz 2016, Loh et al. 2016, Wright et al. 2016, Cao 2017, English et al. 2017, Mason et al. 2017, Ross et al. 2017, Suhud & Willson 2017, Vanden Boogart 2017, Barril 2018, Espinoza et al. 2018, Fredriksson et al. 2018, Gahinet & Cliquet 2018, Sharif Matthews & López 2018)

Presentation of Qualitative analysis	Frequencies and percentages of themes in table format. Qualitative themes in matrix using symbols. Multi-case method presentation. Themes presented by participant's demographics without statistical analysis	(Bol et al. 2002, Hicks 2003, Maifeld et al. 2003, O'Connell & Skevington 2005, Adalikwu 2007, Lessard et al. 2009, Rich 2009, Karlsson et al. 2010, Oleinik 2011, Arpaci et al. 2015, Becher 2015, Hamilton 2015, Lim et al. 2015, Brooks et al. 2016, Hagler et al. 2016, Zaidi et al. 2016, Holtrop et al. 2016, Kaufman et al. 2016, Benzo et al. 2017, Cho et al. 2017, Coleman-Minahan 2017, Garrett et al. 2017, Lin 2016, Pedersen et al. 2017, Fraguell et al. 2018, Soysal 2018)
Meta-Analysis	Meta-ethnography for combining qualitative results from different studies	(Vermeire et al. 2007)
Not English or Greek	Written in other languages other than English or Greek	(Boyer et al. 2009, 2010, Furlani & Bomfim 2010, Gerner & Schraml 2011, Couto et al. 2015, Gurieva & Borisova 2017, Zhdanova et al. 2017)

2.4.1 Descriptive Synthesis of Results

None of the studies were written by UK based authors or had been conducted in UK. Seventeen studies were conducted and written by authors in United States, one in Germany, one in Finland, one in Austria, one in Belgium, one in Ireland, and one in Canada. The articles were published in journals from five different research areas: health, psychology, sports, environment, and education. One article was published in Journal of Mixed Methods Research and one was conducted as a Ph.D. thesis. Mixed methods design was the most common while eight were qualitative studies. The sample size varied between 5 and 1126. Schwartz et al. (2016) used the open questions from already collected questionnaires as part of a National registry from 1126 patients with multiple sclerosis. Holt et al. (2009) managed to collect qualitative data from 400 participants, using seven open-ended questions over the phone, which is unusual for qualitative research.

The identified literature highlighted that there was no consistency over the sampling method that was selected. Four studies used random sampling, which is a technique followed more in quantitative research (Holt et al. 2009, Alcorn et al. 2010, Pylvas et al. 2015, Vekeman et al. 2016). Consecutive, convenient, snowball, opportunistic, purposive, and practical sampling methods were also used in nine studies. Redundancy sampling until saturation was reached was used by (Kazi et al. 2006). Vitale et al. (2008), Boes et al. (2014) used matched and randomised samples respectively. Mohamed et al. (2016) used a combination of online advertisement and participants from an existing study. One author did not specify the sampling method that was used (Madva et al. 2018).

Table 2.5: Synthesis of references included in systematic literature review

Author (Year), Source	Location / Type of study	Sample size & sampling method	When?	What?	Why?	Limitations	Recommendation
Cunningham (2000), Psycho-Oncology J	Toronto, Canada / Mixed	22 cancer patients. Consecutive recruitment.	Individual semi-structured interviews. Categories created using dimensional analysis based on grounded theory. Categories combined into major themes.	Quantitative rating per category, scale 1-5, 1=low strength or intensity of that category. Score of each theme and total psychological score. Pearson's correlations and Survival analysis.	To explore the relationship between psychology and survival. To generate hypotheses about psychological factors.	No diagnostics of regression models. Small sample size, limited confidence in the results. Generalizability of conclusions is limited.	Correlative designs allow relating of participants' characteristics to outcomes. More studies of this type can be undertaken to confirm the validity of the psychology-survival relationship.
Killian (2003), Social Science & Medicine	Germany / Qualitative	100 patients with chronic schizophrenia. Convenient sampling.	Semi-structured interviews. Classification system developed based on codes from content analysis by two coders.	Standardised numeric object-scores assigned to categories. Homogeneity analysis & multivariable linear regression with bootstrap standard errors.	To test relationships among qualitative variables and the impact of clinical, socio-demographic variables on perception of treatment process. To test study aims.	Possibly effects of regression analysis were caused by selection process. Interpretation of results is limited due to not objective criteria.	Able to do recommendations about psychiatric treatment and patients' perceptions.
Schwartz (2003), Journal of Palliative Medicine	Mississippi, USA / Qualitative	51 consecutive patients. Convenient sampling.	Open-ended interview with 10 questions. Themes based on methodological issues and content analysis by two independent investigators.	Presence of themes (yes / no). Chi-squared or Fisher's Exact test. Two sample independent T-test	To explore the profile of participants who mentioned each theme. Hypotheses generation.	Not definitive assessment of relationships, small sample size. Confidence Interval of Effect Size was not reported.	Identified relationships to be explored in future research.
Sowell (2003), Health Education Research	California, USA / Mixed	322 HIV-infected women. Convenient sampling.	One open-ended question. Three main categories developed based on content analysis by two coders independently.	Presence of a category per participant. ANOVA, chi-squared and Pearson's correlation analyses.	To identify demographic differences between categories as defined in study aims.	Inappropriate use of statistical tests. Generalisability of results is limited.	Further studies to look long-term impact on HIV women with regards to community. Made suggestions for support and counselling services.

Author (Year), Source	Location / Type of study	Sample size & sampling method	When?	What?	Why?	Limitations	Recommendation
Mehl-Madrona (2004), Evidence Based Integrative Medicine	Arizona, USA / Qualitative	37 women with uterine fibroids on complementary treatment. Convenient sampling based on word-of-mouth.	Open-ended questions. Categories using dimensional analysis based on grounded theory. Merged in 7 dimensions.	41 categories scored 1-5 indicating the strength or intensity of expression of each category. Pearson correlation, multiple regression and discriminant function analysis.	To explore the association between psychological change and the change in uterine fibroid size. To generate hypotheses and get insight of the data.	Pilot study with no generalizable results. Interpretation of regression coefficients was not provided and type of regression analysis was not specified.	Further studies to confirm findings. Correlative studies & numerical analysis of qualitative data to generate hypotheses, unlike the usual procedure.
Foley (2006), Psycho-Oncology J	Florida, USA / Mixed	58 cancer survivors. Convenient sampling.	Semi-structured interviews. Themes with 5-step thematic framework approach by two independent investigators.	Presence of themes per participant. Chi-squared test	Explore differences of themes by gender, cancer type, age group and ethnicity. Explain hypotheses from literature.	Small sample size. Lack of explanation of quantitative methods.	Development of questionnaire. Differences identified to be explored further.
Kazi (2006), Social Science & Medicine J	Pakistan & New York, USA / Mixed	79 women. Redundancy sampling.	Semi-structured interviews. Social-environmental determinants of depression were identified and grouped into 13 categories. Categories merged in 3 themes.	Total number of determinants per category / theme, per participant was counted to calculate a score. Univariable and multivariable linear regression.	To investigate the association and independent effect of categories and major themes on depression as it had been identified through the literature.	No diagnostics of models. Cross-sectional study & is difficult to determine causality. The questions were referred to last month experience only.	No recommendation for future research.
Whitney (2007), Thesis	University of Nevada, USA / Mixed	5 leaders. Snowball sampling.	Semi-structured interviews. Thematic analysis by 2 independent readers based on phenomenological approach. Eight themes generated.	Presence of themes (yes / no). Spearman's inter-theme correlation (with Bonferroni corrections), Factor analysis.	To determine the most prevalent themes in interviews, the structure of the overall interview data and the strength of association between themes.	Exploratory design and analysis has little value based on 5 participants.	There is suggestion of structure underlying the qualitative data. Further research is needed in larger scale to include women.

Author (Year), Source	Location / Type of study	Sample size & sampling method	When?	What?	Why?	Limitations	Recommendation
Vitale (2008), Journal of Mixed Methods Research	Alabama, USA / Mixed	69 employees of small non-profit firm (35 in control and 34 in experimental group). Sample randomised in two groups.	Open ended questions. Codes and themes using Content analysis by two independent coders.	Frequency of comments in each theme & presence of strength / weakness related comment per interviewee. Spearman correlation and Chi-squared test.	To test study hypotheses: if rank-ordered priority themes & ration of strengths to weaknesses differ between two groups. To test study hypotheses.	Generalisability is not possible as it is conducted in small organisation. Cross-sectional study so findings are related to specific time point.	Future longitudinal study using repeated-measures with larger organisations and varied questionnaires.
Holt (2009), Health Education & Behavior J	Alabama, USA / Mixed	400 in total. Random selection.	Seven open-ended questions over phone. Themes based on open coding scheme and inductive approach by two independent reviewers.	Presence of themes (yes / no). Chi-squared test.	Explore patterns in codes by gender, area, age group. To test original hypothesis.	Not generalizable results. Selection bias & not in-depth interviews.	Future studies with broader populations to identify existing or to develop new instruments for supporting the identified models.
Alcorn (2010), Journal of Palliative Medicine	Boston, USA / Mixed	68 patients. Random selection.	Open-ended questions in questionnaire. Themes & subthemes based on grounded theory by two independent researchers.	Count the presence of each theme per participant (yes / no) & the number of subthemes. Chi-squared test, t-test, Mann Whitney, Spearman correlation, Linear regression and ANOVA.	Differences in sample characteristics according to importance of a theme. Correlation between subthemes & inter-relationships between themes.	No diagnostics of regression models	Generated hypothesis to be tested in future research.
Schmitz (2010), Topics in Stroke Rehabilitation	Minnesota, USA / Qualitative	29 patients (15 stroke survivors and 14 partners). Opportunistic sampling.	Semi-structured interviews. Themes based on thematic analysis by one investigator and independent reviewer.	Presence of themes per participant. Chi-squared test with Monte-Carlo Simulation	Explore differences of themes by gender, age group, type of participant.	Small sample size. Lack of generalisability due to sampling method. Significant level 0.075	Further research for development of clinical tools for stroke.

Author (Year), Source	Location / Type of study	Sample size & sampling method	When?	What?	Why?	Limitations	Recommendation
Steketee (2011), Review of General Psychology J	USA / Mixed	17 in total (16 hoarding and 11 in control group). Practical sampling.	Semi-structured interviews. Thematic categories using content analysis by three independent coders	Presence of categories. Chi-squared or Fisher's exact test.	To examine the direction or extent of the patterns and mechanisms identified through qualitative analysis.	Small sample size to observe significant differences.	Further research with larger sample to explore the identified relationships. Hypothesis testing with quantitative techniques.
Boes (2012), Scand. J. Med. Sci. Sports	USA & Norway / Qualitative	28 world-class & 28 average-performing athletes. Matched for age, gender, type of sport.	Semi-structured interviews. Content analysis blinded to group membership. Quotations assigned a code & grouped to higher codes by common theme.	Frequency of codes in each interview. Mann U Whitney test.	To explore differences in inner development of world-class against average-performing athletes. To supplement quantitative results previously reported.	Not possible to test cause-effect relations.	Further research to explore mental techniques that may enhance inner development for top-level athletic performance.
Haight (2015), Children and Youth Services Review	USA / Mixed	37 participants. Purposefully sampled to include court professionals, law school faculty, parent mentors, students, and parents.	Semi-structured, face-to-face interviews. Ethnographic qualitative analysis using emic codes by two independent coders.	Indicated the presence or absence of each code for each interview for clinic staff, court professionals and parents. Fisher's Exact Test.	To compare themes between the clinic staff, court professionals, and parents groups.	Underpowered due to small sample size. "Quantification" of the qualitative analyses, as participants who did not spontaneously mention particular themes, may have endorsed them if explicitly probed.	Future research using larger samples and more sensitive statistical analyses. To monitor longer term outcomes.

Author (Year), Source	Location / Type of study	Sample size & sampling method	When?	What?	Why?	Limitations	Recommendation
Pylvas (2015), Journal of Workplace Learning	Finland / Qualitative	28 air traffic controllers (ATCOs), Random sampling.	Semi-structured face-to-face interviews. Content analysis. Text in transcript assigned a code related to a theoretical concept.	Code frequency of each theoretical concept per participant. Bayesian Classification Modelling. Works well with small samples.	To test study research questions. To select the most probable predictors (12 theoretical concepts & demographic variables) of vocational excellence.	Small sample, limiting generalisation of the results to the target population. Missing data in demographic variables added uncertainty to the results.	Bayesian analysis supported the qualitative analyses. Theoretical concepts of intrinsic goal-orientation, volition and self-reflection were predictors of vocational excellence. Future studies to include airports from other countries.
Mohamed (2016), Urologic Oncology: Seminars and Original Investigators	USA / Qualitative	30 patient survivors with muscle-invasive bladder cancer, with no metastasis or recurrence. Online advertisement and from previous study.	Semi-structured interviews. Content analysis using an immersion / crystallization approach to create patterns / themes.	Presence of themes identifying unmet needs reported per interviewee. Fisher's exact test due to small sample size.	To examine study hypothesis of differences in unmet needs based on the patient's age, gender and treatment choices.	Small sample size for subgroup comparisons of age and gender. Results are not generalisable.	Age, gender and treatment choices related differences were revealed for specific reported unmet needs.
Schwartz (2016), Quality of Life Research	USA / Mixed	Existing longitudinal data of 1126 patients with multiple sclerosis.	Open-ended questions in the QOL Appraisal Profile (QOLAP) questionnaire. Content analysis where answered were coded based on pre-defined goal delineation themes. The themes were coded into goal delineation items.	Each theme assigned a score of 2 if both raters identified this theme, 1 if only one rater identified the theme, otherwise a score of 0. Intraclass correlation coefficient, Cronbach's deleted alpha and Item-total correlations for items reduction.	To answer primary aim: identify the best of six goal delineation items and relevant themes for two new versions of the QOL Appraisal Profile questionnaire.	Goals assessment data explained relatively little variance in QOL outcomes. Reflects legitimate differences in participants' experiences rather than a problem with the items.	Development of a new open-ended version of QOLAP for use in clinical practice, using the three top-ranked goal delineation items. Future research to validate the new QOLAP.

Author (Year), Source	Location / Type of study	Sample size & sampling method	When?	What?	Why?	Limitations	Recommendation
Vekeman (2016), Springer Open	Belgium / Mixed	75 school principals. Stratified random sampling.	Semi-structured (face-to-face) interviews. Thematic analysis creating broad categories and subcategories leading to the dimensions of strategic orientation and HR orientation.	The dimensions of strategic orientation and HR orientation were coded per principal as 0=Low and 1=High, based on pre-defined criteria. Logistic regression.	To test a research question: the relationship between principals' leadership styles and the configuration of HR practices (HR and strategic orientations).	A larger sample of schools would allow the inclusion of more independent variables. Interviews were restricted to limited to Flemish primary schools and only to principals.	Strong association between instructional leadership and transformational leadership styles with strategic orientation. Further research to investigate other principals' attributes (e.g. personal beliefs and values)
Bernstein (2017), International Journal of Environmental Research	USA / Mixed	22 participants. Purposive and maximum variability sampling.	Individual repertory grid interviews. Elements and constructs developed based on Content analysis using bootstrapping technique by two independent coders.	Elements and constructs recoded to binary variables (yes / no). Fisher's Exact test with Goodman and Kruskal's gamma.	To test relationship of age groups with elements and constructs. To test previously suggested relationship between age and environmental attitudes from literature.	Small sample size to observe significant differences.	Future research including a more systematic investigation of a larger sample of individuals with strong pro-environmental attitudes.
Fruhauf (2017), Frontiers in Psychology	Austria / Qualitative	40 freeride athletes. Purposive sampling strategies, namely criterion-based and maximum variation sampling.	Semi-structured interviews. Data analysed using an inductive hierarchical content analysis. Similar codes merged into themes by two authors.	Presence of themes per interviewee. Chi-squared test.	To test study hypotheses of gender and age groups differences with themes.	Small sample size to observe significant differences. Findings of the present analysis should not be generalised to less experienced freeriders.	Future research with freeriders who had different levels of experience to compare their motives with those of experienced participants.

Author (Year), Source	Location / Type of study	Sample size & sampling method	When?	What?	Why?	Limitations	Recommendation
Madva (2018), Psychology Health & Medicine	USA / Mixed	88 patients with chronic medical conditions (CMCs). Sampling method is not specified.	Semi-structured interviews. Content analysis to code transcripts and create themes.	Presence of themes per interviewee. Chi-squared test.	To test study hypothesis of stressors that can impede health behaviours between mid-life and non-mid-life patients.	The interviews were not specifically designed to inquire about mid-life-stage specific stressors. A moderate sample size, requiring replication in a larger sample.	Mid-life patients with CMCs compared to non-mid-life patients, reported greater psychological distress and work related stressors.
Manning (2018), American Journal of Community Psychology	Ireland / Mixed	50 homeless service providers. Convenience sampling as service providers were identified by service users.	Semi-structured interviews. Summative Content Analysis (SCA) to code top-down three predetermined themes (assumptions, actions, and end-states) and 6 sub-themes, and then bottom-up to ensure complete saturation.	Frequency of sub-themes reflecting consumer-led values & of sub-themes reflecting provider-led values. Score per provider = "consumer-led" / ("consumer-led" + "provider-led"). Score converted to 10-point scale. Growth Curve Models (GCMs).	To test study hypotheses & relationships between providers' values and services users' choice, mastery, physical health, psychiatric symptoms, drug use, and physical and psychological integration.	Limited generalisability because data were obtained from an opt-in convenience sample. Validity of SCA is questioned as conversational style, rather than pervasiveness or salience, may be the primary reason one person mentions a theme 10 times more than another	GCM findings answered the study hypotheses and may have several implications for theory, providers, planners, and policy makers.

2.4.2 When, What, and Why

Information was also collected for answering the three objectives of this systematic literature review (Fakis et al. 2014). The findings presented in that paper about the when, what, and why questions are summarised in this section together with more in depth explanation.

When?

In sixteen studies, quantitative methods were applied on qualitative data collected from semi-structured or unstructured interviews, while in seven projects data were collected using open-ended questions. The qualitative data were initially analysed using qualitative methods and the results were presented as themes, categories, codes, constructs, or determinants. The main qualitative methods used were thematic analysis, grounded theory and content analysis. Content analysis was used by thirteen studies, and as expected this was the main qualitative method that led to quantitative analysis, as it is commonly used for extracting objective content from texts to identify themes and patterns (Hsieh & Shannon 2005). The type of information extracted from the content analysis can then be measured and transformed to quantitative data more regularly than using other methods of qualitative analysis.

On the other hand, seven of the articles in the review used thematic analysis or grounded theory for analysing the qualitative information. Haight et al. (2015) used ethnographic qualitative analysis to analyse the transcripts from semi-structured interviews and to develop emic codes. The variety of qualitative methods used in the identified references before any statistical methods is applied indicates that the quantification of qualitative information is not related to a specific qualitative method.

What?

Several methods were used for quantifying the themes, categories, codes, constructs, or determinants depending on the statistical method applied. The main preferred method in fourteen studies was to transform the themes, categories, codes, constructs, or determinants into binary outcomes by coding their presence per participant (yes = if identified by each participant, no = otherwise). This method was preferred when Chi-squared or Fisher's Exact test were applied for exploring the association between presence of the theme and categorical outcomes (Schwartz et al. 2003, Foley et al. 2006, Holt et al. 2009, Schmitz & Finkelstein 2010, Steketee et al. 2011, Haight et al. 2015, Mohamed et al. 2016, Bernstein et al. 2017, Fruhauf et al. 2017, Madva

et al. 2018). It was also applied when an Independent T test or Mann U Whitney were used for testing if the binary themes were related to continuous or ordinal variables (Schwartz et al. 2003, Alcorn et al. 2010). Vekeman et al. (2016) used similar approach to code the dimensions of strategic orientation and HR orientation per school principal into binary outcome (0 = Low, 1 = High) based on predefined criteria, which was then used in logistic regression. Whitney (2007) used the binary coding to undertake factor analysis and non-parametric correlation (Spearman's with Bonferroni corrections) between themes.

An alternative transformation method was to count the frequency of codes per interviewee and of comments per themes. Thereafter, Mann U Whitney was applied to explore any differences in frequencies between two groups (e.g. world class and average performing athletes) or Spearman's coefficient was used to test the correlation between two continues outcomes (Vitale et al. 2008, Boes et al. 2014). Pylvas et al. (2015) used the frequency of each theoretical concept per participant so as to apply Bayesian Classification Modelling.

Another method of quantifying the qualitative information was by assigning a score indicating the strength or intensity of each identified category per participant (1 = low intensity, 5 = high intensity) (Cunningham et al. 2000, Mehl-Madrona et al. 2004). Schwartz et al. (2016) assigned an alternative score to each theme depending on the agreement of two raters (2 if both raters identified the same theme, 1 if only one rater identified the theme, otherwise a score of 0). Intraclass correlation coefficient, Cronbach's Alpha and item-total correlations were then applied using the derived scores to identify suitable items for a revised questionnaire.

A study specific score was assigned by Manning & Greenwood (2018) using the frequency of the sub-themes reflecting consumer-led values and provider-led values. The score was then calculated per provider by applying the following formula: 'consumer-led' frequency / ('consumer-led' + 'provider-led' frequencies). The scores were then converted to 10-point scale and used in Growth Curve Models so as to test study hypotheses and relationships between providers' and services users' outcomes.

An alternative approach has been applied by Kazi et al. (2006) following the qualitative analysis. Several determinants of depression were identified from all interviews and merged initially in 13 categories and then in 3 major themes. If one determinant was applicable for a woman during the last month then a score of 1 was given or 0 otherwise. The scores under each category and

each theme per participant were summed to calculate a score for each of the 13 categories and 3 major themes. Univariable and multivariable linear regressions were used, even if they were incorrectly reported as univariate and multivariate, respectively, to investigate the association between the categories or themes and depression, which was assessed using the Center for Epidemiological Studies–Depression (CES-D) scale. Hidalgo & Goodman (2013) clarify in their paper that multivariate analysis refers to statistical models that have 2 or more dependent or outcome variables, while multivariable analysis refers to statistical models in which there are multiple independent or response variables but only one dependent variable. Similarly, a simple (univariable) regression model has one dependent and one independent variable.

The next alternative approach for quantifying the qualitative information was applied by Kilian et al. (2003). They initially developed a classification scheme for categorising the participants according to their understanding of, their expectations about, and their active involvement in psychiatric treatment process. Then standardised numerical category scores were assigned to the categories and standardised numeric object-scores to each person using a mathematical lost function and alternating least squares, respectively (Gifi 1990). Homogeneity analysis was used to test the closeness of the interrelationship among the qualitative categories. Ordinary least squares regression analysis was performed to explore the determinants of participants' perceptions about the treatment process based on object scores.

Why?

In four out of the twenty three articles the decision for applying quantitative analysis on qualitative data was driven by the literature and the background information (Foley et al. 2006, Kazi et al. 2006, Boes et al. 2014, Bernstein et al. 2017). For example, Foley et al. (2006) decided to explore the relationship of cancer survivors' experience and participants' demographics as this was a gap identified in the literature. Boes et al. (2014) decided to use statistical methods on qualitative data so as to supplement the quantitative results from the literature. Similarly, Bernstein et al. (2017) wanted to test previously suggested relationship from the literature between age and environmental attitudes.

The majority of researchers, sixteen out of twenty three, used this method driven by the aim of their studies for generating new hypothesis and relationships that could not have been observed through the qualitative analysis or testing existing ones (Cunningham et al. 2000, Kilian et al.

2003, Sowell et al. 2003, Schwartz et al. 2003, Mehl-Madrona et al. 2004, Vitale et al. 2008, Holt et al. 2009, Alcorn et al. 2010, Steketee et al. 2011, Pylvas et al. 2015, Mohamed et al. 2016, Schwartz et al. 2016, Vekeman et al. 2016, Fruhauf et al. 2017, Madva et al. 2018, Manning & Greenwood 2018).

For example, in Mehl-Madrona et al. (2004), Cunningham et al. (2000) new hypotheses were generated about psychological factors that might affect survival or uterine fibroid size. These new hypotheses were not generalizable but can inform future definitive studies. This mixed methods approach could potentially be the link between generating theory and testing or confirming new theory in future quantitative definitive studies, for example, randomized controlled trials (Kuhn 1970, Jick 1979, Greene et al. 1989, Holt et al. 2009).

Other investigators decided to use statistical tests on qualitative data for exploring existing hypotheses, which were identified in the literature search or were part of the original study hypotheses. Holt et al. (2009) tested the hypothesis that greater numbers of women express more themes about religion and faith in interviews than men. This hypothesis, which had also been referred to previous literature, was tested and confirmed in this research as well. Foley et al. (2006) examined if a hypothesis written in the literature, that differences in the interpretation of the cancer experience being related to type of cancer, would hold. They found that gender rather than type of cancer made a difference in the interpretation of cancer experience. Kilian et al. (2003), Sowell et al. (2003), Vitale et al. (2008) used statistical analysis to test study aims and hypotheses that were already defined.

In the remaining references, the decision to use quantitative analysis on qualitative data was more opportunistic or for supporting the presentation of the qualitative findings. For example, Schmitz & Finkelstein (2010) decided to explore differences in themes by participants' demographic characteristics as it may not have been readily apparent using qualitative method alone. Similarly, Haight et al. (2015) compared the presence of themes between the clinic staff, court professionals, and parents groups. On the other hand, Whitney (2007) undertook statistical analysis of the themes for determining the most prevalent theme in the interviews. He identified that four themes (cumulative effect, self-awareness, idealism/realism, and valuing other leaders) were the most prevalent out of the total eight themes generated from interviews, which investigated the experiences of becoming and being a business and community leader.

2.5 Strengths and Limitations of the Systematic Literature Review

This section summarises the strengths and limitations of the systematic literature review. One of the limitations is that only references after 2000 were included in the data synthesis due to contemporary type of this review compared to a historic one. It is also acknowledged the possibility that suitable research, either unpublished or when the abstract was written in languages other than English or Greek, has not been included in this review.

On the other hand, there are some clear strengths underpinning this systematic literature review. The first is the clear research protocol and methodology that were followed. It was a comprehensive review with an objective assessment of the references and synthesis of the evidence based on predefined protocol. The protocol was also presented in a research forum for comments and feedback by academic researchers.

Another advantage of this review is that it was not restricted in one research area. References from a wide variety of research areas such as psychology, mixed methods, health, education, environment, sports, management and policy, health, psychology, and social science were identified indicating that this approach of analysing qualitative data with quantitative methods was not limited to a specific research area.

Another strength of this systematic literature review is the identification of limitations and gaps in the existing mixed methods research literature, which led into the development of the new method Enosis. Firstly, the evidence reviewed in this chapter suggests that the conversion of the qualitative information to quantitative has reduced the rich interpretation of participants' experience that was expressed through their interviews (Huber & Van de Ven 1995). This is one of the limitations for quantifying the qualitative information and then applying statistical tests. The majority of statistical tests based on simple regression analysis could not explain and interpret the complexity of the relationships within the qualitative data.

Even the more advanced quantitative methods, such as multivariable linear regression and Cox regression used by Cunningham et al. (2000), Mehl-Madrona et al. (2004), which explore more complex correlations, cannot quantify the measurement error. This error occurred due to imperfect quantification of rich qualitative information or inadequate modelling is an important one to measure. The qualitative information was transformed to a single dimension (numbers) and some of the qualitative meaning was lost. Therefore, it is important that this measurement

error is quantified, and, if possible, reduced when qualitative information is quantified.

Another highlighted limitation is that the sample size had not been estimated for testing any specific quantitative hypotheses but primarily for satisfying the qualitative analysis and interviews. Power calculations were not performed and, thus, the reported results and conclusions can only be used as complementary or for informing future definitive research, and not as definitive or generalisable. Only three studies adjusted the statistical analysis due to small sample size. Schmitz & Finkelstein (2010) adjusted the statistical analysis using Monte-Carlo simulation method, and Kilian et al. (2003) considered simulation approach based on Monte Carlo bootstrap for estimating the standard errors, as the scores were not empirical observation but a result of qualitative data classification. Pylvas et al. (2015) also applied Bayesian Classification Modelling, which takes into account the small sample size of the dataset. It is, therefore, suggested that an adjustment of the statistical analysis should be considered due to the small sample size of the qualitative dataset when qualitative information is analysed with quantitative methods.

Finally, the majority of statistical methods applied in the research projects identified by this systematic literature review were based on simple tests, which could not explore the complex relationships underpinning the qualitative data. Only a few authors used more complex statistical methods, such as multivariable regression, Bayesian Classification Modelling, and Growth Curve Models, which were able to explore the relationship between the qualitative findings and the participants' characteristics, but could not explore any associations between the qualitative themes (Kilian et al. 2003, Kazi et al. 2006, Pylvas et al. 2015, Vekeman et al. 2016, Manning & Greenwood 2018). Therefore, other advanced method, such as structural equation modelling, should be considered for exploring the multidimensional relationships among the qualitative themes, together with the associations between the themes and participants' characteristics.

These three limitations and gaps in the literature led to the decision of developing a new method that can analyse complex relationships between qualitative data, collected through interviews, and quantitative data (e.g. participants' demographics), as well as the complex associations among the qualitative findings by taking into account the measurement error occurred due to imperfect quantification of rich qualitative information into numbers and the small sample size of the qualitative dataset.

2.6 Summary of the Systematic Literature Review

This is an important systematic literature review in mixed methods research as it presents and synthesises evidence in an under-explored area. It provides evidence about methods that have been used for transforming the qualitative information into numbers following qualitative analysis. The results of the qualitative analysis, such as themes, sub-themes, and categories, were quantified using different approaches. Additionally, this review presents the quantitative methods that have been used for analysing qualitative information derived from interviews, the reasons why this was done, and the potential benefits of this approach.

Twenty three studies were identified and included in the review indicating that this could be a method of interest for qualitative, quantitative, and mixed methods researchers. The authors applied statistical tests on the results generated from different qualitative analyses such as content analysis, grounded theory and thematic analysis. One researcher had used ethnographic qualitative analysis. While content analysis was the obvious choice for quantifying the results, other qualitative methods were also used suggesting that statistical analysis of qualitative information is not limited to one qualitative method.

The review presented several statistical methods that had been applied on qualitative data derived from semi-structured or unstructured interviews, or from open-ended questions. The interest on this approach was expressed by authors from seven different countries, mainly from USA but none from UK. It is possible that this approach is not favoured by qualitative researchers in UK or the collaboration between the quantitative and qualitative researchers is not as strong.

This systematic literature review evidences that the integration of statistical methodology with qualitative data derived from interviews seems to be in early development stages. Therefore, there is a need for developing a new mixed method, which can analyse complex relationships between qualitative data collected through interviews and quantitative data (e.g. participants' demographics), as well as the complex associations among the qualitative findings by taking into account the measurement error occurred due to imperfect quantification of rich qualitative information into numbers and the small sample size of the qualitative dataset.

Structural equation modelling (SEM) is flexible quantitative approach, which can explore complex patterns of covariance among variables that cannot be measured directly, e.g. overarching

themes, but rather indirectly through other observed variables, e.g. sub-themes. It is also a method that can quantify the measurement error and take into account the small sample size of the qualitative dataset. Thus, SEM should be the main statistical technique as part of the new method, as justified in Section 3.4.

The development of this advanced method could be a great opportunity for bridging the gap between qualitative and quantitative researchers, and expertise from both specialties is essential for such a method to succeed. Their collaboration and communication is important for developing statistical models that are theoretically justifiable and not only statistically sound. Additionally, the integration of qualitative and quantitative researchers can improve the interpretation of statistical results in a way they are understandable by non-experts and are linked with real world (Section 6.3.3).

Before exploring the development and feasibility of such a method (Chapter 4), the epistemology and methodological area that should underpin the Enosis method is presented in the next Chapter 3.

3. METHODOLOGY

3.1 Introduction

The systematic literature review revealed the need for developing a method that can be used when analysing complex relationships with quantitative techniques within qualitative data, collected through semi-structured and unstructured interviews. The newly developed Enosis method, which will be explained in detail in Chapter 4, should be able to take into account the measurement error introduced through the quantification of the qualitative information and the small sample size of the qualitative dataset (Hanbury et al. 2011, Fakis et al. 2014). The identified relationships and associations from the application of the Enosis method will inform future definitive research or complement the results and conclusion from the primary qualitative analysis.

One of the challenges, covered in this chapter, for developing such a method is the epistemological and theoretical perspective underpinning the Enosis method. Section 3.3 also presents the methodological area in which the Enosis method will be placed in relation to qualitative, quantitative, and mixed methods. The next challenge, covered in Section 3.4, is about the choice of an appropriate statistical technique for analysing the qualitative information, which should also take into account the measurement error due to the quantification of qualitative information and the small sample size of the qualitative dataset.

Existing methods, which are used to analyse qualitative data with quantitative techniques, will be presented together with the potential similarities and differences with the Enosis method (Section 3.5). This chapter will finally consider several qualitative methods on which the Enosis method could be applied together with the advantages and disadvantages of using the Enosis method as secondary method of analysis (Sections 3.6 and 3.7).

3.2 Epistemology and Theoretical Perspective of the Enosis method

The analysis of qualitative data with quantitative techniques poses dilemmas concerned with which epistemology and theoretical perspective should underpin the Enosis method.

Epistemology, which comes from the Greek word 'episteme', i.e. knowledge or science, refers to the theory of knowledge about the reality as it is perceived through our ideas. Three main epistemological positions (and respective theoretical perspectives) of reality are described through objectivism (positivism), constructivism (interpretivism), and realism (pragmatism) (Maxwell & Mittapalli 2010, Crotty 2012).

Positivists accept that there is a true reality which exists independently of our perceptions of it. They believe that through objective methods, measurements, and observations we can form an unbiased understanding of reality. This is a theoretical perspective that usually underpins quantitative research, where a null hypothesis of a measurable outcome needs to be accepted or rejected. On the other hand, interpretivists believe that the reality cannot be measured, as it is influenced by our perceptions, beliefs, and actions. They argue that it is difficult to have an objective position of reality, as it is interpreted differently by each person depending on their viewpoint (Curtis & Curtis 2011). Qualitative research usually falls within this theoretical perspective the point of interest is the participant's own beliefs, experiences, and perspective about the research question.

There is a third alternative epistemological position, realism (pragmatism as theoretical perspective), which lies between the other two (Maxwell & Mittapalli 2010). Pragmatists also believe in an external and measurable reality, which is although biased due to our perceptions and actions. They believe that there are factors involved in the real world which cannot be easily controlled or measured objectively and that there can be more than one scientifically correct way to understand reality (Creswell & Plano Clark 2011). In recent years mixed method has been linked to pragmatism, as it allows mixed methods researchers to consider multiple methods, different views about the reality and truth, different forms of data collection and analysis (Tashakkori & Teddlie 1998, 2003, Creswell 2013, 2014, Morgan 2014).

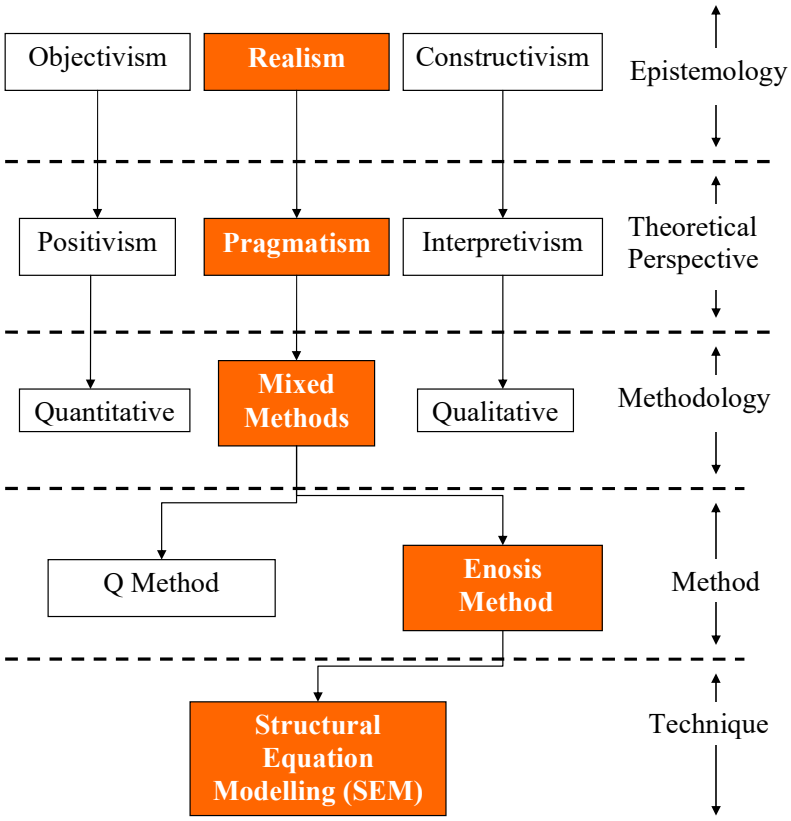
The Enosis method will use the primary qualitative results for secondary quantitative analysis so as to explore the research questions and understand the reality from a different angle. Thus, it needs to be a flexible method that will allow the participants' perceptions and beliefs to

be retained through the quantification of qualitative information and at the same time will measure and estimate their association with the participants' characteristics.

Pragmatism, which believes there is more than one scientific method to obtain new knowledge and understand the phenomena, is the theoretical perspective that will best underpin this new method (Denscombe 2017). The Enosis method will not discard the results and conclusions from the primary qualitative analysis but will contribute to them from a different complementary and theoretical perspective. The assumptions of pragmatism that the real world and phenomena can be measured and there is more than one way to understand reality will, therefore, underpin the Enosis method.

In Figure 3.1, the epistemology, theoretical perspective, methodology, and method that will underpin the Enosis method are presented in the highlighted boxes. This diagram is based on Figure 1 and Table 1 in Crotty (2012, pp. 4-5) book, which present the four basic elements of any research process. The dotted lines are used so as to display clearer the four elements of epistemology, theoretical perspective, methodology, and method linked to the Enosis method. The statistical technique that will be used in the Enosis method is also listed in the diagram and explained in Section 3.4.

Figure 3.1: Graphical presentation with highlighted boxes of which epistemology, theoretical perspective, and methodology will underpin the Enosis method.



The next Section 3.3 explains how the combination of qualitative and quantitative methodologies in the Enosis method and the multiple purposes for which it may be used place the Enosis method within the mixed methods area.

3.3 Methodological Area of the Enosis method

The placement of the Enosis method to one methodological area, quantitative, qualitative or mixed, is challenging (Section 1.3). The Enosis method will be linked to the qualitative

approach as the primary source of information is qualitative data and with the quantitative approach, as a statistical technique will be used to analyse the quantified qualitative data. However, both these methodologies will be interlinked to the Enosis method and eventually one will inform the other.

Therefore, mixed method is proposed as the most appropriate overarching methodology linked to the research design required for applying the Enosis method. The mixture of the qualitative and the quantitative methodologies has been supported by Patton (1988), Hassard (1993), who have reported that both methodologies can be used together, as their connection with different epistemological and ontological assumptions is not fixed and ineluctable.

The Enosis method will fit into the sequential design of mixed methods, as the statistical analysis of the quantified qualitative information will be undertaken following the primary qualitative analysis (Creswell 2014). The application of the Enosis method could be considered at the time of the study design and protocol development (i.e., prospectively) or after the publication of the primary qualitative results (i.e., retrospectively). In both cases, prospectively and retrospectively, it will be applied following the primary qualitative analysis. Thus, the choice of the qualitative method for primary analysis of the qualitative data is important to ensure that the Enosis method can then be applied (Section 3.6).

The Enosis method also sits in the mixed methods area, as it combines secondary quantitative analysis with already collected and analysed qualitative data (Greene et al. 1989). The secondary analysis of the qualitative data may lead into the development of associations and hypotheses, which will complement or expand the primary qualitative results and conclusions. New associations and hypotheses may also be produced that can be explored in more detail in future definitive research and lead into the development of new theory. This application of the Enosis method supports the view that mixing the qualitative and quantitative paradigms for complementary and initiation purposes is based on mixed methods (Greene et al. 1989, Johnstone 2004). Greene & Caracelli (1997) also supports the view that mixing of paradigms could be acceptable for developmental and expansion intention.

There are several statistical techniques that could be considered for analysing the quantified qualitative data. However, the chosen statistical technique should be able to support the flexibility the Enosis method requires for analysing statistically the qualitative data by taking

into account the measurement error occurred due to imperfect quantification of rich qualitative information into numbers and the small sample size of the qualitative dataset (Section 3.4).

3.4 Choice of Statistical Technique for the Enosis method

There are several statistical techniques such as Chi-squared test, ANOVA, partial correlation, multiple regression analysis that can be considered for secondary quantitative analysis of qualitative data as part of the Enosis method. However, this section will set out a justification for Structural Equation Modelling (SEM), which is the most appropriate statistical technique to use in the new method. The advantages of SEM over other statistical techniques are also presented.

Structural Equation Modelling (SEM) was introduced in late '70s and soon became a popular method within psychology (Joreskog 1969, Bentler 1980, MacCallum & Austin 2000, Motl et al. 2002). The last 20 years, applications of SEM have been increased covering a variety of areas, including but not limited to social work, anthropology, sports science, linguistics, biological, and behaviour sciences (Burns & Nolenhoeksema 1992, Gillespie et al. 1995, Williamson et al. 1995, Heyl & Schmitt 2007, Tseng & Schmitt 2008, Guo et al. 2009). Currently it is widely used in neuroscience neurology where structural models are used for testing hypotheses of brain imaging data, such as contemporaneous interactions between brain connected regions (McIntosh & Gonzalez-Lima 1994, Chen et al. 2011).

SEM is a multivariate statistical analysis technique used to analyse structural relationships between measured observed variables and latent variables (hypothetical constructs or factors). It combines multiple regression analysis, factor analysis, and complex path models. Detail about the equations that define SEM, the structure, the assumptions, and the process for developing and testing the complex models will be presented in Sections 4.2.1.2 and 4.4.2.5.

SEM will be chosen to analyse statistically the quantified qualitative data in the Enosis method, as it is a flexible quantitative approach, which can explore complex patterns of covariance among variables that cannot be measured directly (latent variables), but rather indirectly through other observed variables (indicators).

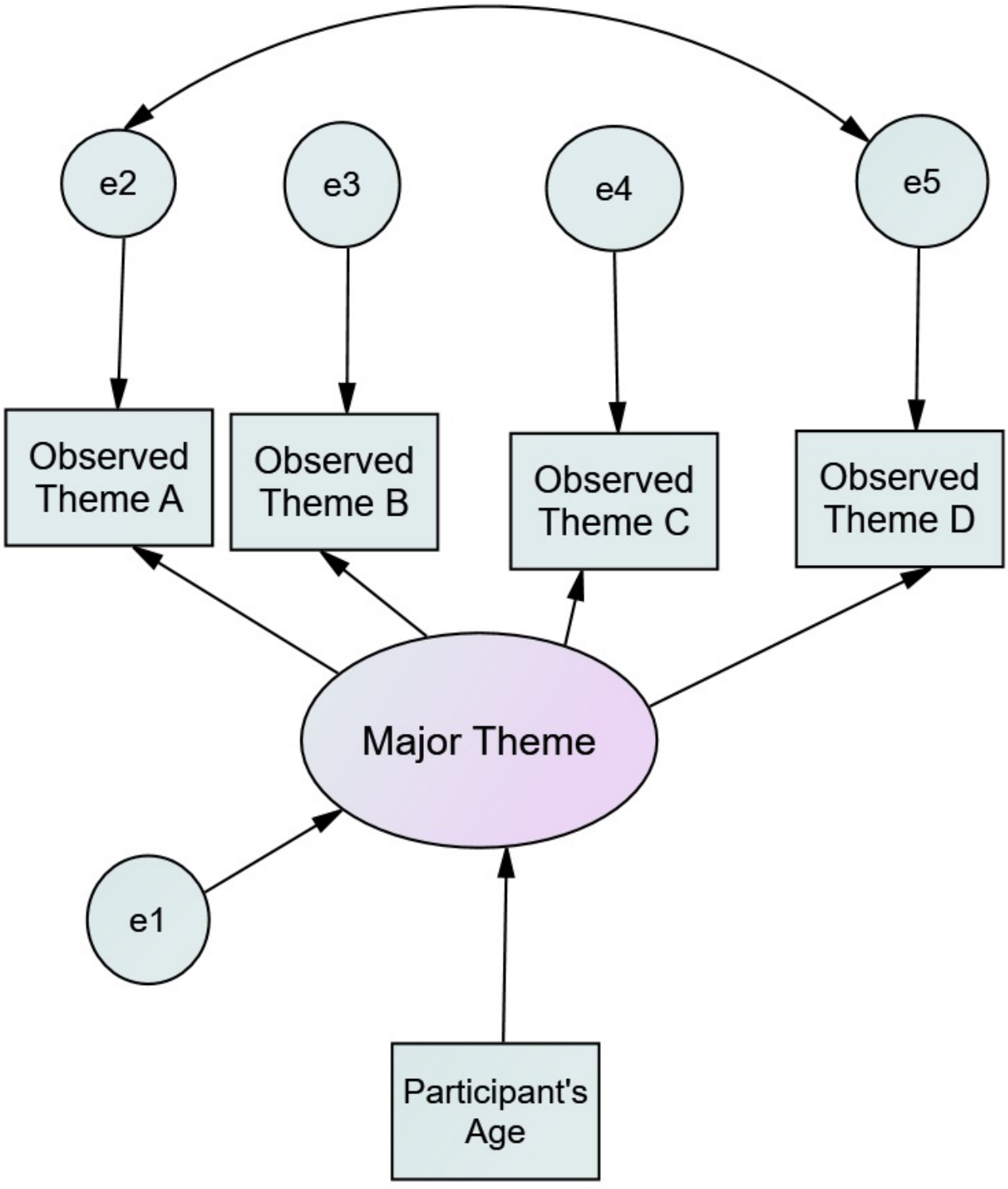
The final major (or overarching) themes developed through qualitative analysis methods will be the hypothetical constructs (latent variables), which will be used for answering research

questions, explaining participants' perceptions or generating hypotheses. These major themes will not be observed items but will be created through the merging of observed themes, codes or categories in the transcripts. The observed themes, codes or categories will, therefore, be indirect measures of the major themes and will be referred to as indicators in SEM (Kline 2011).

These indicators will be created by applying a scoring system that is able to transform the observed themes, codes or categories into meaningful numbers. The quantification of the qualitative data, and the potential loss of qualitative information, is a challenge that has been identified early in this research (Section 1.3) and will be justified in future Chapters (Sections 4.2.1.1, 4.5.1, 6.4.2, and 7.3.1). Although the quantification of the qualitative information can be potentially a subjective process, the proposed scoring systems will need to be clearly defined during their development and interpretation (Sections 4.4, 5.3.1.1, 5.4.2.2, and 5.5.2.2). Otherwise, there is a risk for the transferability of the new method, Enosis, to multiple qualitative datasets and accurate interpretation of the results within the relevant research area.

The ability of SEM to combine the major (or overarching) themes, the observed themes, and the participants' characteristics (or other quantitative observed outcomes) is key advantage compared to other statistical techniques such as ANOVA and regression analysis (Figure 3.2).

Figure 3.2: Graphical example of a Structural Equation Model (SEM) including a major theme (latent variable); the observed themes (indicators); participant's age (an observed variable).



e1 to e5 = measurement errors, → = regression weight, ↔ = correlation.

An advantage of using SEM over other statistical techniques (for example ANOVA, partial correlation, multiple regression analysis) will be not only its ability to explore the associations between unobserved (e.g. themes) and observed variables (e.g. participant's age), but also to account for the measurement error that occurs due to small sample size (Hoyle 1995) (e1 to e5

in Figure 3.2).

Such error occurs due to the imperfect quantification of rich qualitative information. Qualitative information cannot be transformed to a single dimension (numbers) in its entirety without loosing some of the qualitative meaning. This lost qualitative information occurs due to the quantification of the themes and will be explained through the measurement error in SEM. In this way, when the variance of the measurement error is small, the unexplained information left out of a structural equation model is reduced, the parameter estimates are less biased, and the conclusions about relationships are more reliable. In addition, SEM has the ability to adjust the regression estimates and standard errors so as to take into account the small sample size of the qualitative dataset.

Therefore, the SEM will be the most appropriate statistical technique for analysing the quantified qualitative information as part of the Enosis method, not only because it can explore complex relationships between the qualitative data and observed variables, but it can also quantify the potential loss of qualitative information during the quantification process and adjust the results for the small sample size. A detailed description of the SEM is presented in Chapter 4.

3.5 Other Comparative Approaches

Although numerical approaches, including frequencies, and statistical tests, do not have a prominent place in qualitative research, they have been used in various formats for interpreting qualitative data. Methods such as content analysis and Q method aim to use numbers in order to interpret qualitative information. The similarities and key differences between these methods and the Enosis method are presented in this section.

3.5.1 Content Analysis

Content analysis can be done using analytical constructs, which Krippendorff (2004, p.171) described as the "function of 'if-then' statements or a computer program that provides at least one path from available text to answers sought", for quantifying the text. Inferences are then summarised through quantitative techniques including tabulations, cross-tabulations (for example, Chi-squared test), correlations, multiple regression analysis, and factor analysis (Krippendorff

2004). This is usually described as quantitative content analysis and is distinguished from qualitative content analysis.

The quantitative content analysis presents facts of the text in the form of a frequency expressed as a percentage or actual numbers of key categories or observed themes in a similar way to the Enosis method. However, content analysis is mainly a descriptive method and may not reveal the complex associations between qualitative data, which are collected through interviews, and quantitative data (e.g. participants' demographics), which is the strength of the Enosis method through the application of SEM. The Enosis method will use the major (or overarching) themes and observed themes from the original qualitative analysis, which account for the context and theoretical perspective underlying the text and not just counting words in a text.

3.5.2 Q method

Q method is also used for quantifying qualitative information and analysing it with factor analysis. In particular, it aims to study human subjectivity (self-reference) and perceptions in a systematic way through Q-sorting of Q-sample statements as part of behavioural research (Stephenson 1935, 1985). A Q-sample is a collection of statements describing different viewpoints of the problem in question, for example 'the role of religion in politics'. The Q-samples (for example, N number of Q-samples) can be obtained through interviews, published sources or by using standardised Q-samples and their selection may be influenced by the researcher (McKeown & Thomas 1988, Simons 2013). They are selected, structured or unstructured, in a way to match and represent a wide variety of viewpoints. Thereafter, the Q-samples are presented to a number of research participants for Q-sorting. Q-sorting is a process where the participants (for example, m number of participants) are sorting the Q-sample items according to their agreement or disagreement with each one. For example, they may sort the items from those with which they most agree (+5) to those with which they most disagree (-5).

Once sorting is completed a m*N matrix is produced, where m are the number of rows (participants) and N the number of columns (Q-samples). Statistical analysis is then performed using Q-Factor analysis. In Q-Factor analysis the variables of interest are the participants performing Q-sorts and not the Q-sample statements and, therefore, the matrix is transposed to N*m before conducting Factor analysis (McKeown & Thomas 1988). The result of Factor

analysis is the grouping of participants based on the factors produced from the Factor analysis and, therefore, the assumption that they are sharing a common perspective. This common perspective is explained by taking into account the Q-samples that have been included in each factor.

The similarity of the Q method with the Enosis method is that both are aiming to analyse qualitative information in a systematic quantitative way and to compare objectively the subjective viewpoints of individuals. Their common purpose is to generate new hypotheses rather than testing hypotheses. On the other hand, the main differences are that the Enosis method will:

- quantify the themes developed through primary qualitative analysis, which is applied originally, while Q method quantifies selected statements,
- take into account participants' demographics in the statistical analysis of the scores, while Q method generates factors based only on the scores.

3.5.3 QSR Software

The development of Qualitative Solutions and Research (QSR) software, including MAXQDA, ATLAS.ti, and NVIVO, have also contributed to the quantitative analysis of qualitative data (Bazeley 1999). The QSR software allows qualitative researchers the facility to explore relationships between categories and codes through a matrix. Latest versions of the QSR software have the ability to import demographic or other quantitative data, which can be used to explore patterns between different groups (e.g. males and females). The analysis can even go a step further with the development of a numerical table indicating the presence or absence of a theme (or code), which can then be exported to statistical software (for example, Statistical Package for Social Sciences - SPSS) for performing statistical analyses, such as Chi-squared test and factor analysis (Bazeley 2002).

Similar to content analysis, the computer-assisted analysis of textual data is limited mainly to sets of key words, and largely ignores the context, the meaning of the text, and the theoretical underpinning of the research (Castelfranchi 2017). On the other hand, the Enosis method will rely on the interpretation of the text from the qualitative researcher, who will take into account the context when an appropriate qualitative method is applied.

3.6 Qualitative Methods Suitable for the Enosis method

The Enosis method will be applied on qualitative data that are primarily analysed by a qualitative method. The three different qualitative methods, which will be suitable for applying the Enosis method, are potentially the Interpretive Phenomenological Analysis, Grounded Theory, and Thematic Analysis. The methodology and epistemology underpinning these qualitative methods and their link with the Enosis method are explained in this section.

3.6.1 Interpretive Phenomenological Analysis

IPA is qualitative methodology which combines phenomenology and symbolic interactionism (Smith 1996). It focuses on the interpretation of an event or object by an individual and not on an objective statement of the event or the object itself. Smith et al. (2009) argues that IPA is a dynamic and generative process because investigators attempt to interpret participants' experiences, beliefs, and personal views, while at the same time acknowledging personal conceptions. The Enosis method will aim to contribute to this interpretation by exploring the qualitative data from a different angle and generating new hypotheses or associations that can be explored by further qualitative or quantitative research.

Data sources for IPA include, but are not limited to, in-depth unstructured and semi-structured interviews and focus groups as the Enosis method will do. While there is not a single method for analysing collected data in IPA approach, the development and clustering of themes (emerging and overarching) is important for identifying relationships between them based on the analysis strategies outlined by (Smith 2008). The overarching themes are created for explaining the research question and can be used in the Enosis method as latent variables on Structural Equation Modelling.

Smith (1996) emphasises that IPA allows the quantitative and qualitative researchers to have dialogue with each other for exploring similar social and cognitive areas. This dialogue is useful, as it informs both quantitative and qualitative studies. This feature of IPA approach matches the intention of the Enosis method to bridge the gap between qualitative and quantitative researchers. Therefore, qualitative data that are primarily analysed using the IPA approach will be suitable for applying the Enosis method (Section 5.3).

3.6.2 Grounded Theory

The main purpose of Grounded Theory is to develop theory or framework inductively through qualitative data by interpreting the participants' 'lived' experiences (Glaser & Strauss 1967, Glaser 1992). The generated theory may not be generalisable but is refined by continuously defining categories and themes, collecting additional data and checking if they add any insight into previously generated results (Barbour 2003). The Enosis method will also contribute to theory building, as the generated theory from the primary qualitative analysis will be used as the latent variable while the categories or observed themes describing the theory will be used as indicators in SEM.

The basic data sources for Grounded Theory are texts, interviews, and ethnographic observations (e.g. documents, diagrams, maps, photographs, questionnaires) (Charmaz 2006). As the Enosis method is primarily applied on qualitative data derived from interviews, data collected through Grounded Theory will be suitable for this new approach. One of the techniques analysing data with Grounded Theory is based on selective coding, where initially developed codes are merged in main categories (or a category) for developing a new theory (or a model, or a framework) (Strauss & Corbin 1990). These categories will be quantified as part of the Enosis method and will be used as indicators in SEM.

Therefore, qualitative data that are primarily analysed using Grounded Theory will be suitable for applying the Enosis method (Section 5.4).

3.6.3 Thematic Analysis

Thematic analysis is a flexible method, independent of theory or epistemology, and can be applied across a range of other theoretical frameworks or approaches, including IPA and Grounded Theory (Braun & Clarke 2006). The purpose of thematic analysis is to identify, analyse, and report patterns of meaning. Within this theoretical framework the Enosis method will be applied to data being analysed with thematic analysis.

The primary sources for thematic analysis are text or transcripts from interviews and focus groups (Braun & Clarke 2006). The qualitative data are coded and merged into sub-themes and overarching themes that refer to patterns of meaning, which are observable across a series of interview transcripts or texts (Boyatzis 1998). These themes will be used for applying SEM

and exploring further relationships, which will be related to a primary research question.
In Thematic analysis, themes are developed based on their connection to research questions and not simply due to their frequency. The Enosis method fits within this approach, as the sub-themes and overarching themes will be used to explore the same research question from an alternative perspective. An example where the Enosis method will be applied on qualitative data, which are primarily analysed with Thematic analysis, will be presented in Section 5.5.

3.6.4 Rigour of Qualitative Methods

In the same way that a quantitative researcher needs to ensure internal and external validity, reliability, and objectivity in the quantitative research design, a qualitative researcher should ensure the trustworthiness of the qualitative research, so that the readers can be persuaded that the research findings are worthy of attention (Lincoln & Guba 1985). In establishing trustworthiness, Lincoln & Guba (1985) created the 'Four-Dimensions Criteria' of credibility, transferability, dependability, and confirmability. The qualitative researcher should ensure that the research design adheres to these four criteria, and the necessary provisions have been made to achieve them.
Credibility can be achieved by applying several techniques such as data collection and researcher triangulation, prolonged engagement, persistent observation, peer debriefing, negative case analysis, referential adequacy, and member checking (Lincoln & Guba 1985). All these techniques aim for the research findings and their interpretation to be credible to the reader. On the other hand, transferability of the qualitative research, or generalisability of the enquiry, cannot be established similarly to quantitative research. Whether the qualitative findings hold in another setting, context, or even in the same context at another time, depends on the degree of similarities between the two settings or contexts. The qualitative researcher needs to provide, as a minimum, thick descriptions so that those seeking to transfer the findings to their own settings can judge transferability on their own (Lincoln & Guba 1985).
Dependability in qualitative research can be demonstrated when the researchers ensure that the research process is logical, traceable, and clearly documented Tobin & Beglet (2004). One way this can be achieved is for the research process to be audited. A specific type of audit, the confirmability audit, can also be used to establish the confirmability of the qualitative research

(Lincoln & Guba 1985). Confirmability is shown when it is demonstrated that the researcher's interpretations and results are clearly derived from the data. Lincoln & Guba (1985) also argue that confirmability is established when credibility, transferability, and dependability are achieved.

The qualitative methods that will be used for applying the new Enosis method will be assessed for their rigour, so as to ensure that the findings from the Enosis method are also trustworthy (Sections 4.4.2.2, 5.4.1, and 5.5.1).

3.7 A Secondary Analysis Method

The Enosis method will be used as secondary analysis on collected qualitative data, which have primarily been analysed with a qualitative method. It will not be applied as primary or confirmatory analysis of qualitative data because the sample size of the qualitative dataset might be too small to test any hypotheses definitively. The Enosis method will be used as exploratory secondary analysis by qualitative investigators and will not replace the primary qualitative analysis (Barrett 2007).

The use of secondary analysis of qualitative data will have several potential advantages (Heaton 2009, Vartanian 2011). There will be no additional cost for collecting new data, as existing data can be used. In addition, there will be no need to re-analyse the data from the qualitative perspective, as it will have already been analysed by the qualitative researcher. The data is usually organised in themes and sub-themes saving significant time for re-structuring them in the appropriate format. New associations, correlations, and hypotheses, which are not originally identified, will also be explored.

On the other hand, the interpretation of the data will not be straight forward without the input of the primary qualitative researcher, who will have the understanding of the context in which the data will be collected and analysed. Thus, collaboration between the qualitative and quantitative researcher will be necessary during the application of the Enosis method to ensure that the data will be analysed appropriately (Section 4.5.3).

Another issue might be the ethical and legal concerns of re-using data in secondary analysis without the consent of the participants. Research participants may not have given their consent for their data to be used in secondary analysis, especially when the Enosis method is considered

retrospectively. In this case, such a concern will be overcome by using anonymised datasets and obtaining additional ethical and governance approvals. The ethical and governance approvals will require either a prospective submission or retrospective amendments to existing approvals. Therefore, the data used as part of this thesis will be completely anonymised and the appropriate approvals will be in place (Section 4.3).

3.8 Summary

One of the challenges identified in Section 1.3 was what epistemology, theoretical perspective, and methodology will underpin the Enosis method.

The theoretical perspective that will underpin the Enosis method is pragmatism, which supports the need for empirical research to gain and identify knowledge but at the same time recognises that there is not only one, best scientific method to understand reality and phenomena. In addition, the Enosis method will sit within the mixed method methodology, as it combines both the qualitative and the quantitative paradigms. The Enosis method will fit into the sequential design of mixed methods, as statistical analysis will be applied on qualitative data that have primarily been analysed with quantitative methods.

The choice of SEM to analyse the major (or overarching) themes and the observed themes, which will originally be developed through the qualitative analysis, will address the challenge of selecting an appropriate technique for the Enosis method. SEM is a flexible quantitative approach, which can explore complex patterns of covariance among variables that cannot be measured directly (e.g. overarching themes) but indirectly through an indicator (e.g. observed themes, codes or categories). It will be used to explore complex relationships among the qualitative themes, and between the themes and participants' characteristics (or other quantitative observed outcomes). In addition, SEM will account for measurement error which occurs due to imperfect quantification of the qualitative information into numbers and will adjust the results due to the small sample size of data in qualitative research (Hoyle 1995).

This chapter explored existing methods, such as content analysis and Q method, which also aim to use numbers for the interpretation of qualitative information. Both methods quantify the qualitative data which can then be presented as numbers in tables or analysed with quantitative techniques. However, the main difference with the Enosis method will be that they are not

taking into account the context in which the text has been produced or the theory underpinning the research but mainly concentrate on frequency or presence of words. The Enosis method, on the other hand, will be based on the results from primary qualitative analysis, which will be undertaken by the qualitative research within the relevant research context.

Three different qualitative methods, Interpretive Phenomenological Analysis, Grounded Theory, and Thematic Analysis, will be suitable for applying the Enosis method, as their theoretical frameworks are linked. Semi-structured and unstructured interviews are some of the sources for generating qualitative data in these methods, which will also be applicable to the Enosis method. In all three methods, the qualitative results will be presented in a suitable format, i.e. observed and major (or overarching) themes, for applying the Enosis method. The observed and major (or overarching) themes will be quantified and then analysed with SEM.

While the use of the Enosis method retrospectively (i.e. when the new method is not considered at the research concept and protocol development stage but following the completion of the primary qualitative research) may raise ethical concerns about the re-use of data without the participants' consent, the appropriate approvals from governance and ethical perspective will be in place. Only anonymised data will be used for applying the Enosis method to ensure that the participant's identity is not known to the author. In addition, close collaboration between the primary qualitative research and the author will ensure the accuracy of the secondary quantitative analysis and the interpretation of the results.

The next Chapter 4 describes in detail the Enosis method. The development and refinement of the new method will be undertaken in several stages, starting with a pilot study to explore its feasibility (Section 4.4) and proceeding by testing its transferability to multiple qualitative methods (Chapter 5).

4. METHOD

4.1 Introduction

This chapter describes in detail the new method, called 'Enosis' [1]. It presents the pilot study, which will initially be undertaken to test the feasibility of the Enosis method and develop different scoring systems for quantifying the qualitative information. The qualitative information will be collected through semi-structured interviews and primarily analysed using Interpretive Phenomenology Analysis (IPA). Then, this chapter presents how Structural Equation Modelling will be applied to the estimated scores and the results from the IPA analysis. The required actions for obtaining ethical and governance approvals to use re-analyse qualitative data will also be explained.

This chapter presents the conclusions about two of the challenges identified in the 'Introduction' Chapter (Section 1.3). Specifically, the impact of quantifying the qualitative data and any potential loss of qualitative information during the quantification process, together with the application of the Enosis method on small sample size will be explained. It concludes with the importance of collaborations between the qualitative and quantitative researcher, and the essential requirements for applying the Enosis method to other qualitative datasets.

4.2 Description of the Enosis Method

'Enosis' will be a novel mixed method of secondary analysis with qualitative data derived from interviews using the Structural Equation Modelling (SEM) technique. The SEM analysis is a well known statistical method but its application to qualitative data will be novel (Section 4.2.1.2). A key element of the Enosis method will be the transformation of the qualitative data to a quantitative using a scoring system (Section 4.2.1.1).

[1] 'Enosis' is a Greek word which means 'union'. This term was used to describe the new mixed method so as to emphasise the synthesis of the qualitative and quantitative methods.

The Enosis method will aim to:

a. explore complex relationships among the qualitative themes, and between the themes and participants' demographics (Sections 5.3.2.2, 5.3.2.3, 5.4.3.2, and 5.5.3.2),

b. quantify the measurement error due to imperfect quantification of rich qualitative information to a single dimension (scores) (Section 5.6.3),

c. adjust the statistical analysis for small sample size (Section 4.5.2.2),

d. bring closer the qualitative and quantitative researchers (Sections 4.5.3 and 5.6.6).

4.2.1 Two Steps Approach

The 'Enosis' method will consist of the following two steps:

1. quantifying the themes, which have been produced through the original qualitative analysis, and

2. applying Structural Equation Modelling to the estimated scores from step 1.

4.2.1.1 Step 1: Quantification of Qualitative Information

The quantification of the qualitative information will be based on the themes created following the original qualitative analysis. Therefore, qualitative analysis methods that result in the production of themes will be suitable for applying the Enosis method. Three such methods were mentioned in Section 3.6. Different approaches will be applied to quantify the themes into numbers depending on the level of detail recorded during the qualitative analysis and some examples are presented in Sections 4.4, 5.3.1.1, 5.4.2.2, and 5.5.2.2.

4.2.1.2 Step 2: Structural Equation Modelling

The estimated scores will then be used in Structural Equation Modelling (SEM). SEM will be chosen for analysing the quantified themes (scores), as it is a flexible quantitative approach, which can explore multiple patterns of covariance within the data, using several relationships and combinations between at least one unobserved (latent) and one observed variable simultaneously. In addition, it estimates the measurement error that occurs due to imperfect quantification of rich qualitative information to a single dimension (further justification for choosing

SEM was presented in Section 3.4). The structure of the complex models will be constructed using path diagrams. The general Structural Equation Modelling will be defined by the following three equations:

$$\begin{aligned} \boldsymbol{\eta} &= \boldsymbol{B\eta} + \boldsymbol{\Gamma\xi} + \boldsymbol{\zeta} \\ \boldsymbol{y} &= \boldsymbol{\Lambda_y\eta} + \boldsymbol{\epsilon} \\ \boldsymbol{x} &= \boldsymbol{\Lambda_x\xi} + \boldsymbol{\delta} \end{aligned} \tag{4.1}$$

where $\boldsymbol{y}$ will be a $p \times 1$ vector of observed response or outcome variables, $\boldsymbol{x}$ will be a $q \times 1$ vector of predictors, covariates, or input variables, $\boldsymbol{\eta}$ will be a $m \times 1$ vector of latent dependent, or endogenous variables, $\boldsymbol{\xi}$ will be a $n \times 1$ vector of the latent independent, or exogenous variables, $\boldsymbol{\epsilon}$ will be a $p \times 1$ vector of measurement errors in $\boldsymbol{y}$, $\boldsymbol{\delta}$ will be a $q \times 1$ vector of measurement errors in $\boldsymbol{x}$, $\boldsymbol{\Lambda_y}$ will be a $p \times m$ matrix of coefficients of the regression of $\boldsymbol{y}$ on $\boldsymbol{\eta}$, $\boldsymbol{\Lambda_x}$ will be a $q \times n$ matrix of coefficients of the regression of $\boldsymbol{x}$ on $\boldsymbol{\xi}$, $\boldsymbol{\Gamma}$ will be an $m \times n$ matrix of coefficients of the $\boldsymbol{\xi}$ variables in the structural relationship, $\boldsymbol{B}$ will be a $m \times m$ matrix of coefficients of the $\boldsymbol{\eta}$ variables in the structural relationship ($\boldsymbol{B}$ will have zeros in the diagonal and $\boldsymbol{I} - \boldsymbol{B}$ will be required to be non-singular), and $\boldsymbol{\zeta}$ will be an $m \times 1$ vector of equation errors (random disturbances) in the structural relationship between $\boldsymbol{\eta}$ and $\boldsymbol{\xi}$ (Joreskog & Sorbom 1989).
The covariance matrix of the observed variables will be:

$$\boldsymbol{\Sigma} = \begin{pmatrix} \boldsymbol{\Lambda}_y\boldsymbol{A}(\boldsymbol{\Gamma\Phi\Gamma}' + \boldsymbol{\Psi})\boldsymbol{A}'\boldsymbol{\Lambda}_y' + \boldsymbol{\Theta}_\epsilon & \boldsymbol{\Lambda}_y\boldsymbol{A\Gamma\Phi\Lambda}_x' \\ \boldsymbol{\Lambda}_x\boldsymbol{\Phi\Gamma}'\boldsymbol{A}'\boldsymbol{\Lambda}_y' & \boldsymbol{\Lambda}_x\boldsymbol{\Phi\Lambda}_x' + \boldsymbol{\Theta}_\delta \end{pmatrix} \tag{4.2}$$

where $\boldsymbol{A} = (\boldsymbol{I} - \boldsymbol{B})^{-1}$, and the covariance matrices are:
$\text{Cov}(\boldsymbol{\xi}) = \boldsymbol{\Phi}$, $\text{Cov}(\boldsymbol{\zeta}) = \boldsymbol{\Psi}$,
$\text{Cov}(\boldsymbol{\epsilon}) = \boldsymbol{\Theta}_\epsilon$
$\text{Cov}(\boldsymbol{\delta}) = \boldsymbol{\Theta}_\delta$

The parameters will be estimated by maximizing the likelihood of the parameters, subject to $\boldsymbol{\Sigma}$. This will be equivalent to minimising:

$$F = log||\boldsymbol{\Sigma}|| + tr(\boldsymbol{S\Sigma}^{-1}) - log||\boldsymbol{S}|| - (p + q) \tag{4.3}$$

where $\boldsymbol{S}$ will be the sample covariance matrix.

The feasibility of the Enosis method will be initially explored in a pilot study, where qualitative data have been primarily analysed using Interpretative Phenomenological Analysis (IPA) (Section 4.4). Prior to proceeding with the application of the two steps of the Enosis method, the approach for obtaining the necessary ethical and governance approvals will be presented.

4.3 Ethics and NHS Approvals

The Enosis method will be used as a secondary analysis method, as it was presented in Section 3.7, to already collected data, which have primarily been analysed with qualitative methods. Therefore, the necessary approvals will be sought to cover any concerns about the absence of participants' consent for secondary analysis of the qualitative data. Approvals from the University of Derby Ethics Committee, the NHS Research Ethics Committee (REC) and the NHS R&D Department will be requested prior to applying the Enosis method to three different datasets; one in this pilot study (Section 4.4.2.1) and two in Chapter 5. The author will also gain approval from the three qualitative researchers to use their data, analyse them using the Enosis method and report the findings.

The Enosis method will be considered retrospectively to be applied to the ADHD (Section 5.3) and to the Perfectionism (Section 5.4) datasets after NHS REC and R&D approvals had been granted for both studies as part of the original study submissions to governance bodies by the qualitative researchers. Thus, separate amendments for each dataset will be submitted to relevant NHS REC and R&D for re-analysing the qualitative data, which have already been collected, using the Enosis method. In addition, completely anonymised datasets will be used to overcome the challenge of secondary analysis of already collected data without the participants' consent.

On the other hand, the Enosis method will be considered prospectively to be applied as secondary analysis method in the Mental Health (Section 5.5) dataset. In this case, it will be included in the 'Statistical Analysis' Section of the research protocol and in the NHS REC application form before both documents are submitted as part of the original study to governance bodies by the qualitative researcher and any qualitative data collection has started. Completely anonymised data will also be used to apply the Enosis method, even if it is not required, as the

prospective NHS REC and R&D approvals will cover the analysis of the qualitative data with the Enosis method.

One ethics application form will be submitted to the University of Derby Ethics Committee for approval, so as to cover the use of any potentially suitable qualitative dataset when applying the Enosis method.

4.4 Pilot study

4.4.1 Aim and Objectives of Pilot study

The aim of the pilot study will be to test the feasibility of the Enosis method. The conclusions of the pilot study will be used to refine the method before testing its transferability to other qualitative data analysed with alternative qualitative methods.

Specifically, the objectives of the pilot study will be:

1. to create different scoring systems for quantifying qualitative data, which are already analysed by a qualitative method (Section 4.4.3.1),
2. to apply Structural Equation Modelling to the estimated scores (Section 4.4.3.2),
3. to identify any suggestions following the application of SEM (Section 4.5.4).

4.4.2 Method of Pilot study

4.4.2.1 Qualitative dataset

The qualitative data that will be used in the pilot study have been collected by a health care professional through 11 semi-structured matched interviews (dyads) with birth mothers and maternal grandmothers (22 individual interviews), who had a child with a diagnosis of Attention Deficit Hyperactivity Disorder (ADHD). The transcripts have been analysed, as dyads and as individual interviews, using Interpretative Phenomenological Analysis (IPA). The final emerging themes have been clustered and organised by the health care professional into smaller, manageable number of superordinate themes, which were then grouped further to overarching themes. Four overarching themes have been produced and each one included four superordinate themes, with a number of sub-themes within them (Appendix D).

4.4.2.2 Rigour of ADHD Qualitative dataset

The qualitative researcher undertook several actions to ensure rigour in the qualitative analysis as it is required for a robust qualitative research and for a Doctor of Philosophy (PhD). Specifically, he created a transparent and methodical audit trail that provided the first level of consistency and reliability checking within his project. At each stage of the analysis, the qualitative researcher checked the emerging themes against the transcripts to ensure that initial and emerging ideas did not preclude other interpretations of the data.

Further audit was carried out by a female research collaborator. This involved following the development of themes at each stage for two of the five pairs of interviews and checking them against the transcripts and the original tape recordings. This included an interview she conducted and an interview conducted by the author, both chosen randomly.

Another independent audit was carried out by the male clinical verifier for the qualitative research project. This again, involved following the development of themes at each stage for the same two pairs of interviews and checking them against the transcripts and the original tape recordings. A joint meeting was then held to discuss differences and similarities. Any changes to the analysis and alterations to the emerging superordinate and overarching themes were then fed back to the collaborators for verification. At each stage of the analysis the emerging themes were discussed in regular meetings with his research supervisor, female collaborator and a fourth research collaborator from the University of Nottingham with expertise in qualitative analysis.

4.4.2.3 Ethics and NHS Approvals for the Pilot Study

Approval was granted in January 2012 by the 'NRES Committee - Derby 1 and 2' for undertaking secondary analysis with the Enosis method on the already collected and analysed ADHD dataset (Appendix A). The Derbyshire Healthcare NHS Foundation Trust confirmed that R&D approval was not needed but a letter of access was issued in May 2012 (Appendix B). The University of Derby Ethics Committee similarly approved in April 2013 the application for applying the Enosis method to multiple qualitative datasets given that the qualitative researchers provide their permission for using anonymised datasets for secondary analysis (Appendix C). Dr Robinson, the qualitative researcher of the ADHD dataset, was happy to grant

his permission for re-analysing his dataset and collaborating with the author for applying the Enosis method and interpreting its findings.

4.4.2.4 Quantification of Qualitative Information

Two scoring systems will be developed for quantifying the qualitative data and, specifically, the themes which were created by IPA. Themes have been produced by the health care professional per interviewee (birth mother and grandmother separately) and per dyad (birth mother and grandmother together). Therefore, each scoring system will be estimated per superordinate theme per interviewee and per dyad separately.

- The first scoring system will be based on the number of sub-themes mentioned by one interviewee (or dyad) under one superordinate theme. For example, if one interviewee (or dyad) mentions two sub-themes under superordinate theme 'Successes, failures, and gaps' (B3) then a score of 2 will be assigned for that interviewee (or dyad) (Appendix D). This scoring system will be referred to as 'Frequency' thereafter.

- The second scoring system, called 'Proportion', will be based on the number of sub-themes mentioned by one interviewee (or dyad) over the total number of sub-themes for one superordinate theme. For example, if one interviewee (or dyad) mentions two sub-themes under superordinate theme 'Successes, failures, and gaps' (B3) and the total number of sub-themes for this superordinate theme is six, then the score for this interviewee (or dyad) will be

$$2/6 = 0.33. \tag{4.4}$$

Both scoring systems will be used to quantify the qualitative dataset and to apply the Structural Equation Modelling as described in Section 4.4.2.5.

4.4.2.5 Application of Structural Equation Modelling

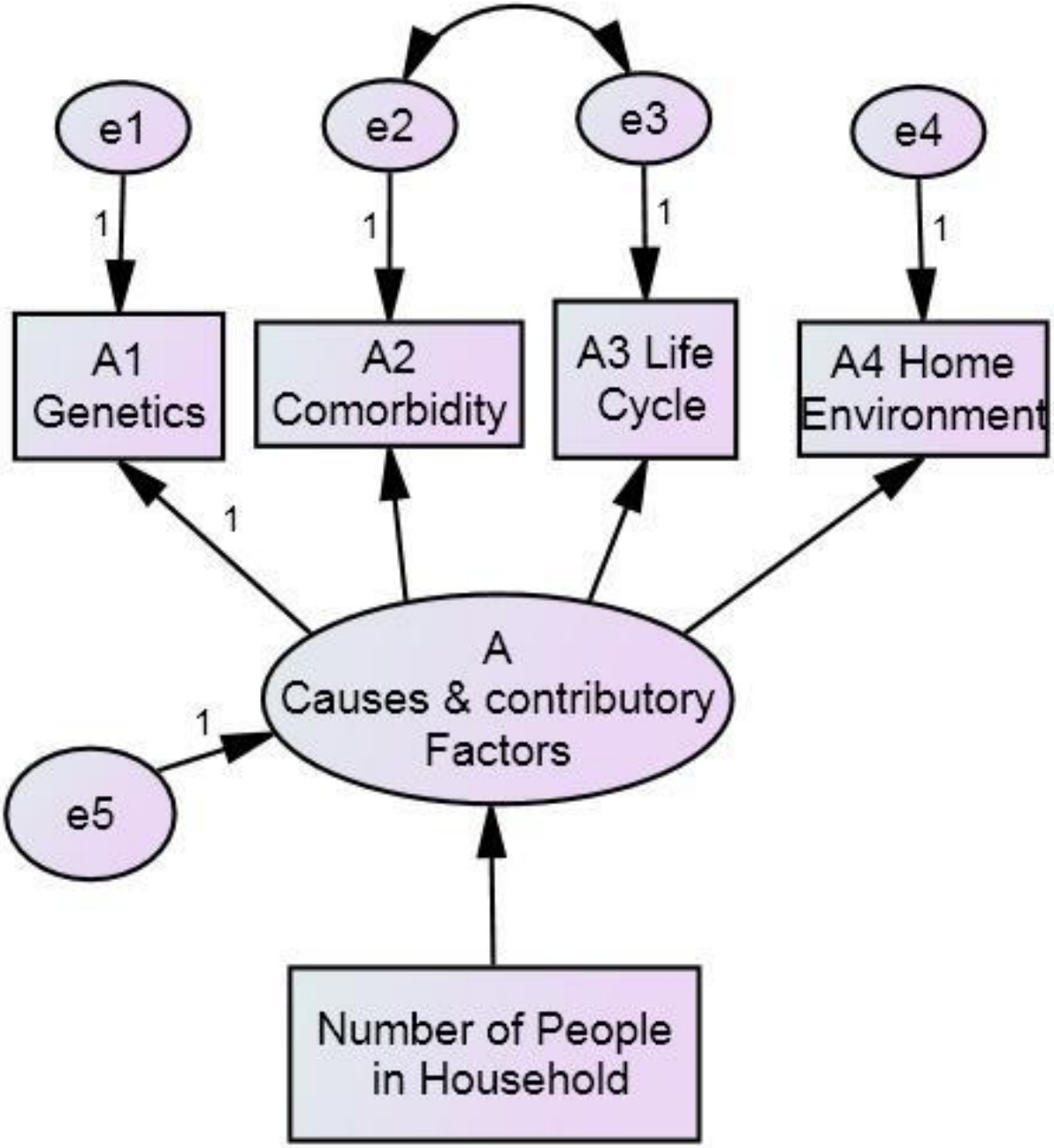
Structural Equation Modelling will be applied to the estimated scores using the Analysis of Moments Structure (AMOS) software, which is an add-on module within SPSS software (Arbuckle 2008).

In the pilot study, the overarching themes will be taken as the latent variables (e.g. overarching

theme A, 'Causes and Contributory Factors' of ADHD, presented in Figure 4.1), as they were not observed items but the interpretation of the superordinate themes developed through the IPA analysis for answering the study research questions. The latent variables will be presented as ellipses. Observed variables, which will be symbolised with rectangles, will be those that are directly measured (e.g. 'the number of people in household' in Figure 4.1). The superordinate themes will be used as indicators of the overarching themes and will be estimated through a scoring system, which will be based on the observed sub-themes (superordinate themes A1 to A4 in Figure 4.1). The measurement error of a variable will be presented with circles (e1 to e5 in Figure 4.1). The single-headed arrow will be used to denote regression weight and double-headed arrow for correlation (r).

SEM will be used for exploring the complex relationships between the overarching themes (latent variables) and the participant's characteristics (observed variables). It will also be applied for exploring the association among the superordinate themes.

Figure 4.1: Demonstration of simple Structural Equation Model including one latent variable, the overarching theme 'Causes and Contributory Factors' of ADHD (A); the indicators of overarching theme A, the four superordinate themes (A1-A4); one observed variable, the 'total number of people in each household'.



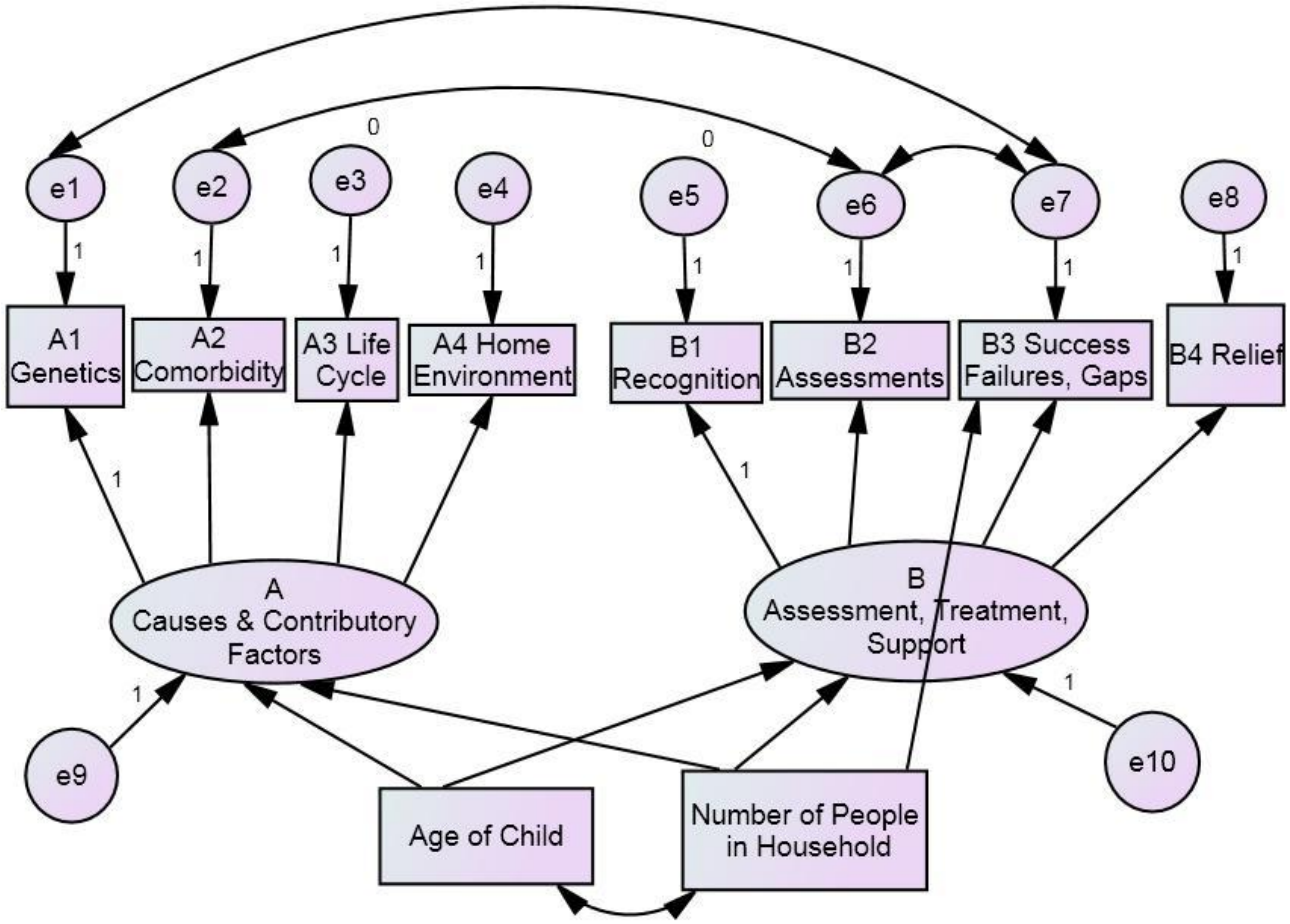
e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

SEM Models

Structural Equation Models will be built starting with the simplest (Figure 4.1) and then progressing to more complex models (Figure 4.2). New correlations estimates and regression weights will be added and tested one by one to produce a model interpreting the data without violating any assumptions. Several models will be created so as to test the feasibility of SEM

using the estimated scores. Multiple group analysis will also be conducted. In multiple group analysis two or more groups (e.g. mothers vs grandmothers) will be analysed separately but compared simultaneously.

Figure 4.2: Demonstration of complex Structural Equation Model including two latent variables, the overarching themes, 'Causes and Contributory Factors' of ADHD (A) and 'Experiences of Assessment, Treatment, and Professional Support' (B) for families with a child with a diagnosis of ADHD; the indicators of overarching themes A and B, the eight scores of the superordinate themes (A1-A4 and B1-B4); two observed variables, the 'age of child' and 'total number of people in each household'.



e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

SEM Assumptions

The assumptions underlying SEM will be tested for each model (Arbuckle 2008). The observed variables will be assessed for multivariate normality using 'multivariate kurtosis' values (< 1 will indicate multivariate normality) (Mardia 1970). Additionally, independence between observed variables or the covariance structure in the model will be tested. The 'discrepancy measure' will be used to check if there was covariance structure in evidence ($p<0.05$ will indicate covariance structure in the model) (Joreskog 1969).

An essential step for building structural equation models will be the model identification. A model will be identified when there is one unique solution for each of the unknown parameters. The models should be 'over-identified' (higher number of observed variances and covariances than unknown parameters) for the analysis to run, produce parameter estimates and test the model hypotheses (Bollen 1989, Hoyle 1995). The unknown parameters will be the total of the regression weights, the variances, and covariances, which are to be estimated. An 'over-identified' model will be achieved by either fixing the variance of the latent variable or one of the regression weights (e.g. fixing the regression weight equal to one).

SEM Model Fit

At each stage of the analysis the proposed models will be discussed in regular meetings with the health care professional, as he is an experienced consultant systemic psychotherapist specialised in children with diagnosis and treatment of ADHD. It will be essential for the original investigator to get involved in the models built, as the applied correlations and regression effects should be theoretically justified (Barrett 2007). It will be fundamental for each model to be constructed only if it has practical and theoretical meaningful in real world. The health care professional will also propose specific hypotheses to be explored in the models. These will be hypotheses, which were generated in the original qualitative analysis or are mentioned in the literature (Robinsons, 2010).

The 'Maximum Likelihood' method will be used for estimating variances, covariances, and regression weights when multivariate normality holds (Joreskog 1993, Hoyle 1995). Otherwise, bootstrap method will be applied as an alternative method for modelling the data if the observed variables are not normally distributed (Bone et al. 1989, Bollen & Stine 1992). The bootstrap method will estimate the standard errors of the parameters based on repeated samples from the original sample with replacement after each case is drawn.

The 'model goodness-of-fit' (i.e. whether the discrepancies, or model residuals, are greater than it is be expected by chance alone) will be tested using the overall Chi-Squared test (null hypothesis: the model fits the data well, $p>0.05$ indicates the model fits the data well) (Barrett 2007, Hoyle 1995). The Tucker-Lewis Index (TLI) and Goodness of Fit Index (GFI) will also be used to test the fit of the model, as they do not depend on the large size of the sample, such as the Chi-Squared test (values close to 1 indicate good fit) (Tucker & Lewis 1973, Sorbom

1989, Arbuckle 2008). The 'model goodness-of-fit' will be reported as [(degrees of freedom, n) Chi-square, p-value, TLI, GFI].

Models without good fit will be modified using the proposed modification indices (correlations or regression weights) by AMOS software (Sorbom 1989). Only modification indices that are theoretically justifiable will be applied to each model. It will be essential that the models explain the real world or are based on theory and are not just a product of statistical software (Barrett 2007). The modification index with the best theoretical justification and higher impact on the model fit will be applied first. The model will be re-tested and if it is not performing well the next modification index will be used until a good theoretical and statistical model is achieved.

Multiple models will be constructed and compared to each other so as to assess which model best interprets the data. The multiple nested models (i.e. all unknown parameters of one model are subset of the parameters in second model) will be compared using the Chi-squared test (null hypothesis: constrain used to define the nested model is true) (Joreskog 1993). The Akaike Information Criterion (AIC) will be used for choosing a model with good fit (i.e. the smaller the AIC the better the model), as it is a criterion that takes into account the number of estimated parameters and is not affected by the sample size (Akaike 1987, Barrett 2007).

4.4.3 Findings of Pilot Study

The findings related to objectives 1 and 2 (Section 4.4.1) about the construction of two scoring systems and their application in SEM are presented in this section.

4.4.3.1 Quantification of Qualitative Information: Scoring Systems

The proposed scoring systems were estimated using the themes from the original qualitative analysis, which were organised in at least three clusters as sub-themes, overarching, and superordinate themes. Due to this clustering the overarching themes were used as latent variables, the superordinate themes as indicators of the overarching and the sub-themes for constructing the scores per superordinate theme in SEM.

All the sub-themes were coded in each transcript to allow the estimation of the scores. The qualitative investigator had to be careful to code sub-themes only when they existed. If sub-themes had been coded when they did not exist in a transcript, it could reduce the possibility

of exploring hypotheses and patterns in SEM.

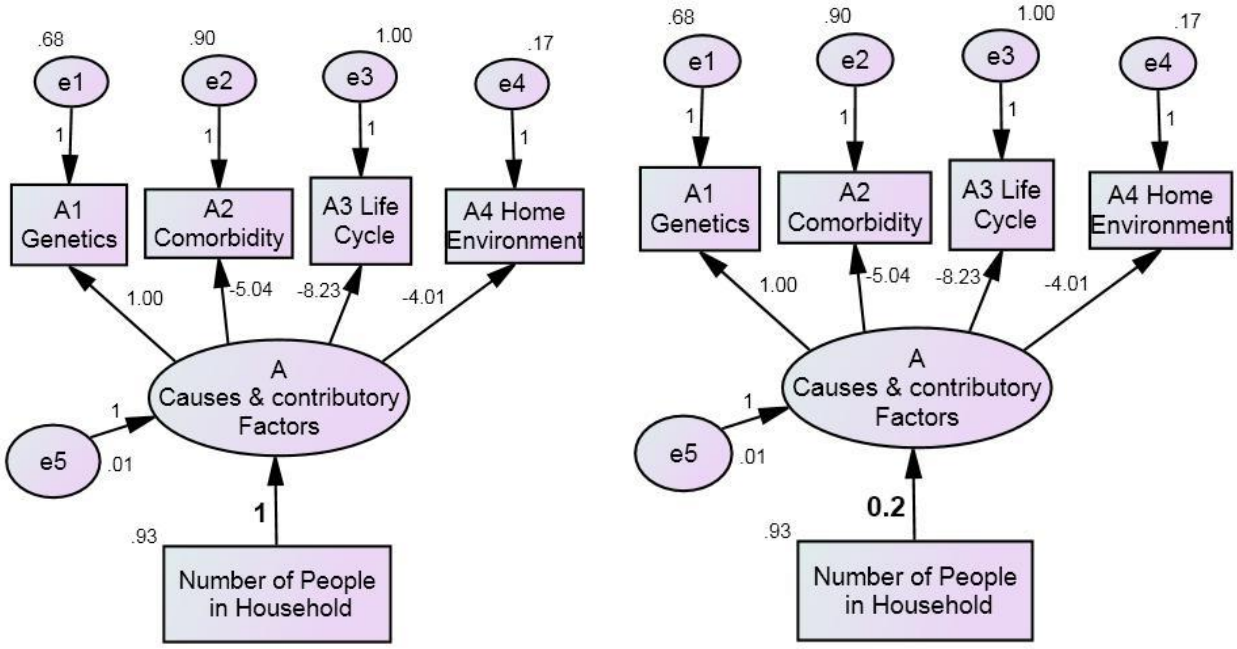
The order of frequency, in which superordinate themes had been reported under an overarching theme, did not always depend on the number of sub-themes coded under each superordinate theme. For example, the 'successes, failures, and gaps of ADHD treatment' theme had 6 sub-themes but it was mentioned the least by the interviewees. However, this order could change every time the structural model changed by adding new latent or observed variables. Therefore, clear conclusions were not drawn about the order of frequency the superordinate themes were mentioned but only explored for repeated patterns between different structural models (e.g. which superordinate theme is always the least or most reported).

4.4.3.1.1 The 'Frequency' Scoring System

The 'Frequency' scoring system indicated the level of presence of each superordinate theme for each interviewee (or dyad). The higher the score for one participant (or dyad) for a specific superordinate theme the more this participant (or dyad) has been referred to this theme.

The interpretation of this scoring system was sensible and simple within SEM analysis. For example, in Figure 4.4a, the regression coefficient of the independent observed variable 'number of people in the household' to theme 'causes and contributory factors' of ADHD (A) was 1. The interpretation of this coefficient was that families with more people in their household referred one superordinate (A1-A4) theme more under the 'causes and contributory factors' overarching theme than those with fewer people.

Figure 4.3: Unstandardised estimates of a Structural Equation Model (SEM) using two scoring systems, a) 'Frequency' and b) 'Proportion'. Each SEM includes one latent variable, the overarching theme 'Causes and Contributory Factors' of ADHD (A); the indicators of overarching theme A, the four superordinate themes (A1-A4); one observed variable, the 'total number of people in each household'.



(a) 'Frequency' scoring system (b) 'Proportion' scoring system

e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

4.4.3.1.2 The 'Proportion' Scoring System

The 'proportion' scoring indicated the level of prevalence of each superordinate theme. The higher the score the more the participant (or dyad) had referred to this theme compared to other themes or other participants (or dyads).

The interpretation of this scoring system was meaningful in SEM analysis. The level of significance (p-value) for the parameter estimates and model specification was not different from a similar structural equation model using the 'frequency' scoring system. However, the estimates, the standard error, and the interpretation of the estimates were different. For example in Figure 4.4b, the regression weight of the independent observed variable 'number of people in the household' to theme 'causes and contributory factors' of ADHD (A) was 0.20. This coefficient was interpreted as families with more people in their household referred 20% (0.20) more superordinate (A1-A4) themes under the 'causes and contributory factors' overarching theme than those with fewer people.

4.4.3.2 Application of SEM: Results

Several feasibility issues, which were identified through SEM analysis using the two scoring systems, are presented in this section under specific headings for better readability.

4.4.3.2.1 Multivariate Normality

The assumption of multivariate normal distribution of observed variables did not always hold, possibly due to the small sample size of the qualitative dataset. In this case an alternative method to 'maximum likelihood', such as bootstrap, was used for estimating standard errors of parameters. This method estimated the standard errors more accurately and, therefore, the confidence intervals and significant level (p-value) of the parameters were affected. As the confidence intervals became wider with bootstrap, the p-value could change from significant to non-significant. This method was more robust when the multivariate normality did not hold but had one limitation, which is reported in Section 4.4.3.2.3.

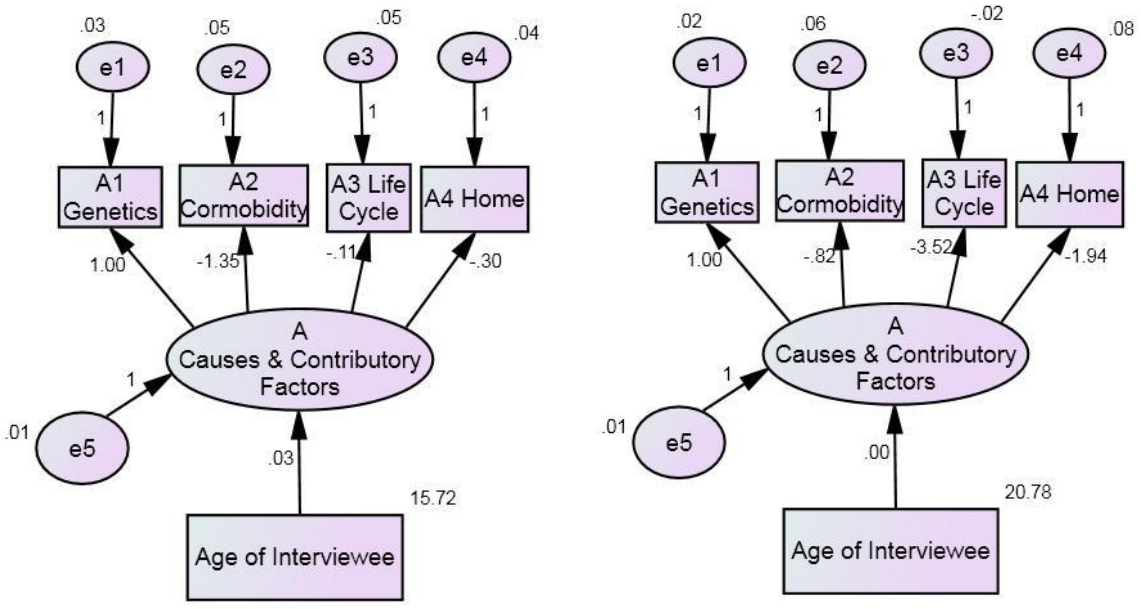
4.4.3.2.2 Models Built

Structural equation models were built starting from simplest, progressing to more complex, due to small sample size. The simplest model included only one overarching theme (latent variable) and the scores of their superordinate themes (indicators) (e.g. Figure 4.1). Then more overarching themes and observed variables (e.g. age of child, number of people in household) were added in the model one by one for constructing more complex models (e.g. Figure 4.2).
This study dataset was complete and there were no missing values. However, in order to test the feasibility of SEM with missing values a couple of scores were deleted. The existence of missing scores did affect the SEM analyses, and, therefore, modification indices were not estimated by AMOS software.
During the model development, modification indices were proposed by the software for improving the model fit and were only used if they were theoretically justified. The modification indices were proposed by the software based on better empirical fit of the model without taking into account the interpretation of the proposed index. The collaboration and judgment of the health care professional and the author was essential for deciding which proposed indices should be applied to SEM.
The next feasibility issue was observed with the estimation of standardised parameter esti-

mates. Standardised estimates are transformations of unstandardised estimates, which have been rescaled to have unit variance and, therefore, the estimates can be compared to each other. The analysis could not be finished if the covariance was negative. Similarly when a complex model was applied or the sample size was small (e.g. 9 cases), the estimate of a variance was negative, which is not acceptable in SEM. Solutions to this problem were to fix the covariance to a non-negative value (e.g. equal to 0) and re-run the analysis or to modify the model by inserting or deleting a variable.

Multiple group analysis was conducted and found feasible. For example in Figure 4.5, the effect of interviewees' age on overarching theme 'causes and contributory factors' of ADHD between mothers and grandmothers was tested [(10, n=22) = 8.92, p=0.540, TLI = 1.393, GFI = 0.860]. Based on this model the age of interviewee did not have different effect on 'causes and contributory factors' of ADHD for mothers and grandmothers.

Figure 4.5: Unstandardised estimates of 'Multiple group' Structural Equation Model (SEM) analysis comparing a) mothers to b) grandmothers. SEM for each group includes one latent variable, the overarching theme 'Causes and Contributory Factors' of ADHD (A); the indicators of overarching theme A, the four superordinate themes (A1-A4); one observed variable, the 'age of the interviewee'.



(a) SEM for group: Mother (b) SEM for group: Grandmother

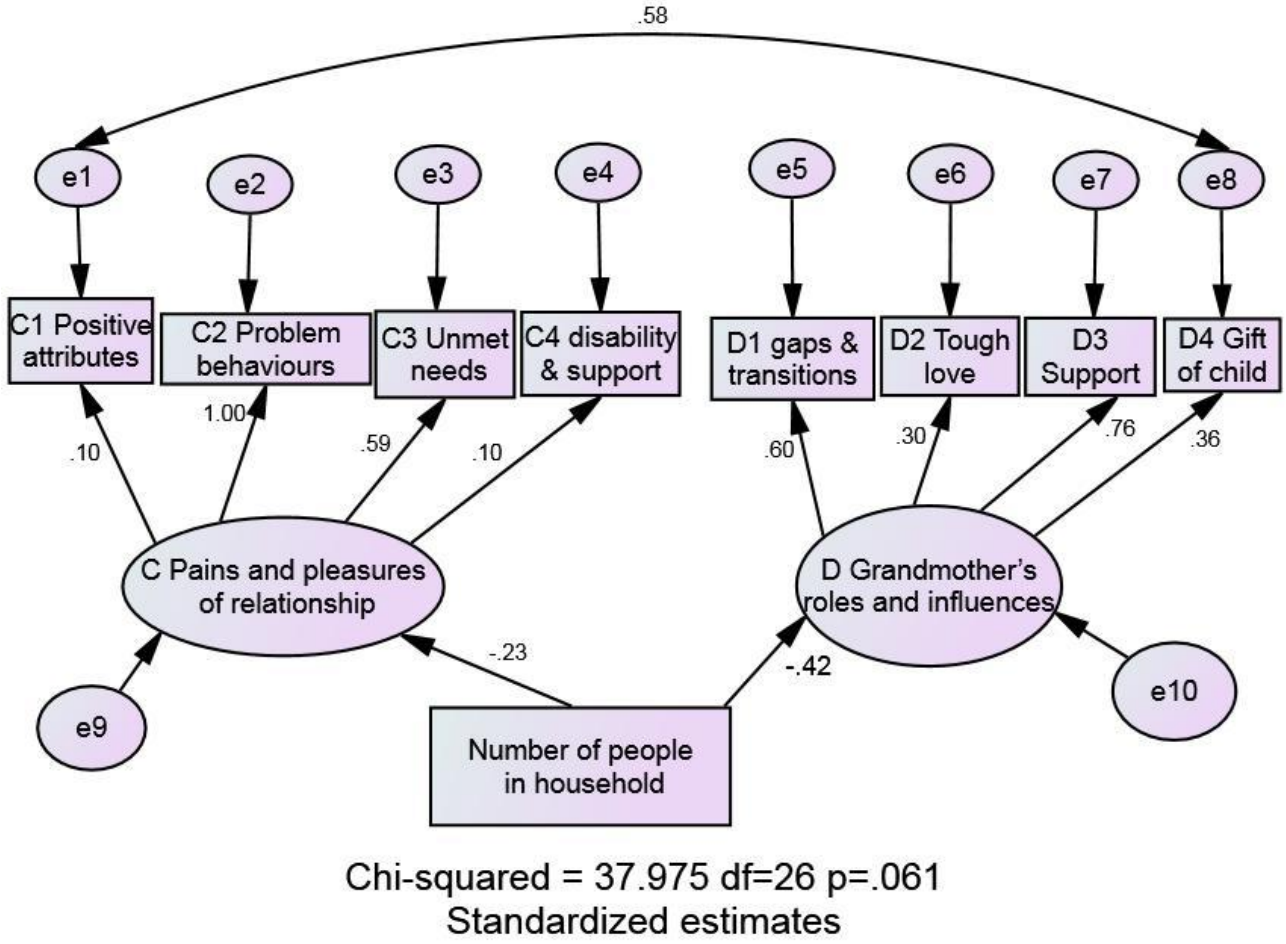
e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

4.4.3.2.3 Sample size

The feasibility of structural equation models was also tested based on different sample sizes. A sample size of 10 interviewees' (or dyads') scores was adequate to produce a model with

two latent (superordinate themes) and one observed (e.g. number of people in household) variable (Figure 4.7). A sample size of 9 cases was enough to perform a model with only two latent variables (without any observed variables), while the simplest model with only one latent variable needed at least 7 cases. The sample size clearly restricted the complexity of the structural model and, therefore, fewer hypotheses were explored than would have been feasible with large sample sizes.

Figure 4.7: Standardised estimates of a Structural Equation Model (SEM) including two latent variables, the overarching themes 'Pains and pleasures of relationships relating to child' with ADHD (C) and 'Maternal grandmother's roles and influences' (D); the indicators of overarching themes C and D, the four superordinate themes (C1-C4 and D1-D4); one observed variable, the 'number of people in household'.



e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

The sample size also affected the way the bootstrap method performed. Bootstrap could be a time consuming method, as it requires the simulation of multiple samples from the one in use. Depending on the number of simulations and the number of latent and observed variables in a model, bootstrap could require significant time to run or might not be feasible if the

sample size is small. Specifically, when a model with one observed, two latent variables and 200 simulations was constructed with the bootstrap method, 30 seconds were required for estimating the unknown parameters. The same model for 1,000 simulations required 3 minutes. This is in contrast to a more complex model with two latent, three observed variables, and 10 simulations which was not feasible to process (1 hour to run the first simulation) due to small sample size of 11 interviews.

4.5 Summary

One of the main objectives of this research project was to develop a new method that can analyse complex relationships between qualitative data, which are collected through interviews, and quantitative data and test its feasibility (Section 1.2). Both the development of the new method, called Enosis, and its feasibility have been completed in a pilot dataset, which had initially been analysed with the IPA approach.

The Enosis method consisted of two steps: quantifying the qualitative data (themes) based on a scoring system and, then, analysing the scores using Structural Equation Modelling (SEM). This method is placed in the mixed methods approach, as it combines qualitative data with quantitative method of analysis, even if it is not based on the traditional mixed methods route, where quantitative and qualitative data are independently collected (Greene et al. 1989) (Section 3.3).

The key considerations and conclusions from the pilot study, which will be important for future application of the Enosis method, are highlighted in the following sections.

4.5.1 Scoring Systems

Two different scoring systems were created for quantifying the themes, which had been generated following the original qualitative IPA analysis of interviews. The 'frequency' scoring fits the data well in SEM but the interpretation of the parameter estimates was not as comprehensive as with the 'proportion' scoring. The added value of the latter scoring system was that it allowed more direct comparisons between interviewees or themes, as it could detect in which superordinate theme an interviewee referred to more frequently compared to other themes or other interviewees. Thus, the 'proportion' scoring system will be preferred to the 'frequency'

scoring system for analysing future datasets.

4.5.2 Application of SEM

4.5.2.1 Model Fit

SEM was applied as part of the Enosis method to the calculated scores. The simplest model was first built including only one overarching theme (latent variable) and the scores of their superordinate themes (indicators) (Figure 4.1). The 'model goodness-of-fit' and the assumption of multivariate normality were tested before proceeding to more complex models. Models without good fit were modified by including first the modification indices with the best theoretical justification following discussions with the qualitative researcher and the higher impact on the model fit. It was observed that modification indices were not estimated when the scores of superordinate themes (indicators) were missing. It is, therefore, important to ensure in future application of the Enosis method that scores are produced for all superordinate themes included in SEM.

Once a model with good fit was developed more complex models were constructed including one more overarching theme (latent variable) at a time (Figure 4.2. The different models were compared to each other using the AIC index for concluding which one interprets best the qualitative dataset. It was noticed that there were cases when SEM analysis could not be completed if a very complex model was applied or the sample was smaller than 9 cases. In this instances, the estimated model covariance was negative. The way to overcome this issue in future application of the Enosis method is by increasing the sample size, simplifying the model or fix the covariance to a non-negative value (e.g. equal to 0).

4.5.2.2 Sample size

Each model in the SEM analysis was based on the number of interviews conducted by the health care professional. While it is argued that SEM should only be applied to sample of size 200 or more for drawing definitive conclusions, the Enosis method will be used as exploratory secondary analysis by qualitative investigators and not to replace or confirm the primary qualitative analysis (Barrett 2007). It will be applied to existing samples and power calculation will not be performed, as statistical analysis will not be conducted for testing specific hypothesis or for

drawing definitive conclusions (Creswell 2003, Schulz & Grimes 2005).

In this pilot study, it was shown that the minimum sample size required for the simplest structural model to be produced is 7 observations. A sample size of 10 observations would be essential for constructing a reasonable model including two latent (superordinate themes) and one observed (e.g. age) variable.

A large sample size is not essential in qualitative research, as the social world and people have meaningful experiences that can be interpreted rather than predicted (Creswell 2003). While a sample from 3 to 6 sources (e.g. interviews, focus groups) will be enough in Interpretative Phenomenological Analysis, it is not unusual for larger samples to be used in qualitative methods (Charmaz 2006, Smith et al. 2009). In these cases more complex models will be constructed and multiple relationships will be explored.

In addition, one of the aims and challenges for developing a new method was to be able to adjust the statistical analysis for the small sample size of the qualitative dataset (Sections 1.3 and 4.2). It was demonstrated in this pilot study that it was feasible to adjust the statistical analysis by using bootstrap method during the SEM analysis. The estimates and standard errors were adjusted to provide to investigators greater confidence of the results. In future, it is important to check whether the assumption of multivariate normal distribution of observed variables holds and, if not, to apply the bootstrap method.

The application of SEM to the calculated scores as part of the Enosis method was feasible by taking into account these the recommendations in Sections 4.5.2.1 and 4.5.2.2. Therefore, SEM will be used in any application of the Enosis method to future qualitative datasets.

4.5.3 Collaborations

One of the objectives of this research was to determine the nature of the required collaboration between the quantitative and qualitative researchers so as to be able to apply effectively the Enosis method (Section 1.2). In the pilot study, structural models were produced based on close collaboration between the author, who is a medical statistician by profession, and a health care professional, who is also a qualitative researcher. This collaboration provided re-assurance that unknown parameters included in the models were theoretically justifiable.

Relationships and regression weights, which had clear theoretical justification, were included

in SEM analysis. While there are statistical criteria (e.g. TLI, GFI, CFI) to determine the goodness-of-fit of structural models, the investigators should always check that the models are clinically or theory based (Barrett 2007). The investigators should not include in the model any correlation or regression weight proposed by software without first exploring that they are linked to reality.

Therefore, the Enosis method strengthened the collaboration between the qualitative and the quantitative researchers in this research. Both investigators came closer to ensure the appropriate application of the Enosis method and interpretation of the results, as advanced statistical knowledge and theoretical justification of a SEM model were required. In Section 6.3.3, the importance of the collaboration during the identification of a suitable dataset, the development of a path diagram, and the interpretation of the results from the Enosis method will be discussed in more detail.

4.5.4 Essential Requirements for Applying the Enosis Method

The pilot application of the Enosis method has led to suggestions for applying this novel method to future qualitative data. Specifically, five essential requirements for using the Enosis method are:

1. the minimum sample of sources should be 10 (e.g. interviews, focus groups). For example, in a qualitative study where face to face semi-structured interviews are conducted, a minimum of ten interviews are required,

2. the final qualitative results should be organised into themes (e.g. overarching, superordinate, and sub-themes) so as an appropriate scoring system to be applied,

3. the unit of the qualitative analysis should be each participant. In cases where focus groups are used, the analysis should be done per focus group and not for each individual within each focus group,

4. whether a sub-theme was mentioned or not by each participant, it should be recorded for developing the scoring system,

5. all interviewees should be asked about the same topic(s) (not necessarily the same questions) so as the comparisons to be meaningful. However, the 'questions guide' for some

qualitative methods (e.g. grounded theory) is amended and developed after each interview. After each interview the coding of the script is developed and new questions could be added in following interviews for exploring further understandings and participants' experiences (Charmaz, 2000). Therefore, the Enosis method might not produce meaningful results when different interview areas or topics are covered per participant in the interviews.

4.5.5 Conclusion

The feasibility of the Enosis method was tested and proven using the 'ADHD' qualitative dataset, which have been analysed with one qualitative method (IPA). In the next Chapter 5, the transferability of the Enosis method to qualitative datasets, which have been primarily analysed with different qualitative methods, will be tested. While the 'ADHD' dataset was used in the pilot study to test the feasibility of the Enosis method, it will also be used in the 'Results' Chapter to explore complex relationships among the qualitative themes, and between the themes and participants' demographics and present the interpretation of the findings. Several other datasets will be considered for analysis using the Enosis method based on the essential requirements listed in Section 4.5.4. The considered datasets and the selection process will be presented in Section 5.2. The next chapter will also demonstrate the added value of applying the Enosis method in multiple datasets that had not been revealed before (Section 5.6).

5. RESULTS

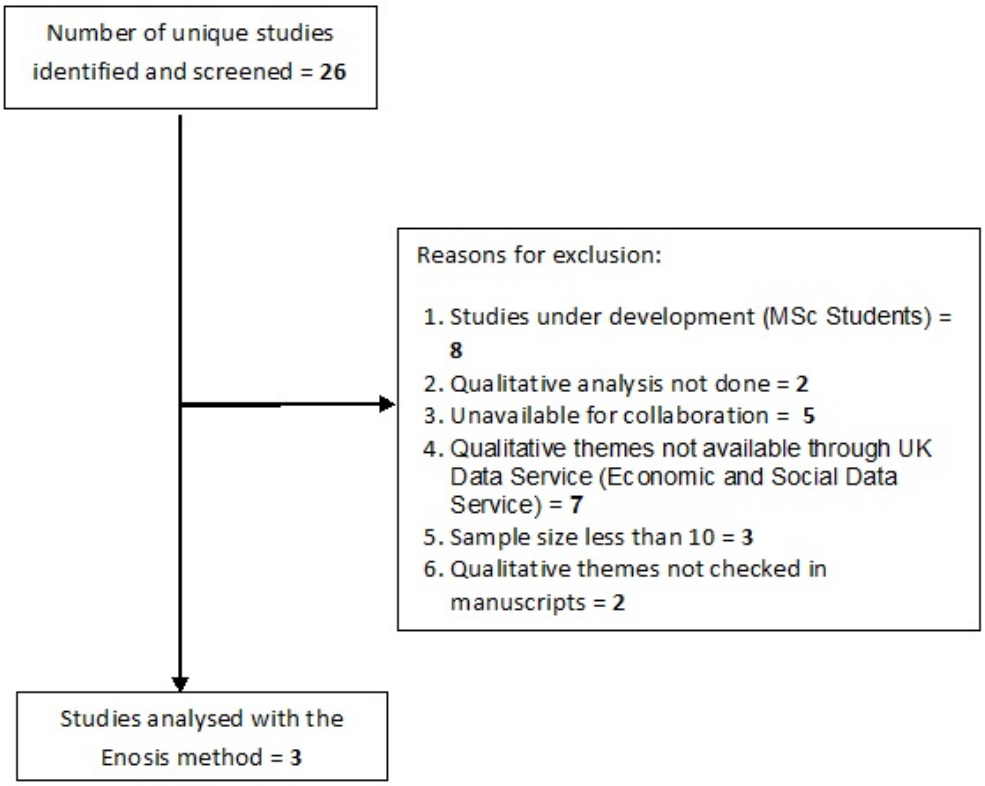
5.1 Introduction

In this chapter the Enosis method will be applied to three different datasets, which have each been primarily analysed using different qualitative methods, such as Interpretative Phenomenological Analysis (IPA), Grounded Theory, and Thematic Analysis. The transferability of the Enosis method and the interpretation of the findings from a clinical perspective are presented in this chapter. Finally, the importance of the collaboration between the qualitative and quantitative research for interpreting the results is highlighted.

5.2 Selection of Suitable Datasets

Twenty six studies that potentially match the five essential requirements, specified in Section 4.5.4, for applying the Enosis method are identified following the completion of the pilot study. Some potential datasets are excluded for more than one reasons (Figure 5.1). Specifically, eight studies are excluded, as they are in development stage by Doctorate students and the qualitative results will not be available in time for the author to apply the Enosis method. Seven possible collaborations are not progressing, as the investigators of the qualitative studies have not finalised the qualitative analysis or do not have available time for collaboration. Seven qualitative studies were identified through the Economic and Social Data Service in the UK Data Service. Unfortunately, the qualitative data kept by this service are only the transcripts and not the qualitative themes, which were created from the qualitative analysis. Three datasets are excluded because the sample size is less than the required sample of 10. Finally, in two studies it is not possible for the researchers to check if the created themes are present or not in all the manuscripts due to time constrains. Therefore, it will not be possible to quantify the themes and these datasets are excluded.

Figure 5.1: Screening process for potential datasets, against the five essential requirements, for applying the Enosis method and reasons for exclusion.



Three datasets are compliant with the five essential requirements and will be used for applying the Enosis method. These are the ADHD database, which was also considered in the pilot study, the Perfectionism database, which has been analysed using Grounded Theory and the Mental Health dataset, which has been analysed using Thematic Analysis.

5.3 ADHD Dataset

The first dataset that will be used for applying the Enosis method is the 'ADHD' dataset, which was also used in the pilot study (Section 4.4). Eleven semi-structured matched interviews (22 individual interviews) with birth mothers and maternal grandmothers, who had a child with a diagnosis of Attention Deficit Hyperactivity Disorder (ADHD), have been analysed by the health care professional using the IPA method (Section 4.4.2.1). The results of IPA were presented as overarching, superordinate, and sub-themes (Appendix D). The themes were created per interviewee (birth mother and grandmother separately) and per dyad (birth mother and maternal grandmother together) (Robinson 2010). These themes will be used for applying

the Enosis method.

Birth mothers and grandmothers also completed three structured questionnaires, the Strengths and Difficulties Questionnaire (SDQ) (Goodman 1997, 1999), an adapted version of Grandparent Support Index (GSI) (Trute 2003), and the Family Assessment Device (FAD) (Epstein et al. 1983). The SDQ measures the child's symptomatic behaviour and positive attributes, the GSI measures how families of children with a developmental disability perceive support from the child's grandparents and the FAD assesses family's functioning. The total scores from these three questionnaires, participants' demographics (mother's age and grandmother's age), and secondary quantitative outcomes, such as number of people or children in household, number of living grandparents, child's age, distance of grandmother from grandchild, and number of grandchildren, will also be used in the Enosis method.

5.3.1 Application of the Enosis Method

5.3.1.1 Quantification of Themes

The first step of the Enosis method will be the quantification of the themes from the original qualitative analysis (Appendix D). A scoring system, called 'Proportion' (min-max = 0-1), will be applied based on the number of sub-themes mentioned by one interviewee (or dyad) over the total number of sub-themes for one superordinate theme. For example, if one interviewee (or dyad) mentioned three sub-themes under superordinate theme 'Home environment' (A4) and the total number of sub-themes for this superordinate theme was five, then the score for this interviewee (or dyad) will be 3/5=0.60. The higher the score the more the participant (or dyad) had referred to this theme compared to other themes or other participants (or families).

5.3.1.2 Structural Equation Modelling

The second step will be the application of Structural Equation Modelling (SEM) to estimated scores using Analysis of Moments Structure (AMOS) (Arbuckle 2008). SEM will be applied to explore the complex relationships between the overarching themes A, B, C, and D (Appendix D) and the participant's demographics as well as hypotheses or relationship structures between the overarching and the superordinate themes.

The four overarching themes (A, B, C, and D) will be the latent variables and will be presented

as ellipses in a path diagram. The observed variables, which will be symbolised with rectangles in the path diagram, will be those that were directly measured (e.g. number of people or children in household, number of living grandparents, child's age, SDQ scores etc.). The scores of the superordinate themes will also be observed variables but will be labelled as indicators of the latent variables (overarching themes), as they will indirectly assess the latent variables. The measurement error of an observed variable will be presented with circles and indicate the unexplained variance in the model. The single-headed arrow will be used to denote regression weight and the double-headed arrow for correlation (r).

'Maximum likelihood method' will be used for estimating variances, covariances, and regression weights when multivariate normality held or otherwise the bootstrap method (Bone et al. 1989, Bollen & Stine 1992, Joreskog 1993, Hoyle 1995). The unstandardised parameter estimates (Standard Error) will be reported in tables and the standardized estimates (after the variables have been rescaled to have unit variance) will be presented in the path diagrams.

The observed variables will be assessed for multivariate normality using 'multivariate kurtosis' values (< 1 indicate multivariate normality) (Mardia 1970). The models will be 'over-identified' (higher number of observed variances and covariances than unknown parameters) to run the analysis by either fixing the variance of the error variable or one of the regression weights (e.g. fix the regression weight equal to one (Bone et al. 1989, Hoyle 1995).

The 'model goodness-of-fit' will be reported as [(degrees of freedom, n) Chi-square, p-value, TLI, GFI]. Any p-value$>$0.05 will indicate a good model fit. The Tucker-Lewis Index (TLI) and the Goodness of Fit Index (GFI) values close to 1 will indicate a good fit (Tucker & Lewis 1973, Sorbom 1989, Hoyle 1995, Barrett 2007, Arbuckle 2008). Additionally, independence between observed variables or the covariance structure in the model will be tested. The 'discrepancy measure' will be used to check if there was covariance structure in evidence ($p<0.05$ will indicate covariance structure in the model) (Joreskog 1969).

Models without good fit will be modified using the proposed modification indices (correlations or regression weights) by AMOS software (Sorbom 1989). The proposed indices will be discussed with the qualitative researcher to ensure their clinical justification. Multiple models will be constructed and compared to each other using the Chi-squared test (null hypothesis: constrain used to define the nested model was true) and the Akaike Information Criterion (i.e. the smaller

the AIC the better the model) (Akaike 1987, Joreskog 1993, Barrett 2007).

5.3.2 Findings of ADHD Dataset

5.3.2.1 Demographics

The scores were estimated per superordinate theme per interviewee (22 in total) and per dyad (11 in total) separately before applying Structural Equation Modelling. Eleven of the sixteen matched interviews (22 out of 32 individual interviews) were used for estimating the scores, as the sub-themes in 5 matched interviews had not been coded in detail within their transcripts and had only been analysed to verify the presence of the superordinate themes.
Participants' characteristics (age, SDQ, and FAD) were not different between birth mothers and grandmothers (Table 5.1). Grandmothers' GSI score was significantly lower than mothers' (Mann U Whitney, $p< 0.001$).

Table 5.1: Mean (SD), or as stated otherwise, of demographic information.

	Mean (SD)
Child age (years)	10 (3)
Mother age (years)	36 (4)
Grandmother age (years)	62 (5)
Distance (miles) of grandmother from grandchild (Median, IQR)	2 (1-12)
Children living in household	3 (1)
People living in household	5 (1)
Living grandparents	4 (1)
Number of grandchildren	6 (3)
Mother SDQ score	24 (5)
Grandmother SDQ score	22 (7)
Mother GSI score (Median, IQR)	43 (31-53)
Grandmother GSI score (Median, IQR)	19 (16-20)
Mother FAD score	1.7 (0.7)
Grandmother FAD score	1.6 (0.4)
Child gender (male) [Frequency, (%)]	10 (91%)

5.3.2.2 Results in Dyad Level

The Structural Equation Models with statistically significant results in dyad level are presented in Table 5.2 and per significant outcome using path diagrams in separate sections below. Models without significant associations and correlations among themes, and between themes and

participants' demographics are not presented.

Table 5.2: Unstandardised parameter estimates of regression weights (Standard Error) and correlations between overarching themes (A, B, C, and D), superordinate themes (1-4) and outcome measures in dyad level.

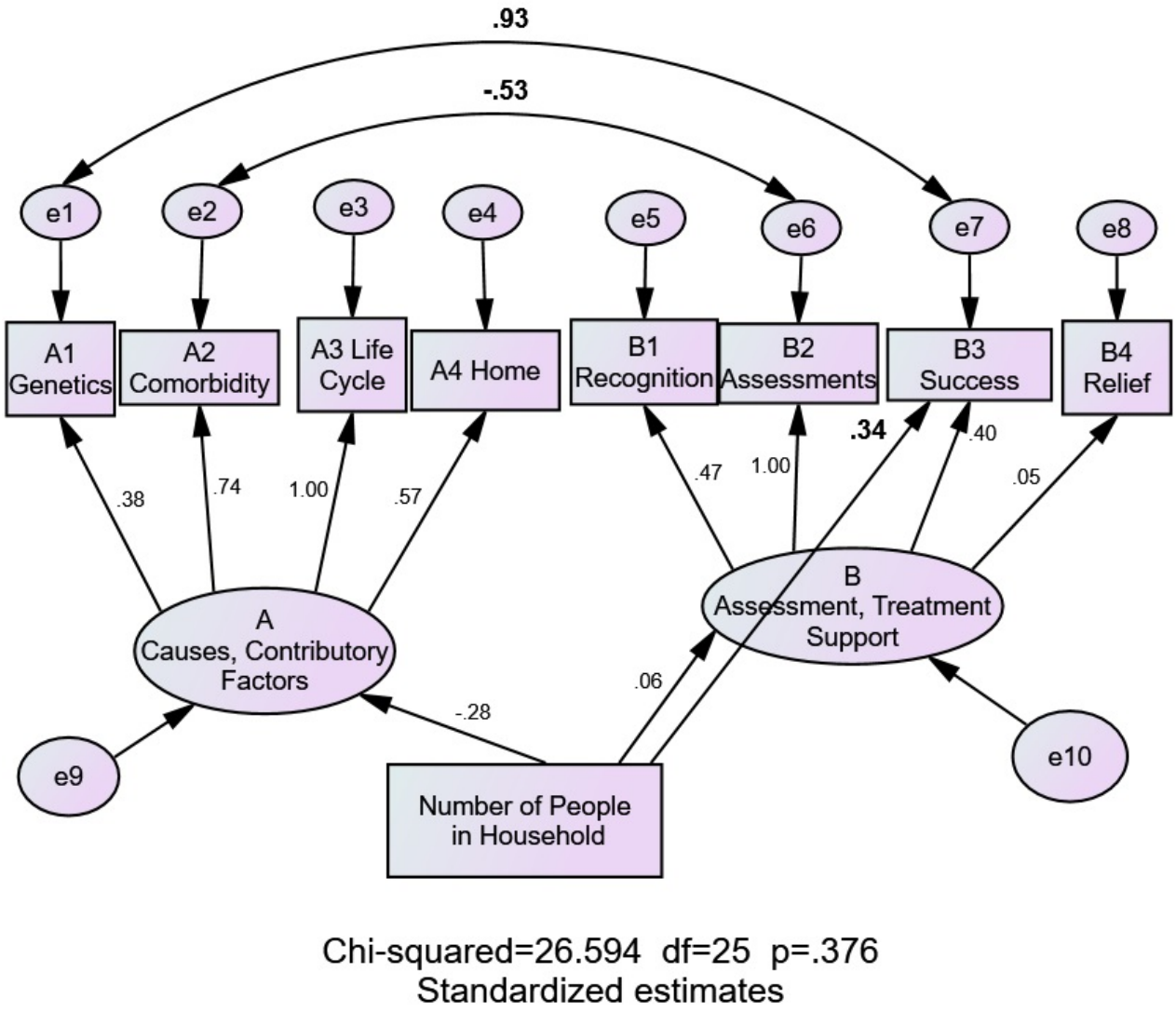
Regression Weights	**Unstandardised Estimate (Std. Error)**	**p-value**
Number of people in household → B3	0.05 (0.01)	<0.001
Number of children in household → B	-0.13 (0.06)	0.022
Number of children in household → A1	-0.11 (0.03)	<0.001
Number of living grandparents → B	0.13 (0.05)	0.008
Number of living grandparents → A4	-0.21 (0.05)	<0.001
Grandmother SDQ score → A	0.04 (0.01)	<0.001
Mother SDQ score → A	-0.06 (0.02)	<0.001
Mother SDQ score → A1	0.04 (0.01)	<0.001
Child age → C	0.04 (0.02)	0.021
Child age → D3	-0.02 (0.01)	0.016
Number of grandchildren → C3	0.07 (0.02)	0.002
Correlations	**Correlation Coefficient (r)**	**p-value**
A1 ↔ B3	0.926	0.028
A2 ↔ B2	-0.525	0.025
B2 ↔ B3	0.407	0.036
C1 ↔ D4	0.927	0.033

→: indicates the effect of an outcome measure to a theme, ↔; indicates correlation between two superordinate themes, r=correlation coefficient, A='Causes and contributory factors of ADHD', B='Experiences of assessment, treatment, and professional support', C='Pains and pleasures of relationships' relating to child with ADHD, A1='Genetics and brain injury' as cause and contributory factor of ADHD, A2='Co Morbidity, confusion, and convergence' as causes of ADHD, A4='Home environment' as cause and contributory factor of ADHD, B2='Multiple assessments and fragmented services', B3='Successes, failures, and gaps' of ADHD treatment and professional support, C1='Positive attributes looking to the future' of the child, C3='The pain of unmet emotional needs' of the family, D3='Practical and emotional support' of grandmother(s) to mother, D4=Recognising the 'gift of the child'.

Number of people in household

The assumption of multivariate normality held (multivariate kurtosis = 0.782). There was evidence of covariance structure in the model (p<0.001) and the model fitted the data well [(25, n=11) = 26.594, p=0.376, TLI = 0.945, GFI = 0.724].

Figure 5.2: Standardised estimates of a Structural Equation Model (SEM) including two latent variables, the overarching themes 'Causes and Contributory Factors' of ADHD (A) and 'Assessment, Treatment, and Support' (B); the indicators of overarching themes A and B, the four superordinate themes (A1-A4 and B1-B4); one observed variable, the 'total number of people in each household'.



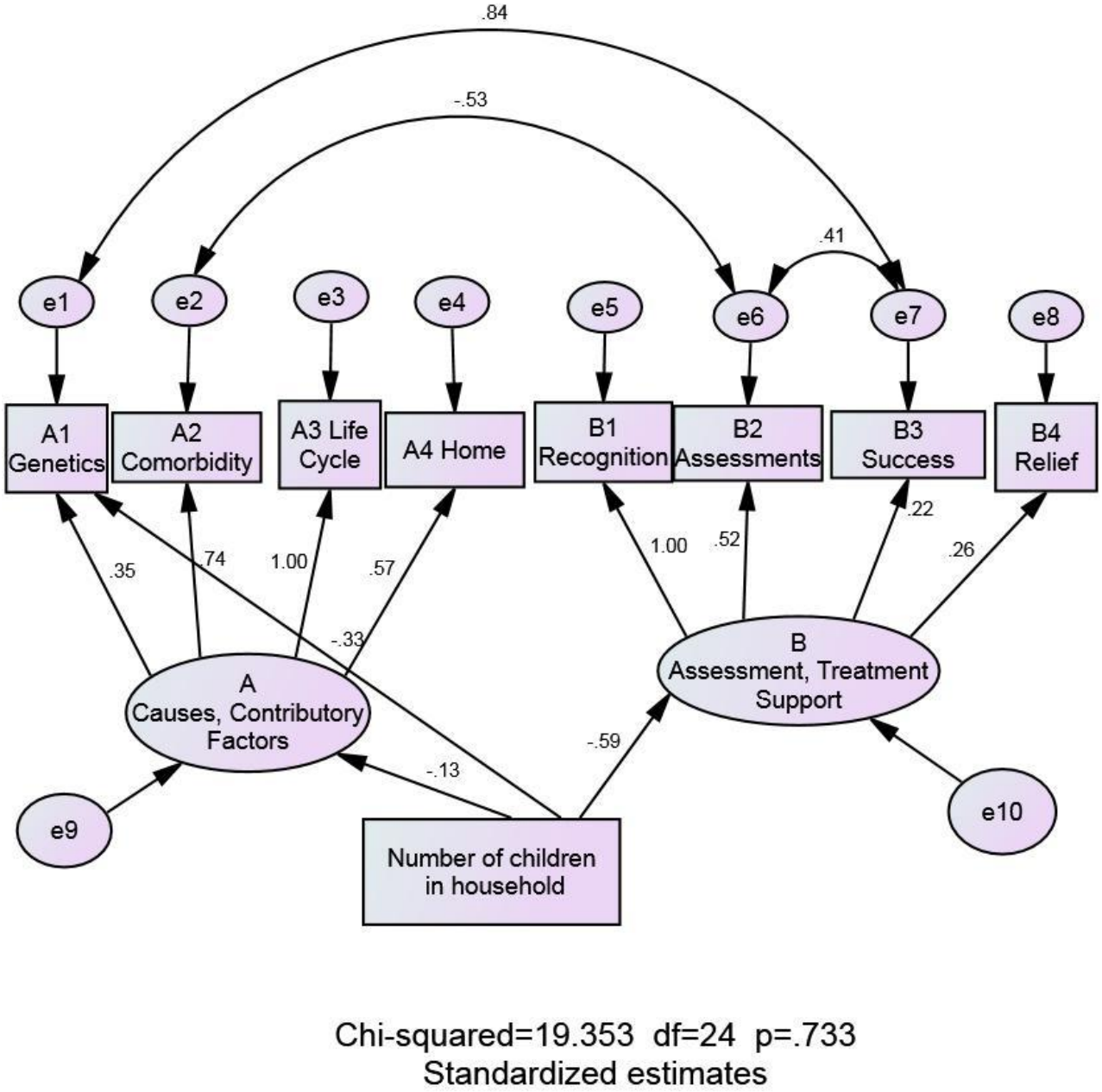
e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

This model indicated that families with more people in their household referred more to 'successes, failures, and gaps' regarding ADHD treatment and professional support than those with fewer people in their household. Another statistically significant result was that families who referred to 'successes, failures, and gaps' regarding ADHD treatment and professional support focused more discussion on the causes of ADHD as 'genetics and brain injury'. It was also found that families who referred to 'co-morbidity, confusion, and convergence' regarding causality of ADHD mentioned the 'multiple assessments and fragmented services' of ADHD treatment less.

Number of children in household

The assumption of multivariate normality held (multivariate kurtosis = 0.755). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [(24, n=11) = 19.353, p=0.733, TLI = 1.198, GFI = 0.735].

Figure 5.3: Standardised estimates of a Structural Equation Model (SEM) including two latent variables, the overarching themes 'Causes and Contributory Factors' of ADHD (A) and 'Assessment, Treatment, and Support' (B); the indicators of overarching themes A and B, the four superordinate themes (A1-A4 and B1-B4); one observed variable, the 'total number of children in each household'.



e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

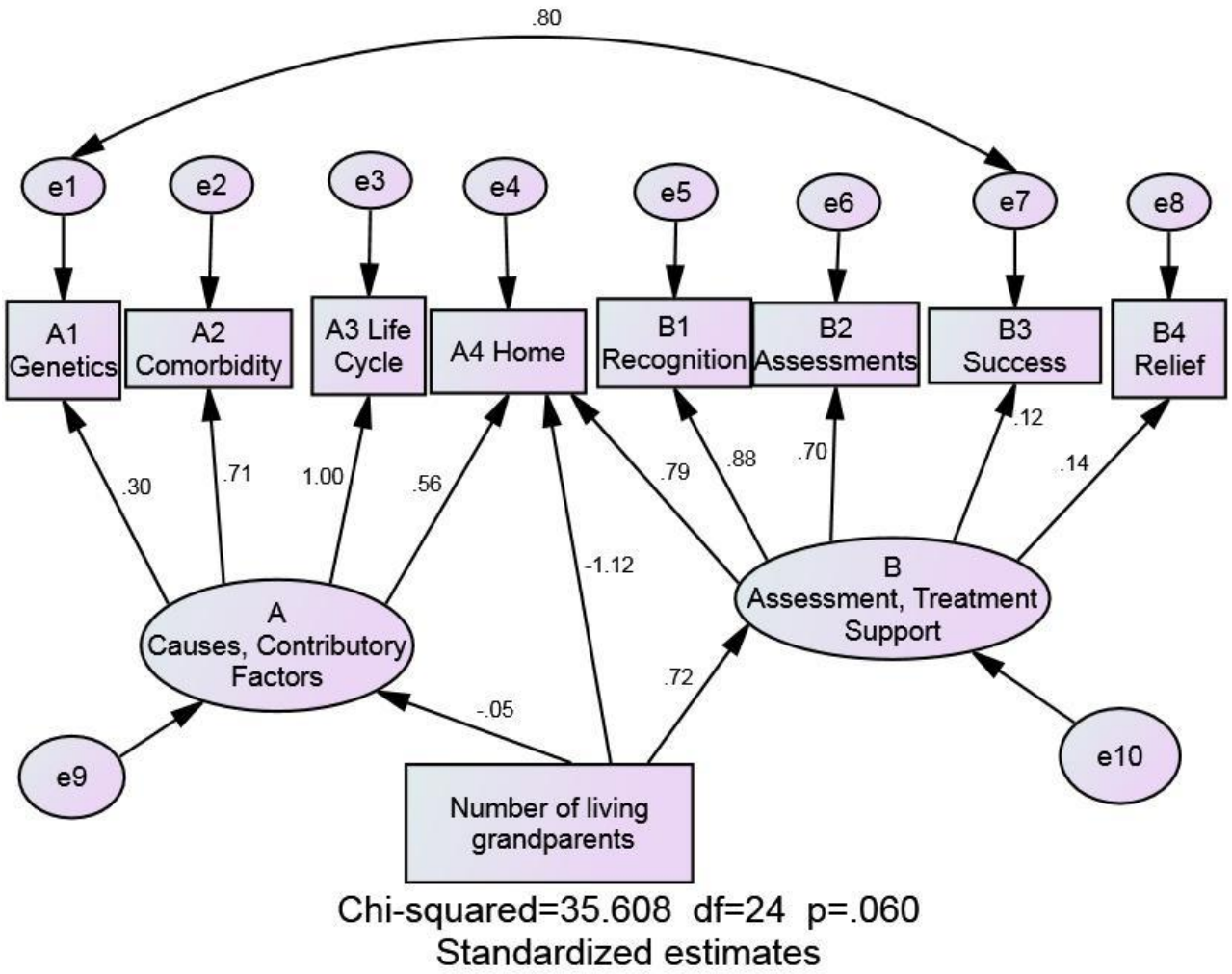
Families with more children in their household mentioned less their experiences with assessment,

treatment, and professional support and reported less the brain injury and genetics as causes of ADHD than those with smaller numbers of children. Additionally, dyads who referred to 'multiple assessments and fragmented services' of ADHD treatment also mentioned the successes, failures, and gaps of these services.

Number of living grandparents

The assumption of multivariate normality held (multivariate kurtosis = 0.770). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [(24, n=11) = 35.608, p=0.060, TLI = 0.615, GFI = 0.690].

Figure 5.4: Standardised estimates of a Structural Equation Model (SEM) including two latent variables, the overarching themes 'Causes and Contributory Factors' of ADHD (A) and 'Assessment, Treatment, and Support' (B); the indicators of overarching themes A and B, the four superordinate themes (A1-A4 and B1-B4); one observed variable, the 'total number of living grandparents'.



e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

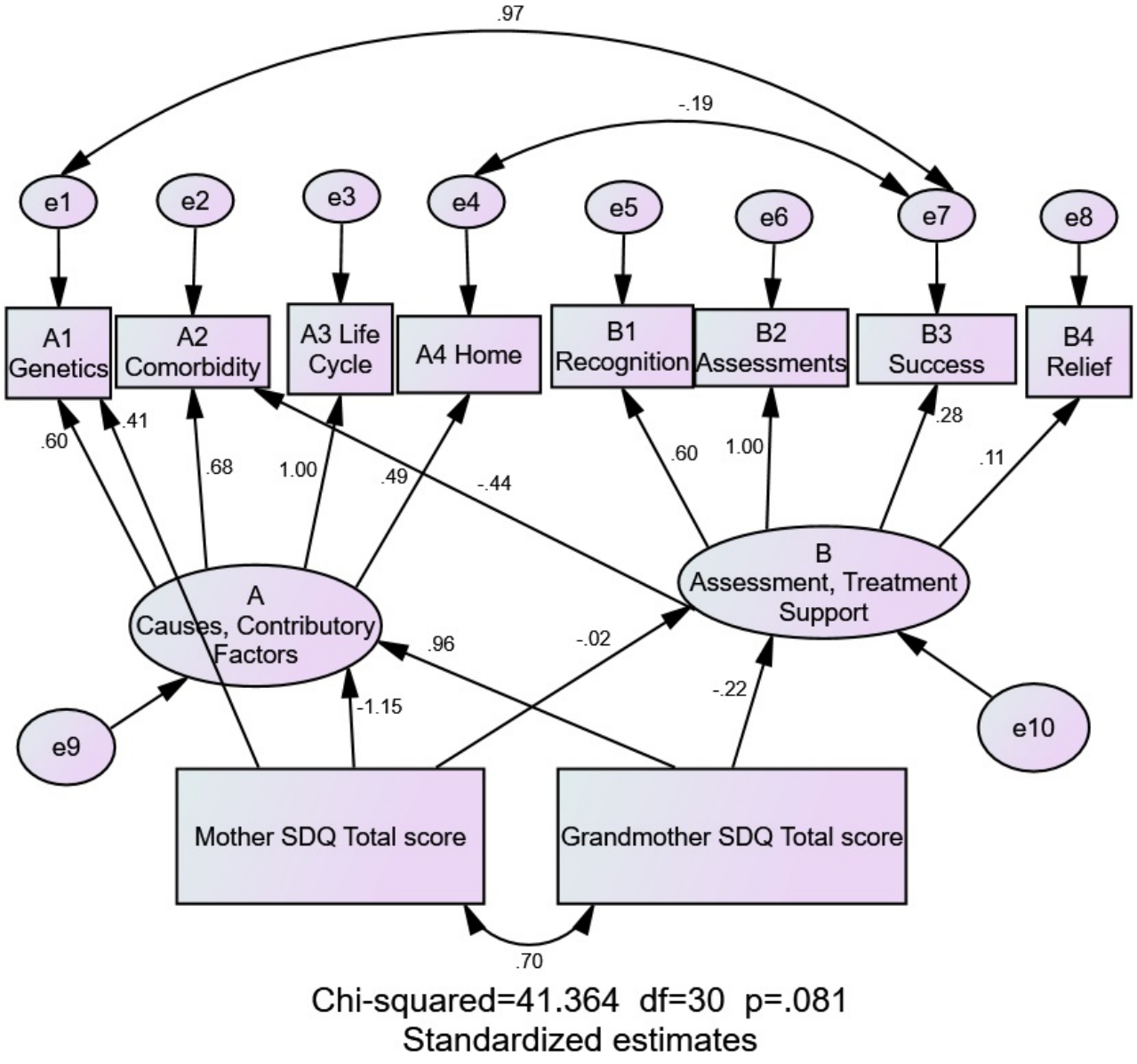
Families with more living grandparents mentioned their experiences of assessment, treatment,

and professional support more frequently than those with few or no living grandparents. They also referred less to home environment as cause and contributory factor of ADHD.

SDQ Score

The assumption of multivariate normality held (multivariate kurtosis = 0.000). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [(30, n=11) = 41.364, p=0.081, TLI = 0.749, GFI = 0.699].

Figure 5.5: Standardised estimates of a Structural Equation Model (SEM) including two latent variables, the overarching themes 'Causes and Contributory Factors' of ADHD (A) and 'Assessment, Treatment, and Support' (B); the indicators of overarching themes A and B, the four superordinate themes (A1-A4 and B1-B4); two observed variables, the 'SDQ scores' for mothers and grandmothers.



e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

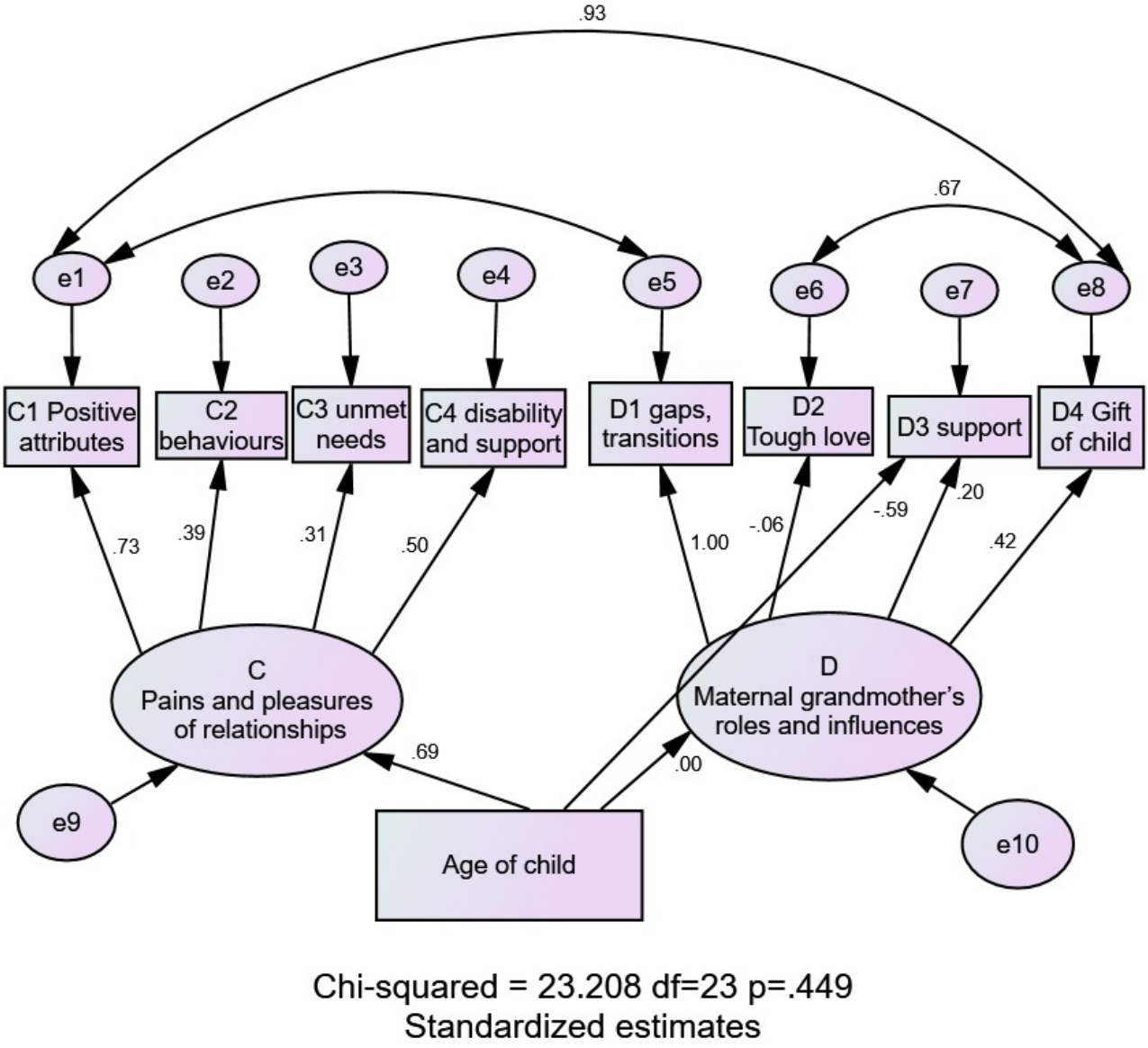
Maternal grandmothers had higher SDQ score than the mothers in families where the causes

and contributory factors of ADHD were mentioned more often. Families also reported genetics and brain injury as cause of ADHD more when mother's SDQ score was higher.

Child age

The assumption of multivariate normality held (multivariate kurtosis = 0.047). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [(23, n=11) = 23.208, p=0.449, TLI = 0.987, GFI = 0.732].

Figure 5.6: Standardised estimates of a Structural Equation Model (SEM) including two latent variables, the overarching themes 'Pains and pleasures of relationships relating to child' with ADHD (C) and 'Maternal grandmother's roles and influences' (D); the indicators of overarching themes C and D, the four superordinate themes (C1-C4 and D1-D4); one observed variable, the 'age' of the child with ADHD.



e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

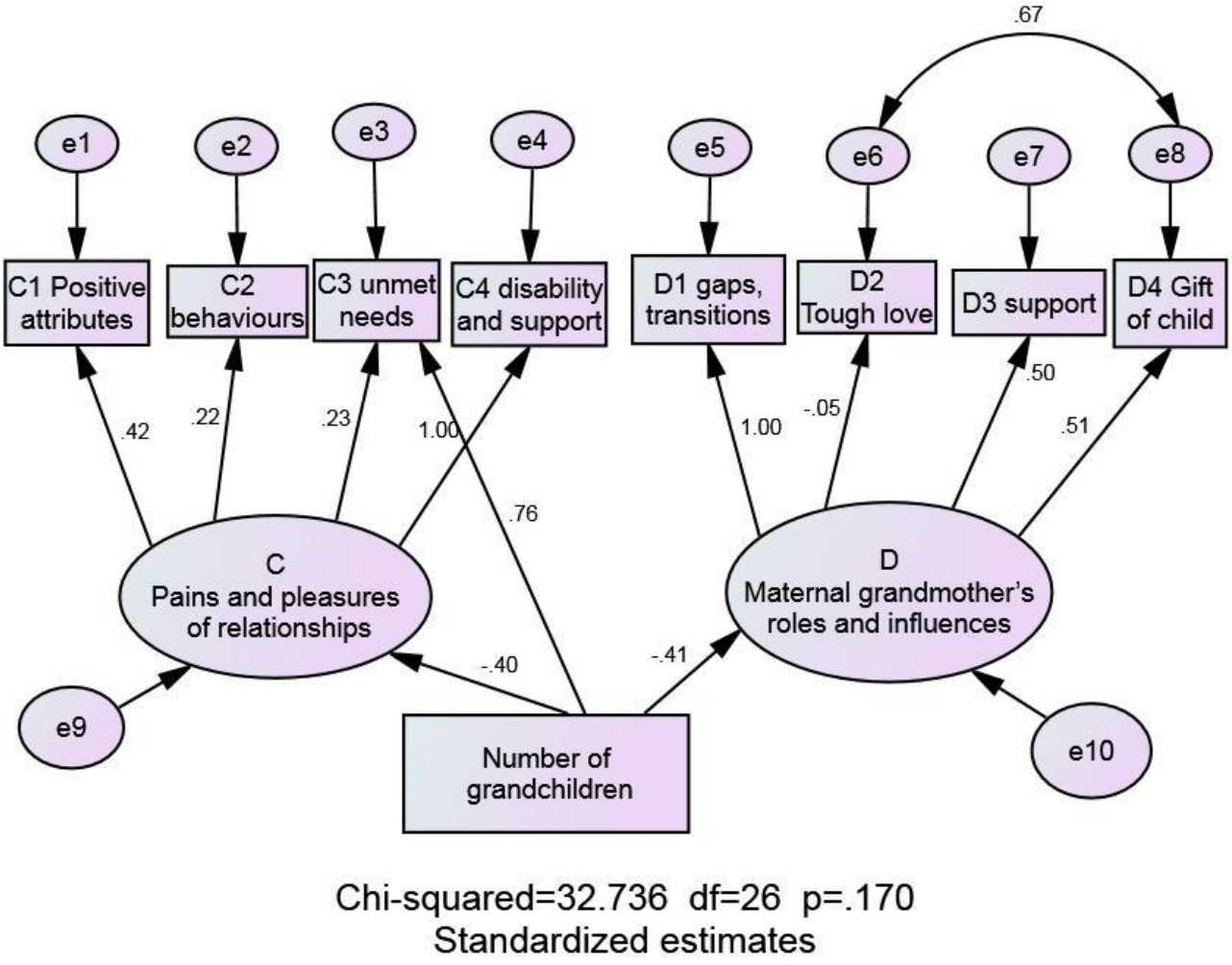
Families with a young child with ADHD mentioned the practical and emotional support they

receive from the grandmothers more, but the pains and pleasures of relationships relating to the child with a diagnosis ADHD were mentioned less than those families with an older child with a diagnosis. Moreover, dyads who referred to the 'gifts of the child' also reported positive attributes and an optimism for the future.

Number of grandchildren

The assumption of multivariate normality held (multivariate kurtosis = 0.368). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [(26, n=11) = 32.736, p=0.170, TLI = 0.565, GFI = 0.647].

Figure 5.7: Standardised estimates of a Structural Equation Model (SEM) including two latent variables, the overarching themes 'Pains and pleasures of relationships relating to child' with ADHD (C) and 'Maternal grandmother's roles and influences' (D); the indicators of overarching themes C and D, the four superordinate themes (C1-C4 and D1-D4); one observed variable, the 'number of grandchildren' that a grandmother had.



e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

Families, where the grandmothers had more grandchildren, mentioned the pain of unmet emotional needs more than families where the grandparents had few grandchildren.

5.3.2.3 Results in Individual Level

The Structural Equation Models with statistically significant results in individual level are also presented in Table 5.3 and per significant outcome using path diagrams in separate sections below. Models without significant associations and correlations among themes, and between themes and participants' demographics are not presented.

Table 5.3: Unstandardised parameter estimates of regression weights (Standard Error) and correlations between overarching themes (A, B, C, and D), superordinate themes (1-4) and outcome measures in participants' level.

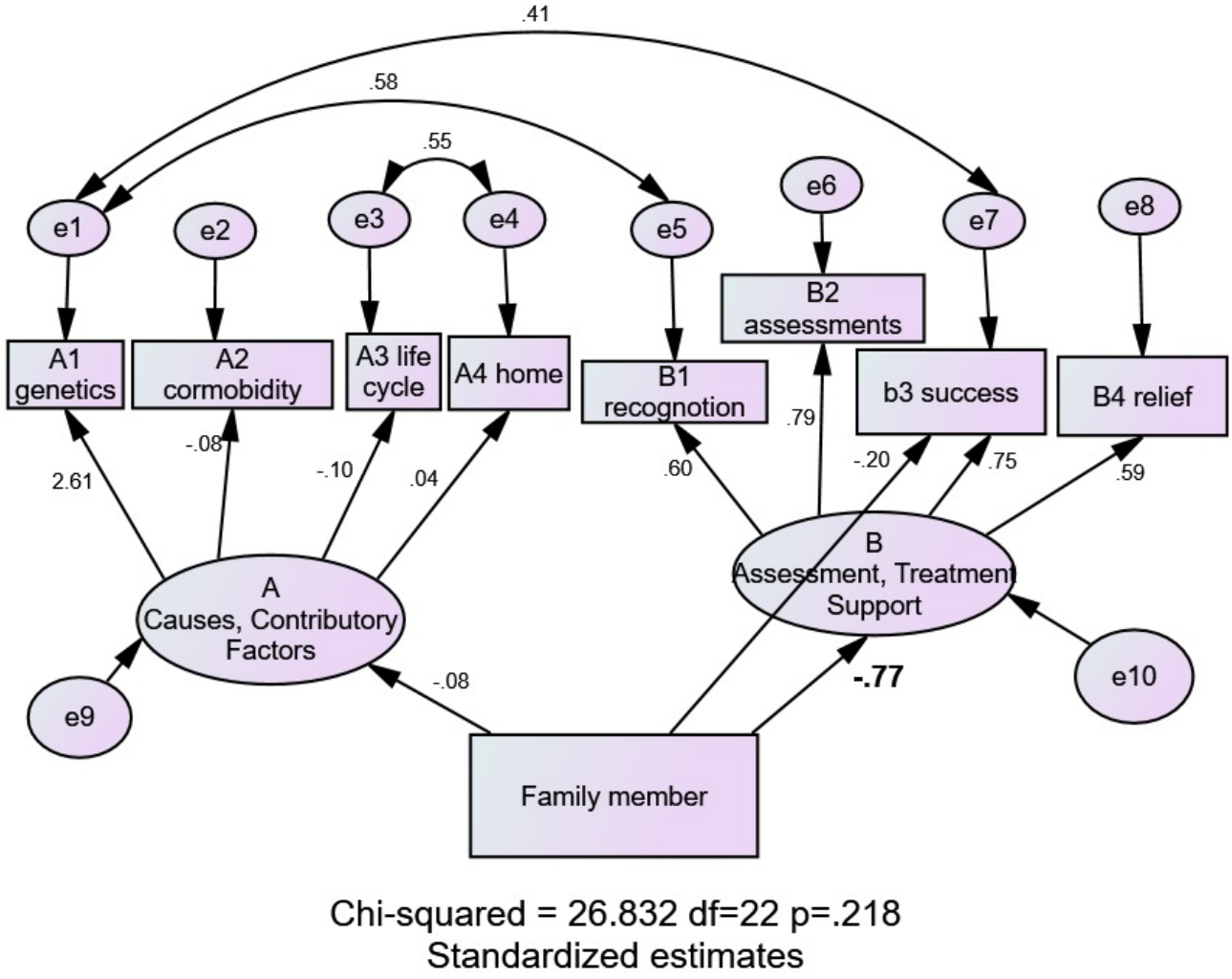
Regression Weights	**Unstandardised Estimate (Std. Error)**	**p-value**
Family member (Grandmother) → B	-0.33 (0.121)	0.007
Participant age → B	-0.012 (0.003*)	0.001
GSI score → B	0.01 (0.004)	0.018
SDQ score → C	-0.014 (0.008*)	0.002
FAD score → C	-0.21 (0.082*)	0.021
FAD score → D	-0.20 (0.083*)	0.006
Correlations	**Correlation Coefficient (r)**	**p-value**
A1 ↔ B1	0.652	0.004
A1 ↔ B3	0.827	0.002
A3 ↔ A4	0.549	0.030
A4 ↔ B2	0.935	0.003
C1 ↔ D4	0.582	0.023
C2 ↔ C3	0.604	0.018

→: indicates the effect of an outcome measure to a theme, ↔; indicates correlation between two superordinate themes, r=correlation coefficient, A='Causes and contributory factors of ADHD', B='Experiences of assessment, treatment, and professional support', C='Pains and pleasures of relationships' relating to child with ADHD, A1='Genetics and brain injury' as cause and contributory factor of ADHD, A2='Co Morbidity, confusion, and convergence' as causes of ADHD, A4='Home environment' as cause and contributory factor of ADHD, B2='Multiple assessments and fragmented services', B3='Successes, failures, and gaps' of ADHD treatment and professional support, C1='Positive attributes looking to the future' of the child, C3='The pain of unmet emotional needs' of the family, D3='Practical and emotional support' of grandmother(s) to mother, D4=Recognising the 'gift of the child', *= bootstrap standard errors.

Member of family

The assumption of multivariate normality held (multivariate kurtosis = 0.856). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [(22, n=22) = 26.832, p=0.218, TLI = 0.886, GFI = 0.834].

Figure 5.8: Standardised estimates of a Structural Equation Model (SEM) including two latent variables, the overarching themes 'Causes and Contributory Factors' of ADHD (A) and 'Assessment, Treatment, and Support' (B); the indicators of overarching themes A and B, the four superordinate themes (A1-A4 and B1-B4); one observed variable, the 'family member' (mother or grandmother).



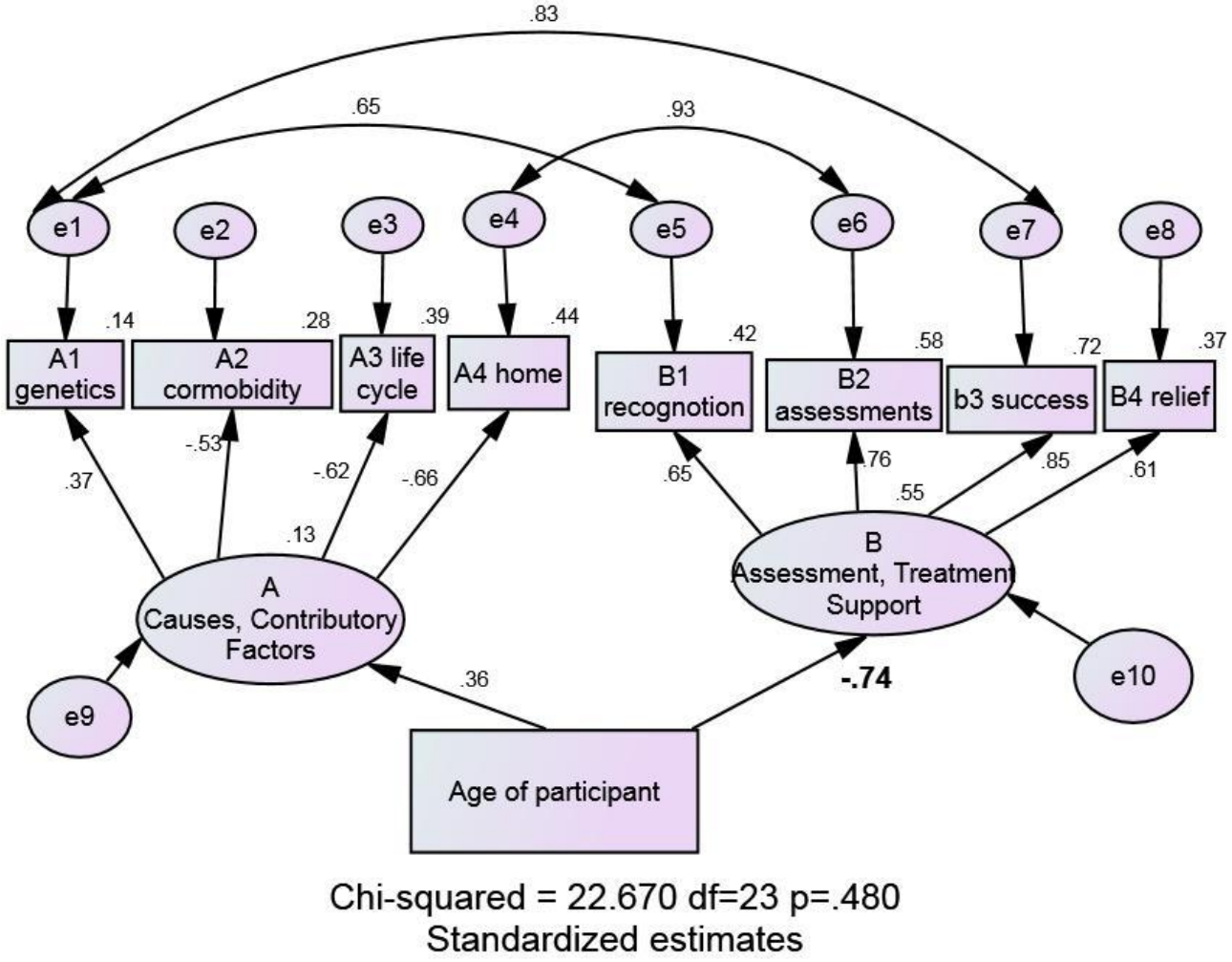
e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

Maternal grandmothers referred less to 'experiences of assessment, treatment, and professional support' than the birth mothers. In addition, participants who referred to 'home environment' also mentioned the 'life cycle issues and events' as causes and contributory factors of ADHD.

Participant age

The assumption of multivariate normality did not hold and bootstrap method was used (multivariate kurtosis = 1.847). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [(23, n=22) = 22.670, p=0.480, TLI = 1.007, GFI = 0.822].

Figure 5.9: Standardised estimates of a Structural Equation Model (SEM) including two latent variables, the overarching themes 'Causes and Contributory Factors' of ADHD (A) and 'Assessment, Treatment, and Support' (B); the indicators of overarching themes A and B, the four superordinate themes (A1-A4 and B1-B4); one observed variable, the 'participant's age'.



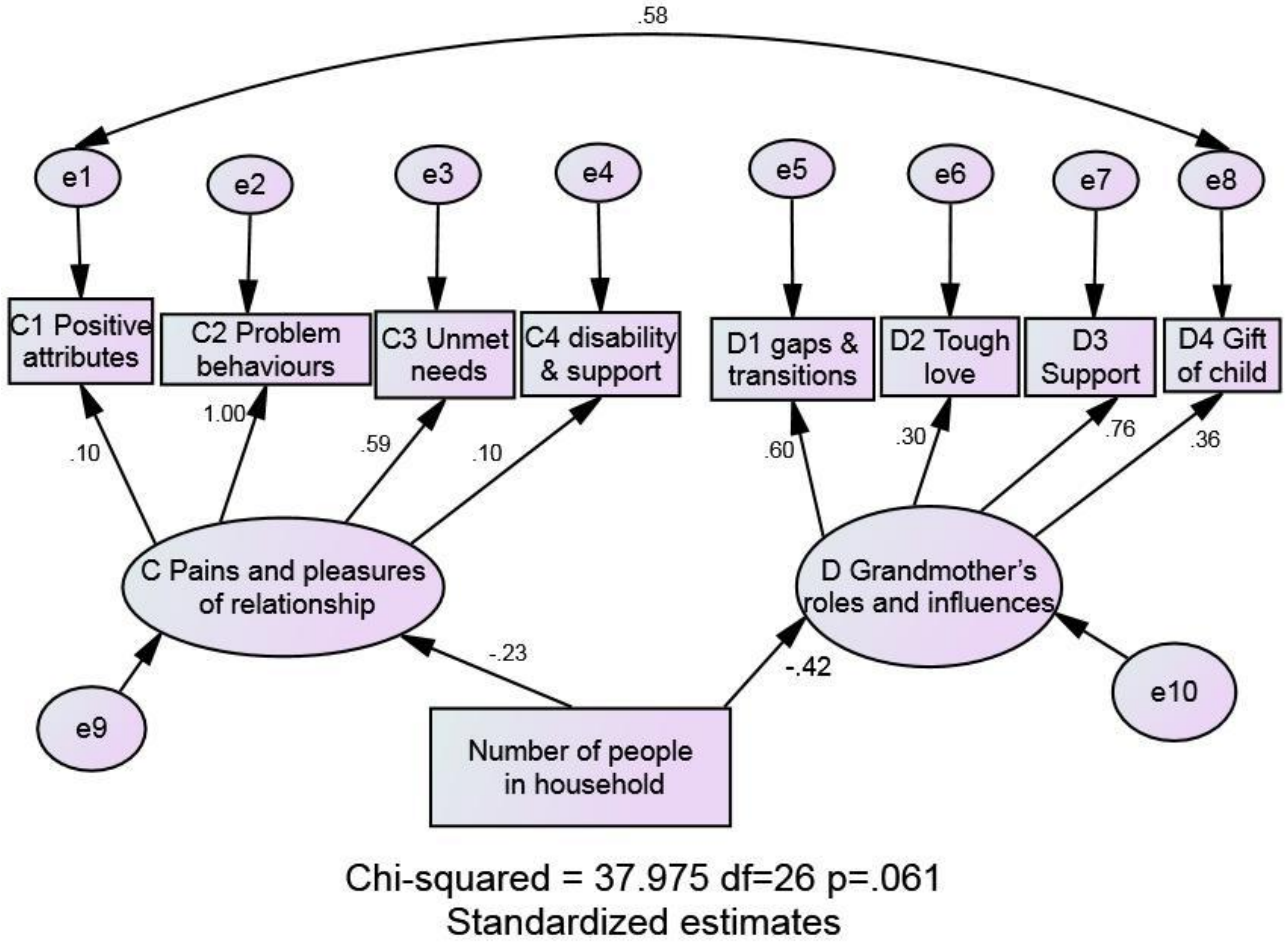
e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

The older participants reported less about their experiences of assessment, treatment, and professional support than the younger ones. Additionally, participants who mentioned the genetics and brain injury as causes and contributory factors of ADHD also reported the 'fight for recognition' and the 'successes, failures, and gaps of treatment'. Mothers and grandmothers who mentioned the home environment as cause of ADHD reported the multiple assessments and fragmented services for ADHD treatment.

Number of people in household

The assumption of multivariate normality held (multivariate kurtosis = 0.695). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [(26, n=22) = 37.975, p=0.061, TLI = 0.517, GFI = 0.777].

Figure 5.10: Standardised estimates of a Structural Equation Model (SEM) including two latent variables, the overarching themes 'Pains and pleasures of relationships relating to child' with ADHD (C) and 'Maternal grandmother's roles and influences' (D); the indicators of overarching themes C and D, the four superordinate themes (C1-C4 and D1-D4); one observed variable, the 'number of people in household'.



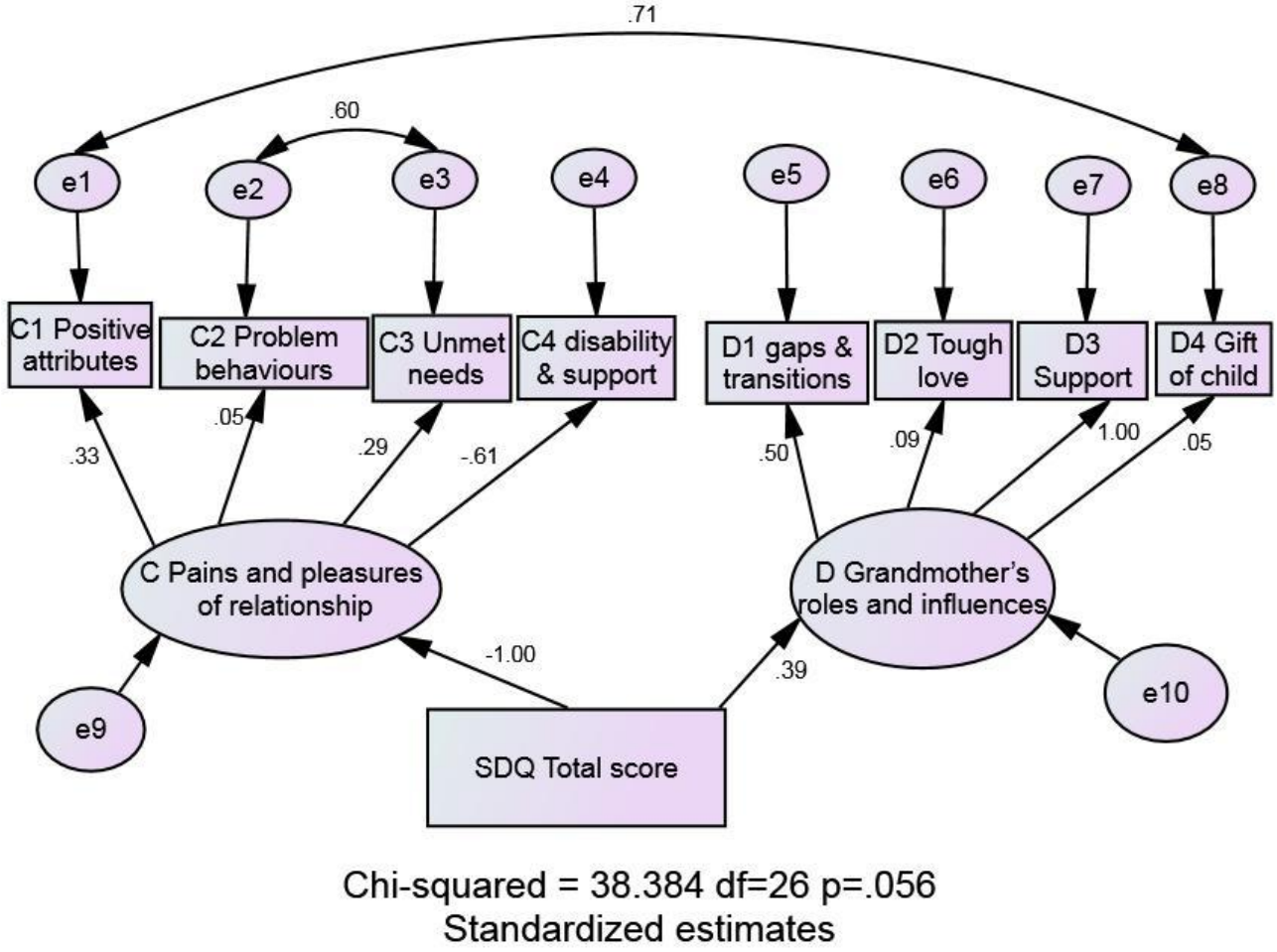
e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

Participants who indicated a sense of receiving a gift of something back from their grandchild, i.e. 'gift of the child', also reported their child's positive qualities and abilities.

SDQ score

The assumption of multivariate normality did not hold and bootstrap method was used (multivariate kurtosis = 3.593). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [(26, n=22) = 38.384, p=0.056, TLI = 0.651, GFI = 0.749].

Figure 5.11: Standardised estimates of a Structural Equation Model (SEM) including two latent variables, the overarching themes 'Pains and pleasures of relationships relating to child' with ADHD (C) and 'Maternal grandmother's roles and influences' (D); the indicators of overarching themes C and D, the four superordinate themes (C1-C4 and D1-D4); one observed variable, the 'SDQ total score'.



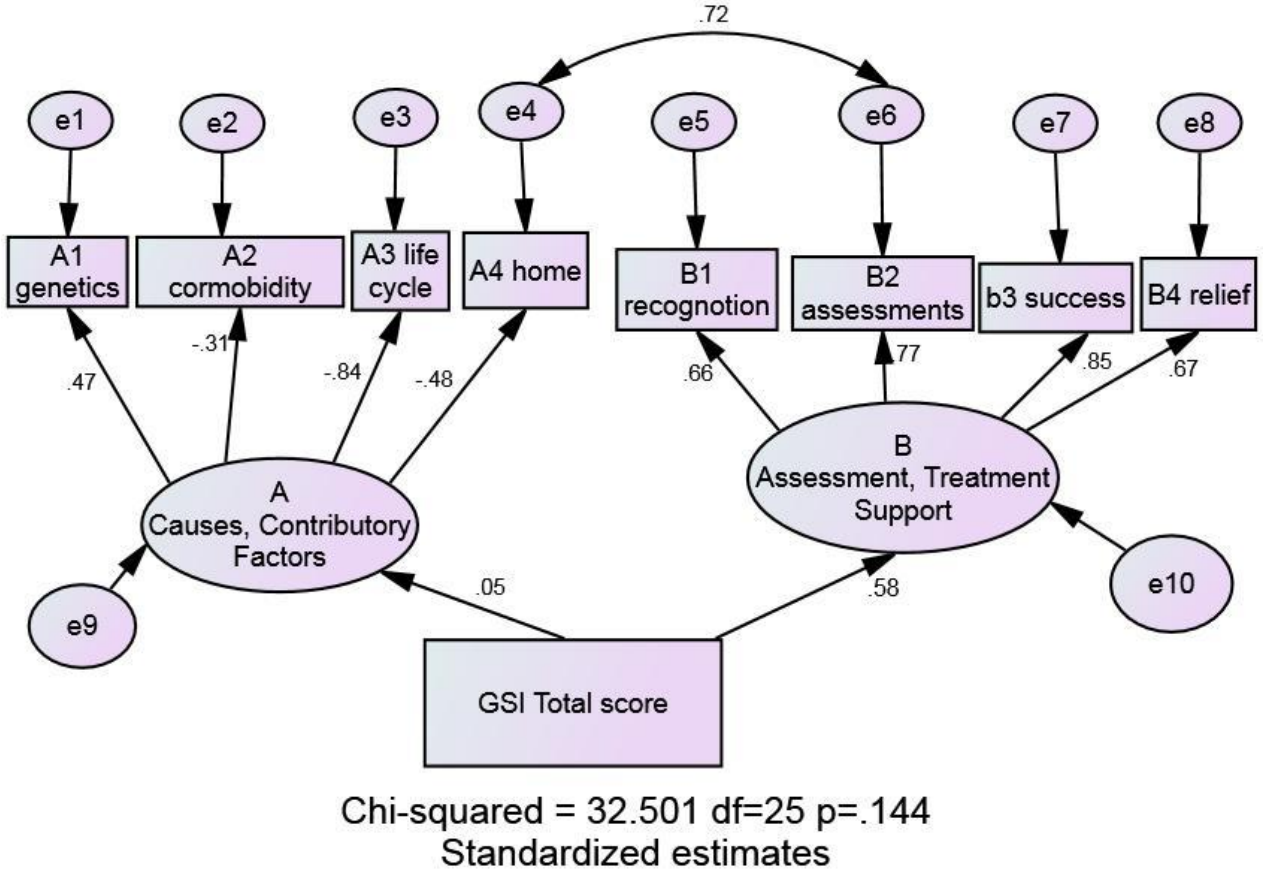
e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

Participants with higher SDQ score reported the pains and pleasures of relationships relating to the child less than those with lower SDQ score. Interviewees who reported problem behaviours, self blame, and self regard mentioned the pain of unmet emotional needs as well.

GSI score

The assumption of multivariate normality held (multivariate kurtosis = 0.045). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [(25, n=22) = 32.501, p=0.144, TLI = 0.807, GFI = 0.792].

Figure 5.12: Standardised estimates of a Structural Equation Model (SEM) including two latent variables, the overarching themes 'Causes and Contributory Factors' of ADHD (A) and 'Assessment, Treatment, and Support' (B); the indicators of overarching themes A and B, the four superordinate themes (A1-A4 and B1-B4); one observed variable, the 'GSI total score'.



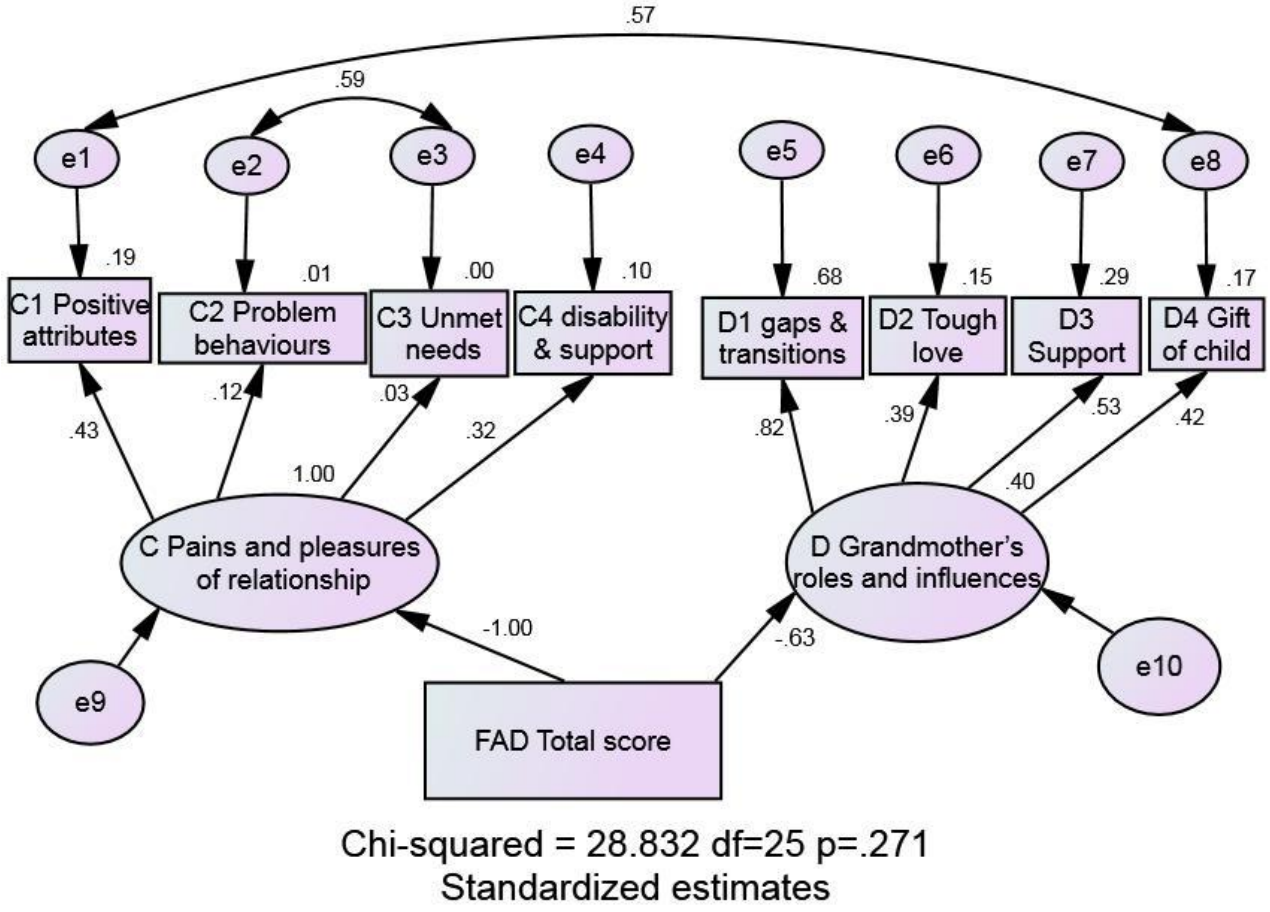
e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

Participants with higher GSI score mentioned their experiences of assessment, treatment, and professional support more than those with lower GSI score.

FAD score

The assumption of multivariate normality did not hold and bootstrap method was used (multivariate kurtosis = 1.031). There was evidence of covariance structure in the model (p=0.001) and the model fitted the data well [(25, n=21) = 28.832, p=0.271, TLI = 0.829, GFI = 0.809]. One participant had not completed the FAD questionnaire and was excluded from this model.

Figure 5.13: Standardised estimates of a Structural Equation Model (SEM) including two latent variables, the overarching themes 'Pains and pleasures of relationships relating to child' with ADHD (C) and 'Maternal grandmother's roles and influences' (D); the indicators of overarching themes C and D, the four superordinate themes (C1-C4 and D1-D4); observed variable, the 'FAD total score'.



e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

Participants with higher FAD score mentioned the 'pains and pleasures of relationships' relating to a child with ADHD and the 'grandmother's role and influences' in the family less than those with lower FAD score.

5.3.3 Summary of ADHD Dataset

5.3.3.1 New and Existing Associations

The application of the Enosis method to the 'ADHD' qualitative dataset, which had originally been analysed with IPA method, added a different dimension in the interpretation of the qualitative data. Significant associations were revealed, which were discussed closely with the qualitative researcher so as to understand their importance in relation to existing ADHD theory or the conclusions from the primary IPA analysis (Tables 5.4, 5.5, and 5.6.

The secondary analysis of existing qualitative information using the Enosis method added value in the interpretation of the original qualitative data by revealing new associations, which had not been identified through the primary IPA analysis and would have been missed if the Enosis method had not been applied. Some of these associations were linked with existing ADHD theory (Table 5.5), while the other new significant associations cannot be generalised due to small sample size but can inform the hypotheses of future definitive research and potentially contribute to existing knowledge about ADHD (Table 5.4).

For example one new association, which was neither present in existing ADHD theory nor revealed by the primary IPA analysis, is that families with more people in their household referred more to successes, failures, and gaps regarding ADHD treatment and professional support than those with fewer people in their household (Table 5.4). It is worth testing in future research if families with more adult household members (e.g., parents and extended family members) may experience and comment more upon both difficulties and successes concerning ADHD and raise issues more frequently. Issues may be discussed more frequently within the house or they may relate to increased stresses for larger and busier households (Fakis et al. 2015).

Table 5.4: New associations at dyad and individual levels produced by the Enosis method, which were not revealed by the primary IPA qualitative analysis and were not present in existing ADHD theory.

New Associations at Dyad level	**Interpretation**
Number of people in household $\rightarrow$ B3	Families with more people in their household referred more to successes, failures, and gaps regarding ADHD treatment and professional support than those with fewer people in their household.
A1 $\leftrightarrow$ B3	Dyads who referred to successes, failures, and gaps regarding ADHD treatment and professional support focused more discussion on the causes of ADHD as genetics and brain injury.

B2 ↔ B3	Dyads who referred to multiple assessments and fragmented services of ADHD treatment also mentioned the successes, failures, and gaps of these services.
C1 ↔ D4	Dyads who referred to the 'gifts of the child' also reported their child's positive qualities and abilities.
New Associations at Individual level	**Interpretation**
SDQ score → C	Participants with higher SDQ score reported the pains and pleasures of relationships relating to the child less than those with lower SDQ score.
A4 ↔ B2	Mothers and grandmothers who mentioned the home environment as cause of ADHD reported the multiple assessments and fragmented services for ADHD treatment.
A3 ↔ A4	Participants who referred to 'home environment' also mentioned the 'life cycle issues and events' as causes and contributory factors of ADHD.
C1 ↔ D4	Participants who mentioned to the 'gift of the child' also reported their child's positive qualities and abilities.
C2 ↔ C3	Interviewees who reported problem behaviours, self blame, and self regard mentioned the pain of unmet emotional needs as well.

→: indicates the effect of an outcome measure to a theme, ↔; indicates correlation between two superordinate themes, r=correlation coefficient, A='Causes and contributory factors of ADHD', B='Experiences of assessment, treatment, and professional support', C='Pains and pleasures of relationships' relating to child with ADHD, A1='Genetics and brain injury' as cause and contributory factor of ADHD, A2='Co Morbidity, confusion, and convergence' as causes of ADHD, A4='Home environment' as cause and contributory factor of ADHD, B2='Multiple assessments and fragmented services', B3='Successes, failures, and gaps' of ADHD treatment and professional support, C1='Positive attributes looking to the future' of the child, C3='The pain of unmet emotional needs' of the family, D3='Practical and emotional support' of grandmother(s) to mother, D4=Recognising the 'gift of the child'.

Other statistically significant findings from the Enosis method were present in existing ADHD theory but were not revealed by the primary IPA analysis (Table 5.5). For example, two significant associations, which were revealed by the Enosis method, were that families with more living grandparents mentioned their experiences of assessment, treatment, and professional support more frequently and referred to home environment as cause and contributory factor of ADHD less than those families with few or no living grandparents.

These hypotheses are also supported by Everett & Everett (1999) and the National Collaborating Centre for Mental Health (2009), as they believe that families with more grandparents offering support may be more likely to have conversations and share their views about treatment and professional support. The home environment in these families may be happier with less stress due to increased grandparental support. Therefore, these families may focus less upon the home environment as a possible contributory factor or cause relating to ADHD (Fakis et al. 2015).

Table 5.5: New associations at dyad and individual levels produced by the Enosis method, which were not revealed by the primary IPA qualitative analysis but were present in existing ADHD theory.

New Associations at Dyad level	**Interpretation**
Number of living grandparents → B	Families with more living grandparents mentioned their experiences of assessment, treatment, and professional support more frequently than those with few or no living grandparents.

Number of living grandparents → A4	Families with more living grandparents referred to home environment as cause and contributory factor of ADHD less than those with few or no living grandparents.
A2 ↔ B2	Dyads who referred to co-morbidity, confusion, and convergence regarding causality of ADHD mentioned the multiple assessments and fragmented services of ADHD treatment less.
Child age → C	Families with a young child with ADHD mentioned the pains and pleasures of relationships relating to the child with a diagnosis ADHD less than those families with an older child with a diagnosis.
Child age → D3	Families with a young child with ADHD mentioned the practical and emotional support they receive from the grandmothers more than those families with an older child with a diagnosis.
Number of grandchildren → C3	Families, where the grandmothers had more grandchildren, mentioned the pain of unmet emotional needs more than families where the grandparents had few grandchildren.
New Associations at Individual level	**Interpretation**
Participant age → B	The older participants report less about their experiences of assessment, treatment, and professional support than the younger ones.
GSI score → B	Participants with higher GSI score mentioned their experiences of assessment, treatment and professional support more than those with lower GSI score.

FAD score → C and D	Participants with higher FAD score mentioned the 'pains and pleasures of relationships' relating to a child with ADHD and the 'grandmother's role and influences' in the family less than those with lower FAD score.

→: indicates the effect of an outcome measure to a theme, ↔; indicates correlation between two superordinate themes, r=correlation coefficient, A='Causes and contributory factors of ADHD', B='Experiences of assessment, treatment, and professional support', C='Pains and pleasures of relationships' relating to child with ADHD, A1='Genetics and brain injury' as cause and contributory factor of ADHD, A2='Co Morbidity, confusion, and convergence' as causes of ADHD, A4='Home environment' as cause and contributory factor of ADHD, B2='Multiple assessments and fragmented services', B3='Successes, failures, and gaps' of ADHD treatment and professional support, C1='Positive attributes looking to the future' of the child, C3='The pain of unmet emotional needs' of the family, D3='Practical and emotional support' of grandmother(s) to mother, D4=Recognising the 'gift of the child'.

Some of the significant associations identified through the Enosis method were also related to conclusions from the original qualitative analysis (Robinson 2010) (Table 5.6). Families with more children within the household, of whom only one had ADHD, were more likely to identify genetics or brain injury as causes and contributory factors relating to ADHD. This was probably happening due to the distinctions with rest of the children in the household (Robinson 2010). It is also worth highlighting that mothers' and grandmothers' SDQ scores are associated with the 'causes and contributory factors' theme in opposite direction. The clinical interpretation may be that grandmothers' low levels of concern about strengths and difficulties of the child may positively relate to increased concern and stresses for birth mothers. Both may overcompensate by not wishing to worry the other whilst wanting to maximise the positive relationship between grandchild and grandmother. This dynamic was also reported by Robinson (2010) following the primary qualitative analysis.

Table 5.6: Associations at dyad and individual levels produced by the Enosis method, which were also revealed through the primary IPA qualitative analysis.

Existing Associations at Dyad level	**Interpretation**

Grandmother SDQ score → A	Maternal grandmothers had higher SDQ score than mothers in families where the causes and contributory factors of ADHD were mentioned more often.
Mother SDQ score → A1	Families also reported genetics and brain injury as cause of ADHD more when mothers' SDQ score was higher.
Number of children in household → B	Families with more children in their household mentioned less their experiences with assessment, treatment, and professional support.
Number of children in household → A1	Families with more children in their household reported less the brain injury and genetics as causes of ADHD than those with smaller numbers of children.
Existing Associations at Individual level	**Interpretation**
Family member (Grandmother) → B	Maternal grandmothers referred less to experiences of assessment, treatment, and professional support than the birth mothers.
A1 ↔ B1 and B3	Participants who mentioned the genetics and brain injury as causes and contributory factors of ADHD also reported the 'fight for recognition' and the 'successes, failures, and gaps' of treatment.

→: indicates the effect of an outcome measure to a theme, ↔; indicates correlation between two superordinate themes, A='Causes and contributory factors of ADHD', B='Experiences of assessment, treatment, and professional support', C='Pains and pleasures of relationships' relating to child with ADHD, A1='Genetics and brain injury' as cause and contributory factor of ADHD, A2='Co Morbidity, confusion, and convergence' as causes of ADHD, A4='Home environment' as cause and contributory factor of ADHD, B2='Multiple assessments and fragmented services', B3='Successes, failures, and gaps' of ADHD treatment and professional support, C1='Positive attributes looking to the future' of the child, C3='The pain of unmet emotional needs' of the family, D3='Practical and emotional support' of grandmother(s) to mother, D4=Recognising the 'gift of the child'.

5.3.3.2 Collaboration

The collaboration between the author and the health care professional was essential for the correct application of the Enosis method and the interpretation of the results. There were regular and intensive meetings during the different phases of the Enosis method, starting with the choice of the scoring system. It was agreed that the 'proportion' scoring system interpreted the qualitative themes fairly accurate taking into account the variety in the number of themes mentioned by different families or interviewees within each superordinate theme.
The importance of the collaboration was also profound during the SEM analysis, where theoretically justified models were created. Modifications indices proposed by AMOS software were not taken into account unless they were clinically meaningful. For example in Figure 5.2 the regression weight from the 'number of people in household' to the theme 'successes, failures, and gaps' of ADHD treatment and professional support was included as it was clinically relevant. Families with more children, of whom only one had ADHD, were more likely to identify genetics or brain injury as causes or contributory factors relating to ADHD, perhaps due to the distinctions with the rest of the children in the household (Robinson 2010).

5.3.3.3 Conclusion

The Enosis method was applied successfully to qualitative data, which had been analysed by IPA qualitative method. The results generated new associations that had not been identified through the original qualitative analysis or supported existing ones, which were interpreted within a clinical context. It can therefore be used in the future in similar datasets for secondary analysis of qualitative data. In the next Section 5.4, the Enosis method will be applied to a dataset, which has been analysed with Grounded Theory so as to explore its transferability to other qualitative methods.

5.4 Perfectionism Dataset

The second dataset that will be used for applying the Enosis method had been analysed by a Psychotherapist using Grounded Theory (Baker 2012). The aim of Baker (2012) was to develop a theory of psychopathological perfectionism (PP).
Semi-structured interviews with 20 volunteers, including a variety of professions from teaching

and policing to a company director and a scientist, were undertaken. All the interviewees were asked about the same topic of perfectionism. The interview always started with the following question 'Do you think you have trouble with perfectionism', and was followed by the request 'Can you please described how you think it has affected you?'. Eligible participants were those who had suffered or were currently suffering anxiety and / or depression, and who displayed dysfunctional perfectionism as part of their personality profile (Baker 2012).

The interview transcripts had been analysed with Grounded Theory, from which emerging data became the basis of categories leading to the development of constructs which then formed the PP theory. The transcripts were also analysed and interpreted by second independent researcher, who was also blinded to the child's gender. The generated categories from both researchers were compared indicating high agreement.

The theory of Perfectionism was described by two constructs, the 'Features of PP' and the 'Stand Alone Feature' (Diagram 5.14 (Baker 2012) pp 208-210 and 235). According to these two constructs

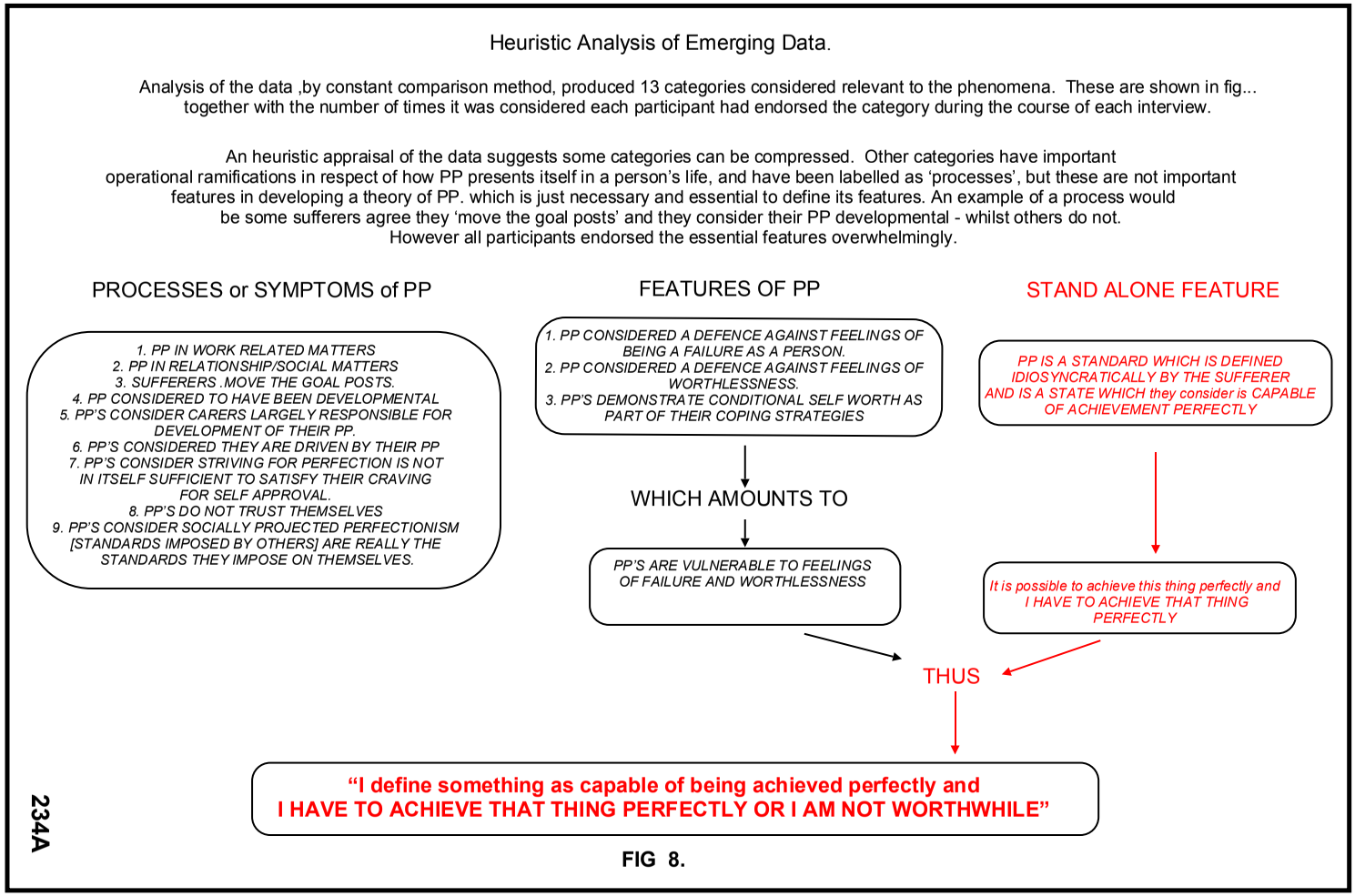
> 'the psychopathological perfectionists were vulnerable to conditional worth involving feelings of failure and self worth, and held the belief that a state of 'perfect' was achievable in at least one idiosyncratic sphere or task.'

Therefore, the psychopathological perfectionism theory was described by Baker (2012) as:

> 'Psychopathological perfectionists hold the notion that some idiosyncratic task is capable of being performed perfectly and to not achieve that task perfectly renders them worthless.'

The third construct was describing the processes and symptoms of psychopathological perfectionism. The separation of the third construct from the other two was one of the unique features of Baker (2012) research.

Figure 5.14: Psychopathological Perfectionism



5.4.1 Rigour of Perfectionism Qualitative dataset

The qualitative researcher applied several criteria to ensure rigour in the qualitative analysis as it is required for a robust qualitative research and for a Doctor of Philosophy (PhD). Specifically, the qualitative analysis has been triangulated with existing knowledge, and been scrutinised and coded 'blind' by an independent inter-rater. A good agreement on coding and method between the inter-rater and researcher was achieved on the essential features and stand alone feature of psychopathological perfectionism. In addition, the developed method of interviewing was specifically focused on a pro-active member checking during the course of each and every interview.

Dr Baker ensured the rigour of grounded theory method by demonstrating that there are multiple instances linking the findings to the data; familiarity with the topic by presenting extensive literature and linking it with the study conclusions; inferential and predictive statements about the phenomena under discussion and about the potential of the theory of psychopathological perfectionism for future research and therapeutic interventions; implicit and explicit discussions as to how the developed theory might be generalised to a range of different situations; epistemological and methodological consistency with the post-positivist paradigm.

The developed theory of psychopathological perfectionism also met the criterion of coherence. Dr Baker argued that the developed theory of psychopathological perfectionism offers more effective explanatory consilience than previous definitions. In addition, the developed theory makes only two assumptions about the necessary and sufficient constructs of the phenomena, thereby presenting a most parsimonious explanation. Finally, the qualitative analysis also met the validity criteria by using a scientific method which had methodological coherence, ensuring that categorisation and saturation were enabled by an appropriate purposive sample, and providing to the reader access to every example which has been used to generate the data.

5.4.2 Application of Enosis

5.4.2.1 Ethics and NHS Approvals for the Perfectionism Dataset

This dataset had already been analysed and published as part of Dr Baker's Ph.D (Baker 2012). Hence, a minor amendment was submitted to the NHS REC and the Research, Management & Governance (RM&G) office, which had approved the original research proposal. Approvals

were granted in March 2013 by the NRES Committee South East Coast - Kent and the RM&G Consortium for Kent and Medway for undertaking secondary analysis of the already collected and analysed Perfectionism dataset (Appendices E and F respectively). The University of Derby Ethics Committee had already approved the application for applying the Enosis method to any qualitative dataset given that the qualitative researcher permits the use of his anonymised dataset for secondary analysis (Appendix C). Dr Baker, the qualitative researcher of the Perfectionism dataset, was welcoming the approach to re-analyse his dataset, collaborate with the author for applying the Enosis method, and interpret the findings.

5.4.2.2 Quantification of Constructs - The 'References' Scoring System

The quantification of the constructs describing the PP theory will be the first step in the application of the Enosis method. The scoring system will be based on the number of times each participant had endorsed each category during the course of each interview. For example, if one interviewee mentioned two categories ('A defence against feelings of being a failure as a person' and 'A defence against feelings of worthlessness'), 8 times and 2 times each respectively under the construct the 'Features of PP', then the score for this construct will be 10 (Diagram 5.14). This scoring system will be referred to as 'References' thereafter.

The 'References' scoring system will indicate the level of 'endorsement' of the constructs by the interviewees, as the greater the score the more the interviewee endorsed this construct.

5.4.2.3 Structural Equation Modelling

The next step of the Enosis method will be the application of Structural Equation Modelling (SEM) to estimated scores using Analysis of Moments Structure (AMOS) software (Arbuckle 2008). SEM will be applied to explore the complex relationships between the two constructs (Diagram 5.14) and the participant's demographics as well as hypotheses or relationship structures among the two constructs. The SEM analysis will be adjusted for the duration of the interview of each participant to account for the effect on the frequency of themes.

The PP theory will be the latent variable and will be presented as ellipse in a path diagram. The two constructs describing the psychopathological perfectionism (latent variable) will be used as indicators of the latent variable in the Structural Equation Modelling. The observed variables, which will be symbolised with rectangles in the path diagram, will be those that are directly

measured (marital status, gender, age, BAI score, and job category). The measurement error of an observed variable will be presented with circles and indicate the unexplained variance in the model. The single-headed arrow will be used to denote regression weight and the double-headed arrow for correlation (r).

'Maximum likelihood' method will be used for estimating variances, covariances, and regression weights when multivariate normality holds or otherwise the bootstrap method will be used (Bone et al. 1989, Bollen & Stine 1992, Joreskog 1993, Hoyle 1995). The unstandardised parameter estimates (Standard Error) will be reported in a table and the standardized estimates (after the variables are rescaled to have unit variance) will be presented in a path diagram.

The observed variables will be assessed for multivariate normality using 'multivariate kurtosis' values (< 1 indicates multivariate normality) (Mardia 1970). The models will be 'over-identified' (higher number of observed variances and covariances than unknown parameters) to run the analysis by either fixing the variance of the error variable or one of the regression weights (e.g. fix the regression weight equal to one) (Bone et al. 1989, Hoyle 1995).

The 'model goodness-of-fit' will be reported as [(degrees of freedom, n) Chi-square, p-value, TLI, GFI]. Any p-value$>$0.05 will indicate a good model fit. The Tucker-Lewis Index (TLI) and the Goodness of Fit Index (GFI) values close to 1 will indicate a good fit (Tucker & Lewis 1973, Sorbom 1989, Hoyle 1995, Barrett 2007, Arbuckle 2008). The independence between observed variables or the covariance structure in the model will be tested. The 'discrepancy measure' will be used to check if there was covariance structure in evidence ($p<0.05$ will indicate covariance structure in the model) (Joreskog 1969).

Models without good fit will be modified using the proposed modification indices (correlations or regression weights) by AMOS software (Sorbom 1989). The proposed indices will be discussed with the qualitative researcher to ensure their clinical justification. Multiple models will be constructed and compared to each other using the Chi-squared test (null hypothesis: constrain used to define the nested model was true) and the Akaike Information Criterion (i.e. the smaller the AIC the better the model) (Akaike 1987, Joreskog 1993, Barrett 2007).

5.4.3 Findings of Perfectionism Dataset

5.4.3.1 Demographics

The 'Reference' scores were estimated per constructs for each of the 20 interviewees. The mean (95% Confidence Interval) score of each construct and summary of the participant's demographics is given in Table 5.7. The participants' jobs were categorised to either 'higher managerial, administrative, and professional occupations' or 'other occupations' based on Standard Occupational Classification (2010) by the Office of National Statistics (Office for National Statistics 2012).

Table 5.7: Frequency, (%) and Mean (95% Confidence Interval) of participants' demographic information.

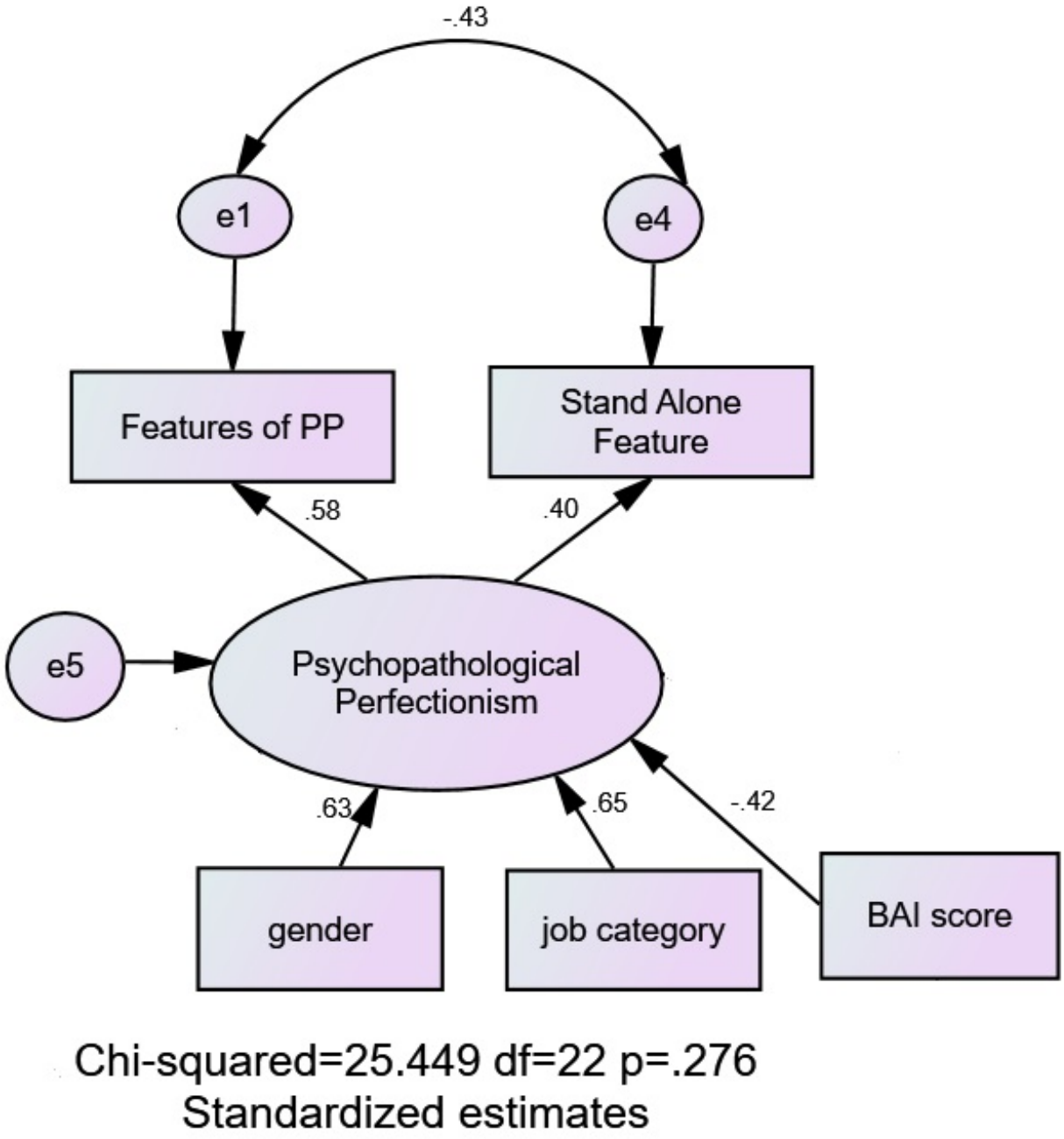
	Frequency, (%)
Marital Status (married)	12 (60%)
Gender (male)	14 (70%)
Higher managerial, administrative, and professional occupations	11 (55%)
	Mean (95% Confidence Interval)
Age (years)	38 (33, 44)
Duration of Interview (minutes)	52 (43, 60)
BAI score	18 (13, 23)
'Features of PP' (score)	15 (13, 17)
'Stand Alone Feature of PP' (score)	8 (7, 9)

5.4.3.2 Main Results

Multiple models starting from the most complex including all the observed variables were constructed. Nested models were, then, compared to each other using the Chi-squared test and the Akaike Information Criterion so as to conclude to the model that fitted best data (Figure 5.15). The duration of each participant's interview did not have a significant effect in SEM and was removed from the final presented model.

The assumption of multivariate normality did not hold and bootstrap method was used (multivariate kurtosis = 3.334). There was evidence of covariance structure in the model (p=0.009) and the model fitted the data well [(22, n=20) = 25.449, p=0.276, TLI = 0.789, GFI = 0.758, AIC = 53.449].

Figure 5.15: Standardised estimates of a Structural Equation Model (SEM) including one latent variable, the PP theory; the indicators of the latent variable, the two constructs 'Features of PP' and 'Stand Alone Feature'; two observed variables, the gender and the job category of the interviewees.



e1, e4, and e5 = measurement errors, → = regression weight, ↔ = correlation.

Table 5.8: Unstandardised parameter estimates of regression weights (Standard Error) and correlations between PP theory; the two constructs, 'Features of PP' and 'Stand Alone Feature'; two observed variables (gender and job category of the interviewees).

Regression Weights	**Estimate (Std. Error)**	**p-value**
Gender (female) → PP	3.661 (1.72*)	0.030
Job category ('Higher managerial, administrative, and professional') → PP	3.457 (1.52*)	0.034
BAI score → PP	-0.105 (0.09*)	0.031
Correlations	**Correlation Coefficient (r)**	**p-value**
e1 ↔ e4	-0.432	0.190

→ = indicates the effect of an observed variable to PP theory; ↔ = indicates correlation between the two constructs , r=correlation coefficient; *= bootstrap standard errors.

The PP theory had significantly higher contribution on the 'Features of PP' rather than on 'Stand Alone feature' construct (standardised coefficient = 0.58, p=0.010) (Figure 5.15). 'Higher managerial, administrative and professional occupations' endorsed significantly more the PP theory than 'other' jobs (p=0.034). Additionally, the female participants endorsed more the PP theory compared to males (p=0.030). Participants with higher anxiety scores (BAI scores) endorsed less the PP theory than those with less anxiety (p=0.031).

5.4.4 Summary of Perfectionism Dataset

5.4.4.1 Transferability of Enosis

The transferability of the Enosis method was successful in the 'Perfectionism' dataset, which had primarily been analysed using Grounded Theory. This dataset was compliant with the essential requirements needed for using the Enosis method (Section 4.5.4). Specifically, Grounded Theory produced one central theory, the psychopathological perfectionism (PP), which acted as the latent variable in SEM. The constructs of the PP acted as indicators of the latent variable and the participants' demographics were used as observed variables. Additionally, the use of the 'references' scoring system was appropriate for the quantification of the PP constructs and the interpretation of the results, as it took into account the intensity with which each participant referred to each category and, therefore, the level of 'endorsement' of the constructs by the interviewee.

5.4.4.2 New and Existing Associations

The application of the Enosis method to this qualitative dataset revealed new significant associations, which were not revealed by the primary Grounded Theory qualitative analysis and were not present in existing PP theory. These associations would have been missed if Enosis had not been used (Table 5.9).

Specifically, the association between the job category and PP cannot be clearly interpreted, as people with PP might be attracted to higher managerial, administrative, and professional jobs and, therefore, their symptoms are worse or these occupations attract people with personality profile of high levels of PP (Peters & King 2012). The significant association observed between female participants and PP might be because women tend to talk more than men, as clinically there is not any evidence to support this finding. Thus, it is worth exploring these new relationships between anxiety levels, job category, and gender with the PP theory in future experimental studies in a variety of settings and cohorts.

The negative association between high levels of anxiety and the PP theory was also highlighted through the Grounded Theory analysis (Table 5.10). Baker (2012, p.259) reported that "while participants with extremely high level of anxiety remained embracing psychopathological perfectionism, they had slipped into depression and anxiety states rendering them inoperative." Finally, the importance of the 'Features of PP' was also identified by Baker (2012) through the qualitative analysis. Baker (2012, p.264) emphasises the importance of this construct as "it forms one of the two necessary and sufficient constructs for a theory of psychopathological perfectionism."

Table 5.9: New associations produced by the Enosis method, which were not revealed by the primary Grounded Theory qualitative analysis and were not present in existing PP theory.

New Associations	**Interpretation**
Gender (female) → PP	Females endorsed more the PP theory than males.
Job category ('Higher managerial, administrative, and professional') → PP	'Higher managerial, administrative and professional occupations' endorsed significantly more the PP theory than 'other' jobs.

→ = indicates the effect of an observed variable to PP theory

Table 5.10: New associations produced by the Enosis method, which were also revealed by the primary Grounded Theory qualitative analysis.

New Associations	**Interpretation**
BAI score → PP	Participants with higher anxiety scores endorsed less the PP theory than those with less anxiety.
PP Theory → 'Features of PP' construct	PP theory had significantly higher contribution on the 'Features of PP' rather than on 'Stand Alone feature' construct.

→ = indicates the effect of an observed variable to PP theory

5.4.4.3 Collaboration

The collaboration with the qualitative researcher was key for the successful application of the Enosis method to this dataset. Initially, Dr Baker provided essential insight about his research by explaining how Grounded Theory was conducted and how the results are interpreted within a clinical setting. This allowed the author to determine whether the dataset met the essential requirements for applying the Enosis method and decide the most appropriate way for quantifying the constructs that described the PP theory and incorporating them into the SEM. The collaboration was also important during SEM analysis, where theoretically justified models were created by taking into account clinically acceptable modification indices proposed by AMOS software. Finally, the results from the Enosis method were interpreted in collaboration with the qualitative researcher so as to be clinically meaningful and to follow the principles of the developed PP theory.

5.4.4.4 Conclusion

The transferability of the Enosis method to Grounded Theory was successful, as it revealed associations that had not been identified by the qualitative researcher through the qualitative analysis alone. Therefore, the Enosis could be applied in future to similar qualitative datasets, which have primarily been analysed by Grounded Theory. The next step will be to apply the Enosis method to a new qualitative dataset that has been analysed by Thematic Analysis method.

5.5 Mental Health Illness Dataset

The third dataset that will be used for applying the Enosis method will primarily be analysed by a qualitative research team led by Anne Janine Fletcher, an Art Therapist, Drama Teacher, Clinical Psychologist, and qualitative researcher, using Thematic Analysis. The Enosis method will be prospectively considered as suitable analysis method of this dataset, due to its inclusion in the study protocol before it will be submitted for governance approvals. Following the interviews and data collection, the Thematic Analysis will be applied followed by the Enosis method.

The aim of Fletcher's study is to explore children's constructs of mental health and mental illness through a visual research methodology. Children aged 11 to 18 years old will be asked to draw a picture of a person with a 'Mental Illness'. The children will then discuss in pairs their drawings using open questions, e.g. what is happening in the picture?, asked by the qualitative researchers. Their answers will then be analysed by the qualitative researchers using Thematic Analysis. The Thematic Analysis will identify, using a comprehensive coding system, recurring categories that will be merged into themes. The categories used will reflect both children's replies to the interview questions, the interpretation of their images and any other issues raised by respondents in the sessions.

5.5.1 Rigour of Mental Health Qualitative dataset

The qualitative researcher will undertake several actions to ensure rigour in the qualitative analysis as it is required for a robust qualitative research and for a Doctor of Philosophy (PhD). Specifically, the research team will work collaboratively to develop a comprehensive

coding frame, paying particular attention to any differences in interpretation. The categories developed from analysing the verbal transcripts will be compared with the interpretation of the images. This will facilitate in comparing and contrasting the views of children and young people, in order to identify both common and specific views and beliefs about mental illness. The merged themes will be reviewed by a second qualitative researcher and any disagreements will be resolved by mutual agreement. Finally, a purposive sampling will be used to include children of varying ages, ethnicity, and differing socio-economic backgrounds to support transferability of the qualitative results.

5.5.2 Application of Enosis

5.5.2.1 Ethics and NHS Approvals for the Mental Health Dataset

At the time of submission for governance approvals, it was confirmed by the Head of Clinical Audit and R&D at North Staffordshire Combined Healthcare NHS Trust that this research study did not include NHS patients and, therefore, did not require review by an NHS REC nor R&D approval (Appendix H). The NHS REC form was not required in this case and the Enosis method was included only within the study protocol and the ethics application, which were submitted to University of Derby Ethics Committee. The University of Derby Ethics Committee approved Fletcher's study on 26^{th} July 2013. In addition, they had already approved the application of the Enosis method to any qualitative dataset given that the qualitative researcher was happy to collaborate with the author (Appendix C). Anne Janine Fletcher was happy to collaborate with the author for applying the Enosis method in the 'Mental Health' dataset.

5.5.2.2 Quantification of Themes

The first step for applying the Enosis method will be to quantify the themes generated from the Thematic Analysis. At the time of finalising this thesis, the qualitative results from the Thematic Analysis have not been published yet. The 'Proportion' (min-max = 0-1) scoring system will be calculated based on the number of sub-themes mentioned by one child over the total number of sub-themes for one superordinate theme.

For example, if one child mentioned three sub-themes under a superordinate theme and the

total number of sub-themes for this superordinate theme was five, then the score for this child will be 3/5=0.60. The higher the score the more the child will have referred to this theme compared to other themes or other children.

5.5.2.3 Structural Equation Modelling

Following the quantification of the themes, Structural Equation Modelling (SEM) will be applied to estimated scores using Analysis of Moments Structure (AMOS) (Arbuckle 2008). SEM will be applied to explore the complex relationships between the between the overarching themes 'Stigmatisation', 'Medical model', 'Containment', and 'Recovery' (Appendix G) and the participant's demographics, as well as hypotheses or relationship structures between the overarching and the superordinate themes (A1 to A4, B1 to B4, C1 to C4 and D1 to D4).

The four overarching themes will be the latent variables and will be presented as ellipses in a path diagram. The scores of the superordinate themes, which will be symbolised with rectangles in the path diagram, will be used as indicators of the latent variables (overarching themes), as they will indirectly assess the latent variables. Other observed variables, which will be directly measured and symbolised with rectangles, will be the participant's demographics (age and gender of child, experience of mental health, single parent / reconstituted family, parental mental illness). The measurement error of an observed variable will be presented with circles and indicate the unexplained variance in the model. The single-headed arrow will be used to denote regression weight and the double-headed arrow for correlation (r).

'Maximum likelihood method' will be used for estimating variances, covariances, and regression weights when multivariate normality holds or otherwise the bootstrap method will be used (Bone et al. 1989, Bollen & Stine 1992, Joreskog 1993, Hoyle 1995). The unstandardised parameter estimates (Standard Error) will be reported in a table and the standardized estimates (after the variables are rescaled to have unit variance) will be presented in a path diagram.

The observed variables will be assessed for multivariate normality using 'multivariate kurtosis' values (< 1 indicates multivariate normality) (Mardia 1970). The models will be 'over-identified' (higher number of observed variances and covariances than unknown parameters) to run the analysis by either fixing the variance of the error variable or one of the regression weights (e.g. fix the regression weight equal to one) (Bone et al. 1989, Hoyle 1995).

The 'model goodness-of-fit' will be reported as [(degrees of freedom, n) Chi-square, p-value, TLI, GFI]. Any p-value>0.05 will indicate a good model fit. The Tucker-Lewis Index (TLI) and the Goodness of Fit Index (GFI) values close to 1 will indicate a good fit (Tucker & Lewis 1973, Sorbom 1989, Hoyle 1995, Barrett 2007, Arbuckle 2008). Additionally, independence between observed variables or the covariance structure in the model will be tested. The 'discrepancy measure' will be used to check if there was covariance structure in evidence ($p<0.05$ will indicate covariance structure in the model) (Joreskog 1969).

Models without good fit will be modified using the proposed modification indices (correlations or regression weights) by AMOS software (Sorbom 1989) following discussions with the qualitative researcher to ensure the clinical justification of the indices. Multiple models will be constructed and compared to each other using the chi-squared test (null hypothesis: constrain used to define the nested model was true) and the Akaike Information Criterion (i.e. the smaller the AIC the better the model) (Akaike 1987, Joreskog 1993, Barrett 2007).

5.5.3 Findings of Mental Health Dataset

5.5.3.1 Demographics

Fourteen children aged 11 (50%) and 15 (50%) years old participated in the research. Their interpretation of the images they drew about people with Mental Illness was coded using Thematic Analysis into overarching (A-D), superordinate (1-4) and sub-themes as it is listed in Appendix G. Four overarching themes, 'Stigmatisation', 'Medical model', 'Containment', and 'Recovery', were created and each one contained 4 superordinate themes.

The scores were estimated per superordinate theme per child using the 'Proportion' scoring system before applying Structural Equation Modelling. The majority of children were boys while the minority had at least one parent with mental illness (Table 5.11). Half of the children had experience of mental health and were from a single parent or reconstituted family. The superordinate themes with the highest proportion scores were the 'Media', 'Identity', and 'Labelling' under the 'Stigmatisation' overarching theme, the 'Embodiment' under the 'Containment' overarching theme, and the 'Questioning' under the 'Recovery' overarching theme.

Table 5.11: Frequency, (%) and Mean (95% Confidence Interval) of children's demographic information.

Demographics	**Frequency, (%)**
Experience of Mental Illness (yes)	7 (50%)
Gender (male)	9 (64%)
From Single Parent / Reconstituted Family (yes)	7 (50%)
Parental Mental Illness (yes)	4 (29%)
Age (11 years vs 15 years)	7 (50%)
Overarching & Superordinate themes	**Mean score (95% Confidence Interval)**
Stigmatisation	
'Gender' (score)	0.43 (0.30, 0.56)
'Media' (score)	0.60 (0.44, 0.76)
'Identity' (score)	0.63 (0.52, 0.74)
'Labelling' (score)	0.61 (0.44, 0.77)
Medical Model	
'Treatment' (score)	0.38 (0.13, 0.63)
'Rejection' (score)	0.45 (0.29, 0.61)
'Causes of Mental Illness' (score)	0.35 (0.21, 0.48)
'What sort of Mental Illness' (score)	0.57 (0.40, 0.75)
Containment	
'Inside' (score)	0.36 (0.21, 0.51)
'Deprivation' (score)	0.36 (0.19, 0.53)
'Communication' (score)	0.40 (0.27, 0.54)
'Embodiment' (score)	0.70 (0.52, 0.88)
Recovery	
'Hopefulness' (score)	0.23 (0.02, 0.44)
'Questioning' (score)	0.67 (0.55, 0.80)
'Independence' (score)	0.36 (0.20, 0.52)
'Insight' (score)	0.55 (0.41, 0.69)

5.5.3.2 Main Results

Several models were applied using the 4 overarching themes, the superordinate themes [1] and the participants' characteristics. A complex model including all 4 overarching themes, superordinate themes, and participants' characteristics in one SEM path diagram was developed. Several less complex nested models were fitted and compared to each other until models that fitted well the data were identified. Less complex models including only two overarching themes, their

[1] A='Stigmatisation', B='Medical Model', C='Containment', D='Recovery', A1='Gender' of person with mental health, A2='Media' influence, A3='Identity' of person with mental health, A4='Labelling' by society, B1='Treatment' of mental health, B2='Rejection' by society, B3='Causes of Mental Illness', B4='What sort of Mental Illness', C1='Inside' the world of a person with mental health, C2='Deprivation', C3='Communication', C4='Embodiment', D1='Hopefulness', D2='Questioning', D3='Independence', D4='Insight'.

relative superordinate themes and two of the participants' characteristics each time were fitting better the data.

All Structural Equation Models with statistically significant results are summarised in Table 5.12 and in more detail using path diagrams in separate sections below. Models without significant associations and correlations among themes, and between themes and participants' demographics are not presented.

Table 5.12: Unstandardised parameter estimates of regression weights (Standard Error) and correlations between overarching themes (A, B, C, and D), superordinate themes (1-4) and participants' characteristics

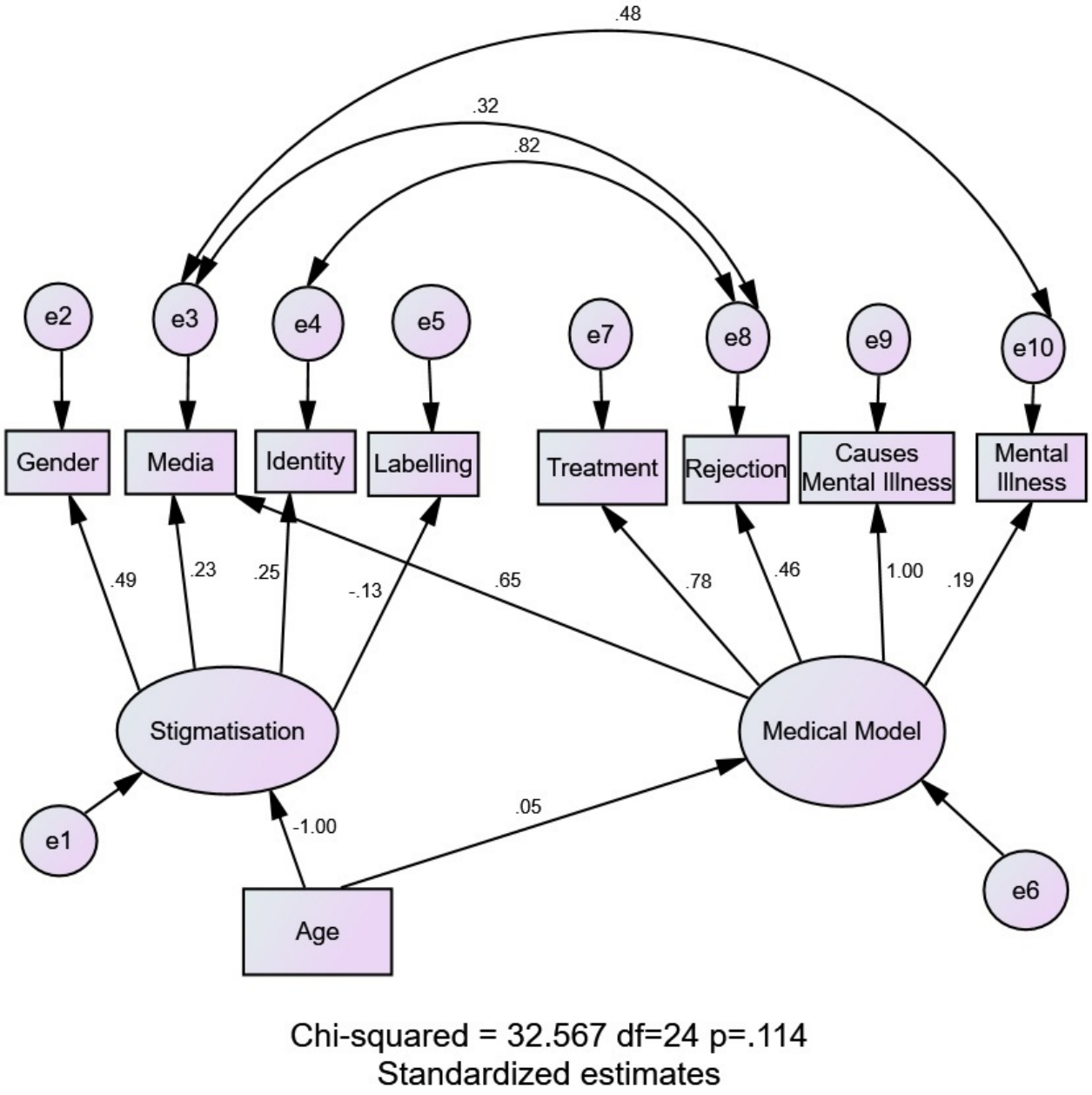
Regression Weights	**Unstandardised Estimate (Std Error)**	**p-value**
Age → Stigmatisation	-0.054 (0.027*)	0.045
Age → Containment	-0.079 (0.027)	0.004
Age → Recovery	-0.114 (0.036)	0.001
Medical Model → Media	0.518 (0.121*)	0.010
Single parent / reconstituted family → Medical Model	-0.476 (0.165*)	0.012
Correlations	**Correlation Coefficient (r)**	**p-value**
Media ↔ Rejection	0.324	0.010
Identity ↔ Rejection	0.822	0.010
Inside ↔ Hopefulness	0.717	0.036
Embodiment ↔ Independence	0.703	0.038

→: indicates the effect of an outcome measure to a theme; ↔: indicates correlation between two superordinate themes, r=correlation coefficient; *= bootstrap standard errors.

'Stigmatisation' and 'Medical Model' vs Age

A model including 'Stigmatisation' and 'Medical Model' as latent variables and age as observed was fitted (Diagram 5.16). The assumption of multivariate normality did not hold and bootstrap method was used (multivariate kurtosis = 2.571). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [$(24, n=14) = 32.567$, $p=0.114$, TLI = 0.749, GFI = 0.794].

Figure 5.16: Standardised estimates of regression weights and correlations presented in Structural Equation Model (SEM) including two latent variables, the overarching themes 'Stigmatisation' and 'Medical Model'; the indicators of the overarching themes, their four superordinate themes; one observed variable, the 'age of children'.



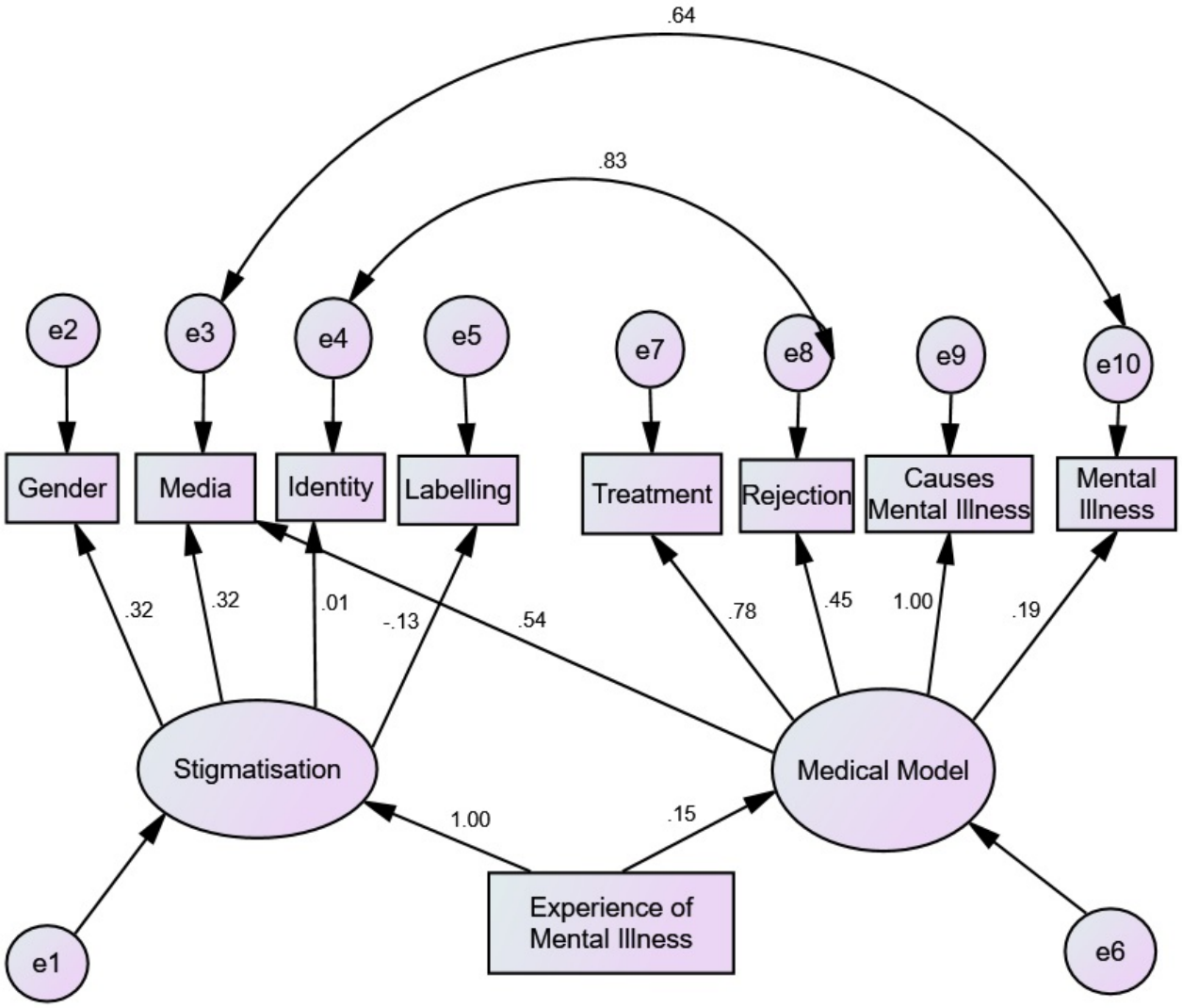
e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

The older children referred to 'Stigmatisation' of a person with mental illness less than the younger in their pictures. Children who drew pictures including the 'Media' and 'Identity' themes also drew the 'Rejection' theme in the same pictures. While 'Media' was a superordinate theme within the 'Stigmatisation' overarching theme, it was also an important indicator of children's view that mental illness comes from a 'Medical Model' as described in children's pictures.

'Stigmatisation' and 'Medical Model' vs Experience of Mental Illness

A model including 'Stigmatisation' and 'Medical Model' as latent variables and children's experience about mental illness as observed was fitted (Diagram 5.17). The assumption of multivariate normality held (multivariate kurtosis = 0.701). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [$(25, n=14) = 30.902$, $p=0.192$, TLI = 0.784, GFI = 0.774].

Figure 5.17: Standardised estimates of regression weights and correlations presented in Structural Equation Model (SEM) including two latent variables, the overarching themes 'Stigmatisation' and 'Medical Model'; the indicators of the overarching themes, their four superordinate themes; one observed variable, the 'Experience of Mental Illness' of the children.



Chi-squared = 30.902 df=25 p=.192
Standardized estimates

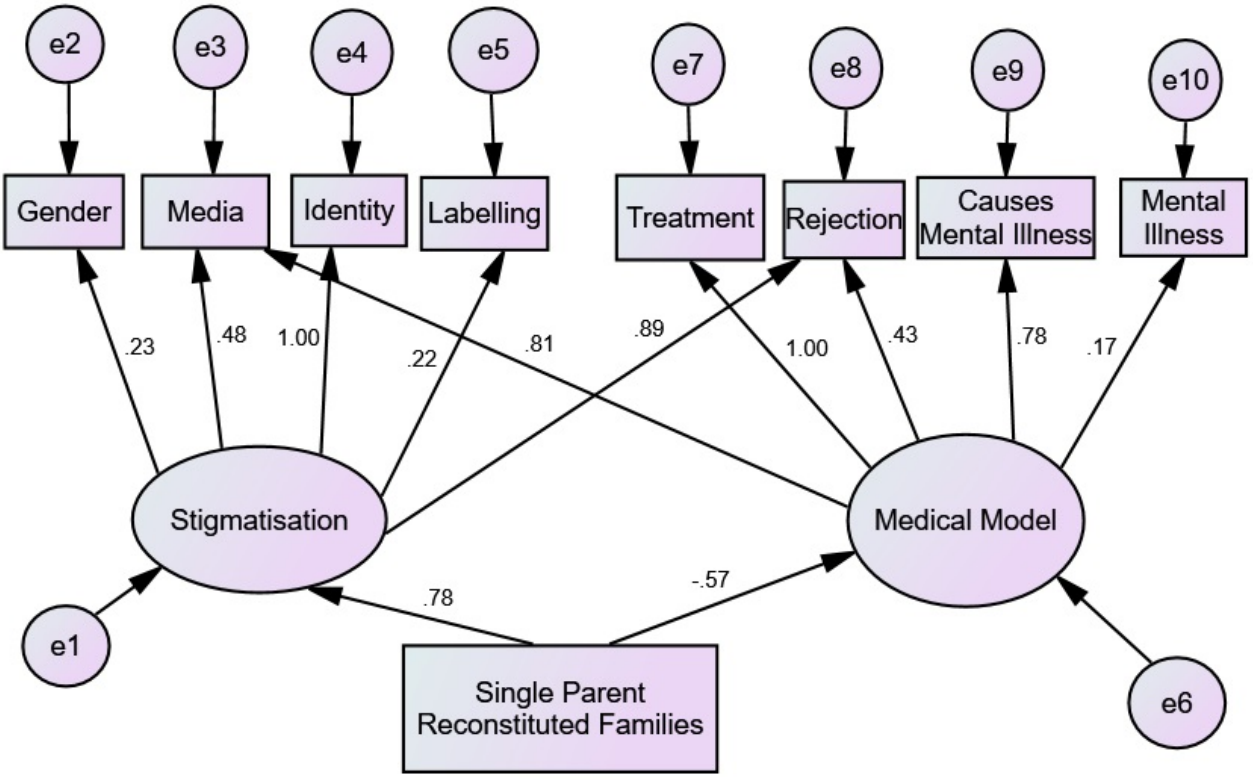
e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

Children who drew the 'Identity' theme also drew the 'Rejection' in the same pictures. There was not a significant effect of child's 'knowledge of Mental Illness' on the 'Stigmatisation' or the 'Medical Model' themes. As seen in the previous model, 'Media' was also an important indicator of the 'Medical Model' as described in children's pictures.

'Stigmatisation' and 'Medical Model' vs Single Parent / Reconstituted Family

A model including 'Stigmatisation' and 'Medical Model' as latent variables and whether a child was from a single parent or reconstituted family as observed was fitted (Diagram 5.18). The assumption of multivariate normality did not hold and bootstrap method was used (multivariate kurtosis = -1.272). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [(26, n=14) = 29.772, p=0.277, TLI = 0.892, GFI = 0.730].

Figure 5.18: Standardised estimates of regression weights and correlations presented in Structural Equation Model (SEM) including two latent variables, the overarching themes 'Stigmatisation' and 'Medical Model'; the indicators of the overarching themes, their four superordinate themes; one observed variable, 'if a child was from a single parent or reconstituted family'.



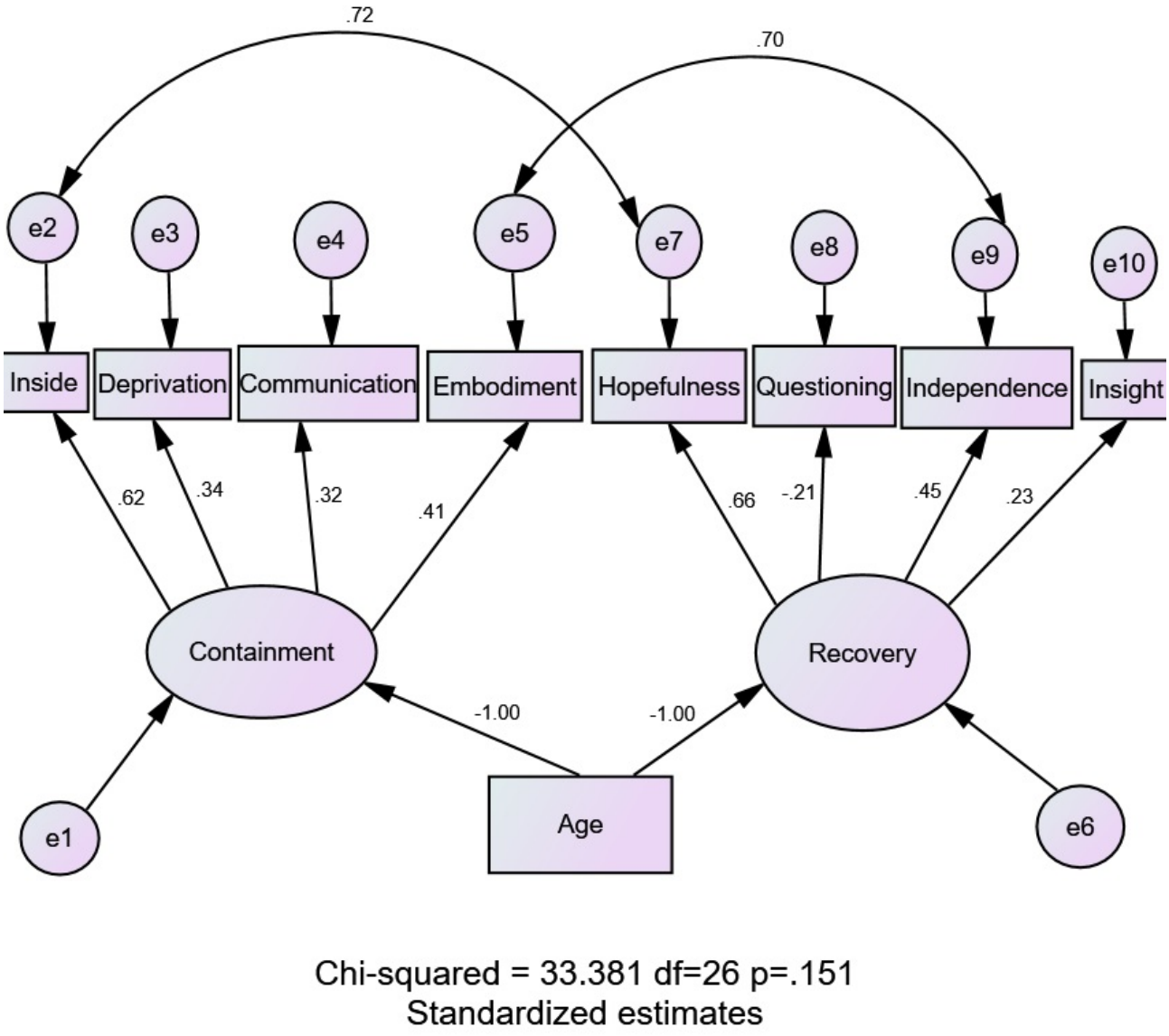
e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

Children from a family with 'single parent or reconstituted family' referred less to 'Medical Model' in their pictures compared to children who were not from these types of family. Again the 'Media' was appeared as an important indicator of the 'Medical Model' based on children's pictures.

'Containment' and 'Recovery' vs Age

A model including 'Containment' and 'Recovery' as latent variables and age as observed was fitted (Diagram 5.19). The assumption of multivariate normality held (multivariate kurtosis = 0.929). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [(26, n=14) = 33.381, p=0.151, TLI = 0.738, GFI = 0.669].

Figure 5.19: Standardised estimates of regression weights and correlations presented in Structural Equation Model (SEM) including two latent variables, the overarching themes 'Containment' and 'Recovery'; the indicators of the overarching themes, their four superordinate themes; one observed variable, children's 'age'.



e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

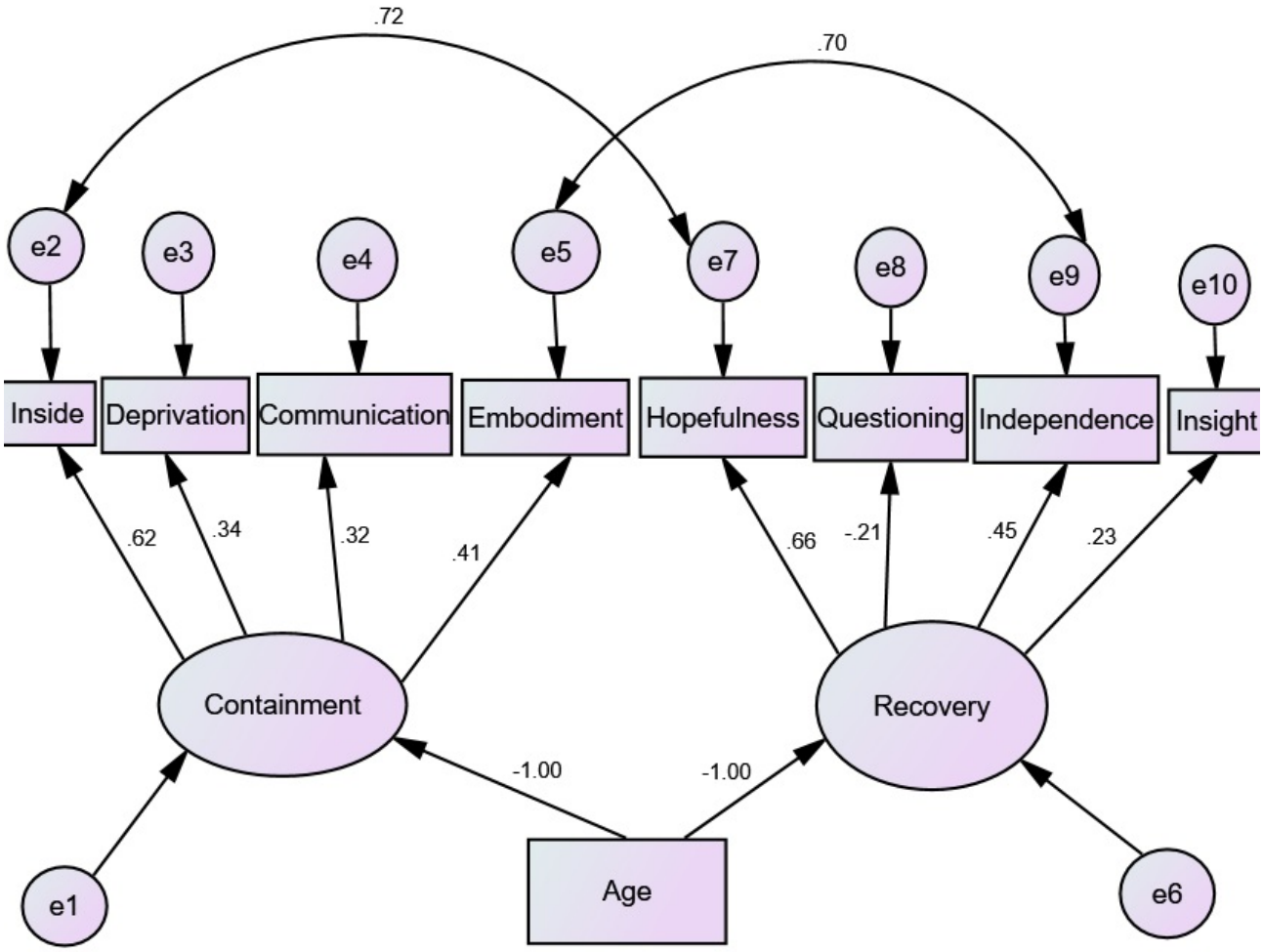
The older children referred to 'Containment' and 'Recovery' less than the younger in their pictures. Children who drew the 'Inside' theme also drew 'Hopefulness' in the same pictures.

In addition, children who drew the 'Embodiment' theme also drew 'Independence' in the same pictures.

'Containment' and 'Recovery' vs Gender

A model including 'Containment' and 'Recovery' as latent variables and gender as observed was fitted (Diagram 5.20). The assumption of multivariate normality held (multivariate kurtosis = 0.196). There was evidence of covariance structure in the model (p=0.003) and the model fitted the data well [(26, n=14) = 32.845, p=0.167, TLI = 0.657, GFI = 0.680].

Figure 5.20: Standardised estimates of regression weights and correlations presented in Structural Equation Model (SEM) including two latent variables, the overarching themes 'Containment' and 'Recovery'; the indicators of the overarching themes, their four superordinate themes; one observed variable, children's 'gender'.



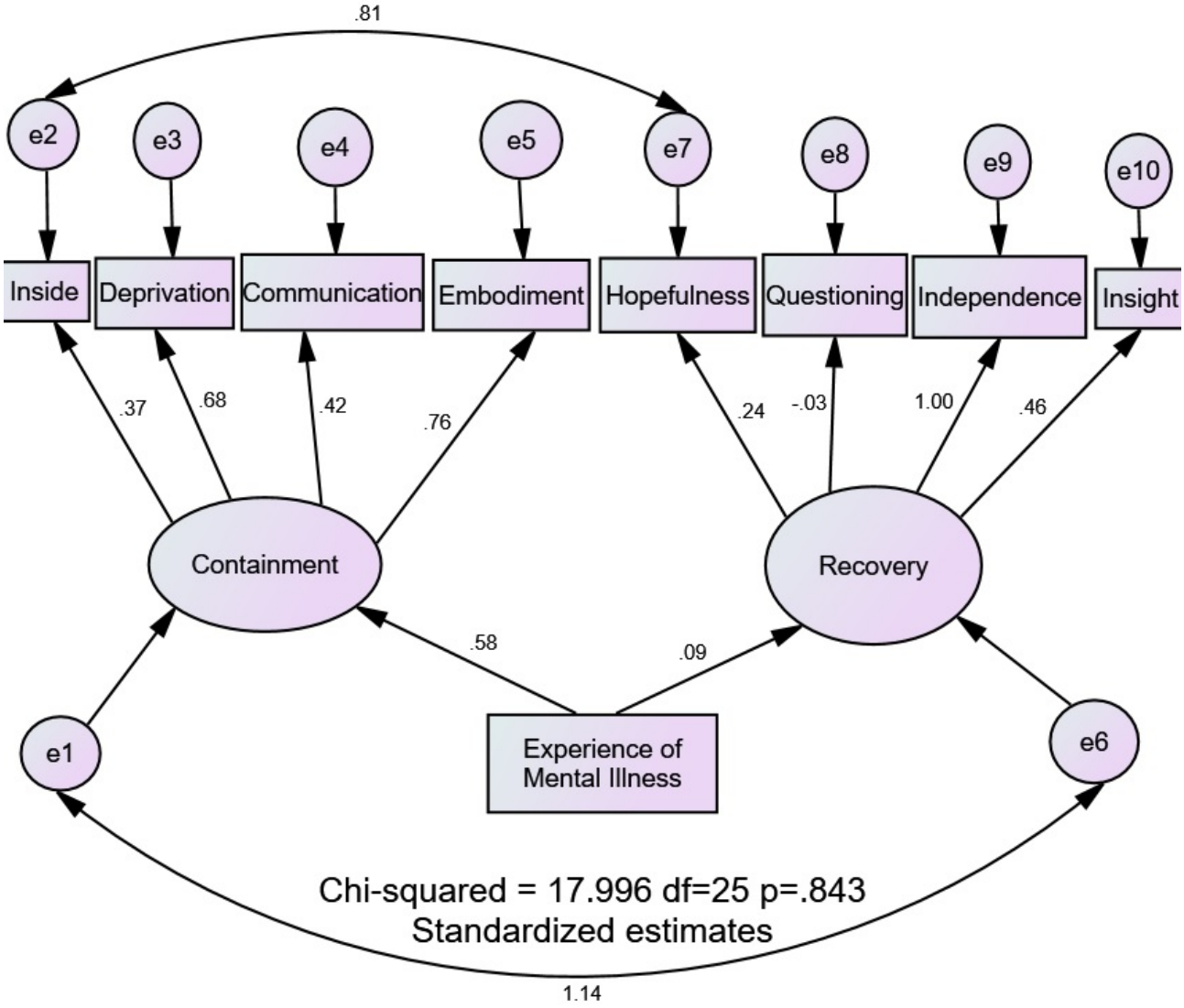
e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

Children who drew the 'Inside' theme also drew 'Hopefulness' in the same pictures. In addition, children who drew the 'Embodiment' theme also drew 'Independence' in the same pictures. However, there was not any significant effect of gender on 'Containment' or 'Recovery'.

'Containment' and 'Recovery' vs Experience of Mental Illness

A model including 'Containment' and 'Recovery' as latent variables and whether a child had experience of mental illness as observed was fitted (Diagram 5.21). The assumption of multivariate normality held (multivariate kurtosis = 0.396). There was evidence of covariance structure in the model ($p<0.001$) and the model fitted the data well [(25, n=14) = 17.996, p=0.843, TLI = 1.283, GFI = 0.776].

Figure 5.21: Standardised estimates of regression weights and correlations presented in Structural Equation Model (SEM) including two latent variables, the overarching themes 'Containment' and 'Recovery'; the indicators of the overarching themes, their four superordinate themes; one observed variable, children's 'experience of mental illness'.



e1 to e10 = measurement errors, → = regression weight, ↔ = correlation.

Children who drew the 'Inside' theme also drew 'Hopefulness' in the same pictures. However, there was not any significant effect of the child's experience of mental illness on 'Containment' or 'Recovery'.

5.5.4 Summary of Mental Health Dataset

5.5.4.1 Transferability of Enosis

The Enosis method was applied successfully to the 'Mental Health' dataset, which had primarily been analysed using Thematic Analysis. This dataset satisfied the essential requirements for

applying the Enosis method (Section 4.5.4).

The number of interviews was more than 10 and the themes from the Thematic analysis had been organised as overarching, superordinate, and sub-themes. The qualitative researcher had recorded whether a sub-theme was mentioned or not by each child and they were used for developing the 'Proportion' scoring system per child per superordinate theme. All children were asked about the same topic of drawing a picture of a person with 'Mental Illness' and they were prompted to interpret their pictures using the same open questions. The overarching themes, which were developed through the Thematic Analysis, were used as the latent variables in SEM and the superordinate themes as their indicators.

5.5.4.2 New and Existing Associations

The analysis of the qualitative data using the Enosis method revealed some new associations that had not been identified through the primary Thematic Analysis and would have been missed if Enosis had not been applied (Table 5.13). While participant's demographics, like age, gender, experience of mental illness, and parental mental illness, were collected and used during the Thematic analysis, the qualitative researcher was not able to identify similar relationships. It was evident during the interpretation and discussion of the Enosis results with the qualitative researcher that the Thematic analysis couldn't explore for complex relationships between the participant demographics and the overarching themes, or among the overarching themes. These associations can be tested in future research and potentially contribute to extension of existing knowledge and theory about Mental Illness.

The new associations presented in this section and in Table 5.13 were also answering the original objectives of the 'Mental Health' research. For example one of the study objectives was to explore if it is useful approach in informing children about mental health. The Enosis method revealed that older children referred to the 'Stigma' that a person with mental illness carries less often in their pictures compared to younger children. This association was not picked up during the interviews or the Thematic Analysis, and it could indicate that it is due to the education the 15 years old receive about the 'Stigma' compared to 11 years old, and, therefore, it was avoided in their pictures. In addition, older children were referred to isolation of a person with mental illness within buildings, 'Containment', and to their 'Recovery' process

less often compared to younger children.

The potentially dual role of the 'Media' was not highlighted through the primary Thematic Analysis but it was identified through the Enosis method. 'Media' was not only present in their pictures when they were referring to the 'Stigmatisation' of a person with mental illness but also when they were expressing their views that mental illness comes from a 'Medical Model'. The stigma that is attached to people with mental illness by 'Media' was strongly correlated with 'Rejection' a person with mental illness was feeling in children's pictures.

Other associations worth exploring in future research are that children with 'Single parent or with reconstituted families' expressed less the view that mental illness comes from a 'Medical Model' and children who drew the place of recovery to be inside the mental home, 'Inside', also drew pictures that expressed more hope for 'Recovery' and 'Hopefulness'.

Table 5.13: New associations produced by the Enosis method, which were not revealed by the primary Thematic Analysis and were not present in existing Mental Health theory.

New Associations	**Interpretation**
Age → Stigmatisation	Older children referred to 'Stigmatisation' of a person with mental illness less than the younger in their pictures.
Age → Containment and Recovery	The older children referred to 'Containment' and 'Recovery' less than the younger in their pictures.
Medical Model → Media	Media was an important indicator of children's view that mental illness comes from a 'Medical Model'.
Single parent / reconstituted family → Medical Model	Children from a family with 'single parent or reconstituted family' referred less to 'Medical Model' in their pictures compared to children who were not from these types of family.
Media and Identity ↔ Rejection	Children who drew pictures including the 'Media' and 'Identity' themes also drew the 'Rejection' theme in the same pictures.

Inside ↔ Hopefulness	Children who drew the 'Inside' theme also drew 'Hopefulness' in the same pictures.

→: indicates the effect of an outcome measure to a theme; ↔: indicates correlation between two superordinate themes.

The analysis with the Enosis method also identified an association, which was revealed through the primary analysis (Table 5.14). The finding was that children who drew pictures of a person with mental illness whom they were related to, e.g. grandparent, ('Embodiment') also demonstrated more knowledge and understanding of the recovery process, 'Independence' through their pictures. This could be explained because the children were linked emotionally with the person in the picture and interested more about their recovery.

Table 5.14: New associations produced by the Enosis method, which were revealed by the primary Thematic Analysis and were not present in existing Mental Health theory.

New Associations	**Interpretation**
Embodiment ↔ Independence	Children who drew the 'Embodiment' theme also drew 'Independence' in the same pictures.

→: indicates the effect of an outcome measure to a theme; ↔: indicates correlation between two superordinate themes.

5.5.4.3 Collaboration

The qualitative and the quantitative researchers collaborated closely and prospectively for the application of the Enosis method to the 'Mental Health' dataset. They both had early discussions about the potential value that the Enosis method could add as secondary analysis method and agreed to include the Enosis method in the research protocol. The quantitative researcher wrote the Enosis method in the 'Analysis' Section of the protocol and answered any questions raised by the Research Ethics Committee. The qualitative researcher planned the Thematic Analysis in such a way so as to comply with the essential requirements detailed in

Section 4.5.4 for applying the Enosis method.

During the Thematic Analysis, both researchers discussed the appropriate structure of the themes to overarching, superordinate, and sub-themes so as to ensure they can be used for the Enosis method. Thereafter, the qualitative researcher was involved during the application of the SEM by confirming if the proposed modification indices, which were proposed by the AMOS software, were meaningful to be included in the models. Their collaboration was also essential for interpreting the results by the Enosis method from clinical perspective.

5.5.4.4 Conclusion

The transferability of the Enosis method to Thematic Analysis was successful and added value to the results and conclusions of the primary Thematic Analysis. The Enosis method revealed associations that had not been identified by the qualitative researcher through the primary qualitative analysis and would have been missed, otherwise. Therefore, the Enosis can be applied in future to similar qualitative datasets, which have originally been analysed by Thematic Analysis.

5.6 Summary

One of the key objectives of this research was to to explore the transferability of the Enosis method to different qualitative datasets (Section 1.2). Following the completion of the pilot study, which demonstrated the feasibility of the Enosis method, the results in this chapter indicate that the Enosis method is transferable to three different qualitative datasets. In this section, a summary of the key findings about the transferability and the added value of the Enosis method to these three datasets is presented.

5.6.1 Transferability of Enosis

The Enosis method was applied successfully to three datasets, which had primary been analysed with a different qualitative method each, IPA, Grounded Theory, and Thematic Analysis. All three datasets were selected as suitable datasets for applying the Enosis method following the completion of the pilot study because they met the essential requirements for applying this new method (Section 4.5.4). The analyses of all three datasets revealed new associations, which had

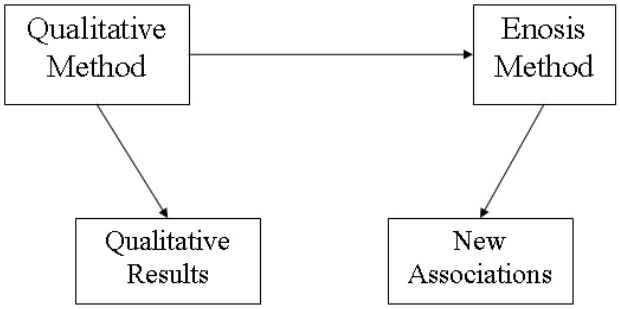
not been identified by the primary qualitative analysis and would have been missed if the Enosis method had not been applied.

The Enosis method was applied as secondary analysis method using the results (overarching, superordinate, and sub-themes) from the primary qualitative analysis and quantifying them in a way that allowed the information and findings from the qualitative analysis to be present. The Enosis method built on the knowledge of the qualitative researchers and the analysis they undertook instead of starting from scratch or ignoring it. The advantage is that the Enosis method was linked with the primary qualitative analysis and the original aims of the research. It also gave the opportunity to the qualitative researcher to interpret the findings within their clinical setting or link them with the findings from the qualitative analysis.

5.6.2 New and Existing Associations

The application of the Enosis to all three datasets revealed new associations that had not been identified by the qualitative researchers during the primary analysis (Tables 5.4, 5.5, 5.9, and 5.13). The secondary analysis of these datasets with the Enosis method added value to the primary qualitative research, as it explored the research questions from a different angle (Figure 5.22). The new associations offer to qualitative researchers alternative ways and hypotheses for answering the research problem. The new associations can be tested in future research with the view of adding to existing knowledge.

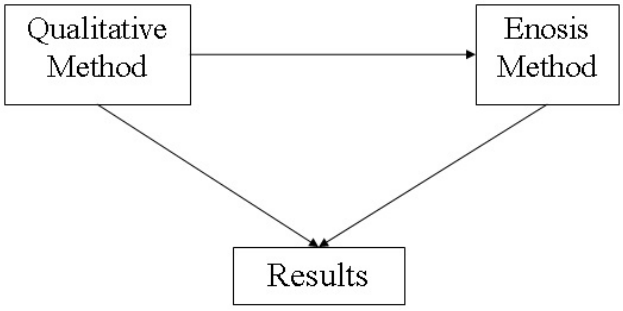
Figure 5.22: New associations revealed using the Enosis analysis method on the same data primarily analysed with a qualitative method



In addition to the new associations, existing associations that had been identified by the qualitative researcher or were present in the current theory, but not found through the primary qualitative analysis, were revealed with the Enosis method (Tables 5.5, 5.6, 5.10, and 5.14). The identification of the same associations through a second analysis method added value to

the validity of the original results (Figure 5.23). The qualitative researchers welcomed this triangulation approach for validating their original results from the primary qualitative analysis.

Figure 5.23: Validation of qualitative results through triangulation using the Enosis analysis method



The Enosis method was successfully applied to all three datasets as secondary method of analysis using the results from the primary qualitative analysis. The secondary analysis process allowed for the qualitative information, interpretation, and results produced by the qualitative researcher to be maintained and were not lost following the quantification of the data. In addition, the results from the Enosis method were able to be linked back to the original data and results from the qualitative analysis.

5.6.3 Quantification of Measurement Error

One of the key challenges for developing a new method, which can analyse complex relationships between qualitative data, which are collected through interviews, and quantitative data using quantitative techniques, was the measurement error that occurs due to imperfect quantification of rich qualitative information to a single dimension.

In the Enosis method, the themes from the primary qualitative analysis were transformed to numbers using a scoring system, the 'Reference', the 'Frequency' or the 'Proportion' (Sections 4.4.3.1 and 5.4.2.2). All three scoring systems were based on the themes from the qualitative analysis so as to take into account the qualitative information and the interpretation of this information by the qualitative researcher. The Enosis method is not discarding the qualitative information but is building on it. Nevertheless, some of the qualitative information was lost through the quantification of the qualitative information to a single dimension.

The added value of the Enosis method, compared to other methods that analyse qualitative information with quantitative techniques (Section 3.5), is that it quantifies through SEM the

measurement error that occurs due to imperfect quantification of rich qualitative information to a single dimension. In all three datasets, the measurement error was represented with circles (e.g., e1 to e10 in Figure 5.2). In the 'ADHD' and the 'Mental Health' datasets, the variance of the measurement errors was less than 0.14 in all the structural equation models (variances are not presented in each path diagram to prevent the displayed diagrams getting too crowded). Therefore, the constructed models explained the majority of qualitative information well and the unexplained information in the models was minimised.

In the 'Perfectionism' dataset, the variance of the measurement errors for the 'Features of PP' and the 'Stand Alone Feature' constructs was 13.82 and 6.46 respectively (variances are not presented in Figure 5.15). The 'Reference' scoring system was used to quantify the themes in this dataset and the minimum-maximum score for each construct was 6 - 26 and 3 - 15, respectively. Therefore, the observed variances of these two measurement errors were at 53% and 43% of the maximum scores of the two constructs. The higher variance of the measurement error in the 'Perfectionism' dataset is an indication that there might be an unexplained information left out of the final model. A more complex model structure including either an additional indicator of the latent variable or an additional latent variable or more observed variables could have reduced the measurement error.

An alternative approach of adjusting the structural equation model for the measurement error is by estimating the observed variance of the measurement error of an indicator and fixing it within the model (Schumacker & Lomax 2010). The observed variance of the measurement error can be estimated using the following formula presented by Schumacker & Lomax (2010), p.182. This formula was used in the 'Perfectionism' dataset, for estimating the observed variance of the measurement error of the 'Features of PP' construct.

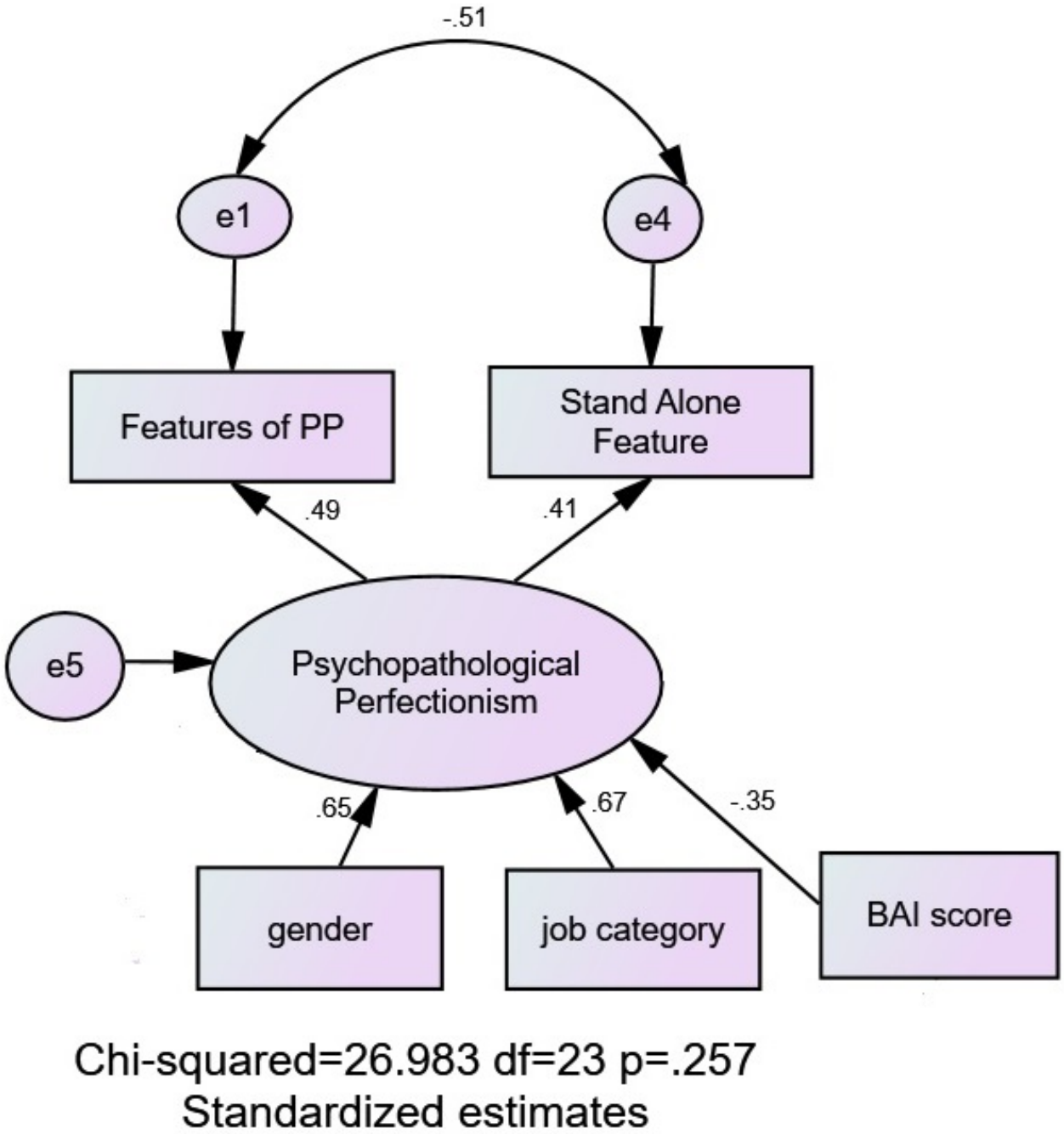
$$\text{Error Variance of X1} = (1 - \text{Reliability Coefficient}) * SD_{X1}^2 \tag{5.1}$$

where X1 = an indicator ('Features' construct) of a latent variable (PP Theory), Reliability Coefficient = the Cronbach's Alpha Reliability Coefficient of the categories consisting the indicator and SD = the standard deviation of the indicator. In the 'Perfectionism' dataset, the Cronbach's Alpha Reliability Coefficient of the 'Features of PP' construct, using the 3 categories consisting the 'Features of PP' construct, was 0.007 and the SD was 4.656. Therefore,

the error variance of the 'Features of PP' construct was 21.53 and was fixed in the structural equation model. The observed error variance of the 'Stand Alone Feature' construct was not estimated, as this construct consisted of only one category and it was not possible to estimate the Cronbach's Alpha Reliability Coefficient.

The adjusted model with the fixed error variance of the 'Features of PP' construct also fitted the data well [(23, n=20) = 26.983, p=0.257, TLI = 0.767, GFI = 0.745, AIC = 52.983] and there was evidence of covariance structure in the model (p=0.009). The AIC of the adjusted model was lower than the AIC of the original model (Section 5.4.3.2). The assumption of multivariate normality did not hold as it did not in the original model and, therefore, bootstrap method was used (multivariate kurtosis = 3.334).

Figure 5.24: Standardised estimates of a Structural Equation Model (SEM) including one latent variable, the PP theory; the indicators of the latent variable, the two constructs 'Features of PP' and 'Stand Alone Feature'; three observed variables, the gender, the job category, and the BAI score of the interviewees. The variance of the 'Features of PP' measurement error was fixed.



e1, e4, and e5 = measurement errors, → = regression weight, ↔ = correlation.

Table 5.15: Unstandardised parameter estimates of regression weights (Standard Error) and correlations between PP theory; the two constructs, 'Features of PP' and 'Stand Alone Feature'; three observed variables (gender, job category, and BAI score of the interviewees). The variance of the 'Features of PP' measurement error was fixed.

Regression Weights	**Estimate (Std. Error)**	**p-value**
Gender (female) → PP	3.703 (1.66*)	0.019
Job category ('Higher managerial, administrative, and professional') → PP	3.517 (1.52*)	0.017
BAI score → PP	-0.086 (0.09*)	0.068
Correlations	**Correlation Coefficient (r)**	**p-value**
e1 ↔ e4	-0.512	0.172

→ = indicates the effect of an observed variable to PP theory; ↔ = indicates correlation between the two constructs , r=correlation coefficient; *= bootstrap standard errors.

The PP theory had significantly higher contribution on the 'Features of PP' rather than on 'Stand Alone feature', which was also present in the original unadjusted model (standardised coefficient = 0.49, p=0.010) (Figure 5.24). 'Higher managerial, administrative, and professional occupations' endorsed significantly more the PP theory than 'other' jobs, as in the original model but the association was stronger (p=0.017) (Table 5.15). Additionally, the association of the female participants endorsing more the PP theory compared to males was stronger (p=0.019). Participants with higher anxiety scores (BAI scores) endorsed less the PP theory than those with less anxiety and this association was similar to the original model (p=0.031). The adjustment of the structural model by estimating the observed error variance of the 'Features of PP' construct and fixing it within the model resulted to a better fitted model, as the AIC of adjusted model was lower than in the original model. In addition, the estimated associations for gender and job category with the PP theory were stronger.

5.6.4 Small Sample Size

One of the challenges in the development and application of a quantitative method to analyse qualitative data is the small sample of the qualitative datasets. The three datasets used in this research, i.e. 'IPA', 'Perfectionism' and 'Mental Health', had small sample size of 22, 20, and 14 respectively. Therefore, the sample size of all three datasets met the first of the five essential requirements for applying the Enosis method, in which the minimum sample of sources should be 10 (Section 4.5.4).

The Enosis method took into account these small sample sizes by applying the bootstrap method when the multivariate normality did not hold. The bootstrap method estimated the standard errors of the parameters based on repeated samples from the original sample with replacement after each case was drawn. This meant that the bootstrap standard errors were larger, the confidence intervals wider, and the significant level (p-value) of the parameters increased. Thus, this approach provided more confidence and accuracy to the interpretation of the results.

For example in the 'ADHD' dataset, the analysis was adjusted when the impact of participants' age on assessment, treatment, and support for ADHD was explored (Section 5.3.2.3, paragraph 'Participant age'), as the multivariate normality did not hold. Thus, the reader can be confident that the observed significant result was not affected by the small sample size. Similarly, the analyses were adjusted in 'Perfectionism' and 'Mental Health Illness' datasets when the multivariate normality did not hold (Sections 5.4.3.2 and 5.5.3.2, respectively).

The small sample size restricted the complexity of the structural equation models as the simplest models were fitted first using one latent and observed variable, and then more observed and latent variables were added in the models. For example, in the 'Mental Health' dataset the more complex models included two latent and one observed variables, as when more variables were added in the models the data were not interpreted as well.

The multiple nested models were compared to each other so as to identify the most complex possible that also best interpreted the data given the small sample size. This was achieved by applying the Akaike Information Criterion (AIC) for choosing a model with good fit when multiple nested models were compared. This criterion took into account the number of estimated parameters and was not affected by the small sample size. This ensured that the model that best interpreted the data in each analysis was chosen.

The results from the analysis of all three datasets demonstrated that the application of the Enosis method in qualitative datasets with small sample sizes was feasible, and yielded models that interpreted the data well and produced accurate results.

5.6.5 Prospective and Retrospective Consideration of Enosis

While the Enosis method was used as secondary method of analysis, it was not considered to be applied to qualitative data only retrospectively ('ADHD' and 'Perfectionism' datasets) but also prospectively ('Mental Health' dataset). The 'ADHD' and 'Perfectionism' datasets had already been analysed and the results had been published, when the author contacted the qualitative researchers to ask for their permission to use the qualitative data for applying the Enosis method ('retrospective' approach).

On the other hand, the qualitative researcher of the 'Mental Health' dataset was in the process of writing the research protocol and submitting to NHS R&D Department for approval, when she agreed to collaborate with the author. The Enosis method was, then, written in the research protocol as secondary analysis method of the qualitative data ('prospective' approach).

In both considerations of applying the Enosis method, prospectively and retrospectively, the appropriate governance approvals were given without any objections or additional questions by the relevant committees. In addition, useful results and conclusions were revealed from both applications. Further discussion about the advantages and disadvantages of using Enosis as secondary analysis method, the prospective and retrospective approaches, and any future ethical considerations is presented in Section 6.3.4.

5.6.6 Collaboration Between Qualitative and Quantitative Researchers

It was apparent that the collaboration between the qualitative and quantitative researchers was essential for the successful application of the Enosis method to all three datasets. There were three levels of collaboration: during the identification and selection of an appropriate dataset for applying the Enosis method; through the application of the Enosis method; during the interpretation of the results.

A dataset was suitable for applying the Enosis method only if it was satisfying the essential criteria, which were developed following the pilot study (Section 4.5.4). When the Enosis method was considered retrospectively to be applied to a dataset, e.g. 'IPA' and 'Perfectionism', the collaboration was essential so as to understand how the qualitative analysis had been undertaken and the results had been presented. This collaboration helped to determine whether the proposed dataset was suitable for the Enosis method. The collaboration was even more

productive when the Enosis method was considered prospectively during the development of the research proposal, e.g. 'Mental Health' dataset. At that stage the two researchers planned the research methodology appropriately so as to be able to apply the Enosis method.

The qualitative and quantitative researchers discussed whether the quantification of the themes from the qualitative analysis was meaningful and considered the appropriate scoring system, 'Reference', 'Frequency' or 'Proportion'. During the application of the SEM, the quantitative researcher was in regular contact with the qualitative researchers to ensure that the explored models and proposed modification indices could have clinical interpretation. It was important for the qualitative researchers to understand in more depth how the Enosis method was applied so as to be able to guide more effectively the quantitative researcher.

It was during the interpretation of the Enosis method's results that the collaboration between the qualitative and quantitative researchers was more fruitful, as new and existing associations had to be explained within the content of the original research. The interpretation of the results added value by exploring the primary and secondary research questions from an alternative perspective.

5.6.7 Conclusion

An initial objective of the project was to explore the transferability of the Enosis method to different qualitative datasets. The results in this chapter indicate that the Enosis method is transferable to multiple datasets, which had been primarily analysed with three different qualitative methods, IPA, Grounded Theory, and Thematic Analysis.

Taken together, the results from all three datasets suggest that the application of the Enosis method as secondary analysis method reveals new associations, which were not identified by the primary qualitative analysis and would have been missed if the Enosis method had not been applied. These new associations together with the identification of existing associations offer the opportunity to qualitative researchers to explore the original research questions from an alternative perspective or to triangulate their original results from the primary qualitative analysis. A benefit of the Enosis method is that results from the primary qualitative analysis, i.e. themes, were used to develop the scoring systems and, therefore, the findings from the new method can be interpreted within a clinical setting or be linked with the findings from the

qualitative analysis.

The results from the application of the Enosis method to all three datasets suggest that the measurement error, which occurs due to imperfect quantification of rich qualitative information to a single dimension, can be quantified by measuring its variance. In addition, when the variance of the measurement error is high, there are alternative ways of adjusting the structural equation model by including either an additional indicator of the latent variable or an additional latent variable or more observed variables. Further analysis of the final structural equation model for the 'Perfectionism' dataset adjusting for high measurement error showed that it is possible to produce a model with better fit and stronger associations.

Another objective of this research was to determine the nature of the required collaboration between the qualitative and the quantitative researchers. The results in this chapter indicate that the collaboration between these researchers is essential in three levels: during the identification and selection of an appropriate dataset for applying the Enosis method; through the application of the Enosis method; during the interpretation of the results. The collaboration between the qualitative and quantitative researchers was successful at all three levels when the Enosis method was applied in all three datasets.

The next Chapter 6 moves on to discuss the research findings in relation to the research aim and objectives, and to the challenges faced, any limitations, and opportunities for future research.

6. DISCUSSION

6.1 Introduction

This chapter provides synthesis and discussion about the development, testing, and implementation of the Enosis method. It presents how the research aim, objectives, and the challenges, mentioned in Sections 1.2 and 1.3, have been addressed. This chapter concludes with any limitations related to the Enosis method and opportunities for future research.

6.2 The Research Landscape

Firstly, it is worth considering what has changed during the last eight years since beginning this research in terms of using quantitative techniques to analyse qualitative data. In 2011, Hanbury et al. (2011) emphasised the requirement for a method that will bridge the gap between qualitative and quantitative methods by taking contextual information into account in quantitative analyses. This method should also acknowledge and take into account the small sample size of the qualitative dataset. The same year, world experts in mixed methods research, John W. Creswell, Ann Klassen, Vicki L. Plano Clark, and Katherine C. Smith, published the 'Best Practices for Mixed Methods Research in the Health Sciences' and highlighted the need for diverse methodologies in the field of mixed methods research, with the intentional collection of both quantitative and qualitative data and the combination of the strengths of each to answer research questions (Creswell et al. 2011).

A comprehensive systematic literature review, about how qualitative information from interviews has been analysed using quantitative methods, was conducted and published in 2014 (Fakis et al. 2014) (Chapter 2). The systematic literature review highlighted that the quantitative methods, which had already been used to analyse qualitative information, were limited to statistical methods, such as Chi-squared test, Independent T-Test, Mann U Whitney, and linear regression, that did not measure the error occurred due to imperfect quantification of

rich qualitative information or inadequate modelling (Section 2.4.2, Paragraph 'What?'). Even the more complex statistical analysis methods that were applied in five out of the twenty three references failed to quantify the measurement error. This review also suggested that statistical techniques were mainly applied on qualitative data, which had primarily being analysed by different qualitative methods, such as content analysis, grounded theory, and thematic analysis (Section 2.4.2, Paragraph 'When?').

The systematic literature review identified a knowledge gap for a method that can analyse complex relationships between qualitative data, which are collected through interviews, and quantitative data (e.g. participants' age and gender), together with the complex associations among the qualitative findings by taking into account the measurement error occurred due to imperfect quantification of rich qualitative information into numbers and the small sample size of the qualitative dataset (Fakis et al. 2014).

The review was updated in July 2018 to identify any additional publications since 2014 using the same search terms and databases as in the Fakis et al. (2014) review. It was remarkable that 1952 potentially suitable unique publications were identified, which is higher than the number of publications identified between 2000 and 2014 during the first literature search (1249 references) using the same search terms and websites. Nine of the 1952 identified articles were eligible and included in the final literature review. This highlights the expansion of mixed method research and the higher acceptability of Journals to publish mixed method research in recent years. This trend had been highlighted by Plano Clark (2010) since 2010, when they reported a dramatic increase in the use of 'mixed methods' or 'multimethods' words in funded projects in USA since 1996. Considering that seventeen out of twenty three studies, which were included in the synthesis stage, were conducted and written by authors in United States, it explains the significant increase of references in the mixed methods area.

It is evident following the update of the systematic literature review in July 2018 that the need for developing a new method, which can take into account the small sample size of the qualitative dataset and the estimation of the measurement error when qualitative data are quantified, is as relevant as it was at the start of this research.

The main aim of this research was to develop a new method that could analyse complex relationships between qualitative data, which are collected through interviews, and quantitative

data using a quantitative technique. A discussion about the research findings related to the research aim and the objectives listed in Section 1.2 will be presented in the following Section 6.3. The added benefit of applying the Enosis method, which was the last research objective, are presented in the 'Conclusions' Chapter in Section 7.8.

6.3 The Enosis Method

6.3.1 Development and Feasibility of the Enosis Method

The first objective of this research was the development and testing of a new method that could take into account the key findings from the systematic literature review, which were about analysing the complex qualitative information with a quantitative method; quantifying the qualitative information to be suitable for the statistical analysis; taking into account the potential loss of information due to imperfect quantification of rich qualitative information into numbers; adjusting for the small sample size of the qualitative dataset in the statistical analysis. From the very beginning, the process for developing the new method was split in two parts: one, to identify a way the qualitative information can be quantified, and two, to identify a flexible statistical method that can take into account the recommendations from the systematic literature review. The challenges faced during both parts are discussed further in Sections 6.4.2 and 6.4.3, respectively.

A new mixed method, called 'Enosis', was then developed to analyse the qualitative data derived from semi-structured and unstructured interviews with a qualitative technique. The Enosis method was a secondary method of analysis (Section 6.3.4) following the primary qualitative analysis and consisted of two simple steps:

1. quantifying the themes, which have been produced through the primary qualitative analysis, using a scoring system and

2. applying Structural Equation Modelling to the estimated scores from step 1.

The plausibility of the Enosis method was initially tested in a pilot study using qualitative data derived from semi-structured matched interviews with maternal grandmothers and birth mothers, who had a child with a diagnosis of ADHD (Section 4.4). The qualitative data had

originally been analysed with the IPA qualitative technique and the results were presented in superordinate, overarching, and sub-themes.

The pilot study demonstrated that the Enosis method is feasible for analysing the 'IPA' qualitative dataset using quantitative technique and taking into account the recommendations from the systematic literature review. The qualitative information was interpreted in a meaningful way through the derived scores, which were based on the themes from the qualitative analysis, allowing continuity between the research aims, the conclusions from the IPA analysis and the results from the Enosis method (Section 4.5.1). In addition, the application of SEM in the derived scores revealed a couple of suggestions for future application of SEM as part of the Enosis method:

1. scores should be produced for all superordinate themes included in SEM, as any missing values will affect the estimation of modification indices, and

2. if the estimated model covariance is negative, to increase the sample size, simplify the model or fix the covariance to a non-negative value (e.g. equal to 0).

To date, there is not any publication that reports the analysis of qualitative data with SEM and, therefore, the comparison with existing literature is not feasible. Further discussion about how the Enosis method addressed the potential loss of information due to imperfect quantification of rich qualitative information into numbers and the adjustment of the statistical analysis due to the small sample size of the qualitative is presented in Sections 6.4.3.1 and 6.4.3.2, respectively. Finally, five essential minimum requirements were specified in the pilot study for applying the Enosis method to future qualitative datasets (Section 4.5.4). The first requirement of a minimum sample to be 10 was developed through the application of Enosis method in the pilot study (Section 4.4.3.2, Paragraph 4.4.3.2.3). It was evident that SEM could not run for any sample less than 10, even with the simplest model. The second requirement of the final qualitative results to be organised into themes was introduced in order to quantify the qualitative information in a way that the original qualitative information is retained or represented as much as possible in the scoring systems (Section 6.4.2). The next requirement about the unit of the qualitative analysis is important for the readers so as to understand at what level the data collection, analysis, and interpretation will be performed. For example, if focus groups

are used as source data, it is essential to define that the unit of analysis are the focus groups rather than the individuals participating within each focus group, as the qualitative themes are developed and interpreted per focus group and not per individual. In this case the first essential requirement of a minimum sample to be 10 will refer to the number of focus groups and not to number of individuals within each group. The fourth requirement about recording whether a sub-theme was mentioned or not by each participant was the basis for developing any of the three scoring systems (Sections 5.3.1.1, 5.4.2.2 and 5.5.2.2). The requirement about all interviewees to be asked about the same topic(s) was the last one to be introduced following discussions with the qualitative researchers and understanding that not all interviewees are asked exactly the same questions, especially in semi-structured or unstructured interviews. While this is common practice in qualitative methods, it is important for applying the Enosis method that the interviewees are asked the same topic(s) as a minimum. This ensures that any comparisons and the interpretation of the derived associations from the Enosis method is meaningful.

Researchers can use this list of five essential requirements prospectively to plan appropriately the methodology of their study so as to be suitable for applying the Enosis method.

6.3.2 Transferability of the Enosis Method

The second objective of this research, following the successful application of the Enosis method to a pilot dataset, was to test its transferability to more qualitative datasets, which had been primarily analysed with different qualitative methods. The decision of how many different datasets to use was mainly based on the time that was required to identify a qualitative dataset that complied with the five essential requirements, the availability of the qualitative researcher to collaborate, the feasibility of obtaining governance approvals as discussed in Section 6.3.4 and the timing of completion of the qualitative analysis in relation to the time constrains of this research.

Twenty six studies that potentially matched the five essential requirements for applying the Enosis method were identified. Of those only three complied with the five essential requirements and were used to test the transferability of the Enosis method. Currently, there is not any publication that specifies the exact number of required studies (or samples) for testing the

transferability of a mixed method (not for a lab / clinical test or a structured questionnaire). An alternative approach that has been used for testing the transferability and validity of a new quantitative method is on simulated data, for example in Kiebel et al. (1999) research. However, this approach was not feasible for the Enosis method, as the primary source was qualitative data from interviews, which cannot be simulated or, even if simulated, cannot be analysed by a qualitative method and interpreted in a meaningful way. It was, therefore, decided following discussions with the supervisors that the variety of different qualitative methods used in the identified datasets is more important (IPA, Thematic Analysis, Grounded Theory) rather than the quantity of one qualitative method.

Out of the twenty six potential studies only three met the essential requirements (Section 5.2). The majority of studies were rejected because they were under development and at the time the Enosis method was considered the qualitative analysis had not started yet. A potential suitable source could have been the Economic and Social Data Service and the online depository of completed studies. However, the results from the qualitative analysis, i.e., the themes, their structure, and whether they were present in each transcript, were not available but only the original transcript as raw data. The rest of the twenty six studies were rejected for a variety of reasons such as smaller sample than 10, the qualitative researcher was not available for a collaboration, the qualitative analysis was ongoing and the sub-themes had not been checked in all transcripts (Figure 5.1).

The transferability of the Enosis method was tested and proven on three datasets, 'ADHD', 'Perfectionism', and 'Mental Health', which had been primarily analysed with IPA, Grounded Theory, and Thematic Analysis, respectively. The themes from the qualitative analyses were quantified using the 'Proportion' or the 'References' scoring system (Sections 5.3.1.1, 5.4.2.2 and 5.5.2.2) and SEM was applied in the estimated scores (Sections 5.3.1.2, 5.5.2.3, and 5.4.2.3). The themes from the qualitative analyses were successfully quantified into scores and the SEM was applied without any errors.

The application of the Enosis method in all three datasets revealed new associations that were not identified by the primary qualitative analysis and would have been missed if the Enosis method had not been applied (Tables 5.4, 5.5, 5.9, and 5.13).

For example in the 'ADHD' dataset, a new significant positive association was identified be-

tween the number of adult people living in household and the reported successes, failures, and gaps regarding ADHD treatment and support services (Figure 5.2). The clinical interpretation of this finding may be that families with more adult household members (e.g. parents, grandparents, and extended family members) experience and comment more upon both difficulties and successes concerning ADHD and raise issues more frequently than those families with fewer members (Fakis et al. 2015).

In the 'Mental Health' dataset, a new significant positive association was revealed between the children who drew pictures of a person with mental illness whom they were related to, e.g. grandparent, and their level of knowledge and understanding of the recovery process (Figure 5.20). It is worth exploring the clinical interpretation of this finding in future research, about children who are linked emotionally with the person in the picture are also more interested about their recovery.

These new associations answered the research questions from a different perspective and provided the qualitative researchers with alternative ways and hypothesis for understanding and approaching the research problem. They can also be used to inform the power calculations for estimating the sample size of future quantitative research. It is, although, important these new associations to be assessed for their theoretical justification in future research before they are implemented into practice (Greene et al. 1989).

The Enosis method also generated associations that had been identified by the qualitative researcher or were present in the current theory but not found through the primary qualitative analysis (Tables 5.5, 5.6, 5.10, and 5.14).

For example in the 'ADHD' dataset, a structural model explored the clinician's hypothesis that families who were confused about the cause and co-morbidities related to ADHD were more likely to mention the need for one centralised service about ADHD (Robinson 2010). This pattern was revealed through the Enosis method, where families who referred to 'co-morbidity, confusion, and convergence' regarding causality of ADHD mentioned the 'multiple assessments and fragmented services' of ADHD treatment less (Figure 5.2).

The identification of these associations added value to the validity of the original results, as the qualitative researchers were able to triangulate the original results from the primary qualitative analysis. Therefore, the Enosis method can contribute to theory building by providing

additional evidence to existing hypotheses and theoretical models (Briggs 2007).

The successful application of the Enosis method in three different datasets, which were primarily analysed with three different qualitative techniques, is strong evidence of the transferability of the Enosis method. Its application can be extended to more datasets, which are primarily analysed with qualitative techniques beyond the IPA, Grounded Theory, and the Thematic Analysis. The only condition for applying successfully the Enosis method is that the dataset must meet the essential requirements listed in Section 4.5.4, 'Essential Requirements for Applying the Enosis Method'.

6.3.3 Collaboration of Qualitative and Quantitative Researchers

The third objective of this research was to determine the nature of the required collaboration between the quantitative and qualitative researchers to ensure the successful application of the Enosis method. The qualitative and quantitative methodologies have been widely used together in mixed method research since the late 80s and early 90s when "research moved beyond simply using qualitative and quantitative methods as distinct, separate strands in a study" (Creswell & Plano Clark 2011, p.20). The mixture of both methodologies was also supported by Patton (1988) and Hassard (1993), who have reported that they can be used together, as their connection with different epistemological and ontological assumptions is not fixed and ineluctable.

Qualitative research is data-driven, rather than rule-driven method, and good analysis process requires the collaboration of multiple researchers (Richards 1999). Richards (1999, p.2), who promoted qualitative teamwork, explained that "most processes of theory constructing either require or are assisted by the synthesis of multiple, unique interpretations or constant comparison of data sources". She advised that collaborative work in the synthesis and analysis stage is essential by including researchers with relevant and complementary skills, allowing time for reflection, reforming and rethinking, and comparison of different interpretations.

It was common at that time for either researchers to work and apply both methodologies in the same research in isolation and not in collaboration. Bryman (2007) interviewed 20 UK social scientists, who had published books and journals during the period between 1994 and 2003, about the barriers for integrating qualitative and quantitative approaches. The

interviewees reported that while it is important for research teams to be composed of qualitative and quantitative specialists, "the presence of skill specialisms may lead to compartmentalisation of roles and responsibilities that can hinder the integration of findings".
Saludadez & Garcia (2001, p.10) highlighted about the collaboration between the qualitative and the quantitative researchers that:

> Qualitative and quantitative researchers can explore research problems where they can collaborate and work in a complementary manner to provide a more holistic solution to the inquiry. By complementary, we mean that 'each approach is used in relation to a different research problem or different aspects of a research problem' Brannen (1992, p.12), and not in the sense of subordinating qualitative to quantitative methods or vice versa.

The systematic literature review conducted in 2014 and updated in 2018 also highlighted the lack of collaboration and integration of the qualitative and quantitative researchers at the synthesis or interpretation stage. It was common practice for the qualitative and quantitative parts of the same mixed methods study to be conducted separately, and the results to be reports without real integration with each other.
This research evidences that the Enosis method bridges the gap between the qualitative and quantitative researchers, as the key element for the successful application of the new method was the strong collaboration between the two researchers. It was essential for the health care professional, who conducted the qualitative analysis, to get involved during the identification and selection of an appropriate dataset for applying the Enosis method through the application of the Enosis method and during the interpretation of the results. Equally the quantitative researcher, beyond the knowledge and experience of SEM analysis, was required to engage with the qualitative researcher to understand the primary research aim and questions, and how the proposed qualitative analysis and its output can meet the five essential requirements listed in Section 4.5.4.
The qualitative researchers were able to guide the quantitative researcher during the identification and selection of an appropriate dataset due to their in depth knowledge of the qualitative data and the qualitative technique they applied. The essential requirements for applying the Enosis method were checked and, if not met, both researchers engaged into a dialogue about

identifying possible solutions. For example in the 'ADHD' dataset, the sub-themes had not been coded in all the transcripts and, therefore, the outstanding transcripts were checked by the qualitative researcher for the presence of the sub-themes so as to be able to estimate the scores and quantify the qualitative data for all interviewees.

Similarly during the application stage of the Enosis method, the collaboration was essential for deciding the appropriate scoring system for quantifying the qualitative information (Sections 5.3.1.1, 5.4.2.2, and 5.5.2.2) and linking the qualitative results and structure with the latent variables and indicators in SEM (Sections 5.3.1.2, 5.4.2.3, and 5.5.2.3). In addition, the models explored in SEM and the proposed modification indices were discussed between the quantitative and qualitative researchers to ensure their clinical justification before they were applied. None of the qualitative researchers had prior experience or knowledge of SEM but they were all capable of understanding how the models were created and applied, as well as contributing to the interpretation of the findings. Thus, it is not an essential requirement for the qualitative researchers to have knowledge of SEM for applying the Enosis method as long as they collaborate with a researcher (or statistician) with such knowledge and experience, and vice versa.

The collaboration became even more productive and interesting at the interpretation stage of the results from the Enosis method. It was fascinating to experience how significant statistical results were linked with meaningful clinical interpretations (Tables 5.5, 5.6, 5.10, and 5.14). The qualitative researchers were also positively surprised with the identification of new associations that were not apparent following the primary qualitative analysis (Tables 5.4, 5.5, 5.9, and 5.13). Both the qualitative and quantitative researchers appreciated at that stage the added value of the Enosis method for exploring the same research question from a different perspective, which had not been identified through the qualitative analysis.

Saludadez & Garcia (2001, p.9) highlight in their research the general perception that "the relationship of qualitative research with quantitative research is that of subordination or what Brannen (1992, p.24) calls 'pre-eminence of the quantitative over the qualitative (p.24)'". They emphasise that

> the challenge remains to bring the qualitative-quantitative research relationship to the level where the two are equal.

It is apparent that the Enosis method strengthens the collaboration between the qualitative and quantitative researchers together with their understanding about the value and importance of each other's methods, methodologies, and epistemologies. It brings the qualitative-quantitative research relationship to a level where the two are collaborating on equal terms. It is important that both qualitative and quantitative researchers are open minded and receptive to alternative approaches of analysing and interpreting the same research questions in order to form a productive relationship. The Enosis method facilitates the constructive dialogue between the quantitative and the qualitative researchers, as it creates the required space for both scientists to meet and share ideas.

Dr Robinson acknowledged that while his preferred and natural focus and expertise are related to qualitative enquiry and research methods, our collaboration in the 'ADHD' dataset using the Enosis method added an unexpected and rich dimension to his research project and experience. He highlighted that

> our collaboration added increased rigour and greater validity to the project, as it enabled us to gain greater feedback and to look at the findings with different eyes in generating more ideas and possibilities.

He also emphasised the equal nature of our collaboration as he valued our meetings and discussions, as they were a rich opportunity to share ideas, information, resources, and possibilities both in relation to the research processes, and to the data generated. In essence, both our collaboration and the Enosis method greatly enhanced Dr Robinson's research journey, the richness of the data and the utility relating to the results.

The timing of the collaboration between the two qualitative and the quantitative researchers, and the consideration of using the Enosis method can be either 'prospective' or 'retrospective', and it is further explained in Section 6.3.4.1.

6.3.4 A Secondary Analysis Method

The third objective of this research was to explore the key aspects of applying the Enosis method as secondary analysis method to already collected and analysed data with qualitative methods. The use of a method as secondary analysis method has some potential advantages and challenges (Heaton 2009, Vartanian 2011). One of the challenges is the difficulty of interpreting

the results from the secondary quantitative analysis within the clinical context of the primary research.

The Enosis method dealt with this challenge based on the strong collaboration between the qualitative and quantitative researchers (Section 6.3.3). The qualitative researcher was involved in all stages of the Enosis method and particularly during the interpretation of the results. An advantage of the Enosis method is that the results from the primary qualitative analysis were first quantified using an appropriate scoring system (Section 6.4.2) and then analysed using SEM (Section 6.4.3). This process allows the results and conclusions from the Enosis method to be linked directly back to the original research question and the qualitative findings. In addition, the Enosis method builds on the primary qualitative results rather than discards them. In this way, qualitative information is transferred and taken into account during the secondary analysis.

Another challenge of using a secondary analysis method is the ethical and legal concerns of re-using data in secondary analysis potentially without the consent of the participants together with any difficulty of obtaining governance and Ethics approvals. The way that the Enosis method suggests to overcome this challenge depends on the timing of considering to use the method. Further discussion and proposed suggestions around this challenge are presented in the next Section 6.3.4.1.

On the other hand, the application of the Enosis method as secondary analysis method has displayed some significant benefits. An important benefit of the Enosis method is that it produces knowledge above and beyond the knowledge that was produced by the qualitative analysis alone and thus improves the quality of the research (Flick 2018). In all three datasets, the Enosis method generated new associations that were not identified through the primary qualitative analysis (Section 6.3.2). Researchers have, therefore, the opportunity to explore their research questions from two different angles, qualitative and quantitative, and generate new hypothesis which can be tested in future research (Figure 5.22).

In addition, the secondary analysis of all three datasets using the Enosis method revealed associations and hypothesis, which had been reported in the literature or in the original qualitative results (Abeyasekera 2005) (Section 6.3.2). In this case, the Enosis method can be used as a methodological triangulation (between-methods) approach, where the findings from the qual-

itative analysis are compared with the findings from the Enosis, to allow the researchers to explore the phenomenon widely from different perspectives (Jick 1979, Denscombe 2017) (Figure 5.23). It is therefore the suggestion to use the Enosis method as complementary to primary qualitative analysis and not to replace it (Barrett 2007).

An added value of the Enosis method is that the secondary quantitative analysis of the primary qualitative data made the research results and conclusions appealing to a wider audience, who is interested or more receptive to quantitative methods. There are Journals, such as BMJ, and organisations, such as NICE, that are interested in findings and results from quantitative research so as to influence or inform policy making and changes in practice. Decision makers are often using evidence from large randomised controlled trials or systematic and Cochrane reviews to inform their decision about new policies and practice changes. However, there is a widespread recognition that a variety of evidence, including qualitative and quantitative, that has been systematically collected and critically reviewed for their quality should be used by policy and decision makers (Mays et al. 2005, Creswell et al. 2011, Carayon et al. 2015).

Carayon et al. (2015) encourages healthcare researchers, who study complex healthcare problems in human factors and ergonomics (HFE) research to combine qualitative and quantitative techniques, especially in the data analysis stage. Qualitative researchers have the opportunity to analyse their qualitative data using a quantitative technique and add another dimension when answering their research question as proven in the findings of this study using the Enosis method. Qualitative and quantitative research methods are used complementary to each other through the Enosis method in primary research. Qualitative researchers will be able to widen their evidence base for answering the research question so as to strengthen their arguments and conclusions.

Finally, an advantage of using the Enosis method as secondary analysis method is that the primary collection and qualitative analysis of the data has already been undertaken so there is not any additional cost or time for collecting new data, as the existing ones are used (Heaton 2009, Vartanian 2011).

Thus, it is evident in this research that using the Enosis method as secondary analysis method adds significant value to the primary qualitative research.

6.3.4.1 'Prospective' and 'Retrospective' Consideration of the Enosis Method

While the Enosis method is always applied after the qualitative analysis, the time of consideration for using this method and, therefore, the time of collaboration between the qualitative and quantitative researchers can be either 'prospectively' or 'retrospectively'. The 'prospective' consideration of using the Enosis method is during the study concept and design stage, when the research protocol is under development and before the qualitative data have been collected. The 'retrospective' consideration is after the governance and Ethics approvals have been granted and the qualitative data have been collected. In this research, the Enosis method was considered in two datasets, 'ADHD' and 'Perfectionism', retrospectively and in one, 'Mental Health', prospectively.

An advantage of the 'prospective' consideration of the Enosis method is that the required governance and Ethics approvals will be granted quickly without any challenges of using this method. The process for obtaining the appropriate governance approvals from NHS Research Ethics Committee (REC), the University of Derby Ethics Committee and the NHS R&D Departments was significantly lengthier and more stressful for the 'ADHD' and the 'Perfectionism' datasets rather than for the 'Mental Health' dataset, where a 'prospective' collaboration was set up. For the first two datasets, minor amendments to the original approvals had to be submitted to REC and NHS governance bodies for consideration and approval. It was worth noticing that if the projects had been declared closed by the NHS REC, then a new application would have been required as an amendment was not accepted. In addition, two NHS organisations followed two different approaches for issuing approvals for the 'ADHD' and the 'Perfectionism' datasets. The Derbyshire Healthcare NHS Foundation Trust issued a letter of access but not R&D approval for the 'ADHD' dataset, while the RM&G Consortium for Kent and Medway issued an R&D approval.

On the other hand for the 'Mental Health' dataset, an early enquiry was submitted to the appropriate R&D Department at North Staffordshire Combined Healthcare NHS Trust about the governance approval requirements and it was confirmed that only University Ethics approval was necessary. Therefore, the time from submission to obtain all the required approvals was 4 and 2.5 months for the 'ADHD' and the 'Perfectionism' datasets respectively, while for the 'Mental Health' dataset was 1 month. The 'prospective' consideration of the Enosis method in

the later dataset meant that the new method was included in the original submitted paperwork for University Ethics approval and there was not any requirement for retrospective amendments. It is evident that the governance process for obtaining R&D approvals was inconsistent between different NHS organisations and, nevertheless, confusing for the researchers.

One ethical consideration of applying a secondary analysis method is that the participants have not given their consent for their data to be shared with another researcher or used as part of secondary analysis. The advantage of the 'prospective' approach is that the Enosis method is part of the original Ethics application and is detailed in the study protocol, hence the participant's consent covers the secondary analysis of the qualitative data as well. The way that this issue was dealt with in the 'ADHD' and the 'Perfectionism' datasets, where the Enosis method was considered 'retrospectively', was by submitting to the Research Ethics Committee (REC) and the NHS R&D Department a minor amendment requesting access only to anonymised patient data for secondary analysis (Sections 4.4.2.3 and 5.4.2.1). Both the REC and the NHS R&D Department granted approvals given that the studies had not been declared closed, as this approach followed the Research Governance Framework 2005 (Department of Health and Social Care 2005).

Another advantage of the 'prospective' consideration is the efficient use of time for identifying suitable dataset to apply the Enosis method. In this thesis, 26 potential datasets were screened and only 3 met the essential requirements for applying the Enosis method (Section 5.2). The rejected datasets did not meet at least one of the requirements because the data had been collected and analysed before considering to apply the Enosis method. The personal time that was spent for identifying potential datasets through peers, the University Library or National databases, setting up meetings with qualitative researchers to discuss the essential requirements and set up a collaboration was considerably long and can be avoided if the quantitative and qualitative researchers decide to collaborate prospectively. In the 'Mental Health' dataset, both researchers met and discussed their collaboration during the study design and protocol development stage. It was more productive to set up this prospective collaboration, as both researchers were able to design and plan the data collection and qualitative analysis in such a way that the essential requirements for applying the Enosis method were met.

On the other hand, a 'retrospective' consideration of applying the Enosis method has the

advantage that once the Enosis method has been applied, the results can be immediately used in conjunction with the qualitative ones to strengthen the evidence for answering the research questions and impact on practice changes. In the 'ADHD' dataset, the qualitative data were published at the time that the Enosis method was applied. This meant that the qualitative researcher was able to use the results from the Enosis method immediately to either triangulate the original findings and strengthen his decisions for practice changes or use the new hypothesis to inform his future research proposals. In contrast, the findings from the qualitative analysis in the 'Mental Health' dataset have not been published or implemented into practice yet, while this will also make the adoption of the results from the Enosis method more challenging.
Thus, this research suggests that the Enosis method can be considered not only 'prospectively' at the time of the study design but also 'retrospectively' following the governance and Ethics approvals have been granted and the qualitative data have been collected.

6.4 Challenges

During the development and application of the Enosis method several challenges were identified. The main discussion points for each challenge mentioned in Section 1.3 are elaborated in this section.

6.4.1 Epistemology, Theoretical Perspective, and Methodology of the Enosis Method

One of the challenges, while developing the Enosis method for bridging the knowledge gap identified through the systematic literature review (Section 2.6), was to identify the epistemology, theoretical perspective, and methodology that underpins the new method.
The Enosis method combines the qualitative and quantitative methodologies, as qualitative data are quantified and analysed with a quantitative technique, and the results are used to answer the research questions. Careful consideration was given whether the Enosis method sits within the quantitative, qualitative or mixed method methodological area. Qualitative methods aim to understand and explain social phenomena and their contexts through the participants' perceptions, beliefs, stories, and experiences (Ritchie & Lewis 2003). While the Enosis method has similar aim, as it is exploring the research questions of the primary qualitative research, it does not fit with the definition of qualitative research from Strauss & Corbin (1998, p.11), as

it uses SEM for the analysis of the data:

> By the term 'qualitative research' we mean any type of research that produces findings not arrived at by statistical procedures or other means of quantification.

On the other hand, the aim of quantitative research is through mathematical models and quantitative analysis to validate, reject or refine hypotheses, and make generalisations (Walliman 2018). This aim does not fit with the purpose of the Enosis method, which is applied as secondary analysis method and aims to explore the research questions of the primary qualitative research from different angle and perspective.

The Enosis method combines the qualitative and quantitative methodologies, as qualitative data are quantified and analysed with a quantitative technique, and the results are used to answer the research questions. Thus, it fits within the mixed method area (Creswell 2014). Specifically, it fits into the sequential design of mixed methods, as the quantitative analysis is applied following the primary qualitative analysis (Creswell 2014). Patton (1988) and Hassard (1993) support the view that both methodologies can be used together, as their connection with different epistemological and ontological assumptions is not fixed and ineluctable.

In this research, the qualitative and quantitative researchers collaborated closely for the successful implementation of the Enosis method and the interpretation of the results in all three datasets. They used the Enosis method to explore and understand the reality and truth about the research questions from a different perspective (Tashakkori & Teddlie 1998, 2003, Creswell 2013, 2014, Morgan 2014).

This research evidences that the Enosis method can be used for multiple purposes based on the mixed methodology, such as:

- Initiation: The Enosis method explores qualitative data from a different perspective that the qualitative analysis cannot support (for example, associations between themes and participants' demographics) and generates new associations and hypotheses, which are not identified through the primary qualitative analysis. These new associations can inform the design of future definitive research (Greene et al. 1989) (Section 6.3.2),

- Complementary & Triangulation: The Enosis method generates associations and hypothesis that support the existing hypothesis and ideas, which emerged from the original

qualitative analysis (Tashakkori & Teddlie 2003). The results from the Enosis method are triangulated with the results from the original qualitative analysis so as to complement each other Greene et al. (1989), Denscombe (2017) (Section 6.3.2), and

- Expansion: The Enosis method is not only generating new associations but also associations that support and expand the existing understanding and knowledge of complex qualitative phenomena (Tashakkori & Teddlie 2003). Based on Brewer (2000) and Fielding & Schreier (2001), the value of knowledge from many sources (i.e., the original qualitative analysis and the Enosis method) is evaluated better, rather than from one source of knowledge.

It is worth noticing that other methods also exist, such as content analysis and Q method, that aim to use numbers in order to interpret qualitative information. The purpose of the Enosis method is not to compete with or replace these methods, as they all have some similarities and differences (Section 3.5). The Enosis method addresses one of the main disadvantages and differences with these methods, which is to take into account the measurement error occurred due to imperfect quantification of rich qualitative information into numbers and the small sample size of the qualitative dataset.

Following the recognition of the methodological area, mixed method, in which the Enosis method sits, the theoretical perspective that underpins the new method was defined. The new method had to be flexible in combining different theoretical perspectives so as to be able to analyse qualitative data with quantitative techniques. This research evidences that the Enosis method is a flexible approach, as participants' perceptions and beliefs are retained through the quantification of qualitative information using a scoring system based on the themes from the primary qualitative analysis. At the same time it measures and estimates the association between the qualitative themes and the participants' characteristics, as well as among the themes. These assumptions fit best with the theoretical perspective of pragmatism, which believes there is more than one scientific method to obtain new knowledge and understand the phenomena and reality (Creswell & Plano Clark 2011).

Other theoretical perspectives, such as positivism and interpretivism, were considered and rejected, as they are both strongly linked with the quantitative and qualitative methods, respectively. In addition, the assumptions of both theoretical perspectives are not reflecting the

Enosis method. While positivists accept that there is only one true reality, which exists independently of our perceptions of it, the Enosis method accepts that it is a complementary secondary analysis method to the primary qualitative analysis that contributes in the explanation and understanding of the phenomena from an alternative perspective (Denscombe 2017).

The epistemologies of objectivism and constructivism that underpin positivism and interpretivism, respectively, were rejected as the appropriate epistemology where the Enosis method sits, as they do not support the same theory of knowledge. The Enosis method generates quantifiable results, which are triangulated with existing results from the primary qualitative analysis and existing theory, or generate new ones that have not been identified by the qualitative analysis and can enhance the knowledge base. Thus, the epistemological position that underpins the Enosis method is realism, which believes there is an external and measurable reality that is although biased due to our perceptions and actions (Creswell & Plano Clark 2011).

Therefore, the Enosis method fits in the mixed method methodological area and the researchers can use it for multiple mixed method purposes, regardless if they will consider using it 'prospectively' or 'retrospective'. The theoretical perspective and the epistemology that underpin the Enosis method are pragmatism and realism, respectively.

6.4.2 Quantification of Qualitative Information

One of the challenges that was identified during the development of the Enosis method was the quantification of the qualitative data in a way that the original qualitative information will be retained or represented as much as possible in the derived numbers.

The systematic literature review identified several methods for quantifying the qualitative information before it is analysed with statistical test (Section 2.4.2, Paragraph 'What?'). The most common method for quantifying the qualitative information was to create binary outcome by coding the presence of each theme (e.g., yes = if identified for specific participant, no = otherwise or 0 = Low, 1 = High based on pre-defined criteria) per participant, as it was then used in common statistical tests, such as Chi-squared, Fisher's Exact, Independent T test, and Mann U Whitney.

In this research two scoring systems, the 'Frequency' and the 'Proportion', were developed as an

extension of the binary approach (Section 4.4.2.4). The 'Frequency' scoring system is based on the number of sub-themes mentioned by one interviewee under one superordinate theme, while the 'Proportion' is based on the number of sub-themes mentioned by one interviewee over the total number of sub-themes for one superordinate theme. Both scoring systems assume that the themes from the qualitative analysis are presented in the order of overarching, superordinate, and sub-themes.

The feasibility of the two scoring systems was proven in a pilot study (Section 4.4.2.4). Both scoring systems quantified appropriately the themes from the qualitative analysis and fitted well the data in the SEM. However, the advantage of the 'Proportion' scoring, compared to the 'Frequency' and other similar reported methods, is that it indicates the level of prevalence of each superordinate theme, as the higher the score the more the participant has referred to this theme compared to other themes or other participants. For example, in Section 5.5.3, Table 5.11, the 'proportion' average score for the 'Embodiment' superordinate theme is the highest within the 'Containment' overarching theme and among all other superordinate themes, indicating that the participants referred to it more than any other theme.

The next quantification method that was identified by the systematic literature review was to count the frequency of codes per interviewee and of comments per theme. This approach is similar to the 'References' scoring system, which was developed following the feasibility phase based on feedback that was received during the presentation of the Enosis method to the 7th Institute of Mathematics and its Applications (IMA) International Conference on Quantitative Modelling (Section 8.3). The 'References' scoring system is based on the number of times each participant has mentioned each category (sub-theme) during the course of each interview.

The advantage of the 'References' scoring system, compared to the 'Proportion' and the 'Frequency' systems, is that it takes into account the intensity with which each participant referred to each category (sub-theme) and, therefore, the level of 'endorsement' of the superordinate theme by the interviewee. This scoring system will not be feasible if the qualitative investigator does not code how many times a sub-theme is reported by each interviewee into every transcript. Although this scoring is used and interpreted in SEM in similar way like the 'Frequency' scoring, it can be difficult to be applied, as the collection of this detailed information might be time consuming and labour intensive. The 'References' scoring system was applied

in the 'Perfectionism' dataset, in which every time an interviewee was referred to a category under a specific construct this was coded in the manuscript and counted (Section 5.4.2.2). This intensive coding had been done as part of the original Grounded Theory analysis and it was utilised for applying the 'References' scoring system so as to indicate the level of 'endorsement' of the constructs by the interviewees.

This research evidences that the interpretation of the results using any of these three scoring systems in the Enosis method is feasible and meaningful. The interpretation of the unstandardised regression weights from the SEM were similar for the 'Frequency' and the 'References' scoring system. For example in Figure 4.4a, the regression coefficient of the independent observed variable 'number of people in the household' to theme 'causes and contributory factors' of ADHD (A) was 1. This coefficient was interpreted as families with more people in their household referred to 1 more superordinate (A1-A4) theme under the 'causes and contributory factors' overarching theme than those with fewer people. On the other hand in Figure 4.4b, the equivalent regression coefficient using the 'Proportion' scoring system was 0.20. This coefficient was interpreted as families with more people in their household referred 20% (0.20) more superordinate (A1-A4) themes under the 'causes and contributory factors' overarching theme than those with fewer people.

Four unique methods for quantifying qualitative information were revealed by the systematic literature review. The first assigned a score indicating the strength or intensity of each identified category per participant (1 = low intensity, 5 = high intensity) (Cunningham et al. 2000, Mehl-Madrona et al. 2004) or the agreement of two raters for each theme (2 if both identified the same theme, 1 if only identified the theme, 0 otherwise) (Schwartz et al. 2016); the second assigned a score of 1, if a sub-theme (or determinant as it was reported in the publication) was applicable for a woman during the last month, or 0 otherwise (Kazi et al. 2006); in the third standardised numerical category scores were assigned to categories and standardised numeric object-scores to each person using a mathematical lost function and alternating least squares (Kilian et al. 2003); the fourth was based on the frequency of sub-themes reflecting consumer-led values and provider-led values by applying the formula: 'consumer-led' frequency / ('consumer-led' + 'provider-led' frequencies). The last three scores were specific to the aim and design of these research projects, and, therefore, were not implemented in the Enosis method. The first one

using an intensity score (0 - 5) was considered in this research but it was not preferred to the 'References' scoring system, as the intensity score was assigned based on the researcher's judgement.

All the reported scoring methods, including the three systems that were used by the Enosis method, reduce the rich interpretation of people's experience that is expressed through their interviews (Huber & Van de Ven 1995). However, the three scoring systems used in the Enosis method build on the primary qualitative analysis and retain as much of the qualitative information as possible by quantifying the results from the primary qualitative analysis rather than discarding them. Thus, they create the necessary link between the research question, the results from the primary analysis and the results from the Enosis method. The researchers have three choices to consider and choose from with regards to the most appropriate scoring system for quantifying the qualitative data depending on how they would like to interpret the results, how much of the qualitative information they would like to use and their available time.

6.4.3 Choice of a Statistical Technique for the Enosis Method

One of the challenges for developing a new method, which aims to analyse qualitative information with quantitative techniques and take into account the small sample size of the qualitative dataset together with the measurement error occurred due to the quantification of the qualitative information, was the choice of the statistical technique for analysing the estimated scores (Section 6.4.2).

The systematic literature review identified that the statistical techniques, which have been used to date to analyse qualitative information, are limited to simple tests such as Chi-squared, Fisher's Exact, Independent T-Test, Mann U Whitney, and Spearman's correlation coefficient, which do not take into account the small sample size of the qualitative dataset or the measurement error (Section 2.4.2, Paragraph 'What?'). Even the more advanced quantitative methods, such as multivariable regression analysis, Cox regression, Bayesian Classification Modelling, and Growth Curve Models, which explore more complex correlations, cannot quantify the measurement error.

The Enosis method overcomes this challenge by using Structural Equation Modelling (SEM) for analysing the quantified qualitative information to scores. SEM is a flexible quantitative

approach that explores complex patterns of covariance between variables that cannot be measured directly (latent variables: e.g., overarching themes or theoretical constructs from qualitative analysis) but indirectly through other observed variables (indicators: e.g., presence of sub-themes), and directly observed variables (e.g., participants' age and gender) (Kline 2011). It also quantifies the measurement error by estimating its variance for each indicator and latent variable. Further discussion about the added value of estimating the measurement error is presented in the following Section 6.4.3.1.

In this research, SEM was initially applied to and proven feasible in a pilot study (Section 4.4.3.2) and, then, was applied fully to three datasets, the 'ADHD', the 'Perfectionism', and the 'Mental Health', following the quantification of the qualitative information to scores. In all three datasets, the themes from the primary qualitative analysis fitted well within the structure of the SEM (Sections 5.3.1.2, 5.4.2.3, and 5.5.2.3, respectively). For example in the 'Perfectionism' dataset, the developed theory of Psychopathological Perfectionism (PP) was included in SEM as latent variable, which was described by two theoretical constructs, the 'Features of PP' and the 'Stand Alone Feature', that were used as indicators of the PP theory. This allowed the comparison between the participants' characteristics and the theoretical model, which had been developed through the Grounded Theory, in a way that the results were clinically interpretable and could be linked to the primary research question (Section 5.4.3.2).

The challenge of the small sample size of the qualitative dataset is also taken into account through the Enosis method, as the statistical analyses are adjusted using the Bootstrap method. Further discussions about this challenge is presented in Section 6.4.3.2. To date, there is not any publication that reports the analysis of qualitative data with SEM and, therefore, comparison with existing literature is not presented.

One drawback of using SEM is the time required for developing a model, testing if the model assumptions hold and then correcting the model in collaboration with the qualitative researcher. In this thesis, approximately 20 models are presented but at least 100 had been constructed before they were finalised. The process of developing and finalising a model is time consuming but it improves, as the quantitative researcher gets more experience with the research aims and objectives, the qualitative dataset and methodology, and the application of SEM.

The Enosis method fills in the identified gap in the literature (Section 2.6), as it analyses com-

plex relationships between qualitative data collected through interviews and quantitative data (e.g. participants' age and gender) by taking into account the measurement error occurred due to imperfect quantification of rich qualitative information into numbers together with the small sample size of the qualitative dataset. The Enosis method also contributes to current literature by providing three options (scoring systems) for quantifying the qualitative information.

6.4.3.1 Quantification of Measurement Error

A challenge that other methods, which analyse qualitative information with quantitative techniques (Section 3.5), have faced is that they could not quantify the measurement error that occurs due to imperfect quantification of rich qualitative information to a single dimension. A benefit of the Enosis method is that this measurement error is quantified through the application of SEM unlike other statistical techniques such as T-test, ANOVA, and partial correlations.
An advantage of SEM is its ability to explore the associations between unobserved (e.g. themes) and observed variables (e.g. gender) together with taking into account the measurement error occurred due to imperfect quantification of the qualitative data (Hoyle 1995). The variance of the measurement error in all structural equation models is also estimated so as to quantify the potentially lost information when qualitative information is transformed to a number or the unexplained information missing from the constructed model.
In the 'ADHD' and the 'Mental Health' datasets, the variance of the measurement errors was less than 0.14 in all the structural equation models. Therefore, the constructed models explained the majority of qualitative information well and the unexplained information in the models was minimised. On the other hand in the 'Perfectionism' dataset, the variance of the measurement errors for the 'Features of PP' and the 'Stand Alone Feature' constructs was at 53% and 43% of the maximum scores of the two constructs. The higher variance of the measurement error in the 'Perfectionism' dataset was an indication that there might be an unexplained information left out of the final model.
Further consideration can be given to the higher variance of the measurement errors in the 'Perfectionism' dataset in future research. One way that the measurement error could be reduced is if more complex model structure is applied by including either an additional indicator of the latent variable or an additional latent variable or more observed variables.

An alternative option is the adjustment of the structural model by estimating the observed variance of the measurement error of an indicator, using Equation 5.1, and fixing it within the model (Schumacker & Lomax 2010), p.182. In the 'Perfectionism' dataset, this approach was applied for adjusting the structural model by estimating the observed variance of the measurement error of the 'Features of PP' construct and fixing it within the model (Section 5.6.3). The alternative approaches were rejected as there were not any additional latent variables nor indicators available, and all the available observed variables had been used to construct the initial most complex structural equation model. It is interesting to note that the applied approach resulted in a model that was a better fit to the data and produced stronger associations for gender and job category with the PP theory.

6.4.3.2 Small Sample Size

One of the challenges for developing a new method to analyse qualitative data with quantitative methods is the small sample size of the qualitative observations. This challenge was identified through the literature search and had not been addressed by any other quantitative method that has already been used to analyse qualitative data (Section 2.6).

Qualitative research aims to explore and understand in depth personal perspectives and perceptions of complex phenomena and human issues, especially when it is undertaken under a non-positivism paradigm (Marshall 1996, Boddy 2016). In theory, the number of required participants in qualitative research becomes apparent as the study progresses, and data saturation is achieved as new categories, themes or codes stop emerging from the data. Several sampling techniques based on convenience, judgement, and theoretical sampling have been developed for estimating the required sample size in qualitative research (Marshall 1996). Recently, Marshal et al. (2013) made four recommendations so as to add rigour in the sample size determination in qualitative information systems research and gain wider acceptance compared to quantitative studies.

However, sample size power calculations based on a primary outcome for determining the minimum required sample size are not appropriate in qualitative research as it is the norm in quantitative research. Therefore, the sample size in qualitative research tends to be relatively small compared to definitive quantitative studies, where power calculations have been

performed.

The small sample of the qualitative datasets limits the interpretation and generalisability of the results from the statistical analysis of qualitative data. Definitive conclusions can only be drawn if the statistical analysis is properly powered to observe statistically significant differences. In addition, the introduction of big variability in the results requires the statistical analysis to be adjusted for the small sample size. The researchers in majority of studies, which used statistical techniques to analyse qualitative data and were identified through the literature search, used simple statistical techniques such as Chi-squared test, Independent T-Test, Mann U Whitney, and linear regression, and did not adjust the analysis for the small sample size of the qualitative dataset (Section 2.4.2, paragraph 'What').

This research demonstrated that the Enosis method takes into account the small sample of the qualitative dataset during the statistical analysis by applying Structural Equation Modelling (Sections 5.3.1.2, 5.4.2.3, and 5.5.2.3). In all three datasets, the multivariate normality of all Structural Equation Models was tested due to the small sample size, and when it was not hold, the bootstrap method was used as the most common method for adjusting the analysis for small sample sizes (Bone et al. 1989, Bollen & Stine 1992, Joreskog 1993, Hoyle 1995). Bootstrap standard errors were reported so as to provide more confidence to the qualitative and quantitative researchers about the results generated from the Enosis method.

Other SEM adjustment methods, which are suitable for small number of observations and large number of variables, such as component-based SEM with Partial Least Squares (PLS), are available and could be used in future research instead of the bootstrap method (Tenenhaus 2008).

It is worth noticing that SEM is usually applied in large datasets when it is the main analysis method in a definitive research project. However, due to the small number of observations used in qualitative research and, therefore, in the Enosis method, generated associations and hypotheses are not be generalisable (Tashakkori & Teddlie 2003). The new associations and hypotheses should be tested in a series of future qualitative studies or definitive quantitative research, in which the sample size will be estimated using power calculations based on the results from the Enosis method (Jick 1979).

6.5 Limitations and Future Research Recommendations

Any research project is expected to have limitations and all the identified limitations of this research are presented in this section.

This research is limited to qualitative data collected through semi-structured or unstructured interviews. It is not covering any other form of qualitative data, such as video, audio, books, narrative, images or photos. In the 'Mental Health' dataset, while the children drawn pictures of a person with a 'Mental Illness', the qualitative data, which were primarily analysed with Thematic Analysis, were derived from follow up interviews with the children (Section 5.5). Future research can be conducted where the Enosis method is applied to different sources of qualitative data given they are following the essential requirements (Section 4.5.4).

One of the limitations identified through the systematic literature review is the reduction of rich interpretation of peoples' experience to single number when qualitative information is quantified (Section 2.4.2). The Enosis method overcame this limitation by using scoring systems, which were developed based on the themes from the primary qualitative analysis and, therefore, the original qualitative information was still represented into the scores (Section 6.4.2). Several discussions were undertaken in different forums (e.g. European Conference of Research Methods) or with the qualitative researchers on how to improve the scoring systems so as to allow for as little qualitative information as possible to be lost.

One of the suggestions was incorporated with the development of the 'References' scoring system, which takes into account the intensity with which each participant referred to each category (sub-theme) and, therefore, the level of 'endorsement' of the superordinate theme by the interviewee. Other suggestions for adjusting the scoring systems, such as with the duration of the participant's interview, could be explored in future research. In the 'Perfectionism' dataset, the duration of the interview was included in the SEM as an observed variable and it was not shown to have any significant effect. It is essential that future scoring systems are continuous variables and not binary ones (e.g., yes / no, 0 / 1, etc.), which cannot be used for applying the Structural Equation Modelling.

Another limitation is that the Enosis method cannot be applied to any qualitative dataset, which has originally been analysed with a qualitative method, but only to those that satisfy the five essential requirements (Section 4.5.4). This will limit the applicability of the Enosis

method, especially when it is applied 'retrospectively'. As it was discussed in Section 6.3.4.1, 23 qualitative datasets (88%), which were screened against the essential requirements, were not found eligible for applying the Enosis method 'retrospectively'. This should be a considered limitation for the future application of the Enosis method 'retrospectively', and instead apply the method 'prospectively'.

One requirement that could be more challenging to address in some qualitative studies is the fifth one, where all interviewees should be asked about the same topic(s) so as the comparisons to be meaningful. In some qualitative methods, the interview schedule or questions are not defined at the start of the study, or it might evolve while the research progresses. However, in the Enosis method there is not a requirement for the interviewees to be asked exactly the same questions as long the same interview areas or topics are covered per participant in the interviews. This is a requirement that can be addressed easier if the Enosis method is considered 'prospectively' rather than 'retrospectively'.

Finally, a limitation of this research is that SEM analysis was conducted using the AMOS software, as it is one of the most commonly used programs and it would be easier for future researchers to apply the Enosis method (Guo et al. 2009). Other statistical software, e.g. LISREL, Stata, MPlus, and R, can also be used for applying SEM. Due to time constrains for completing this research project as part of a Doctorate, the application of the Enosis method with other statistical software was not feasible. In future work the Enosis method can be applied using different statistical software, where the commonalities and differences among them could be identified (Section 8.6).

6.6 Summary

The aim of this research was to develop a new method that can analyse complex relationships between qualitative data, which are collected through interviews, and quantitative data (e.g. participants' age and gender) by taking into account the measurement error occurred due to imperfect quantification of rich qualitative information into numbers and the small sample size of the qualitative dataset is met with the development of the Enosis method.

This chapter began by describing that very little information was found in the literature about methods that have been used to analyse qualitative data with quantitative techniques. The

existing methods did not measure the error occurred due to imperfect quantification of rich qualitative information or inadequate modelling. In addition, they did not adjust the results for the small sample size of qualitative observations that were used. Therefore, the argument that Hanbury et al. (2011) made in 2011 about the requirement for a method that will bridge the gap between qualitative and quantitative methods by taking contextual information into account in quantitative analyses was still valid and unanswered.

The Enosis method was then developed so as to address the identified knowledge gap in the systematic literature review. The Enosis method consisted of two steps: 1. quantifying the qualitative results produced from the primary qualitative analysis using a scoring system; 2. applying SEM to the derived scores. A benefit of the Enosis method is that the quantification of the qualitative information was undertaken building upon the primary qualitative results using the themes, sub-themes, and theoretical constructs identified through the qualitative analysis. Section 6.4.1 has attempted to provide a detailed discussion about why the Enosis method is placed within the epistemology of realism, theoretical perspective of pragmatism, and the methodological area of mixed methods.

The first step in this research sought to assess the feasibility of the Enosis method in a pilot study. The results of the pilot study did show that the Enosis method is feasible to be applied to a qualitative dataset, which has been primarily analysed with the IPA approach. The most important result to emerge from the analysis in the pilot study, and discussed in this chapter, was the development of five essential requirements so as the application of the Enosis method to be feasible.

These five essential requirements were then used so as to identify two additional qualitative datasets, which had primarily been analysed with Grounded Theory and Thematic Analysis, and test the next objective of this research about the transferability of the Enosis method. The results of this research, without any doubt, proved the transferability of the Enosis method to multiple qualitative datasets. The key messages resulting from the analysis of the three datasets, which this chapter is discussing in detail, are about:

- the ability of the Enosis method to reveal new associations that are not identified by the primary qualitative analysis and will be missed if the Enosis method had not been applied (Section 6.3.2),

- the contribution of the Enosis method in bridging the gap between the qualitative and quantitative researchers and setting up a research relationship to a level where the two researchers are collaborating on equal terms (Section 6.3.3),

- the added value for the qualitative researchers of applying the Enosis method as secondary analysis method by exploring the research questions from a different angle, generating new hypothesis that can be tested in future research, triangulating with the original findings from the qualitative analysis, and making their research results and conclusions appealing to a wider audience (Section 6.3.4). Therefore, the qualitative researchers can use the Enosis method for multiple purposes such as initiation, complementary and triangulation, and expansion (Section 6.4.1).

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- the flexibility of considering the application of the Enosis method to be applied either 'prospectively' or 'retrospectively' and, thus, allowing a collaboration between the qualitative and quantitative researchers to be formed at any time from the concept stage of a research until publication (Section 6.3.4.1).

- the different options for quantifying qualitative information, using one of the proposed scoring systems, 'Frequency', 'Proportion', and 'References'. A benefit of the Enosis method is that the three scoring systems build on the primary qualitative analysis and retain as much of the qualitative information as possible by quantifying the results from the primary qualitative analysis rather than discarding them (Section 6.4.2).

- the ability of the Enosis method to analyse complex relationships between qualitative data collected through interviews and quantitative data (e.g. participants' age and gender) by taking into account the measurement error occurred due to imperfect quantification of rich

qualitative information into numbers together with the small sample size of the qualitative dataset (Section 6.4.3).

Finally in this chapter, the limitations of this research and suggestions for future research were also presented (Section 6.5). It is important to remember that this research is limited to qualitative data collected through semi-structured or unstructured interviews and it is not covering other forms of qualitative data. Further research could also be undertaken to investigate the application of the Enosis method using alternative statistical software, other than AMOS, suitable for SEM analysis and present the commonalities and differences among them.

The next chapter describes the main conclusions related to the aim and objectives of this research project. It also presents the main conclusions about the challenges that were identified during the development and implementation of the Enosis method.

7. CONCLUSION

7.1 Introduction

This chapter brings together the main conclusions related to the aim and objectives of this research project. The primary aim of this research was to develop a new method that could analyse complex relationships between qualitative data, which are collected through interviews and quantitative data using a quantitative technique. The primary research aim was generated following a comprehensive systematic literature review and five specific research objectives were explored in this research (Section 1.2). The conclusions for each research objective related to the new method, called 'Enosis', are presented in the following sections:

- Section 7.3: The development of the Enosis method and testing of its feasibility,
- Section 7.4: The transferability of the Enosis method to different qualitative datasets,
- Section 7.5: The nature of the required collaboration between the quantitative and qualitative researchers for applying the Enosis method,
- Section 7.6: The key aspects of secondary analysis of already collected and analysed data with qualitative methods,
- Section 7.8: The added benefit of applying the Enosis method.

A number of challenges were identified during the development and implementation of the Enosis method as well as through my participation in conferences, forums, meetings, and the submission of articles for publication (Section 1.3). The conclusions for each of the challenges are presented in the following sections:

- Section 7.7: The epistemology, theoretical perspective, and methodology that underpin the Enosis method,

- Section 7.3.1: The quantification of the qualitative data and the potential loss of qualitative information during the quantification process,
- Section 7.3.2: The choice of an appropriate statistical technique for analysing the qualitative data,
- Section 7.8.4: The application of the Enosis method on small sample size.

7.2 Systematic Literature Review

This research argues that the secondary analysis of qualitative data using quantitative technique is feasible by taking into account the measurement error that occurs due to imperfect quantification of rich qualitative information into numbers and the small sample size of the qualitative dataset. The original focus of this argument was derived following my involvement to a mixed method research project as part of my Master, my personal interest in alternative ways of analysing qualitative data and the completion of a comprehensive systematic literature review, which was conducted and published in 2014 (Fakis et al. 2014) (Chapter 2).
The outcome of the systematic literature review was the need for developing a new method, which is able to explore the complex relationships between qualitative data collected through structured or semi-structured interviews and quantitative data (e.g. participants' demographics), as well as the complex associations among the qualitative findings (Section 2.6).
It was also evident following the update of the systematic literature review in July 2018 that while quantitative techniques are still used for analysing qualitative data, it has not been reported to date a method that can take into account the small sample size of the qualitative dataset and the measurement error when qualitative data are quantified. Therefore, the need for developing a new method, which can take both these issues into account, is as relevant as it was at the start of this research.

7.3 Development and Feasibility of the Enosis Method

A new method, called 'Enosis', was then developed within the mixed methods framework (Section 4.2). The Enosis method consists of two steps: the first was the quantification of the themes from the qualitative analysis to scores (Section 6.4.2) and the second was the application

of the SEM on the derived scores (Section 6.4.3).

The feasibility of the Enosis method was proven in a pilot study through its application to the 'ADHD' qualitative dataset, which had been primarily analysed using an IPA qualitative method. In the pilot study different scoring systems were trialled and the feasibility of applying SEM was explored. The main conclusions and recommendations are presented in the following Sections 7.3.1, 7.3.2, and 7.3.3.

7.3.1 Quantification of Qualitative Information: Scoring Systems

Two scoring systems, the 'Frequency' and the 'Proportion', were initially developed in the pilot study for quantifying the qualitative information. Both scoring systems take into account the structure of the themes (overarching, superordinate, and sub-themes) and can be used if the presence or not of each sub-theme within each transcript has been identified during the qualitative analysis.

These two systems were developed and tested successfully in the pilot study (Sections 4.4.2.4 and 4.4.3.1). The development of the scores was feasible and their interpretation was meaningful. While the level of significance (p-value) was the same using both scoring systems in the same structural equation model, the estimates, the standard error, and the interpretation of the estimates were different (Section 4.4.3.1). Therefore, between the 'Frequency' and the 'Proportion' scoring systems, it is recommended to use the 'Proportion', as it indicates the level of prevalence of each superordinate theme (i.e, the higher the score the more the participant has referred to this theme compared to other themes or other participants).

Following the completion of the pilot study, a third scoring system, the 'References', was developed and applied to another qualitative dataset, the 'Perfectionism' (Section 5.4.2.2). The 'References' scoring system requires, in addition to the other two systems, the number of times a sub-theme is reported by each interviewee into every transcript.

All three scoring systems are feasible and can be used in future application of the Enosis method for quantifying the qualitative information. It will be the investigator's responsibility to choose the system that quantifies better the already collected qualitative information or to plan during the study development stage for analysing the qualitative information and reporting the results in such a way that will allow for a specific scoring system to be used. An advantage of the

'References' system is that takes into account the intensity with which each participant referred to each category (sub-theme) and, therefore, the level of 'endorsement' of the superordinate theme by the interviewee. On the other hand, capturing this detailed information could be time consuming and very labour intensive.

7.3.2 Choice of a Statistical Technique for the Enosis Method

Following the suggestion from the systematic literature review that the new method should take into account and estimate the measurement error occurred due to imperfect quantification of rich qualitative information into numbers, the Structural Equation Modelling (SEM) was used as the appropriate statistical technique for analysing the qualitative information in the Enosis method.

SEM is flexible multivariate statistical analysis technique and was used in the pilot study to analyse structural relationships between, and among, the themes from the qualitative analyses and the quantitative data, such as participants' baseline characteristics (Section 4.4.2.5). It was also used because it can quantify the measurement error due to the quantification of the themes to scores and adjust the results by taking into account the small sample size of the qualitative dataset.

In the pilot study, the analysis of the estimated scores using SEM was feasible and the interpretation of the results was meaningful (Section 4.4.3.2). Two recommendations when applying SEM as part of the Enosis method in future research were identified and presented in Section 6.3.1.

7.3.3 Essential Requirements for Applying the Enosis Method

Following the completion of the pilot study five essential requirements were developed and should be used when applying the Enosis method to future qualitative datasets (Section 4.5.4). These requirements were used to identify more suitable qualitative datasets for exploring the transferability of the Enosis method (Section 5.2).

7.4 Transferability of the Enosis Method

The transferability of the Enosis method to qualitative datasets, which had been analysed with different qualitative methods, was proven by using three qualitative datasets; 'ADHD', 'Perfectionism', and 'Mental Health'. The qualitative data from the three datasets were collected through semi-structured or unstructured interviews and primarily analysed with qualitative methods such as IPA, Grounded Theory, and Thematic Analysis, respectively.

The application of the Enosis to all three datasets was successful and the interpretation of the results clinically meaningful. The Enosis method revealed new associations that had not been identified by the qualitative researchers during the primary qualitative analysis. It therefore adds value to the primary qualitative research, as it explores the research questions from another angle. The Enosis method also generated associations that had been identified by the qualitative researcher or were present in the current theory but not found through the primary qualitative analysis. The identification of these associations added value to the validity of the original results, as the qualitative researchers were able to triangulate the original results from the primary qualitative analysis. More detail about this benefit of the Enosis method are presented in Section 7.8.1.

Thus, this research evidences that the Enosis method can be applied to any qualitative dataset, which satisfy the five essential requirements listed in Section 4.5.4. It can also be applied to datasets that have been analysed with other qualitative methods, such as Framework Analysis, if the essential requirements are met.

7.5 Collaboration of Qualitative and Quantitative Researchers

The application of the Enosis method requires the involvement of researchers with expertise and knowledge of both qualitative methods and SEM. It is unlikely that one researcher will have in depth knowledge and expertise in both of these areas and, therefore, the collaboration between a qualitative and a quantitative researcher is essential.

In this research, the qualitative researcher, beyond the need of undertaking the qualitative analysis, was required to contribute to the development of the scoring system, the theoretical justification of the statistical models and the interpretation of the results. Equally the quantitative researcher, beyond the knowledge and experience of SEM analysis, was required to

engage with the qualitative researcher to understand the primary research aim and questions, how the proposed qualitative analysis and its output can meet the five essential requirements listed in Section 4.5.4.

In all three datasets, the involvement of qualitative researchers in model building was essential so as the models to be theoretically justified and fitted well the data. In addition, the importance of the collaboration was evident during the interpretation stage, where significant statistical results had to be linked with meaningful clinical interpretations (Sections 5.3.3.2, 5.4.4.3, and 5.5.4.3). The collaboration between the two researchers and the time of considering to use the Enosis method can be either 'prospective' or 'retrospective', as it is highlighted in the following Section 7.6.

Saludadez & Garcia (2001) highlighted the need for a method that is able to bring the qualitative and quantitative research relationship to a level where the two are equal. The Enosis method meets that need, as it contributes to the development of a productive and strong collaboration between qualitative and quantitative researchers, where both parts are equally respected and participating.

7.6 Enosis: A Secondary Analysis Method

The Enosis method was applied in all three datasets as secondary analysis method following the primary qualitative analysis. It cannot be used as primary analysis method or replace the need for qualitative analysis of qualitative data, which have been collected through semi-structured or unstructured interviews, as it is applied to the themes from the qualitative analysis. In addition, it is applied as a complementary and not definitive method to the qualitative analysis due to the small sample size of the qualitative dataset and the lack of sample size power calculations.

While the Enosis method is always applied after the qualitative analysis, the time of consideration for using this method can be either 'prospectively' or 'retrospectively'. The 'prospective' consideration of using the Enosis method is during the study concept and design stage, when the research protocol is under development and before the qualitative data have been collected. The prospective consideration ensures that any required governance and Ethics approvals will be granted quicker without any challenges of using the Enosis method. In addition, the qual-

itative data collection, the qualitative analysis, and the results are planned in such a way to comply with the five essential requirements for applying the Enosis method (Section 4.5.4). In the 'Mental Health' dataset, the Enosis method was considered prospectively by including it in the 'Analysis' Section of the study protocol.

On the other hand, if the application of the Enosis method is considered 'retrospectively' after the governance and Ethics approvals have been granted and the qualitative data have been collected, there are several risks to be considered. There is a risk that the regulatory and Ethics approvals might take longer to be granted or might not be able to apply at all, if the results of the primary qualitative analysis have been published and and the study has been declared closed to NHS REC. In the 'ADHD' and 'Perfectionism' datasets, the Enosis method was applied retrospectively and the time for obtaining governance and Ethics approvals was longer than for the 'Mental Health' dataset. Another risk is that the qualitative data might be collected and analysed in a way that the Enosis method cannot be applied. In this research, twenty six studies were screened so at the end to identify three suitable datasets for applying the Enosis method (Section 5.2).

However, the advantage of the retrospective consideration is that once the Enosis method has been applied, the results can be immediately used in conjunction with the qualitative ones to strengthen the evidence for answering the research questions and impact on practice changes.

In both approaches, 'prospective' or 'retrospective', the advantage of applying the Enosis method as secondary analysis method is that collection of the research data has been undertaken so there is not any additional cost or time for collecting new data. In addition, the secondary analysis of a qualitative dataset will explore existing hypothesis and research questions, which have been reported in the literature or in the original qualitative results, as well as generated new associations and hypothesis that have not been identified through the primary qualitative analysis (Section 7.8.1). This allows the qualitative researchers to widen their evidence base for answering the research question, strengthen their arguments and conclusions, and have greater contribution to practice and policy changes (Section 7.8.5).

7.7 Epistemology, Theoretical Perspective, and Methodology of the Enosis Method

One of the challenges in this research was to identify the appropriate epistemology, theoretical perspective and methodology that underpins the Enosis method. The Enosis method combines the qualitative and quantitative methodologies, as qualitative data are quantified and analysed with a quantitative technique, and the results are used to answer the research questions. Thus, it fits within the mixed method area and follows the sequential design, as the quantitative analysis is applied following the primary qualitative analysis (Creswell 2014). The two methodologies, qualitative and quantitative, are used together, as their connection with different epistemological and ontological assumptions is not fixed and ineluctable (Patton 1988, Hassard 1993).

The Enosis method is a flexible approach, in which participants' perceptions and beliefs are retained through the quantification of qualitative information using a scoring system based on the themes from the primary qualitative analysis. At the same time it measures and estimates the association between the qualitative themes and the participants' characteristics, and among the themes. These assumptions fit best with the theoretical perspective of pragmatism, which believes there is more than one scientific method to obtain new knowledge and understand the phenomena and reality.

The Enosis method generates quantifiable results, which can be triangulated with existing results from the primary qualitative analysis and existing theory, or generate new ones that have not been identified by the qualitative analysis and can enhance the knowledge base. Thus, the epistemological position that underpins the Enosis method is realism, as it believes that there is an external and measurable reality, which is although biased due to our perceptions and actions (Creswell & Plano Clark 2011). Both the principles of realism and pragmatism supported the development of the Enosis method, which explores the research questions from a different angle by combining the quantitative analysis with qualitative data.

7.8 Benefits of the Enosis Method

The qualitative researchers are supplied with an alternative mixed method for analysing the qualitative data from a different perspective and answering the research questions from a different angle. This research evidences several benefits why qualitative researchers should consider using the Enosis method for secondary analysis of qualitative data.

7.8.1 New Associations and Hypotheses

Firstly, the Enosis method is able to identify new associations, which are not identified through the primary qualitative analysis, and triangulate existing ones when it is used as secondary method of analysis. The main purpose of the Enosis method is to be complementary method to the primary qualitative analysis and not to replace it. It supports the view of mixing the qualitative and quantitative paradigms for complementarity, development, initiation, and expansion purposes (Greene et al. 1989, Johnstone 2004).

What this thesis evidences is that the secondary application of the Enosis method added value to the original research by generating new associations that could be tested in future research. New associations, which had not been identified in the primary qualitative analyses, were identified in all three datasets following the analysis with the Enosis method (Tables 5.4, 5.5, 5.9, and 5.13). It is worth emphasising that while the qualitative researchers used the final overarching themes and the participants' characteristics (e.g. age, gender, number of grandchildren, type of family, job category) to explore possible associations, they were not able to identify these new associations that were only present by using the Enosis method and not through the qualitative analysis.

In addition, existing hypothesis that were reported following the qualitative analysis were triangulated through the application of the Enosis method, as similar results and conclusions were reached (Tables 5.5, 5.6, 5.10, and 5.14). The consistent findings across all three datasets highlight the value that Enosis adds above and beyond the primary qualitative analysis by expanding the evidence base and strengthening the conclusions from the primary qualitative analysis.

7.8.2 Building on Primary Qualitative Results

An advantage of using the Enosis method is that it builds on and expands the findings from the qualitative analysis rather than ignoring the important results identified through the primary analysis. This is achieved by quantifying the qualitative information with a scoring system, which is based on the themes developed through the qualitative analysis (Section 7.3.1).
These scores are then analyses using SEM. The use of SEM, a flexible quantitative technique, allows to explore complex patterns of covariance among variables, which cannot be measured directly (latent variables) but indirectly through other observed variables (indicators). The final major (or overarching) themes developed through qualitative analysis methods are hypothetical constructs, which are used for answering the research questions, explaining participants' perceptions or generating hypotheses, and are used in SEM as latent variables. These major (or overarching) themes are not observed items, as they are created through the merge of the identified themes, codes or categories in the participants' transcripts. However, the sub-themes, codes or categories are identified directly within the transcripts and act as indirect measures (indicators in SEM) of the major themes (Kline 2011).
When the themes in the qualitative analysis are structured to overarching, superordinate, and sub-themes, multiple relationships and patterns are explored simultaneously between the major (or overarching) themes and the observed variables together with the inter-relationships amongst the various major (or overarching) themes. The results from the Enosis are, then, easily interpreted and linked directly back to the results and conclusions from the qualitative analysis.

7.8.3 Quantification of Measurement Error

A benefit of the Enosis method is that it takes into account the measurement error occurred due to imperfect quantification of rich qualitative information into scores.
The application of SEM in the Enosis method allows the estimation of the lost qualitative information, due to its imperfect transformation of the themes to a single number or due to a model that does not fit well the data, through the variance of the measurement error in the path diagrams. If the variance of the measurement error is high, it can be an indication of several elements that need to be looked at. Firstly, it can be used for indicating if the applied scoring

system represent, correctly or not, the data due to variation in responses (themes) and in the interview schedule. Alternative scoring systems can be developed to quantify the qualitative information and apply the SEM. High variance of the measurement error can also indicate that there might be an unexplained information left out of the final structural model. One way that the measurement error can be reduced is if more complex model structure is applied by including either an additional indicator of the latent variable or an additional latent variable or more observed variables.

In this research, the variance of the measurement errors in two of the three datasets, in the 'ADHD' and the 'Mental Health' datasets, was small when the Enosis method was applied. Therefore, the constructed models explained the majority of qualitative information well and the unexplained information in the models was minimised. While the variance of the measurement errors in the 'Perfectionism' dataset was high, an alternative approach was applied for adjusting the structural equation model by estimating the observed variance of the measurement error of an indicator and fixing it within the model (Schumacker & Lomax 2010), p.182 (Section 5.6.3). This approach resulted to a model that was a better fit to the data and strengthened the associations between the observed variables (gender and job category) and the latent variable (PP theory).

Thus, this research evidences that the Enosis method can be applied to analyse complex relationships between qualitative data, which are collected through interviews, and quantitative data (e.g. participants' demographics) by taking into account the measurement error occurred due to imperfect quantification of rich qualitative information into numbers.

7.8.4 Adjustment for Small Sample Size

The fourth advantage of the Enosis method is that it takes into account the small sample size of the qualitative dataset.

The majority of qualitative datasets are based on a relatively small sample size compared to quantitative research, where power calculations are undertaken for estimating the required sample size to answer the primary research question and produce generalisable results. On the other hand, qualitative research aims to explore and understand in depth personal perspectives and perceptions of complex phenomena and human issues and, thus, the sample size is relatively

small (Marshal et al. 2013, Boddy 2016). The sample size of the three datasets, 'ADHD', 'Perfectionism', and 'Mental Health', used in this research was 22 (11 dyads), 20 and 14 individual interviews, respectively.

In the Enosis method, the Bootstrap method is used, when the multivariate normality of the model is not held, as it is the most common method for adjusting for small sample size in SEM (Bone et al. 1989, Bollen & Stine 1992, Joreskog 1993, Hoyle 1995). Bootstrap standard errors are then reported so as to provide more confidence to qualitative and quantitative researchers about the results generated from the Enosis method.

7.8.5 Wider Impact of Qualitative Research

Lastly, the Enosis method offers the opportunity to qualitative researchers to make their research findings and conclusions appealing to a wider audience, such as Health Care Managers, Policy Makers, and Health Care Organisations, who have traditionally used results from quantitative or mixed methods to make their decisions and change public policies or practice. The aim of the Enosis method is not to replace the primary qualitative research, which is a valuable method in its own right with significant contribution to the existing evidence base, but to provide another angle in the analysis of the qualitative data and their interpretation.

In recent years, NICE requires evidence from a variety of methods and outcomes, e.g. realist synthesis, Cochrane reviews, and participants' quality of life, for taking definitive conclusions about treatments and therapies within NHS. Carayon et al. (2015) encourage health care researchers who study complex healthcare quality problems to expand their use of mixed methods research, especially with regard to mixing at the stages of data analysis. The complexity of healthcare systems and problems requires the collections of both quantitative and qualitative data. The quantitative data can provide information about the complexity of and the numerical factors related to the problem, while the qualitative data can provide more in depth information about the human factors, reasoning, and perceptions related to the problem.

What this research evidences is that the Enosis method can be used by the qualitative researchers to widen even further their evidence base for answering the research questions from another perspective, to strengthen their arguments and conclusions, to increase their potential audience base and contribute to practice and policy changes.

7.9 Summary

This research evidences that the Enosis method is a suitable mixed method for secondary analysis of qualitative information derived from semi-structured or unstructured interviews and originally analysed with a qualitative method, such as Interpretive Phenomenological Analysis (IPA), Grounded Theory, and Thematic Analysis.

The application of the Enosis method is not restrictive to qualitative data primarily analysed only with the IPA, Grounded Theory, and Thematic Analysis qualitative methods. It can be applied to any qualitative dataset that satisfies the five essential requirements about the minimum sample size, the structure of the qualitative themes, the unit of qualitative analysis, the presence of a sub-theme, and the structure of the qualitative interview (Section 4.5.4).

The 'Enosis' method consists of two steps: 1. quantifying the themes, which have been produced through the original qualitative analysis, using a scoring system; 2. applying Structural Equation Modelling on the estimated scores from step 1. The themes from the primary qualitative analysis are quantified using any of the three scoring systems, the 'Frequency', the 'Proportion', and the 'References', which take into account the structure of the themes (overarching, superordinate, and sub-themes), the level of prevalence, and the 'endorsement' of the themes by the interviewees. An appropriate statistical software, such as AMOS, is then used to analyse the estimated scores using SEM.

This research evidences that the Enosis method is able to take into account the measurement error occurred due to imperfect quantification of rich qualitative information into numbers and the small sample size of the qualitative dataset, which existing mixed methods failed to achieve. With regards to the small sample size of the qualitative dataset, the standard errors of the parameters' estimates are calculated using the Bootstrap method so as to draw more accurate conclusions about the SEM findings. With regards to the measurement error, the value of using SEM as part of the Enosis method is that any lost qualitative information due to its imperfect transformation of the themes to a single number or due to a model that does not fit well the data is estimated and presented as variance of the measurement error. The researchers can then use this information to either adjust their scoring system or modify the structural equation model.

The Enosis method can be considered as secondary analysis method by a qualitative researcher

in collaboration with a quantitative researcher during the study design, when they are planning a new research project, or retrospectively following the completion of the qualitative project. While there are different advantages for a prospective or retrospective consideration of the Enosis method and collaboration between the qualitative and quantitative researchers, this new method adds value to the original qualitative research in both cases.

The added value of secondary analysis is the new associations revealed through the Enosis method, which are not identified through the primary qualitative analysis and will, otherwise, be missed. It is worth emphasising that due to the small sample of the qualitative dataset any new associations and hypotheses from the Enosis method are not definitive and should be tested in future research. Moreover, existing associations and hypothesis that are reported following the primary qualitative analysis can be triangulated with associations identified through the Enosis method. The results can also be used for informing the power calculations to determine the sample size of future research. Therefore, the Enosis method positively contributes in bridging the gap between the qualitative and quantitative research, and encourages the collaboration between qualitative and quantitative researchers.

Dr Robinson, the qualitative collaborator in the 'ADHD' dataset, acknowledged the significant impact of the Enosis method and the importance of our collaboration as he said that

> further interrogation of the original data with the Enosis method offered challenge, verification, validation, confirmation, triangulation and enrichment in relation to my research results.

8. DISSEMINATION

8.1 Introduction

This chapter presents the dissemination strategy of the Enosis method, together with the reception and feedback received so far. It also presents the impact that the Enosis method has had in professional level. It concludes with future dissemination activities, which are aiming to wide adoption of the Enosis method.

8.2 Publications

The systematic literature review, which was undertaken in the first year of this project, was published in the Journal of Mixed Methods Research (JMMR) (Fakis et al. 2014). Following the publication of the article, several researchers got in contact with the author asking for further information about the research, copy of the paper or praising the importance, quality, and findings of the systematic review. This paper has been cited by 18 researchers to their peer-reviewed publications (last checked on 04/04/2019), which range from literature reviews in specific research area to research project using mixed methods. The majority of the researchers used the Fakis et al. (2014) systematic review as evidence of existing studies that qualitative data were analysed with quantitative techniques and justification for using mixed methods in their project. The publication is still current and relevant to the mixed methods area, as citations are as recent as in August 2018 (Ribeiro et al. 2018). One of the Journal's external peer reviewers said about the published paper:

> There is a very strong story [in this paper] about the use of statistics within mixed methods research. The paper suggests a reasoned approach or framework needs to be developed for the integration of statistical methodology into this type of research. I believe that this paper could be important for the mixed methods community because it highlights that this type of integration is probably in its infancy and has

> much room for growth. There is a clear need for conceptual and methodological work in this area. A great opportunity to build collaborative bridges with [qualitative researchers and] statisticians (and biostatisticians).

The publication of the systematic review to a high impact Journal (impact factor 1.6, ranked 19 out of 96 in Social Sciences Journals) highlighted to qualitative researchers a gap in the literature for an alternative way of analysing qualitative data and an opportunity for closer collaboration with the quantitative researchers. Following the completion of the systematic review, the Enosis method was developed and used to analyse qualitative data, which had been analysed using the IPA method (Section 5.3).

The Enosis method, its application to the 'ADHD' dataset, the results and conclusions were then published in the International Journal of Multiple Research Approaches (IJMRA) in January 2015 (Fakis et al. 2015). The qualitative and quantitative researchers decided to publish the findings from the application of the Enosis, as it added significant value to the original conclusions from the IPA method, which had been disseminated through the Robinson (2010) thesis. It was also an opportunity to present the findings from the new complex method in lay terms so as to encourage its dissemination and use by the qualitative researchers. One of the reviewers said that "the explanations are clear to me as a non-statistician and the findings and discussion from the statistical analysis are coherent and seem to be in keeping with the analysis."

While the development and application of the Enosis method was challenging in the mixed methods area, it was welcomed by the external peer reviewers of the IJMRA. It was evident from the reviewers' comments that similar to Enosis method had not been used before and they were interested to read how its findings were linked with the results from the IPA method. It was important that the Enosis method had been accepted to an International mixed methods methodology peer-reviewed journal, as it was an opportunity to present its original contribution in the mixed methods area. Unfortunately, this paper has not been cited today and this could be because the IJMRA has ceased after volume 9 since 2016.

8.3 Conferences and Presentations

The dissemination of the Enosis method and results was done via several other channels beyond the two published papers mentioned in the previous Section 8.2. Alternative key avenues for presenting the new method and the findings were through conferences and meetings.

The methodology and the findings from the pilot study were presented in two conferences. The first conference was the 7th Institute of Mathematics and its Applications (IMA) International Conference on Quantitative Modelling in the Management of Health and Social Care in April 2013. A poster describing the key steps of the Enosis method and the findings from the pilot study was presented. As the audience was quantitative researchers, the main feedback was related to the methodology and how it could be improved.

Extremely positive and helpful comments were received on how to improve the scoring systems, how to present the method as secondary and how to collaborate with qualitative investigators who may be interested in this method. The recommendations about the scoring system was taken into account when the Enosis method was applied in the 'Perfectionism' dataset. A new scoring system, called 'References', was developed to take into account the intensity with which each participant referred to each category (sub-theme) and, therefore, the level of 'endorsement' of the superordinate theme by the interviewee (Section 5.4.2.2).

The second conference, where the Enosis method was presented, was the European Conference of Research Methods (ECRM) in July 2013. A poster presenting the findings from the analysis of the 'ADHD' dataset was submitted. The poster received the First Prize Award in the Posters category and received extremely positive comments. This poster was an extremely important recognition of the completed work and the new proposed method. The audience was mainly qualitative or mixed methods researchers and was open minded to the new concept introduced by the Enosis method. The editors of the International Journal of Multiple Research Approaches, the Marketing & Social Research and the International Journal of Mixed Methods in Applied Business and Policy Research commented that the new method was bridging a gap in mixed methods and they invited me to submit a paper in their journals. An article was prepared and submitted for publication to International Journal of Multiple Research Approaches for publication in January 2014 (Fakis et al. 2015).

8.4 Other Dissemination Activities

As soon I started developing a new method to fill in the identified knowledge gap from the systematic literature review, I realised that I should give it a name. Several discussions with my supervisors and qualitative researchers took place to decide for a name that would have described the aim of the new method so as other researchers could recognise it. The first proposal was to be named after my last name, i.e. 'Fakis' Method, as it is the case with many tests and methods (e.g. Kolmogorov-Smirnov). This idea was rejected, as it did not contain any symbolism and could have been seen by other investigators as egocentric. Other names that were proposed were 'Dimension' or 'Poly-dimension' to symbolise that data are used from one dimension (qualitative) and transformed to another (quantitative) before analysed with a quantitative technique, SEM. The name that was preferred was 'Enosis', which in Greek means 'union'. It symbolises that the new method synthesises the qualitative and quantitative methods, and brings researchers together. It also synthesises the qualitative data with quantitative technique (SEM) for generating new hypotheses or exploring existing ones. The dissemination of the Enosis method was much easier and effective by using a specific name to describe it.

Feedback on the development of the Enosis method was also taken through personal meetings with qualitative and mixed methods researchers, presenting at University of Derby study days, attending research meetings and speaking with my qualitative collaborators. Specifically, I attended a session organised by the International Journal of Social Research Methodology, which gave me the opportunity to meet with other researchers, explain my method and receive feedback. It was also useful for exploring the requirements of a peer-reviewed journal to submit a paper describing the Enosis method.

My research activities have also been disseminated through my personal webpage at the University of Derby website (Fakis 2018). The Enosis method, my publications, and my research interests are presented in this University of Derby webpage. All these activities created a useful research and professional network. My professional links were expanded in the areas of qualitative and mixed methods, and they are extremely beneficial for exchanging research ideas, getting feedback, and promoting the Enosis method.

8.5 Professional Impact

The work I have undertaken as part of this research project had significant contribution to my professional development. An application to Royal Statistical Society (RSS) for the professional status of Chartered Statistician (C.Stat) and to Science Council for Chartered Scientist (C.Sci) were successful in 2011 and 2012 respectively. In addition, I was elected a member of the RSS Council in 2016.

My innovative research and the development of the new method, Enosis, contributed to my career progression, as I was promoted to a Senior Medical Statistician role in January 2013 and to Head of Medical Statistics and Data Management at Derby Clinical Trials Support Unit (DCTSU) in 2017. I was also awarded the titles of Honorary Lecturer and of Honorary Associate Professor in the Department of General Entry and Medicine at University of Nottingham in 2013 and 2016 respectively. In 2014, the Editor of Journal of Diabetes, Obesity and Metabolism offered me the position of the Journal's statistical advisor as a recognition of my wider and specialist knowledge in which this Doctorate had also contributed. The contribution of this doctorate to achieve these professional statuses and recognition was critical.

My involvement with the mixed methods research enhanced and widen my knowledge on qualitative and mixed methods. I attended several qualitative courses to understand the fundamental differences and similarities between qualitative methods and to gain further knowledge on management of qualitative data. The close collaboration with the qualitative investigators experienced on IPA, Grounded Theory, and Thematic Analysis helped me to understand better the qualitative framework and expand my knowledge. This new knowledge has already been utilised in discussions with investigators in my workplace, where I provide advice and direction on mixed methods and not only on quantitative.

The Enosis method can also be used by the qualitative researchers to advance their career and to promote the findings of their research to a wider audience. As the Enosis method is applied as secondary method of analysis, it can result to additional publications in high impact journals that are considering quantitative methods more favourably. The publication of results in these journals increases the potential impact of their research in practice changes, as policy makers and organisations, for example NICE, are influenced by such publications.

In particular, the application of the Enosis Method in the 'ADHD' dataset has contributed to

service developments. Dr Robinson is currently developing a project for families with young adults who have ADHD and may be targeted for radicalisation and extremism. He highlighted that the associations from the Enosis method, which were triangulated with the qualitative results or referenced to existing literature and evidence, Tables 5.5 and 5.6, influenced directly the development of a new assessment and treatment protocol for engaging and working with three generational family members, where this risk or concern has been identified.

8.6 Future Dissemination

The dissemination of the study results and the Enosis method would continue following the completion of this thesis. It is my intention to disseminate the Enosis method as widely as possible so as to become an alternative recognisable mixed method that the qualitative researchers are happy to use. Towards this direction I am planning to replace my current University webpage with a research blog, where I will communicate with the research community any future applications, developments, and improvements of the Enosis method. As part of the dissemination plan for the wider adoption of the Enosis method, I am planning to write a User Guide with step by step guidance for qualitative researchers on how to implement and conduct the Enosis method in their research project.

I am also planning to present the Enosis method and its original contribution to all three datasets in several conferences such as the European Conference on Research Methodology for Business and Management Studies, the Mixed Methods International Research Association (MMIRA) Conference and a conference about qualitative research. The audience in these conferences would mainly be qualitative and mixed methods researchers for whom the Enosis method is most beneficial. Quantitative investigators who are only interested to quantitative methods are unlikely to use the Enosis method, as it primarily requires the collection and analysis of qualitative data. On the other hand, qualitative and mixed methods researchers will be keen to use the Enosis method as complimentary secondary analysis method to triangulate the results from the primary qualitative analysis and explore the research questions from a different angle.

I am currently in the process of writing, in collaboration with the qualitative researcher, a peer-reviewed paper for presenting the application of the Enosis method, its findings and conclusions

from the 'Mental health' dataset. Given that the Enosis method has already been explained in the Fakis et al. (2015) paper and in detail in this thesis, we are considering of presenting the findings from the Enosis method together with the results from the Thematic Analysis integrated in one paper. This publication would allow the readers to appreciate the significant contribution of the secondary Enosis method analysis to the primary results of the Thematic Analysis.

Future joint publication with Dr Robinson will be written, in which the added value of the Enosis method for strengthening the qualitative and quantitative collaboration will be detailed. This paper will detail the impact the Enosis method had from the qualitative researcher's point of view about the interpretation of the results, answering the research questions and informing future actions.

I am also considering couple of options for undertaking postdoctoral research. I am in discussions with Accident and Emergency (A&E) Department doctors, who are interested to explore the reasons and motivation of a person who becomes a frequent attendant in A&E through semi-structured interviews. In this new proposed research, the Enosis method will be considered as secondary analysis method for exploring the research questions from a different angle and provide the researchers with more possibilities and options to understand and answer the research questions. The second option for postdoctoral research is to apply the Enosis method in one dataset using several different statistical software for SEM analysis, such as LISREL, Stata, MPlus, and R, and present the differences and similarities of applying the Enosis method in the User Guide.

Lastly, I will collaborate closely with the Research Design Service:East Midlands (RDS:EM) through face to face meetings, email discussions, and by attending their workshops to inform them of the benefits of the Enosis method for mixed methods research. RDS:EM are providing advice to researchers, especially those undertaking clinical research, on study design and methodology during the research concept stage and before a grant application is applied for funding. My aim is for the RDS:EM to consider the Enosis method as suitable mixed method when they are advising researchers.

8.7 Summary

There is a range of activities that have been undertaken and are also planned for disseminating the Enosis method and its conclusions. The dissemination of the results from this research started as soon as the systematic literature review was completed through a peer reviewed publication and are continuing to date with the development of new collaborations for postdoctoral research.

The systematic literature review was published in the Journal of Mixed Methods Research (JMMR) and generated interest within the mixed methods community as several mixed methods researchers got in contact with the author or cited the publication within their article (Fakis et al. 2014). Following the publication of the systematic literature review and the completion of the pilot study, a second peer reviewed article was published in the International Journal of Multiple Research Approaches (IJMRA) (Fakis et al. 2015). This article detailed the Enosis method, its application to the 'ADHD' dataset, the results and how the conclusions were interpreted from a clinical point of view. The reviewers were particularly interested in how the Enosis method findings were linked with the results from the IPA method, as similar analysis to Enosis method had not been attempted before.

The results from the application of the Enosis method were also disseminated through conferences. Useful feedback was received about the methodology and the findings from the pilot study and was used to refine the components of the Enosis method such as the development of a new scoring system, define the five essential requirements and plan the transferability of the method to new qualitative datasets. In addition, a poster presenting the findings from the analysis of the 'ADHD' dataset received the First Prize Award in the Posters category at the European Conference of Research Methods (ECRM).

Other avenues for disseminating the Enosis method included presentations of the new method to colleagues at work, University of Derby (UoD) student peers during the study days and external researchers in a session organised by the International Journal of Social Research Methodology. My UoD webpage was also used to present the new mixed method and attract any interested researchers. It is worth emphasising that the dissemination of the Enosis method was much easier and effective by using a specific name to describe the new mixed method.

This research has had a significant contribution to my professional development. Since the

start of this research, I obtained the professional status of Chartered Statistician (C.Stat) and Chartered Scientist (C.Sci), as well as becoming an elected Council member of the Royal Statistical Society. It also helped me to gain promotion at work, initially to a Senior Medical Statistician role and, then, to Head of Medical Statistics and Data Management at Derby Clinical Trials Support Unit (DCTSU).

Future dissemination activities beyond the completion of this Doctorate research are also planned so as to disseminate the Enosis method as widely as possible. Towards to this direction, I am planning to replace my current University webpage with a research blog, write and publish a User Guide for applying the Enosis method, and present the conclusions from this thesis to National and International conferences, for example the Mixed Methods International Research Association (MMIRA) Conference. Future publication about the importance of the collaboration between the qualitative and quantitative researchers is under development together with Dr Robinson. Following the completion of this Doctorate, I am also planning to undertake postdoctoral research either by applying the Enosis method to primary clinical qualitative research or analysing one dataset using several different statistical software for SEM analysis and presenting the differences and similarities in a User Guide.

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Appendices

Appendix A

ADHD REC APPROVAL

RE: REC reference: 05/Q2401/80 Declaration of end of study and final report acknowledgement

From: Apostolos Fakis (a_fakis@yahoo.com)

To: gazrobo1@hotmail.co.uk

Date: Monday, 2 April 2012, 17:47 BST

Hi Gury,

Please see below the correspondence from REC. I am also attaching the protocol for the Pilot Study and the systematic literature review paper sent for publication.

Thanks,

Apostolos

> --- On **Fri, 27/1/12, Marten Carol - Co-Ordinator -NCtPCT <*Carol.Marten@nottspct.nhs.uk*>** wrote:
>
> From: Marten Carol - Co-Ordinator -NCtPCT <Carol.Marten@nottspct.nhs.uk>
> Subject: RE: FW: REC reference: 05/Q2401/80 Declaration of end of study and final report acknowledgement
> To: "Apostolos Fakis" <a_fakis@yahoo.com>
> Date: Friday, 27 January, 2012, 10:24
>
> Dear Apostolos
>
> Thanks for sending me this, we have no record of it here and you have not been added to the study on our contacts page??
>
> I can see from the information you sent me that Jenny felt this was a minor amendment. As you have already go access to the data it does not matter if the study has been closed as you will not be collecting new data. Therefore you can continue to use the data accordingly.
>
> The hard copy file is in archive I will print out this email correspondence and put it with the file and make a note on our electronic records
>
> Kind Regards
>
> Carol

Mrs Carol Marten|NRES REC Coordinator

Health Research Authority

NRES Committee - Derby 1 and 2

National Research Ethics Service (NRES)

Direct line 0115 8839436| Fax 0115 8839294

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From: Apostolos Fakis [mailto:a_fakis@yahoo.com]
Sent: 24 January 2012 22:31
To: Marten Carol - Co-Ordinator -NCtPCT
Cc: Robinson Gary (DERBYSHIRE HEALTHCARE NHS FOUNDATION TRUST)
Subject: Re: FW: REC reference: 05/Q2401/80 Declaration of end of study and final report acknowledgement

Dear Carol,

Please see attached the amendment that was submitted at that time and approved by REC,

You will see the correspondence between the CI and REC co-ordinator below.

Please let me know if anything else is needed.

Thanks,

Apostolos

From: Robinson Gary (RXM) Derbyshire Mental Health Services Trust
Sent: 30 June 2008 07:58
To: Hancock Jenny (YDD08) Derwent Shared Services
Subject: RE: re study reference 05/Q2401/80

Hi Jenny. Great thanks for that.

Best wishes

GARY ☺

Gary Robinson
Principal Systemic Psychotherapist
Rivermead
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From: Hancock Jenny (YDD08) Derwent Shared Services
Sent: 26 June 2008 16:06
To: Robinson Gary (RXM) Derbyshire Mental Health Services Trust
Subject: FW: re study reference 05/Q2401/80

From: Hancock Jenny (YDD08) Derwent Shared Services
Sent: 26 June 2008 15:43
To: 'Gary.robinson@derbyMHServices.nhs.uk'
Cc: 'Apostolos Fakis'
Subject: re study reference 05/Q2401/80

Dear Gary

Thank you for the notice of substantial amendment received today. My standard operating procedures say that changes to the research team, other than the chief investigator or a "key collaborator" do not require review by the ethics committee. I propose therefore to treat this as a minor amendment, which means that you can go ahead with the changes right away. I will write to you to confirm this within the next few days.

Regards
Jenny

Jenny Hancock
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Email: jenny.hancock@derwentsharedservices.nhs.uk
www.nres.npsa.nhs.uk

IRAS (Integrated Research Application System) will be available for use and consultation from 29 January 2008. www.myresearchproject.org.uk

Scoring system and statistical modeling a pilot study.doc
101kB

Paper Submitted to JMMR.pdf
339.4kB

Appendix B

ADHD LETTER OF ACCESS

Derbyshire Healthcare NHS
NHS Foundation Trust

15th May 2012

Workforce & OD
Bramble House
Kingsway Site
Kingsway
Derby
DE22 3LZ

Tel: 01332 623768
Email: Susan.Purser@derbyshcft.nhs.uk

Apostolos Fakis
Medical Statistician
Research & Development Department
Royal Derby Hospital
Uttoxeter Road
Derby
DE22 3NE

Dear Apostolos

Letter of access for research

Study Title: **An Investigation of Parental and Grandparental Perceptions relating to Causality, Treatment and Support for Families of a Child with a Diagnosis of Attention Deficit Hyperactivity Disorder (REC Reference 05/Q2401/80**

This letter confirms your right of access to conduct research through Derbyshire Healthcare NHS Foundation Trust for the purpose and on the terms and conditions set out below. This right of access commences on **21st May 2012** and ends on **31st December 2014** unless terminated earlier in accordance with the clauses below.

You have a right of access to conduct such research as confirmed in writing in the letter of permission for research from this NHS organisation. Please note that you cannot start the research until the Principal Investigator for the research project has received a letter from us giving permission to conduct the project.

The information supplied about your role in research at Derbyshire Healthcare NHS Foundation Trust has been reviewed and you do not require an honorary research contract with this NHS organisation. We are satisfied that such pre-engagement checks as we consider necessary have been carried out.

You are considered to be a legal visitor to Derbyshire Healthcare NHS Foundation Trust premises. You are not entitled to any form of payment or access to other benefits provided by this NHS organisation to employees and this letter does not give rise to any other relationship between you and this NHS organisation, in particular that of an employee.

While undertaking research through Derbyshire Healthcare NHS Foundation Trust, you will remain accountable to your employer **Derby Hospitals NHS Foundation Trust, Royal Derby Hospital,** but you are required to follow the reasonable instructions of **Gary Robinson, Principal Systemic Psychotherapist** in this NHS organisation or those given on her/his behalf in relation to the terms of this right of access.

Where any third party claim is made, whether or not legal proceedings are issued, arising out of or in connection with your right of access, you are required to co-operate fully with any investigation by this NHS organisation in connection with any such claim and to give all such assistance as may reasonably be required regarding the conduct of any legal proceedings.

You must act in accordance with Derbyshire Healthcare NHS Foundation Trust policies and procedures, which are available to you upon request, and the Research Governance Framework.

You are required to co-operate with Derbyshire Healthcare NHS Foundation Trust in discharging its duties under the Health and Safety at Work etc Act 1974 and other health and safety legislation and to take reasonable care for the health and safety of yourself and others while on Derbyshire Healthcare NHS Foundation Trust premises. You must observe the same standards of care and

propriety in dealing with patients, staff, visitors, equipment and premises as is expected of any other contract holder and you must act appropriately, responsibly and professionally at all times.

You are required to ensure that all information regarding patients or staff remains secure and *strictly confidential* at all times. You must ensure that you understand and comply with the requirements of the NHS Confidentiality Code of Practice (http://www.dh.gov.uk/assetRoot/04/06/92/54/04069254.pdf) and the Data Protection Act 1998. Furthermore you should be aware that under the Act, unauthorised disclosure of information is an offence and such disclosures may lead to prosecution.

You should ensure that, where you are issued with an identity or security card, a bleep number, email or library account, keys or protective clothing, these are returned upon termination of this arrangement. Please also ensure that while on the premises you wear your ID badge at all times, or are able to prove your identity if challenged. Please note that this NHS organisation accepts no responsibility for damage to or loss of personal property.

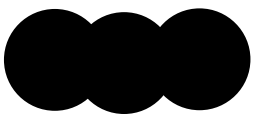
We may terminate your right to attend at any time either by giving seven days' written notice to you or immediately without any notice if you are in breach of any of the terms or conditions described in this letter or if you commit any act that we reasonably consider to amount to serious misconduct or to be disruptive and/or prejudicial to the interests and/or business of this NHS organisation or if you are convicted of any criminal offence.

Your substantive employer is responsible for your conduct during this research project and may in the circumstances described above instigate disciplinary action against you.

Derbyshire Healthcare NHS Foundation Trust will not indemnify you against any liability incurred as a result of any breach of confidentiality or breach of the Data Protection Act 1998. Any breach of the Data Protection Act 1998 may result in legal action against you and/or your substantive employer.

If your current role or involvement in research changes, or any of the information provided in your Research Passport changes, you must inform your employer through their normal procedures. You must also inform your nominated manager in this NHS organisation.

Yours sincerely



Susan Purser

For and on behalf of the Director of Workforce and Organisational Development,
Derbyshire Healthcare NHS Foundation Trust

cc: Rubina Reza, Research & Clinical Audit Manager, Derbyshire Healthcare NHS Foundation Trust
Janet Edmunds, Recruitment Assistant, Level 5, Royal Derby Hospital

Appendix C

UNIVERSITY OF DERBY ETHICS APPROVAL

Approval Letter

Date: Thursday 18 April 2013
Name: Apostolos Fakis

Dear Apostolos

PROJECT TITLE: NEW MIXED METHOD: STATISTICAL MODELLING OF QUALITATIVE DATA

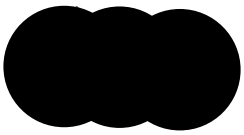
Thank you for submitting your application to the School of Health Research Ethics Committee.

Your study has been approved via Chair's Action and you are now able to proceed.

If any change to the study described in the application or to the supporting documentation is necessary you are required to make a resubmission to the School of Health Research Ethics Committee.

All the best.

Yours sincerely,



Professor Susan Hogan
(Chair, School of Health REC)

Appendix D

ADHD THEMES

Overarching (A-D), Superordinate (1-4) and Sub themes

From IPA analysis conducted by qualitative investigator.

A. Causes and contributory factors

1. Genetics and brain injury

Birth trauma

Accidental injury

Hereditary

2. Co Morbidity, confusion and convergence

Acceptability

Learning difficulties first

Genetics and co morbidity

3. Life cycle issues and events

Starting school

Sibling connections

House moves

Loss and bereavement

Attachment

Family Scripts

4. Home environment

Structure and routine

Parental disagreement, conflict and abuse

Parental health

B. Experiences of assessment, treatment and professional support

1. Fight for recognition. Banging heads against brick walls

Lack of knowledge and expertise

Mother blaming and shaming

2. Multiple assessments, fragmented services. Passed pillar to post

Importance of individual professionals

Rejection and isolation

Diagnosis is not enough

3. Successes, failures and gaps

Blurring of assessment, diagnosis, treatment and support

Positive experiences of support: Importance of continuity

Nothing may be enough

Mainstream or special education provision

Respite needs

Improving services

4. Relief and worry of diagnosis and of medication

Effects of diagnosis

Easing of blame and shame

Pressures to medicate

Effects of medication

C. Pains and pleasures of relationships relating to child

1. Positive attributes, looking to the future

Playfulness and fun

Love, care and affection

Determination and imagination

Energy and special abilities

Consideration and helpfulness

The future

2. Problem behaviours, self blame and self regard

Extreme behaviours

Self regard

Self criticism

3. The pain of unmet emotional needs

Emotional burden and support for mothers

Mother spread thin, sibling concerns

Effects upon wider family

4. Hidden disability, support, blame and shame

Public misunderstanding and awareness

Extended family understanding and support

Fathers and male role models

Privacy and the need to know

D. Maternal grandmother's roles and influences

1. Grand parenting, parenting, generational gaps and transitions

Distinguishing naughtiness and ADHD: Bridging the generation gap

Learning to parent differently, passing the parental baton

Change over time

2. Tough love, care, criticism and regard

Tough love

Conditional and unconditional regard: Shared and hidden regard and conflict

Believing that the other or self could do more

3. Practical and Emotional support

Support from birth

Taking weight of mothers shoulders

Shoulder to cry on

Working as a team

Advocacy

Involvement with assessments and professional support

4. The gift of the child

Love and affection

Energy and humour

A sense of pride

Specialness and importance

Time and interest

Appendix E

PP REC APPROVAL

Health Research Authority

NRES Committee South East Coast - Kent

Ground Floor
Skipton House
80 London Road
London
SE1 6LH
Tel: 02079722551

05 March 2013

Mr David Baker
Stirling House, Black Robin Lane,
Kingston, Canterbury, Kent.
CT4 6HR

Dear Mr Baker

Study title:	**What is the essence of psychopathological perfectionism? - Developing a theoretical basis for an understanding of perfectionism within a cognitive behaviour framework**
REC reference:	**08/H1103/84**
Protocol number:	**n/a**
Amendment number:	**Minor Amendment dated 15 January 2013 (our ref: AM02)**
Amendment date:	**15 January 2013**
IRAS project ID:	**2064**

Thank you for your letter of 15 January 2013, notifying the Committee of the above amendment to include Mr Apostolos Fakis as part of the research team.

The Committee does not consider this to be a "substantial amendment" as defined in the Standard Operating Procedures for Research Ethics Committees. The amendment does not therefore require an ethical opinion from the Committee and may be implemented immediately, provided that it does not affect the approval for the research given by the R&D office for the relevant NHS care organisation.

Documents received

The documents received were as follows:

Document	Version	Date
Notification of a Minor Amendment	Minor Amendment dated 15 January 2013 (our ref: AM02)	15 January 2013

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

08/H1103/84:	**Please quote this number on all correspondence**

Yours sincerely

Amy Spruce
Assistant Co-ordinator

E-mail: NRESCommittee.London-Brent@nhs.net

Copy to: *Mr Peter Dodds, Eastern and Coastal Kent Primary Care Trust.*
Dr. Michael Townend

Appendix F

PP NHS APPROVAL

NHS
National Institute for Health Research
RM&G Consortium for Kent & Medway
CLRN, No 6 The Courtyard
Campus Way
Gillingham Business Park
Kent ME8 0NZ
Phone: 01634 350403
Email: rmgconsortium.km@nhs.net
http://kent-medway.crncc.nihr.ac.uk

Mr David Baker
Stirling Therapy Consultants
Stirling House
Black Robin Lane
Kingston
Canterbury, CT4 6HR

25th March 2013

Dear Mr Baker,

Permission for research (amendment)

We have recently been informed of an amendment to the study. This letter is to inform you that the current permission will continue when the amendment is put into effect.

Study details:

Study Title	What is the essence of psychopathological perfectionism? Developing a theoretical basis for an understanding of perfectionism within a cognitive behaviour framework
Chief Investigator	David Baker
Sponsor name	University of Derby
RM&G Consortium's study number	09/038P
Sponsor's reference number	None
IRAS or UKCRN ID number	2064
REC number, REC name	08/H1103/84, South East Coast - Kent

This letter relates to the following amendment

Amendment number and date	AM Minor 15_Jan_2013 REC ref: AM02 (our ref V01)
Current protocol version and date	No version & not dated

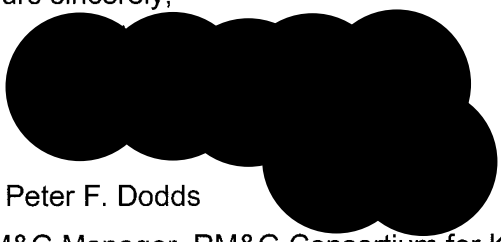
and the following NHS organisations

Organisation giving permission	Original Date of Permission	Sites to which permission applies
NHS Kent and Medway (This now includes the former Eastern & Coastal Kent PCT)	13/4/5/09	

Please note that all the terms and conditions of the original permission continue to apply.

Finally, I wish you continued success with the study.

Yours sincerely,



Dr Peter F. Dodds

RM&G Manager, RM&G Consortium for Kent and Medway

copy to: Ms J A Lewis Smith, Assistant Dean, Head of Social Care & Therapeutic Practice, University of Derby, Kedleston Road, Derby, DE22 1GB, Apostolos Fakis

Appendix G

MENTAL HEALTH THEMES

Thematic Analysis of Mental Health Data

Overarching (A-D), superordinate (1-4) and sub themes

A. Awareness of Mental Illness, Mental health, Mental issues (concerns about mental illness)

1. Drawing

Offensive, crazy, mad, bad, odd, unusual, poorly, weird

Big short arms, surgery, impaired vision

Sad, crying, angry, threatening, worried, anxious

Monster, green face, glasses, mad hair, rotten teeth

Need glasses, physically disabled, traumatised

Elderly

Teenage

Bereavement, depression, died

Containment, ECT, shock, cells, lobotomy, self harm, jump

Language

Laughter

Older people and teens

2. Photography

Understanding, crazy hair, mental illness

Reflection, shocked, surprised, show

Consequences, cause own mental illness

Stereotype, normal person

Camera eyes, telescopic eyes

3. Drama

Empathy, sadness

Embodiment, angry males, clumsy, crazy face

Inherited, contamination

Understanding

Lack of education

Male figure

4. Participatory Appraisal

Drawing the places where they go for help

I enjoyed drawing what I thought mental illness was

Drawing the places where they go for help

I enjoyed doing the wand because it got me thinking

B. Thinking and thought processes

1. Drawing

Education, explanation

Mainly females

Sensitive subject, upset, feel

Own fault, unstoppable

Descriptive, looking deeply, difference

Physical disability conflated with mental illness

Recovery model

Thinking, humour

Metamorphosis, life cycle, explosion

2. Photography

Powerful, reaction

Empty memory

Laughter, discussion

Identified with body parts representing mental illness

3. Drama

Shocked, pessimistic, distressed

Sculpture, modelled, pieces, freeze frames, body

Identification, representation

Media, laughter

Medical model, diagnosis

4. Participatory Appraisal

Talking about mental illness

Cos they can't have a good time, sorry for him

C. Feeling immersed and making sense

1. Drawing

Questioning, curios

Unconscious thought, amazing

Rehabilitation

Frustrated, not heard, hard

Identification, interesting

Worried about drawing skills

2. Photography

Feeling involved, participation

Reflection, memory (empty)

Empowerment, ownership

Focus, photo, angles, shots

Cool cameras, taking pictures, easy

3. Drama

Real life characters, physical, diagnosis

Links methods together, frustrated

Upsetting, real, enthralled, embodies

Telling a story, flows well

Awesome, express, empathy, education

Uncomfortable, own fault, born with it

4. Participatory Appraisal

More drama

More of draw and drama

All of each

All of it

D. Clinical/Educational practice (Effectiveness)

1. Drawing

Children's voice, being heard, young children, psychology, psychiatry

Meaning making, identification, flows, ideas

Non-directive, concern

2. Photography

Education

Reflective

3. Drama

Kinetic, identification

Representation, modelled, story, descriptive, helping, confidence

More aware, concentration, focus, change

Education, academic, schools, CAMHS, see and talk

4. Method

Effective, flows, interesting, ideas, approach, insight

Society, family, children, complex, playful, creative, very good

Schools, mental health, education, contradictory (lost in meaning)

Longer sessions over period of time, fun, agreement, working together

Working with difference, like every one else, not listened to

Appendix H

MENTAL HEALTH APPROVAL

North Staffordshire Combined Healthcare NHS
NHS Trust

Trust Headquarters
Bellringer Road
Trentham
Stoke-on-Trent
ST4 8HH

Website: www.combined.nhs.uk

Date: July 29th 2013

Dear Janine

RE: **A qualitative study to explore the effectiveness of a visual methodology (Derby University)**

Following my last correspondence to you dated 5 December 2012, I confirm that your research study does not include NHS patients and therefore does not require review by an NHS REC. It was reviewed and approved by Derby University Research Ethics Committee (26 July, 2013).

It has been agreed that you can conduct this study within your role and that it does not require R&D approval from North Staffordshire Combined Healthcare NHS Trust.

Kind regards

Laurie Wrench
Head of Clinical Audit and R&D