

University of Derby

Investigating the relationship between implicit and explicit measures of optimism, and examining changes in them using positive psychology interventions.

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Doctor of Philosophy 2021

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## **Preface**

The research and writing contained within this thesis has been solely authored by the doctoral candidate, with guidance and thesis direction advice only given by those stated within the supervisory package. Before beginning the studies, all research was considered and approved by the University of Derby ethical committee.

## **Abstract**

Optimism has a multitude of benefits to individuals in the domains of physical health (Räikkönen & Chirag, 2019); it has also been associated with better performance, socially and academically (Solberg Nes, Evans, & Segerstrom, 2009), decreased stress and less likelihood to burnout (Chang, 2000), better mood, coping and stronger immunity in response to stress (Segerstorm, 1998), and increased problem solving (Chang, 1996). Currently, optimism has been defined in two main ways. Firstly, it has been defined as 'the global generalising tendency to believe that one will generally experience good versus bad outcomes in life' (Scheier & Carver, 1985; p.219). This suggests that optimists look on the bright side of life, whereas pessimists believe that if something can go wrong for them, it will. Secondly, optimism is conceptualised as a positive explanatory style; it concerns how they explain the event to themselves, either positive or negative. This optimistic or pessimistic thinking is reinforced daily through how we explain things to ourselves, relating to why good or bad things happen to us (Seligman, 2005).

In the main, explicit measures have been used to measure optimism; however, explicit measures may be susceptible to several biases, such as social desirability. Implicit measures have been suggested to be able to overcome these biases (Greenwald, 1998). In this thesis, an implicit measure was created and assessed to overcome these biases. These implicit measures were compared to explicit measures to investigate how well they correlated.

This thesis has three main aims; (a) to create an optimism implicit association test (IAT) to investigate the relationship between implicit and explicit measures of optimism. (b) to investigate the relationship between implicit and explicit measures of optimism, including associated changes when using positive psychology interventions. (c) to investigate if optimism is changeable over time.

To address these aims, within the thesis, three studies and a systematic review were employed.

Study 1 aimed to create a valid and reliable optimism implicit association task (IAT) and to also investigate the relationship between implicit and explicit measures of optimism. The study examined the relationship between implicit Visual Probe Task

(VPT), IAT and explicit Life Orientation Test Revised (LOT-R). The findings in study 1 showed promising results for the reliability and validity of the IAT. However, no relationship was found between implicit and explicit optimism measures.

Study 2 examined the factor structure of optimism, within both the optimism IAT and explicit questionnaire measures. The findings suggested that implicit and explicit optimism were separate factors and therefore, could be considered separate dimensions.

A systematic review and meta-analysis explored optimism and positive psychology interventions in the workplace (using the PRISMA checklist). The systematic review revealed three studies that investigated randomised controlled trials (RCT) and whether positive psychology interventions (PPIs) increase optimism in the workplace. The meta-analysis found good homogeneity and a small to medium effect on optimism. This suggests that optimism in the workplace is malleable through PPIs.

Study 3 used a pilot RCT to examine whether PPIs can change the implicit and explicit optimism. A working population were randomly assigned to kindness to self, kindness to others or control group. The findings suggest a preliminary effectiveness at increasing optimism.

The overall conclusion from the three studies and systematic review suggested that optimism and pessimism are separate two-dimensional constructs. Additionally, the findings suggest that implicit and explicit measures are also separate constructs. Finally, the acts of kindness to self and others positive psychology interventions show potential to increase implicit and explicit optimism, and optimism is changeable over time.

## Acknowledgements

First and foremost, my deepest thanks are to my DOS Prof. David Sheffield and my supervisor Dr Frances Maratos. I am also very thankful to Yasuhiro Kotera for his help in collecting data. I am thankful to the College of Life and Natural Sciences at the University of Derby for many opportunities.

Thank you so much to my supporting ladies through the PhD, but definitely through the past few weeks. Ivana, thank you for your support and your company whilst writing. You have made me laugh and talked for hours when I have been stressed. Kirsty, thank you for all of your proofreading, support and chats. Carol for proofreading, your brilliant formatting knowledge and homemade flapjacks. Kisane, thank you for your support, cups of tea and proofreading.

Thank you to Debbie for your support and guidance when I first started my PhD, and to Chris for our many supporting chats over a cup of tea in the last four years.

The biggest thank you is to my family and especially to my husband who supported and helped me every step of my PhD. Thank you to my daughter Sophia who sat for hours with me whilst I worked and my son Bradley who was patient with me when was writing up, but always made me smile. Finally, my mum for your support through the last four years.

# Chapter 1: Introduction to optimism, implicit and explicit measures, and positive psychology

## 1.1 Overview

The focus of this thesis is on implicit and explicit measures of optimism, including investigating the effectiveness of positive psychology interventions using these different measures. This literature review chapter will begin with an overview of optimism, with the history and main theories of optimism discussed. This will be followed by a discussion concerned with the benefits of, and the mechanisms behind, optimism, preceding exploration of implicit and explicit theories of optimism. Following this discussion of current implicit and explicit measures of optimism will be pursued. Finally, positive psychology and its links to optimism will be discussed, including the history and benefits of positive psychology. This then leads to the presentation of the aims and objectives of the present body of research/thesis.

## 1.2 Historical philosophical perspective of optimism and definition of Optimism

*“The optimist sees the rose and not its thorns; the pessimist stares at the thorns, oblivious to the rose”*(Gibran, 1951; p. 45).

In Latin, the word optimism means ‘the best possible’ (Richards & Keller, 2006b). Throughout history, philosophers that have studied optimism and contributed to the advancement of optimism, include those such as Aristotle (384 B.C. to 322 B.C), David Hume (1776), Georg Wilhelm Friedrich Hegel (1770-1831), and Friedrich Nietzsche (1844-1900) (Richards & Keller, 2006b).

Aristotle constructed the idea that humans are beyond what is happening here and now, and beyond what we actually are, suggesting that fundamentally, we are our potential. That is ‘*what we are not yet, but what we could be*’ (Aristotle, 384 to 322 BC, cited in Chang, 2001). This belief in our potential has been noted by philosophers throughout history who believed that potential can determine what we will become in the world. Potential has been suggested to reflect two different expectations of either good or bad things happening to us (Richards & Keller, 2006).

The development of this idea and the understanding of the 'optimistic concept' was next traced to the French philosopher Descartes (1596-1650), he suggested, "*there is no soul so weak that it cannot, if well-directed, acquire an absolute power over its passions*" (Descartes, cited in Hartland-Swann, 1956; p. 59).

In the more recent past, psychologists such as Sigmund Freud (1856-1939) began to explore optimism from a philosophical and psychological status. Freud claimed that optimism is in one's human nature to strive for happiness, and simultaneously, humans wish for extremely joyful experiences and to avoid distress (cited in Chang, Aspinwall, Richter, & Hoffman, n.d.). Of a similar era and with similar views, William James (1842-1910) went beyond Freud to claim that optimism and pessimism is an individual's choice. James put more emphasis on optimism and pessimism being at the level of the individual. He proposed that everyone is different. Thus, whilst some individuals are optimistic, others are pessimistic (Gilboy, 2005). Slightly more recently, Tiger (1979), suggested that optimism is "*a mood or attitude associated with an expectation about the social or material future – one which the evaluator regards as socially desirable, to his [or her] advantage, or for his [or her] pleasure*" (p.18). Peterson (2000) extended this definition by proposing optimism to be a three-factor construct with cognitive, emotional and motivational elements. Following this more recent definition, many psychologists (e.g., Kluemper, 2009) began to argue that optimism is an individual trait being variable across individuals. From these different opinions, two broad approaches to optimism emerged one focused on human nature and one on individual differences. Whilst both these approaches suggest that optimism is consistent (i.e., optimists have a high expectation for the future), there are differences (Peterson, 2000).

In the human nature approach, it is argued that optimism is an inherent part of human nature (Peterson, 2000). However, in the individual differences approach it is argued that experiences influence how optimistic or pessimistic an individual is, and their expectations for the future (Peterson, 2000). This stated, psychologists, such as Lazarus, Beck, Taylor and Tiger, have argued that both approaches are compatible and that human nature provides the baseline to an individual's optimism characteristic or, in other words, individual differences (Tiger, 1979).

The two approaches to optimism, human nature (i.e., genes) and individual difference (nurture) have been explored within the literature (Peterson, 2000; Tiger, 1979). Such as, Fox (2008), who investigated the link between genes and optimism. Fox determined that individuals homozygous for the long allele (LL) gene, which has been associated with trait optimism, showed a strong bias towards the optimistic stimuli, indicating that our genes may play a role in our optimism levels. In contrast, Seligman (2000) argued that your optimism style is developed in childhood, suggesting that optimism is part of our nurture. These are clear examples that there is still an ongoing debate around nature and nurture within optimism. However, within this thesis, the definition of what optimism is will be explored.

Various definitions of optimism have been proposed within psychology and philosophy throughout history, however, they suggest optimism as being positive about the future (Scheier & Carver, 1985). According to the Oxford Dictionary (2017), optimism is the confidence and hopefulness about the success or future of something. However, within psychology, a clear definition of optimism is still debated (Garber, 2000), as optimism has been defined in two main ways. Firstly, optimism may be defined as *'the global generalising tendency to believe that one will generally experience good versus bad outcomes in life'* (Scheier & Carver, 1985; p.219). This suggests that optimists look on the bright side of life, whereas pessimists believe that if something can go wrong for them, it will (Scheier & Carver, 1985). Secondly, Seligman and Csikszentmihalyi (2001) conceptualised optimism as a positive explanatory style. That is, he suggests when individuals experience an event, it is how they explain the event to themselves, either positive or negative that is their explanatory style or attribution style. He proposed that each individual has their own explanatory style, which is developed during childhood, and this leads to different ways of thinking about the causes of events in our own lives. He argues that the optimism trait will be with an individual their entire lives; unless they deliberately take steps to change it. He suggests that optimism (or otherwise) is reinforced daily through how we explain things to ourselves, relating to why good or bad things happen to us (Taylor, 2001). (An example of an event is shown in table 1.1).



Table 1.1: Showing an example of optimism and pessimism explanatory style

Event - Not getting a promotion	Bad event	Good event
Optimistic explanation	<p>They are asked questions I was not expecting.</p> <p>I will work harder next time and get the promotion.</p> <p>I went out last night.</p>	<p>Well done, I worked hard for it.</p> <p>I have the right skills</p> <p>That was a good interview; I will do well at this job.</p>
Pessimistic explanation	<p>It's my own fault, I should have worked harder.</p> <p>I am never going to get a promotion.</p> <p>I am going to stay in this job forever.</p>	<p>It must have been luck that I got the promotion.</p> <p>Everyone gets lucky now and again.</p> <p>They may not like my work and take the promotion away.</p>

In sum, the two definitions of optimism have several main differences. Firstly, explanatory style (attribution style) is interested in the 'why' and 'how' individuals explain events that happen to them (e.g., positivity or negatively), whereas dispositional optimism is concerned with what is likely to happen in the future. Attribution style suggests that optimism is a learned skill and not a fixed personality trait. Furthermore, the attribution style definition of optimism suggests it is a learned skill (Learned helplessness which is discussed in 1.3.1) and is known as Learned Optimism (Seligman, 2008). Learned optimism is the concept that we can change our behaviour by recognising, identifying and changing our negative self-talk (Boniwell & Tunariu, 2019). Therefore, explanatory style and dispositional optimism definition will be used within this thesis.

The two definitions, dispositional optimism (Scheier & Carver, 1985) and explanatory optimism (Seligman & Csikszentmihalyi, 2001) will be referred to and discussed throughout the thesis. Therefore, within this thesis operational definitions will be used to define the construct of optimism, as a positive attitude or emotion toward things or events in the future, asserting that things are/will be better in the long term (Bunnin, Nicholas & Jiyuan, 2008). Explanatory optimism and dispositional optimism

definitions can also be linked to theories of optimism, which are discussed below (as well as in Chapter 3 when considering an investigation of trait or state optimism).

Definitions of optimism:

- 1) Dispositional optimism may be defined as *'the global generalising tendency to believe that one will generally experience good versus bad outcomes in life'* (Scheier & Carver, 1985; p.219). This suggests that optimists look on the bright side of life, whereas pessimists believe that if something can go wrong for them, it will (Scheier & Carver, 1985).
- 2) Explanatory optimism style is defined as an individual's experience of an event, it is how they explain the event to themselves, either positive or negative that is their explanatory style or attribution style (Seligman & Csikszentmihalyi, 2001).

### 1.3 Theories of Optimism

Many models of optimism have been suggested, such as the Hope construct theory (Magaletta & Oliver, 1999; Snyder et al., 1991). However, those considered as leading theories in the field are 'explanatory style optimism' (Forgeard & Seligman, 2012a) and 'dispositional optimism' (Carver, Scheier, & Segerstrom, 2010). These are outlined below, but will be further discussed in Chapter 4, where key differences in the theories will be further discussed and evaluated.

#### 1.3.1 Explanatory Style optimism theory

The explanatory style approach posits that individuals react with optimistic or pessimistic tendencies in daily life to explain the events that are happening to them. That is, whether individuals describe themselves - or their situation - optimistically or pessimistically is their 'explanatory style' (Forgeard & Seligman, 2012a). Peterson (2000) suggested that individuals are inherently inclined to explain their behaviour and different outcomes within their lives. This view is founded in attribution theory; where individuals seek a causal relationship using their current thoughts and beliefs (Attributions) about a life event or various observations they make (Poropat, 2002).

The history of Explanatory Style optimism stems from attributional theory, evolving over time (Peterson, 2000). The foundations of attribution theory are widely believed to have commenced with Heider (1958). Heider stated that perceived determinants of an outcome were externality and internality differentiated. Externality refers to

when an individual blames the cause of an effect on the environment around them and so provides an opportunity for an external explanation. In contrast, internality is when the individuals blame themselves for the effect(s) they have observed. In subsequent development of attribution theory by Weiner (1974), a stability element was added. In this, a further evaluation of whether the explanation is something or fixed state and lasting, or of momentary cause (Abramson, Seligman, & Teasdale, 1978a).

At around the same time, Maier and Seligman (1976) were investigating learned helplessness in animals. Within their experiments, it was found that when animals were exposed to uncontrollable stressful events, the majority of animals became helpless and give up. Thus, the animal continued to act helplessly even after the stressor had ended, and even if they could control the situation.

Replication of the experiment in humans by Klein, Fencil-Morse, and Seligman (1976) resulted in similar results. In these such scenarios, a number of participants in the study continued to act helpless. The phenomenon was termed 'learned helplessness' by Klein et al., as they argued that once individuals have 'learned' that their actions won't make a difference, they become helpless. Additionally, even when a solution becomes available this learning style subsequently prevents individuals 'trying it out'. Hence learned helplessness becomes internally generalised so that every future act/event is expected to be the same and, as such, pro-active responding to a situation or event is not executed. This ultimately creates a pessimistic generalisation of the same expectations across all different situations (Maier & Seligman, 1976).

Whilst pessimistic styles are generally related to individuals with a pessimistic outlook, and the opposite for optimistic individuals, to help explain these differences, the three-dimensional explanatory style model was applied to learned helplessness (Abramson et al., 1978a; Christopher Peterson et al., 1982). In this model, if an individual is pessimistic before an uncontrollable stressful situation occurs, then they are more likely to develop learned helplessness. This is due to adversity being seen as internal, consequently affecting an individual's self-esteem. However, an optimist would be argued to attribute the situation to a global (or external) cause and would, subsequently, not develop learned helplessness (Abramson et al., 1978; Peterson et

al., 1982). In 1978 Abramson et al. included this final development in the model of 'Explanatory Style optimism theory' and that is the model still used today with the dimensions of internality- externality, stability-instability and globality.

To sum, therefore, the concept of learned helplessness was transformed into the optimistic explanatory style (see also Burns & Seligman, 1991). It describes explanatory style (attribution style) optimism as three dimensional: internal/external, stable/unstable and global/specific. Internal/external denotes whether an individual believes that they have control or power over events. The stable/unstable dimension characterises whether an individual believes a repeated event will be the same or can be changed. Global/ specific refers to whether a person's explanation generalises the event to others beyond the exact event happening (Seligman & Csikszentmihalyi, 2001). Therefore, an optimistic individual who experiences a stressful or negative situation would typically view the cause to be unstable, specific and external. In contrast, a pessimistic individual would usually consider the situation to be stable, global and internal (Peterson, Park, Steen, & Seligman, 2009; Seligman & Buchanan, 1995). Consequently, these explanatory styles can provide a negative or positive explanation for an event or situation an individual encounters, and can subsequently influence an individual's mood, behaviour and actions. Indeed, a pessimistic explanatory style has been associated with depression, whereas an optimistic explanatory style has been shown to protect against depression (Peterson et al., 2009; Seligman & Buchanan, 1995).

### 1.3.2 Dispositional Optimism Theory

Dispositional optimism, as previously mentioned, is the optimistic belief that good things will happen, compared to the pessimistic belief that if something can go wrong, it will. In this theory, the individual holds such beliefs and expectations for generally all elements of their lives (Carver et al., 2010). Originally, dispositional optimism was referred to as 'positive expectations' in various situations; however, the theory was then developed and the idea of positive expectations applied into general and broader expectancies of a given situation. Therefore, optimists expect good things to happen, and pessimism expects bad things to happen, per se (Scheier & Carver, 1992).

Dispositional optimism originated from the theoretical expectancy-value model (Scheier & Carver, 2001). This model has two elements and focuses on the motivation(s) of behaviour. The first element suggests that individuals take actions to pursue a goal that they desire; with the greater the importance of the goal, the more motivation an individual has. However, if there is no desirable goal associated with the action, then there is less motivation (Austin & Vancouver, 1996). The second element of the model and the link to optimism is expectancy. This is linked to a sense of confidence about a given goal. Therefore, having optimism minimises doubt about achieving a certain goal, as the goal is perceived as attainable (Carver & Scheier, 2001). Moreover, if an individual has confidence, they will make more of an effort. However, if an individual has no confidence or has doubt about a situation, there is no desire to start the relevant action and it is avoidance. The difference between confidence and doubt is therefore believed to be the difference between 'continuing to act' or 'quitting' (Scheier & Carver, 1992). From the development of the expectancy-value model, dispositional optimism was proposed as general confidence about a situation or a desirable goal (Scheier & Carver, 1992). Thus, optimists may face adversity, but they typically continue to persevere even when progress is slow or difficult (Carver & Connor-Smith, 2010).

Adding to these human activities, according to Carver and Scheier (2001), are defined by the pursuit of goals, and the adjustment of behaviour through thoughts and actions towards these goals. Therefore, individuals self-regulate and consider themselves with respect to obstacles potentially preventing goals. This self-regulation can then become cyclical as to whether an individual believes (or has confidence with respect to others) they can achieve the said goal, or goals. The individual's belief is further determined by optimism or pessimism; if they are optimistic, they will have confidence even when faced with difficulties about achieving a goal (and vice versa regarding pessimism). This optimistic or pessimistic behaviour becomes generalised for all events, situations and challenges faced in an individual's life. Indeed, a meta-analytic review by Nes and Segerstrom (2006) on dispositional optimism further supported such arguments and found that being optimistic is a beneficial personality trait. That is, a positive association was found between higher optimism levels and better coping strategies regarding the reduction, elimination or management of stress. Furthermore, the review revealed that

dispositional optimists may adjust their coping strategies to ensure they meet the stress demand.

To conclude this section, there are thus two prominent theories of optimism. These being an explanatory style where self-explanation is key (Seligman, 2002) and dispositional optimism (Scheier & Carver, 1992) where an optimistic view is key.

## 1.4 The benefits and limitations of optimism

### 1.4.1 Benefits of optimism

Optimism has been associated with thinking about the future, which can be very beneficial. Planning and thinking about the future has been described by researchers as '*perhaps one of the most fascinating features of the human mind*' (Szpunar, 2010, p. 1; see also Buckner & Carroll, 2007; Hesslow, 2002; Schacter, Addis, & Buckner, 2008;). Thinking about the future is as far as we know, dominantly, a human trait. Indeed, humans have the ability to vividly generate simulations of different situations or circumstances that they have never before encountered, regardless of whether their thoughts about the future are optimistically hopeful or not (Suddendorf & Corballis, 1997). That is, humans can perceive the future positively (optimistically) and/or negatively (pessimistically), and in balance, this is found to be a characteristically practical advantageous method. This balance both allows an individual to be motivated to engage in future behaviours, but also allows the presentation of warnings for potentially adverse outcomes (Schwartz & Garamoni, 1986).

Schwartz and Garamoni (1986) have further suggested that having a slightly uneven balance towards optimism is very valuable in coping with stressful events. For example, studies that have investigated university student's optimism levels found that students with higher optimism scores showed better performance socially and academically (Demetriou & Schmitz-Sciborski, n.d.; Solberg Nes et al., 2009). Furthermore, within the first year at university, optimistic individuals were shown to be less stressed or demonstrate fewer indicators of depression (Brissette, Scheier, & Carver, 2002). A further two studies have found that optimistic university students, evaluated using both dispositional and explanatory styles measures, received higher grades and were more motivated (Peterson & Barrett, 1987; Solberg Nes et al., 2009).

Outside of academia, increased optimism has been linked to increased athletic performance (Gordon, 2008), as well as better psychological adjustment to a variety of stressors, reflected in greater physical health and immune system functioning and lower susceptibility to cardiovascular disease, chronic pain, cancer and AIDS (Räikkönen et al., 1999; Reed et al., 1994; Scheier et al., 1989). Furthermore, a study by Lee et al. (2019) found that higher optimism correlated with a longer life span and a higher likelihood of exceptional longevity (survival to age 85 or older). The population for the study were nurses from the NHS with a ten year follow up and veterans with a thirty-year follow up. This longitudinal study showed that higher optimism is beneficial for an individual life span. In addition, dispositional optimism has been linked to better-coping strategies when stressful life events are encountered (Billingsley, Waehler, & Hardin, 1993).

Added to this, explanatory style and dispositional optimism have even been shown to be a protection from depression and physical illness, to increase well-being, and improve academic and career achievements (Peterson & Seligman, 1984; Wise & Rosqvist, 2006; Forgeard & Seligman, 2012; Peterson & Bossio, 2001; Rasmussen, Scheier, & Greenhouse, 2009).

In conclusion, therefore, studies have shown that higher levels of optimism benefit a variety of positive life outcomes, including health, happiness, motivation and achievement (Carver et al., 2010; Scheier & Carver, 1987, 1992, 1993). These benefits have been found when optimism has both been theorised as an explanatory style and/or a dispositional trait (Forgeard & Seligman, 2012; Peterson, 1988; Rasmussen et al., 2009; Scheier & Carver, 1987, 1992; Snyder, 2002; Goodin & Bulls, 2013; Räikkönen & Matthews, 2008). However, what has yet been neglected is the different mechanisms through which optimism can operate.

#### 1.4.2 Criticism of optimism

Researchers have identified many benefits to being optimistic, however, there are downsides to being optimistic. Research has shown that optimism can be detrimental to certain individuals in particular circumstances, such as individuals that have a defensive pessimistic thinking style and unrealistic optimists (Forgeard & Seligman, 2012). Defensive pessimism may have benefits to some individuals, such as performing better academically when the individual faces possible failure,

increased self-esteem and good support networks (Norem & Chang, 2002). The defensive pessimism thinking style is the ability to plan (i.e., cover all of the angles) and think of the worst-case scenarios in any situation. The individual may have performed well in the previous situation, but this cognitive strategy allows individuals to set low expectations, to cushion any potential failure or anxiety about the situation (Held, 2004; Norem & Cantor, 1986). Defensive pessimism is beyond the scope of this thesis, however, within this thesis, the investigation of the different constructs of optimism will be investigated, and whether optimism is separate from pessimism (i.e., an individual can be optimistic and pessimistic at the same time).

Researchers have argued that some individuals may have an optimism bias, blind optimism or unrealistic optimism. Optimism bias has been linked to wishful thinking, persistent optimism and this leads to lower perceived risk, and this can have a negative outcome on an individual. Individuals that have an optimistic bias perceived their risk to situations as lower than the average person (Norem & Chang, 2002; Weinstein & Klein, 1996). For example, a below-average risk of cancer, heart disease and failure (Peterson & Vaidya, 2001). Studies have suggested that optimistic bias, blind optimism or wishful thinking can be detrimental to an individual's long-term physical and psychological health (Eichelberger, 2007; Ecken & von der Gracht, 2012). To avoid wishful thinking flexible optimism (positive realism) or individuals being optimistic and pessimistic at the same time could help to avoid 'wishful thinking' and allow individuals to achieve their set goals (Peterson, 2000). Seligman (2004) suggests that individuals should be able to use pessimism to keep a check of reality, but without dwelling on the negatives. Therefore, this suggests that there may be a benefit to optimism and pessimism being separate constructs. Within this thesis, the constructs and mechanisms of optimism will be investigated, however, optimism bias is beyond the scope of this thesis.

In conclusion, studies have shown that different types of optimism and pessimism (i.e., defensive pessimism and optimism bias) may be detrimental to certain individuals (Peterson & Vaidya, 2001; Forgeard & Seligman, 2012). However, within this thesis the types of optimism and pessimism will not be explored, nevertheless, the different constructs and mechanisms through which optimism can operate will be investigated.



## 1.5 Cognitive and Biological Mechanisms of optimism

### 1.5.1 The Brain Basis of Optimism and Attentional Biases

There are many different beliefs around the subject of what optimism is and how it is constructed. For instance, Carver, Scheier and Segerstrom, (2010) suggested that optimism and pessimism both have different advantages, and it is the balance expressed between them that is important. Optimism is associated with actively maximising one's own wellbeing and minimising stressors. Pessimism, however, is related to avoidance strategies when faced with distress and hesitations. Hecht (2013) believed a balance of optimism and pessimism is needed for survival and wellness. He conducted a literature review on optimism neurophysiology and found that the two different cerebral hemispheres were associated with optimism and pessimism. That is, broadly speaking, the right hemisphere (RH) was associated with pessimism, whereas the left hemisphere (LH) was associated with optimism. Leading on from this, several studies have investigated the link between cognition and biological brain workings (Kaufman, Kornilov, Tan, & Grigorenko, 2010; Zehr, 2015).

The cognitive mechanisms via which optimism is operationalised have been described by Heeren, De Raedt, Koster and Philippot (2013) to have three main elements or principles. Firstly, 'selective attention and information processing', concern the attention or information that is chosen to be attended to or ignored. An optimist takes from the environment clues that are positive and filters out negative information or that which is not positive. A pessimist, however, takes from the environment clues that are negative and filters out positive information, or that which is not negative. In support of this theory, using eye-tracking, Isaacowitz (2005) found that optimists invest less time looking at negative or unpleasant images, whereas pessimists looked longer at the negative image (see also, Segerstrom, 2001). Kakolewski, Crowson, Sewell, and Cromwell (1999) further investigated the association between negative and positive stimuli in a divided visual field study. Participants' attention was measured when reviewing positive and negative words presented unilaterally. That is, participants were shown in the right visual field, positive words, and in the left visual field negative words, or vice-versa. In the first

instance, an attentional bias to positive stimuli in the right visual field was observed. However, when the negative words were presented in the right visual field and positive words in the left visual field, results revealed a bilateral split of attentional bias. These findings thus suggest that positive words are associated with the left hemisphere, and an optimistic individuals' attention was selected towards the positive stimuli (Kakolewski, Crowson, Sewell, & Cromwell, 1999).

In support of this hemisphere dominance argument and optimism being biological influenced, Fox (2002) conducted a study using happy and fearful face images, with anxious participants. The results showed participants demonstrated an attentional bias (i.e., greater attention) towards fearful faces when presented in the left visual field, suggesting that the right hemisphere is associated with negative information. Marsolek, DeYoung, Domansky and Deason (2013) further explored this with likeable and unlikeable trait words presented unilaterally to healthy participants. Here, results revealed that likeable traits were more accepted in the right visual field, which is suggested to be associated with the left hemisphere. Thus, these studies demonstrate a link between selective attention and information processing and positive information/optimism. Specifically, studies have shown that the left hemisphere is involved in process of optimistic associations and the right hemisphere in the processes of pessimism association (Hecht, 2013).

### 1.5.2 Optimism and the Locus of Control

The second aspect of cognition associated with optimism concerns one's belief of being able to influence events, situations and/or relationships; i.e. one's locus of control (Peacock & Wong, 1996). Or, in other words, the general belief that individuals can or cannot control essential elements of their own lives, which is seen as a determining or influencing factor of attitude (Rotter, 1996). According to Rotter (1966), individuals that have an external locus of control believe that forces outside of their power control events in their daily lives. Hence, having an external locus of control is associated with a pessimistic outlook as such individuals think that any success or achievements are outside of their control, and due to luck or chance. In contrast, optimists are argued to have an internal locus of control. That is, they are masters of their own destinies, having the ability to influence their own lives and environment.

Interestingly, many studies have suggested that an inner locus of control is further associated with left hemisphere activity. For example, Harmon-Jones (2003) used electroencephalography (EEG) to study the brain activity of students that were informed via a radio message that their tuition fees were going to be increased. The students were split into two groups; one group were told that they had no control over the situation, and the other group were told they could sign a petition against the decision. The latter group had increased activity in the left hemisphere. Adding to this, Boksem and Kostermans (2012) found similar results when participants were asked to invoke an internal or external locus of control, by asking them to write an essay on either a time they felt power over a situation (i.e., internal locus of control) or when someone had power over them (i.e., external locus of control). In the former situation, participants were shown to have more activity in the left frontal cortex. Thus, taken together these studies indicate that one's belief in their control over a given situation is linked to activity in the left (and right) hemispheres.

### 1.5.3 Optimism and Attribution Style

As previously mentioned, attribution style is an individual's own explanatory style, i.e., the way an event is interpreted by the said individual. An optimist believes that a negative outcome in life is external, temporary and a local cause (Peterson, & Steen, 2002). In other words, to give hope to a situation an individual may internally explain that the situation was very hard or maybe impossible, and even though the attempt was not successful, future ones may be. The external explanation is mirrored by when an optimistic individual has a successful event happen to them — ascribing their success to internal, stable and global factors. Internally this would be explaining to themselves to feel good about the situation and be described as something like *'Everything I chose to do I am capable of succeeding'* (Kamen & Seligman, 1987; p 7).

### 1.5.4 The biological basis of optimism

A further mechanism through which optimism can operate is via genetics. Indeed, in Evolutionary psychology, it is hypothesised that trait optimism is a useful adaptation for quickly recovering after a bad experience (Richards & Keller, 2006c). Biological optimism has been investigated via twin studies. For example, Schulman, Keith, and Seligman (1993) compared optimism scores in identical and fraternal twins, raised in

the same shared environment. The findings showed that there was a significant increase in the relationship between identical twins and their level of optimism, as compared to non-identical twins. As such Schulman et al., concluded that some inherited effects could be occurring, but that the environment and life experiences still play a part. Furthermore, twin studies have shown a genetic factor to optimism and suggest that 25% to 30% of variability is due to genetics (Renaud, Wrosch, & Scheier, 2016).

To sum, the mechanism through which optimism can operate appears to reflect not only cognitive biases, but also brain and evolutionary based mechanisms. That is, optimism is associated with the left hemisphere and pessimism is associated with the right hemisphere, as well as a cognitive mechanism of; selective attention and information processing, locus of control and general schemas. Last but not least, genetics and inheritance may also play a part. However, to date one of the main areas of investigation is still cognitive bias (Avirbach, Perlman, & Mor, 2019; Roycroft & Roach, 2019; Slavny, Sebastian, & Pote, 2019). As such this forms the focus of the PhD through the use of both implicit and explicit measures.

#### 1.6 The importance of Implicit and Explicit Processing in the Study of Optimism

When measuring optimism one aspect that is very important is the tools used, the dominant optimism measures are explicit self-report questionnaires (Perterson, 2000; Seligman, 2011; Scheier, Carver, & Bridges, 1994). However, research has suggested that explicit self-report measures have limitations (Greenwald & Banaji, 1995); therefore implicit measures have been developed to try and overcome the limitations.

Researchers such as Greenwald and Banaji (1995) suggest that we process social information in two modes. In the explicit mode, such as self-report questionnaires, participants are aware of their answers and are able to control or reflect upon their responses. Therefore, participants may give socially desirable answers so as to create a bias as to their personality. In contrast, in the implicit mode, individuals are hypothetically unaware of the link between what is being measured and their personality, i.e. their responses are assumed to be automatic, intuitive, routine or impulsive (Greenwald, Mcghee, & Schwartz, 1998). The conflict, or otherwise,

between these response types is often encompassed within 'dual process' theories (Hall & Lindzey, 1978).

Dual process theories are taken from social psychology and psychodynamic theory (Hall & Lindzey, 1978), in which conscious beliefs and subconscious desires cause internal conflict. There are several different theory types, e.g., automatic vs deliberate, heuristic vs systematic, effortful vs spontaneous, reflective vs reflexive, intentional vs unintentional etc., but the core assumption of all is similar. That is, one such process occurs automatically or implicitly without effort or intention or cognitive resources, whereas the Second is deliberate/explicit involving an active process that is cognitive effortful (Haeffla et al., 2007).

Dual process theory has been used to explore perceptions, stereotyping, and decision making (Devine, 1989; Gilbert, Pelham, & Krull, 1988; Wilson, Lindsey, & Schooler, 2000), as well as attentional biases.

#### 1.6.1 Attentional bias, Information Processing and Optimism

Within the field of optimism, the study of attentional bias (i.e., what information is selected from the environment for further processing) has typically focused on information within the visual domain. There are two main reasons for this, firstly visual stimuli presentation times can be controlled precisely and, secondly, a comprehensive and vital range of research can be undertaken through the study of visual attention (Eysenck & Keane, 2002). Indeed within the visual system, two networks are proposed – one concerned with alerting and one concerned with orientating/selection (Fan, McCandliss, Tobias Sommer, Raz, & Posner, 2002; Fernandez-Duque & Posner, 1997; Raz & Buhle, 2006). The networks work together to respond to information in the environment across both time and space (Lu, Cai, Shen, Zhou, & Han, 2012). Attention focused on or toward a preferential stimulus is known as attentional bias, and this can be within the temporal (time) or spatial (visual location) domain (Coull & Nobre, 1998).

In studying attentional bias, one can overcome some of the limitations of explicit biases. To expand, as stated by Segerstrom (2001), self-report measures involve conscious reflections of the subject matter being measured. Conscious reflection can, however, sometimes lead to primed behaviours rather than one's natural biases. Thus, studying attentional biases is argued to allow for a 'pure' measure of

cognitive processing (Cisler & Koster, 2010). Here, previous research has shown attentional bias to play a significant role in generating emotional and behavioural reactions (Beck & Clark, 1997; MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002). Indeed, cognitive biases, schema and structures are thought to be activated when stimuli significant to that individual is shown (Beck & Clark, 1997). For example, Leppänen (2006) found depressed participants showed an attentional bias towards sad faces (negative stimuli), and an attentional bias was away from happy faces (positive stimuli). In addition, studies of non-clinical populations have found specific cognitive schemas are used in attentional bias when positive and negative stimuli are shown (Williams, Mathews, & MacLeod, 1996).

Specifically, related to optimism Segerstrom (2001) found optimists have a greater attentional bias to positive as compared to negative stimuli. This suggests that optimistic individuals keep cognitive schemas of success and abilities easily accessible, allowing for automated attentional biases; i.e. more attention to positive stimuli relating to positive emotions and thoughts are produced through the association (Bargh & Chartrand, 1999). The attentional bias creates a loop of corresponding thoughts and emotions towards the given stimuli. Therefore, when using implicit measures, the more optimistic the individual is, the greater their positive future outlook and as such cognitive schemas activating optimistic attentional bias (Karademas, Kafetsios, & Sideridis, 2007).

In accord with this, Peters, Vieler, and Lautenbacher (2016) found that participant's who scored higher on dispositional optimism paid more attention to happy faces in an eye-tracking study. In similar studies, used eye-tracking to investigate positive emotions, including optimism, parallel attentional bias results have been found (Kelberer, Kraines, & Wells, 2018; Lea, Qualter, Davis, Pérez-González, & Bangee, 2018). Segerstrom (2011) used a Stroop task to investigate the attentional bias between optimism and positive stimuli, and found a relationship between optimism and greater attentional bias to positive stimuli. A Stroop task by Karademas, Kafetsios and Sideeridis (2007) found a higher attentional bias from optimists towards wellbeing related stimuli.

To summarise, investigating implicit attentional biases has been shown to be a useful tool for examining more automatic, intuitive, routine or impulsive emotions,

attitudes or beliefs. Indeed, it would be expected when using such methodologies, that optimists would have an attentional bias to positive stimuli and pessimists an attentional bias to negative stimuli. However, despite the advantages of using implicit measures to examine optimism by far the most standard practice is to use explicit measures.

### 1.6.2 Implicit and explicit measures of optimism

The most common forms of gathering information about an individual's personality is by that individual completing explicit self-report questionnaires. One of the most commonly used methods for measuring explicit optimism is the Life Orientation Test-Revised (LOT-R) (Scheier, Carver, & Bridges, 1994). Another widely used explicit measure of optimism is the Optimism questionnaire by Seligman (2006). According to many theorists, using explicit measures is a valid methodology for gathering information on the self-concept of personality that is introspectively accessible (Greenwald, Nosek, & Banaji, 1998). However, some have argued that information is unacceptable because it does not access an individual's automatic or impulsive personality (Schnabel, Banse, & Asendorpf, 2006). Thus, implicit measures overcome problems associated with socially desirable answers and may uncover more about an individual's optimistic personality or otherwise. To expand, Roefs et al. (2011) stated that in comparison to explicit measurements, implicit measures respond to the unconscious thought and therefore targets automatic beliefs, and it overcomes the tendencies to give socially desirable answers.

Indeed, in addition to social desirability bias, self-report measures are susceptible to intentional deceit and self-presentational bias (Blair, 2002; Vartanian, Polivy, & Herman, 2004; Vitousek, Daly, & Heiser, 1991). Additionally, when using self-report methodology, the opinion is that participants construct their opinions carefully and rationally, which may not be the case for every individual (Zajonc, 1980). In contrast, implicit methods are based on an individual's automatic response and are, therefore, argued to be a better predictor of personality as they are less susceptible to social influences (Greenwald et al., 1998).

To date, an understanding of the optimistic personality has been dominated by explicit self-report methods (Zhang, Aidman., Burns, & Kleitman, 2020). However, an increasing number of researchers are now using implicit tests to measure optimism.

For example, Kosnes, Whelan, O'Donovan, and McHugh (2013) used an Implicit Relations Assessment Procedure (IRAP) to investigate positive and negative future thinking and the role in depression. Segerstrom (2001) and Karademas et al. (2007) have used the Stroop test to investigate attentional bias in optimism. Additionally, Fox (2008) used a visual probe task to investigate optimism and found that optimistic participants had a strong bias towards the optimistic stimuli. The findings showed that the depressed participants had slower reaction times to the positive future thinking trials.

Importantly, while a further test - the Implicit Association Test (IAT) -has been found to be a useful tool for measuring an individual's personality traits (Grumm & von Collani, 2007), again limited research exists regarding the use of this measure when examining optimism. Most recently, an IAT has been constructed to investigate orientations to implicit positive stimuli with promising results (Costantini et al., 2019). That is Costantini et al. (2019) found that positive IAT and explicit self-reported measure frequently predicted depressive symptoms. However, to date, no research exists examining the utility of an implicit association test for optimism. Yet such a tool could prove very valuable, as it would investigate implicit optimism.

Research over the last 30 years has started to utilise different implicit measures for a variety of different research topics (Van Dessel et al., 2020), nevertheless, explicit self-report questionnaires continue to be a useful tool and have been valuable for investigating optimism and the importance of them should not be under-rated in the research around optimism (Millstein et al., 2019; Peterson, 2000). The implicit methods could further support or complement the explicit self-report methods to further understand optimism and the different constructs of optimism. Furthermore, some caution is needed when using implicit methods, as researchers have suggested several limitations and criticisms. Firstly, the notion that the implicit measures are accessing the 'unaware'/'unconscious' needs more evidence and should be treated as a hypothesis (De Houwer et al., 2009). Some researchers suggest that we should reframe from making the assumption that individuals are unaware and further research is needed to explore if individuals completing the implicit tasks are unaware in their responses (Gawronski, 2019). Secondly, the literature has debated whether behaviour can be predicted with implicit measures. Many studies into implicit behaviours have only found small relationships through



implicit methods predicting individual behaviour, suggesting that implicit methods do need to improve if they are used for predicting behaviour (Gawronski, 2019; Greenwald, 2009; Kurdi et al., 2018). Thirdly, the literature suggests that implicit measures may be less stable over time and may fluctuate over time compared to explicit measures, evidence has shown that implicit measures have shown lower test-retest correlations compared to explicit measures (Baron & Banaji, 2006; Rudman, Phelan, & Heppen, 2007). The test-retest scores are echoed in optimism explicit self-report measures (Hinz et al., 2017) and implicit (Bosson et al., 2000) measures. For example, the explicit optimism measures have found high test-retest scores (please see chapter 2, section 2.2) compared to the implicit measure (please see chapter 3, section 2.3), therefore, within this thesis, the test-retest implicit and explicit optimism will further assist the discussion around the limitation of test-retest implicit measures (Chapter 3). However, importantly, the fluctuation over time seen in the implicit measures do not necessarily undermine the validity of the measure (Gawronski, 2019). The low test-retest scores and the fluctuation over time need to be considered within a larger debate that an individual's behaviour, beliefs or emotions may change over time rather than being a fixed stable trait (Brownstein, Mava & Gawronski, 2019). However, Vuletich and Payne (2019) suggest we should be cautious when the scores of the implicit measures are interpreted and take this into consideration. The fourth limitations builds on the interpretation of the implicit measures, the overall scores of the implicit measures may be influenced by an implicit bias, such as the environment of where the implicit task was undertaken may influence the scores (Maddux, Barden, Brewer, & Petty, 2005), the perceived social role of the participant (Richeson & Ambady, 2003), and the emotional state of the participant at the time of the implicit task (Dasgupta, DeSteno, Williams, & Hunsinger, 2009). The evidence suggests that contextual factors are important for implicit measures. Therefore, within this thesis, the implicit tasks were conducted online and within a laboratory setting in different chapters to hopefully overcome some of these limitations (please see chapter 4, section 4.8.5). Furthermore, when interpreting the implicit measures researchers argue that it may be possible that the given stimulus does not activate the full representation of the stimulus in the quick response time given. There may be a subset of sorted information that had not to be activated and therefore, a full representation of the stimulus has not been reported. Consequently, the implicit measure may be limited in reporting the full

representation of the given stimulus (Correll, & Wittenbrink, 2016). Lastly, implicit measures have been criticised for being a generic measure or adopting a 'one-size-fits-all' approach to all topic areas (Lindgren et al., 2019). Dessel et al. (2020) suggest that researchers should consider carefully which implicit measures 'best fits' the methodology of the research aims and not just include any implicit measure. Therefore, within this thesis, two implicit measures (IAT and VPT) have been investigated for reliability and validity as a measure for optimism. As previously mentioned a optimistic IAT has not been developed before and these limitations will be taken into consideration, furthermore, the VPT was utilised in chapter 3 due to previous research (Fox, 2001) employed this method to investigate implicit optimism. Despite these limitations, previous implicit tasks have found some promising results (Costantini et al., 2019; Gawronski, 2019) and within this thesis, the implicit and explicit measures will further contribute to the discussions around the different measures.

### 1.7 The relationship between Positive Psychology and Optimism

Optimism has been found to be a key idea within positive psychology and it is often measured within positive psychology interventions (Sethi & Seligman, 1993). The term positive psychology was first coined by Maslow (1954) and originated in humanistic psychology. Before this, behaviourism dominated the field of psychology. Proponents of this approach argued that free will is an illusion, and behaviour is dependent on our previous actions (Skinner, 1977). In contrast, in humanistic psychology, it is hypothesised that an individual's behaviour is influenced by how they perceive the world and its meaning, all individuals are internally motivated to fulfil their potential, and are not only a product of their environment (Rowan, 2015).

Before Maslow in 1954, the association with the concept of positive psychology can be dated back to the Ancient Greeks. The Ancient Greeks were the first recorded contributors to the philosophy of happiness and positivity. Aristotle (384-322 BCE) questioned what it was to have a 'good life'. He concluded that happiness was an important factor for a 'good life' and individuals hope to achieve fulfilment, by engaging in activities that are virtuous (Mason & Tiberius, 2009).

The concept of a 'good life' that Aristotle first proposed in 384-322 BCE was later developed into utilitarianism. Jeremy Bentham first created the utilitarianism

philosophy and was carried on by John Stuart Mill. The philosophy underpinning was the notion that the government could create the greater good for the most amount of people (or 'greatest happiness principal'), they believed that this could be achieved through rights act or policies from the government. Utilitarianism was the first to develop measurements to measure happiness and happy experiences (Pawelski & Gupta, 2009).

The concept of happiness and emotions was later developed by the philosopher and psychologist William James in the 1890s. William James was a scholar that was interested in the importance of emotions and suggested that we create happiness through what we do in our lives. James was interested in the study of individual optimal functioning and how it relates to their experiences (Froh, 2004). Furthermore, he challenged his peers in an address to the American Psychological Association, to question why some individuals fully engage in life and other do not (Pott, 2017).

The concept of positive psychology was later considered by humanistic psychology. The history of humanistic psychology began in the late 1950s early 1960s and within this era, the Humanistic Psychologist Maslow first coined the term positive psychology. Humanistic psychology believed that we need to take a holistic approach to psychology and study a person as a whole. The humanistic research was undertaken with qualitative inquiry, to examine an individual's thoughts, behaviours, and experiences (Froh, 2004).

Maslow was a prominent psychologist within humanistic Psychology, who focused on human potential rather than human deficiencies. Maslow's (1954) theory of human motivation stated that individuals are fundamentally positive and are motivated by a hierarchy of need. He suggested that there are five levels of this hierarchy, beginning with physiological need, followed by safety, love/belonging, esteem, and fulfilment with self-actualisation. The pinnacle of human development, i.e., self-actualisation, according to Maslow, has characteristics such as morality, creativity, spontaneity and problem solving (refer to figure 1.1).

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Figure 1-1: Maslow (1943) hierarchy of needs

Throughout the history of psychology, a main focus has been curing mental illness. Indeed, Maslow, (1954. p.354) stated that:

*'The science of psychology has been far more successful on the negative than on the positive side; it has revealed to us much about man's shortcomings, his illnesses, his sins, but little about his potentialities, his virtues, his achievable aspirations, or his full psychological height. It is as if psychology had voluntarily restricted itself to only half its rightful jurisdiction, and that the darker, meaner half.'*

Humanistic psychology main focus was on mental health, positive attributes and the belief that all individuals have a build-in innate drive to fulfil their potential. However, researchers have argued that humanistic psychology was limited and criticised at this time due to it not developing a respectable empirical basis (Seligman & Csikszentmihalyi, 2000).

Recently psychologists have begun to take more of an interest in wellbeing and self-actualisation (Rowan, 2015). Therefore, within the field of positive psychology, researchers have begun to link well-being with the concept of self-actualisation, as introduced by Martin Seligman (1998). Seligman, in his American Psychiatric Association (APA) presidential Address in 1998, introduced positive psychology as a

new branch of psychology. In this address, he discussed the importance of wellbeing and the need for documenting actions. Seligman and Csikszentmihalyi brought together past research, thoughts and ideas from psychologists and philosophers to identify positive psychology (Boniwell & Tunariu, 2019). Compared to humanistic psychology, a main argument is that positive psychology focuses on scientific methodology, whereas in humanistic psychology, an individualised phenomenological approach is preferred (Seligman & Csikszentmihalyi, 2000). However, positive psychology still uses many of the concepts and underpinning of humanistic psychology. Furthermore, researchers have recently begun to explore positive psychology with a qualitative methodology to further explore an individual's potential and human strengths (Rich, 2017). Nevertheless, the vast majority of the current positive psychology research focuses on quantitative methodology in this developing field of research.

In positive psychology, it is recognised that there is often a dynamic psychological interplay between positive and negative activities. Additionally, the approach is a non-pathologising approach. That is, it is intended to complement, rather than replace, current knowledge of mental illness. Furthermore, in a positive psychology approach, negative experiences or emotions are still recognised, but the focus is on ways to investigate and understand how individuals can live well or even flourish; even when stressful situations or challenges occur within an individual's life (Lomas & Ivtzan, 2016).

Positive psychology has gained more credibility over time, although it still variably defined. For example, Seligman & Csikszentmihalyi (2000) defined positive psychology as having contentment and satisfaction about the past, happiness in the present, and optimism for the future. Whereas Gable and Haidt (2005) defined it as the study of optimum functioning for individuals, groups and institutions - and what contributes to this optimum functioning. However, the most commonly cited definition and the one to be used here is, that positive psychology is the study of positive emotions and traits that enable individuals, groups and institutions to thrive (Seligman, Steen, Park, & Peterson, 2005).

### 1.7.1 The Benefits of applying a positive psychology approach

Positive psychology focuses on the positive experiences of three different time points; past, present and future. The past centres on well-being, contentment and satisfaction. The present concentrates on flow experiences and happiness. Finally, the future focuses on hope and optimism, and this chapter is interested in the future optimism time point (Boniwell, Tunariu, & Hefferon, 2019).

In 2004, the World Health Organization considered mental health disorders as one of the leading causes of disabilities all over the world. According to the World Health Organization (2011), mental health disorders account for 13% of the total worldwide burden of disease. Stating this, there is an extensive gap between treatment and provision for mental health disorders globally. For example, in countries with low to middle incomes, 76%-85% of individuals receive no treatment for severe mental disorders. The figures are slightly better for high-income countries, whereas around 35%-50% of individuals receive no treatment. Moreover, the World Health Organization stated in 2017 that more than 300 million people worldwide are affected by depression, and it is currently predicted that by 2030, the leading cause of disease worldwide will be depression (World Health Organisation, 2017).

Countering this, Layous, Chancellor, and Lyubomirsky (2014) have stated that intentionally concentrating on positive wellbeing can help reduce negative thoughts, behaviour and emotions; all of which have been linked to risk factors for multiple mental health disorders, including depression. Additionally, positive outcomes with respect to employment, relationships and health can all be increased by promoting positive wellbeing. Researchers have further found that individuals can intentionally and successfully increase their happiness levels, with this potentially leading to better well-being and alleviated depressive symptoms (Sin et al., 2009). Therefore, spending time on intentionally trying to increase wellbeing would be beneficial.

As stated above, within positive psychology the aim is to use scientific methods to understand positive characteristics and enhance life (Carr, 2011), with the study of positive psychology concerned with the understanding and enablement of happiness and wellbeing. This includes understanding positive traits, and investigation of activities that encourage positive behaviours, as well as factors influencing the development of meaningful positive relationships, institutions and social systems

(Seligman, 2002; 2008). Seligman et al., (2005) further adds that positive psychology has moved forward in two new directions; i) 'to find and nurture genius and talent'; and ii) 'to make normal life more fulfilling'.

### 1.7.2 Criticism of positive psychology

Positive psychology has many benefits; however, researchers have offered several criticisms of the positive psychology discipline. Researchers such as Lazarus (2003) believe that positive psychology promises a lot and may not be able to deliver those promises and, overall, it may be just a passing fad. Lazarus suggested that Positive Psychologists emphasise the positives, ignore the negatives and do not consider topics in-between them. Lazarus (2003) states that "*This typology of positive and negatives, which the positive psychology movement is stuck with is unproductive because the realities of life usually fall in between and, to be even more precise, most people seek to integrate the extremes of positive and negative, thereby making the best of the negative and often creating positive out of a negative*" (p 1). Boniwell and Tunariu (2019) agreed and suggest that it is a valid point that the positives are exaggerated in positive psychology; however, they advocate that it is important to observe what is meant by 'positive' within positive psychology. The positives that positive psychology focuses on is the appreciation of what works well, rather than the shortfalls when examining human actions and/or experiences.

The positives argument has been further criticised by researchers suggesting that classing emotions as positive and negative is a very simplistic viewpoint. Fontaine, Scherer, Roesch, and Ellsworth, (2007) suggest that emotions are multi-dimensional and neither positive or negative. Boniwell and Tunariu (2019) propose that as positive psychology research develops and continues the complexity of emotions should be explored, whilst trying to keep the positive mindset ethos overall. However, exploration of the multi-dimensional nature of emotions is beyond the scope of this thesis.

Positive Psychology has been compared to an ideological movement and overemphasised the novelty of positive psychology, however, this has allowed a shift in perspective (Matthews & Zeidner, 2003). This has allowed researchers to identify a new area in research and to make a start in the novel field. Indeed, many researchers expended considerable effort to make positive psychology scientifically

evidenced and use techniques that have been validated through experimentation (Boniwell & Tunariu, 2019). However, the methodologies used in positive psychology have been scrutinized, and one legitimate criticism is that the vast majority of the research is cross-sectional correlation research using self-report (explicit) methods. The limitation of the cross-sectional correlation method is it does not show causal direction, only that there is a relationship. However, as the field grows and more research is conducted, we should be expected to see a growth in longitudinal, cross-cultural studies, qualitative and mixed-method research (Boniwell & Tunariu, 2019; Hefferon et al, 2017). Therefore, to address this methodological criticism, the studies within the thesis did not focus solely on self-report methods; the primary focus is on implicit methods.

Another critique of positive psychology that sometimes we need to focus on the negative; struggle and hardship is a part of human existence (Van Deurzen, 2009). Furthermore, when peoples are struggling, suffering or victims of unfortunate circumstances, positive psychology has been criticised for blaming them for their own misery. When people are unable to show increased optimism, willpower, virtues, and strength, positive psychology may suggest it is the individual's fault (Held, 2002). According to Hayes et al (1999), one of the hardest things for humans is to be happy, suggesting that suffering is a human life characteristic. However, positive psychology is not proposing the everyone has exclusivity positive thoughts, rather it highlights the values of having a positive mindset, emotions, traits, groups and systems (Boniwell & Tunariu, 2019).

In summary, positive psychology has got several criticisms, however, with the development and research in the field of positive psychology, these should be explored further. The research within this thesis will investigate implicit methods within the positive psychology field to further enhance the literature within this developing area.

### 1.7.3 Theories of positive psychology

The development of wellbeing models via positive psychology has manifested via two approaches those focused on hedonics (Subjective well-being (SBW)) and those focused on eudemonics. In a hedonic approach, avoiding pain and achieving pleasure or happiness is the focus. However, in a eudaemonic approach, the focus



is on meaning, potential and fully thriving (Ryan & Deci, 2001). Researchers have long debated the differences and similarities between eudemonic and hedonic wellbeing, and how we define wellbeing (Ryan and Deci, 2001). However, Delle (2017) suggests that eudaemonic wellbeing always includes hedonic wellbeing (i.e., achieving pleasure). Other researchers have suggested that wellbeing is multidimensional and includes both eudaemonic and hedonic wellbeing (Ryan and Deci, 2001). However, there is an ongoing debate about eudemonics and hedonics, and how wellbeing should be defined. Therefore, as previous researchers have debated they are linked, this thesis will be investigating eudaemonic wellbeing, as the models main focus is on meaning, potential and fully thriving (Ryan & Deci, 2001).

In the eudemonic model of well-being six domains are suggested; personal growth, self-acceptance, positive relations, purpose in life, environmental mastery and autonomy (Ryff & Keyes, 1995). However, in the virtues in action (VIA) model (character strengths and virtues) proposed by Peterson and Seligman (2004) 24 characteristics across six elements are presented. These are: wisdom, courage, humanity, transcendence, temperance domains, and justice. In this model, it is hypothesised that achieving these in life will give an individual pleasure, engagement and meaning (Figure 1.2 taken from Shryack, Steger, Krueger, and Kallie (2010)). However, whilst this model includes a description of the elements that constitute positive psychology as well as the elements that make up wellbeing, it does not describe how the elements relate to wellbeing nor methods of their measurement (Seligman, 2011).

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*Figure 1-2: Showing the character strengths and virtues (Peterson and Seligman, 2004)*

To address issues with the VIA model, Seligman (2003) went on to propose an 'Authentic Happiness theory'. This theory is synthesised from elements of Hedonism theory, Desire theory and Objective List theory. In The Authentic Happiness Theory (AHT) the idea that there are three main kinds of happiness, pleasure (pleasant life), engagement (good life) and meaningful life is developed (Seligman et al., 2003).

Seligman (2003) states that pleasure and engagement are subjective to the person, whereas meaningful life is more objective, as it is concerned with serving others and, potentially, more worthwhile than one's pleasures and desires.

Seligman (2002) suggested that there is a happiness formula within the AHT, comprised of  $H = S + C + V$ ; where H stands for the enduring level of happiness. This enduring level of happiness contrasts with momentary happiness - such as receiving flowers or watching comedy films - as in the latter only a short uplift of happiness is achieved.

The S in the formula equates to barriers to becoming happier, the set point. Fifty per cent of the formula has been suggested to be genetically inherited and therefore fixed. The C equates to a person's circumstances; which accounts for about ten per

cent of the formula. Circumstances can change but are often seen as unpractical and expensive. Finally, the last aspect of the formula is 'V' which represents voluntary control. The last forty per cent in Seligman's (2002) formula is intentional and can be changed if an individual chooses to do so.

Of note, Intentional happiness is under one's own control, through an individual's thoughts and behaviour. It is proposed that the way individuals think about things, positively or negatively, can increase or decrease happiness. Thus, it is suggested that individuals can control the amount of happiness they experience (Seligman, 2002). However, AHT has been criticised with respect to being one-dimensional and focused on feeling good, including how one can choose the course of their life (Compton & Hoffman, 2019). The theory has further been criticised with respect to its focus on happiness and not wellbeing as a whole (Scorsolini-Comin, Fontaine, Koller, & Santos, 2013). Therefore, further theories of happiness have been suggested, such as the Happiness Advantage Theory (HAT) by Achor (2010).

In the HAT it is argued that most individuals are taught that hard work will bring success and that this, subsequently, will lead to happiness. Achor (2010) argues that this philosophy is taught by parents, family, schooling and society. The motivation in life is success first, which will then be followed by happiness. According to this theory, if success causes happiness, then everyone who has succeeded at something should be happy. However, with every success, the goalposts of the success change. That is, with one victory accomplished, the next one is set, and hence happiness moves further away. Therefore, the formula of hard work bringing success, and this then leads to happiness is an un-truth. Indeed, Achor believes that this formula is 'backwards' and that, rather, happiness and optimism drive performance and achievement. Thus he posits that changing the formula to happiness first, gives the individuals a competitive edge, which he calls the 'happiness advantage'. In accord, with this, Achor (2011) has found that waiting to be happy limits an individual's potential for success. He argues the counter, i.e., if the individual (or the brain) is cultivated with positivity, it makes an individual more motivated, efficient, resilient, creative and productive. This, in turn, promotes success. However, the HAT has been superseded by Seligman's wellbeing (PERMA) theory, first proposed in 2011. One reason for this is that PERMA is multi-dimensional and covers many areas of well-being (Seligman, 2011).

The PERMA theory is multi-dimensional and considers five elements to contribute to wellbeing and flourishing (Seligman, 2011). Michalec, Keyes, and Nalkur (2009) describes flourishing as an individual's prosperity in their private and social lives, with a positive mental health that is filled with positivity and emotional vitality. Seligman (2005) suggests that individuals need to show the following elements to flourish: positive emotions, engagement, interest, meaning and purpose. However, he further adds that a number of supplementary features are required in order to flourish. These include self-esteem, optimism, resilience, vitality, self-determination and positive relationships (Seligman, 2011).

Seligman's (2011) wellbeing theory includes the need for positive emotion, engagement, positive relationships, meaning, and accomplishment and hence the abbreviation PERMA. Thus, within this theory wellbeing is multi-dimensional and all of the elements play a key role in well-being.

*P(ositive emotion)*

*E(ngagement)*

*R(elationships)*

*M(eaning)*

*A(ccomplishment)*

Specifically, and relevant to this thesis, the element of positive emotion includes feeling happy and satisfied with life. Feeling positive can provoke a feeling of joy associated with past experiences, an optimistic view of the future, and/or an appreciation of the value of the present (Seligman, 2011). Engagement is the feeling of being totally engrossed in an activity, which is related to the concept of 'flow'; this is when time seems to stop, and full concentration is given to a task. Positive relationships are important to wellbeing, as humans are 'social beings' and benefit from happier relationships. The meaning in life refers to the sense of belonging to something bigger than one's self, for example, a union, club or charity. Lastly, accomplishment is important to flourishing, as in working towards a goal or a skill gives a sense of wellbeing (Seligman, 2011).

The happiness theory and wellbeing theory suggest that up to forty per cent of happiness can be increased (altered), within the voluntary control part of the formula, to allow individuals to flourish (Seligman, 2012).

To conclude, within this thesis the theory of PERMA will be investigated. The VIA model and AHT were not included explicitly in the thesis as they were predecessors to Seligman's PERMA theory. Furthermore, HAT does not consider optimism as an element in the theory, so it was also excluded. Therefore, PERMA was the main focus in this thesis because that it is the main theory dominating the literature (Bartholomaeus, 2020), it is multi-dimensional, all the elements play a key role in well-being, and the theory considers both eudaimonic and hedonic wellbeing components (Seligman, 2012). Additionally, the P (Positive Emotion) element in PERMA focuses on optimism, which is the main focus of this thesis (Seligman, 2012). Finally, no research has been conducted that has investigated PERMA and implicit optimism so this will address this gap.

#### 1.7.4 Positive psychology and Intervention Studies – An overview

Mihaly Csikszentmihalyi (2008) stated that “*contrary to what most of us believe, happiness does not simply happen to us. It's something that we make happen...*” (Nakamura & Csikszentmihalyi, 2009). Therefore, as it is argued that up to forty per cent of happiness can be increased (or altered) in the above Happiness theory, much of the field of positive psychology has focused on the evaluation on positive well-being interventions. Of note, research reveals that these interventions and techniques have been found to make individuals instantly happier and, in the longer term, increase optimism, sense of purpose, physical and psychological health, resilience (White, 2019 for review).

Some of the techniques and interventions used to enhance well-being include activities such as gratitude visits (e.g. visiting someone that you are grateful too, and telling them), designing a perfect day in the realms of a person's reality and then living it (e.g. ‘Have a beautiful day’), writing a gratitude journal, engaging in small acts of kindness (e.g. such as opening a door for someone), identifying personal strengths, and thinking about happy memories (Seligman, 2011). Seligman, Steen, Park and Peterson (2005) found that three different positive psychological activities, such as some of those suggested above, significantly improved effect and

diminished depression, in a sample of 577 adults. Additionally, after six months of pursuing these activities including 'finding and using personal strengths in everyday life', 'a gratitude visit' and 'daily writing of three good things', individuals showed significant increases in happiness and significant decreases in depressive symptoms.

In addition, stemming from his research into positive psychology, Seligman (2011) designed a Comprehensive Soldier Fitness program (CSF). The aim of which was to increase a soldier's positive performance and psychological strength. The ethos of the program was to promote psychological fitness and resilience, rather than focusing on treatment (Forgeard & Seligman, 2012b). Resilience has several contributing factors, including optimism, faith, close relationships, sense of meaning and self-efficacy (Reivich, Seligman, & McBride, 2011). Indeed, Seligman (2011, p.128) has stated that "*Civilian medicine is perversely incentivized. If we want health, we should concentrate on building resilience-psychologically and physically-particularly among young people. We want a fighting force that can bounce back and cope with the persistent warfare that the next decade promises*" (Seligman, 2011).

To summarise, a number of positive psychology theories have been put forward, with each demonstrating benefits as well as limitations. However, currently, the main theory dominating the literature and with much support is that of PERMA by Seligman (2011).

## 1.8 Chapter Summary Positive psychology and optimism

Following the advent of positive psychology, a number of interventions to increase mental wellbeing have been designed and evaluated. However, these interventions are not only designed in a bid to decrease mental illness but, more importantly, increase an individual's wellbeing and ability to flourish (Seligman, Steen, Park, & Peterson, 2005). In accord with this, research has shown that positive psychology based interventions (PPIs) increase wellbeing, including those focused on expressing gratitude and optimism, forgiveness, finding and using signature strengths, and/or savouring (Linley, Nielsen, Wood, Gillett, & Biswas-Diener, 2010; Lyubomirsky, Dickerhoof, Boehm, & Sheldon, 2011; Reed & Enright, 2006). Added to this, a review by Sin, Della, Porta, & Lyubomirsky (2011) found that positive

psychology interventions increase positive thoughts, behaviours and emotions, and decrease negative symptoms.

Optimism is one of the elements that is investigated within positive psychology (Bhullar & Wall, 2018). Consequently, many studies have investigated if different positive psychology interventions can increase wellbeing and optimism. Indeed, in research by Peters, Flink, Boersma, and Linton (2010) found that when a Best Possible Self PPI was used by the participants a short term increase in optimism was observed. Additionally, Neff, Rude, and Kirkpatrick, (2007) found that a self-compassion PPI was associated with significant increases in optimism. Wellbeing with the addition of optimism was increased for patients with heart disease when a six-week PPIs (gratitude, kindness and mindfulness) were introduced (Lambert D'raven, Moliver, & Thompson, 2015). Further studies found an increase in optimism when investigating PPIs, such as gratitude exercises (i.e. writing letters of gratitude), expressing gratitude, three good things (i.e. writing three good things that have happened in the day), signature strengths (i.e. discovering what personal strengths define someone), self-compassion (i.e. being kind to yourself) (Boehm, Lyubomirsky, & Sheldon, 2011; Lyubomirsky, Dickerhoof, Boehm, & Sheldon, 2011b; Mongrain, Anselmo-Matthews, & AnselmoMatthews, 2012; Shapira & Mongrain, 2010).

However, to date, one of the limitations of interventions used within positive psychology, such as all those cited above, is that they typically utilise explicit self-report measurements (Tweed et al., 2009). Currently, to the author's knowledge, there hasn't been any research investigating the effects of IPPs and optimism using implicit measures.

### 1.8.1 Aims and Objectives

To conclude, as overviewed in this Chapter, there is considerable evidence for the development and investigation of implicit measures of optimism, including their relationship (or otherwise) with explicit measures of optimism. In addition, there is currently very little research exploring the effects of PPIs on implicit measures of optimism in addition to explicit measures. Thus, one major aim of the current research is to create an optimism implicit association test (IAT) to investigate the relationship between implicit and explicit measures of optimism. The second major aim of the current work is to investigate the relationship between implicit and explicit

measures of optimism, including associated changes when using positive psychology interventions. The third aim of this thesis is to investigate if optimism is changeable over time.

Thus, the objectives of the thesis are:

1. To create a valid and reliable implicit association test (IAT) for optimism.
2. To examine the factor structure of the optimism IAT.
3. To investigate the relationship between one explicit self-report questionnaire and two implicit tasks.
4. To examine the factor structure of optimism, within both the optimism IAT and explicit questionnaire measures.
5. To conduct a systematic review that investigates optimism and positive psychology interventions in the workplace (using the PRISMA checklist).
6. To examine if a pilot positive psychology intervention can increase optimism using implicit and explicit measurements of optimism in an English and Japanese population.

In order to investigate the set-out aims and objectives of this thesis, four studies were conducted and one systematic review. Objectives 1, 2 and 3 were explored in chapter 3. Objective 4 was investigated in chapter 4. Objective 5 was investigated in chapter 5. Finally, objective 6 was investigated in chapter 6.



# Chapter 2: Methodology overview - Implicit and explicit measures

## 2.1 Introduction

Optimism has been investigated via several different methods, including cognitive, physiological, behavioural and neuroscience measures. The purpose of this thesis is to investigate the cognitive aspects of implicit and explicit measures of optimism. In this chapter, the different measurement tools that were used within the thesis to investigate optimism will be discussed, with a specific focus on the implicit and explicit methods of optimism. This will include a discussion of their psychometric properties (reliability, validity and where appropriate the suggested dimensions) and the limitations of the different methods used. The reliability of the method concerns its repeatability or reproducibility. For a method to be useful, it needs to demonstrate the same result each time consistently, i.e., demonstrate high reliability (Coaley, 2010). Validity is concerned with whether a method is measuring what it claims to be measuring (Coaley, 2010).

Different methods and measures that were used within this PhD thesis as illustrated below;

- The relationship between explicit and implicit measures of optimism will be investigated using the implicit association task (IAT), implicit visual probe test (VPT) and explicit LOT-R will be presented in Chapter 3. This data, as well as further exploration of the IAT using Exploratory Factor Analysis (EFA), will be presented in this chapter.
- The different constructs of implicit and explicit optimism and what the IAT measures using the IAT, LOT-R, Optimism and pessimism scale 2 (SOP2), and Attributional style questionnaire (ASQ) will be presented in Chapter 4.
- Two acts of kindness positive psychology interventions will explore impacts upon optimism and wellbeing; using IAT, LOT-R and DASS-21, and will be presented in Chapter 6. In this pilot study, English and Japanese versions of the measures will be adopted.

### 2.1.1 Epistemological Position

Within research there are many different methodological viewpoints, in this thesis, a positivists realist approach will be taken. Epistemology is a philosophy that underpins research to guide the methodology used (Guba, 1990). Epistemology is the study of the nature and forms of knowledge, how it is created, acquired and communicated (Scotland, 2012). Positivistic epistemology has been closely linked to quantitative research but, as with all epistemologies, positivism shares a group of theories. It is grounded in realist ontology, in which the belief is that reality occurs independently from one's own representation and is objectively observed. Therefore, obtaining these facts or knowledge is undertaken by direct experiences or empiricism (observations). The positivist's viewpoint is seen as objective and value-free, and is driven to develop a universal causal law (Barker, Pistrang, & Elliott, 2002). This thesis will follow the positivist epistemology viewpoint when investigating implicit and explicit optimism. That is, experiments will be undertaken and knowledge drawn from result observations.

### 2.2 Explicit self-report measures: Optimism and Wellbeing measurements

To date, optimism has mainly been researched through explicit self-report questionnaires. In this thesis two questionnaires will be utilised to investigate explicit optimism, one concerned with dispositional optimism and one concerned with explanatory style optimism (Seligman, 2001; Scheier et al., 1994). As previously stated in chapter one, self-report measures have been found to be susceptible to many biases including susceptibility to self-presentation and/or social desirability (i.e. the idea that we hide or do not want to promote things about ourselves; (e.g. Greenwald, 2001; Friese, Hofmann, & Schmitt, 2008). However, there are advantages to self-report measures, including their cheap cost, and that they are administered easily across online, face to face or laboratory situations (McDonald, 2008). Self-report questionnaires which have been used to investigate dispositional optimism and explanatory style optimism include the Scale Optimism-Pessimism (SOP2), Life Orientation Test-Revised (LOT-R) and Attributional Style Questionnaire (ASQ), respectively. These questionnaires have been found to be both reliable and valid. A further explicit measure discussed in this chapter is the Depression, Anxiety

and Stress Scale (DASS-21). This measure will be used when investigating wellbeing in the applied positive psychology intervention (chapter 6). A detailed review of these four measures, justifying their use, will now be presented.

### 2.2.1 Life Orientation Test-Revised (LOT-R) – Dispositional Optimism

Dispositional optimism is the belief that good things will happen. From a dispositional optimism stance, the individual holds consistent beliefs and expectations for generally all elements of their lives (Carver et al., 2010). Scale development of the original Life Orientation Test (LOT) followed from Scheier and Carver (1992) asking participants directly about their expected life outcomes in the future. The LOT was validated by Scheier and Carver (1985), but revised by Scheier et al., in 1994. Following on from this the briefer LOT-R was first used to measure dispositional optimism in a British sample by Lai, Cheung, Lee and Yu (1998). The modified version was released to resolve criticisms with the LOT concerning the scales ability to distinguish dispositional optimism from other personality traits, such as neuroticism (Scheier, Carver, & Bridges, 1994). The LOT and the LOT-R have a high correlation of 0.95 and reported high construct validity (Scheier et al., 1994). The LOT-R has been converted into many different languages, including a Japanese version (2004), which will be used in chapter 6 to investigate cross-cultural differences in a positive psychology intervention (Sumi, 2004). Importantly, the LOT-R is considered the gold standard of dispositional optimism measure and is the most commonly used measure to investigate optimism.

#### 2.2.1.1 Psychometric properties of the LOT-R

##### 2.2.1.1.1 Dimensional constructs

The dispositional optimism LOT was initially formulated to measure a one-dimensional bipolar construct (Scheier & Carver, 1985). LOT-R was also intended to be a one-dimensional construct, and Scheier (1994) suggested from a confirmatory factor analysis that one-dimensional was superior to a two-dimensional construct. However, many researchers have found the LOT-R to be two-dimensional, representing optimism and pessimism as separate factors (Chang, Maydeu-Olivares, & D’Zurilla, 1997; Creed, Patton, & Bartrum, 2002; Røysamb & Strype, 2002).

The one-dimensional correlation between optimism and pessimism was assumed to be negative; however, this relationship was found to be a weak as represented by a

coefficient correlation of about  $r = -.20$  (Glaesmer et al., 2012a; Monzani, Steca, & Greco, 2014; Sierra et al., 2013). Using the LOT-R a two-dimensional construct of optimism and pessimism has been found in other cultures, including Japanese culture (Chang, 1996; Sumi, 2004). A confirmatory factor analysis conducted by Cano-García et al., (2015) with 906 Spanish participants found a one factorial model with two independent factors. Overall, these findings suggest that optimism and pessimism are two independent factors. This was further confirmed by Sierra et al., (2013) and Hinz et al., (2017). Therefore, within this thesis and based upon the above review of the evidence, a two-dimensional approach when using/investigating the LOT-R will be used.

#### 2.2.1.1.2 Reliability and Validity

The reliability and validity of the LOT-R has been investigated via a number of different studies, with results invariably finding adequate measures of internal consistency, test-retest reliability, construct and predictive validity (Chang et al., 1997; Hirsch, Britton, & Conner, 2010; Majer, Jason, & Olson, 2004; Richardson & Ratner, 2005; Scheier, Carver, & Bridges, 1994).

Hinz et al. (2017) conducted a study that investigated the psychometric properties of the LOT-R, in a sample of 9711 participants. Results revealed that there was good reliability for optimism,  $r = 0.70$  and pessimism  $r = 0.66$ , with an overall score of  $r = 0.66$ . Dispositional optimism as measured via the LOT-R questionnaire has been found to be relatively stable and reliable over time. For example, Atienza, Stephens and Townsend (2004) found LOT-R test-retest correlation was 0.73 over a 12 month period with a study of 182 women. A similar study with 212 college students over a four-week period revealed a test-retest correlation of 0.76 (Lucas, Diener, & Suh, 1996). The psychometric properties of the Japanese version revealed a test-retest reliability of 0.65 for optimism and 0.70 for pessimism over a four-week period (Sumi, 2004). This was mirrored by Lai, Cheung, Lee and Yu (1998) who found a test-retest correlation of 0.66 in a Hong Kong Chinese sample over a five-month period.

However, findings over longer periods of time are more controversial. For instance, two studies over a ten-year period found very different results, Matthews, Raïikko, Raïikkoñnen, Sutton-Tyrrell and Kuller (2004) revealed a test-retest of 0.71 with 209 participants and Segerstrom (2007) a test-retest of 0.35 with 100 participants.

However, the second study encompassed fewer participants and thus may have

been lacking in power. In sum, as the LOT-R has high test-retest over short periods of time and is also one of the most widely used measurements of dispositional optimism, on this basis, it was the chosen measure incorporated in this PhD research.

#### 2.2.1.1.3 Further Strengths and Limitations - Generalisability

Further investigation into the LOT-R was explored by Hinz et al., (2017). In a study with 9711 participants, they found no difference in gender (effect size  $d = 0.12$ ). However, Hinz et al. (2017) did find a small difference in regards to age, with younger adults reporting being more optimistic than older adults. These findings have been replicated in further studies (Aaij et al., 2016; Armbruster, Pieper, & Hoyer, 2014; Sierra et al., 2013). Although in a recent study by Schou-Bredal et al. (2017) the LOT-R was found to demonstrate no gender differences and only small differences in regards to age.

#### 2.2.1.1.4 Data analysis

The English and the Japanese version both comprise ten questions, of which there are three optimism items (Items 1, 4 and 10) (e.g., "I always look on the bright side of things"), three pessimism items (Items 3, 7 and 9) (e.g., "I rarely count on good things happening to me"), and four filler items. See appendix 1 for the LOT-R. The English and Japanese versions both utilise a five-point Likert scale (4=strongly agree, 3=agree, 2=neutral, 1=disagree, and 0=strongly disagree) (Scheier et al., 1994). Although the four filler items are not scored, and the pessimism items are reverse coded. The three optimism items are added together, and then the three pessimism items are added together, to enable optimism and pessimism scores for the two-dimensional construct. For the one-dimensional construct, the optimism and pessimism scores are added together to calculate an overall score. As stated above, in the present research a two-dimensional approach will be utilised. The higher the score, the more optimistic an individual is. The higher the pessimism score the more pessimistic an individual would be considered to be (Scheier et al., 1994).

#### 2.2.2 Attributional style Questionnaire (ASQ) - Explanatory style

The explicit explanatory style optimism will be investigated in the second study of this thesis (Chapter 4). Measures of explanatory style have developed over time (Seligman, 2008), but the most recent and more commonly used is the (self-report)

Attributional Style Questionnaire (ASQ; Peterson et al., 1982). The ASQ measures individual differences of what individuals attribute the cause of 'bad' or 'good things' happening to them. This includes their bias to attribute events internally (versus externally), stable (versus unstable), and globally (versus specific) (Peterson et al., 1982).

The three dimensions within the explanatory style (An example shown in figure 2.1):

***Personal (internal/external)***

This dimension refers to whether or not an individual believes that they have control or influence over a situation or event. The internal versus external is when an individual attributes an event to external causes or themselves.

***Permanent (Stable/Unstable)***

This dimension *characterises* whether an individual believes that if the same event happens again, it will have the same outcome or it will be different. An optimistic individual would describe their good qualities as stable, and the outcome of an event would be the same if it happened again.

***Pervasive (Global/Specific)***

This dimension optimists see a failure as a setback, and pessimists see failure as the end, and there is no going back (Seligman, 2011).

An example of an explanatory style if a job interview was unsuccessful		
	Pessimistic example	Optimistic example
Permanent	I will never be able to get another job.	There are plenty of other jobs to apply for.
Perverse	I am just not good at interviews. I will never get a different job.	I will work harder next time to impress the interviewers, and I will get the job.
Personal	I am useless.	The job might not have been right for me.

Figure 2-1: An example of an explanatory style if a job interview was unsuccessful.

## 2.2.2.1 Psychometric properties of the ASQ

### 2.2.2.1.1 Dimensional constructs

The ASQ measures optimism as a three-dimensional construct. These are internally (versus externally), stable (versus unstable), and globally (versus specific). The three dimensions have been shown to be correlated with each other. However, optimism and pessimism attributions were found to be uncorrelated ( $r = 0.02$ ), therefore showing that optimism and pessimism are separate constructs (Peterson et al. 1982). A factor structure using a varimax rotated principal components analysis found optimism and pessimism were two independent explanatory styles within the ASQ. This furthermore suggests that positive and negative explanatory styles may have different structures. For instance, internality was independent from stable and global dimensions for negative events. Although positive events were shown to form three separate single factors (Corr & Gray, 1996). However, one of the limitations of this study was its small sample size. Several other studies have found that internality/externality is more independent from global events, and stable and global events correlate strongly (e.g. Hu, Zhang, & Wang, 2015).

Indeed, a confirmatory factor analysis revealed that in a sample of 1000 participants, all three dimensions were correlated and this was true for both positive and negative events (Higgins, Zumbo, & Hay, 1999). Further investigation of the structures were undertaken by Hewitt, Foxcroft and MacDonald (2004), who used multi-method analytic strategies on the different dimensions in a sample of 2748 participants. They found that both negative and positive attributes correlated with the three dimensions; internality/externality, stability/instability, and globality/locality. However, their research still supported previous findings in that internality had a higher correlation with negative events. Peterson et al. (1982) questioned the relationship between optimism event attributions and pessimism event attributions and found a low correlation between them ( $r = 0.20$ ). The correlation was replicated by other studies such as Corr and Gray (1996) and Bunce and Peterson (1997), who also found that optimism and pessimism were independent explanatory styles. Furthermore, Corr and Gray's (1996) study also used CFA, and the findings suggested that optimism and pessimism might have different structures. Therefore, the stance that optimism and pessimism are separate constructs will be taken throughout this thesis and, so, the optimism and pessimism ASQ scores will be presented as two separate scores.

### 2.2.2.1.2 Reliability and Validity

A meta-analytic review study by Sweeney, Anderson and Bailey (1986) found medium reliability for internality (0.58), stability (0.52), globality (0.73) in the measure of pessimism events. Medium reliability for internality (0.40), stability (0.67), and globality (0.66) were also reported in the measure of optimism events. Several studies have investigated if the explanatory style construct is stable over time. A 3-year longitudinal study of 146 young adults found a moderate correlation ( $r=0.44$ ) at the second time point of one month follow up (Dykema, Bergbower, Doctora, & Peterson, 1996). A more recent study by Hankin and Abramson, (2002) found good internal consistency of  $\alpha= 0.93$  and  $\alpha= 0.89$  over a two week time period. To further explore the reliability and validity of the ASQ a meta-analysis of 86 studies with 5,1407 participants was undertaken in 2015 and revealed an overall significantly medium effect size pertaining to the ASQ (Hu, Zhang, & Wang, 2015).

### 2.2.2.1.3 Limitations and strengths

Due to some research discussion around limitations of the questionnaire being a little difficult for participants to complete without the researcher, it is not advisable to use this measure in online research (Dykema et al., 1996a). However, according to Nederhof (1985), social desirability can be diminished through a researcher not conducting the questionnaire face-to-face, thus making it suitable for online research. Given this, the ASQ was only used to explore the constructs of optimism (chapter 4) and not as a measure in chapter 3 or the intervention research (chapter 6).

### 2.2.2.1.4 Data analysis

#### 2.2.2.1.4.1 Find an example question from the questionnaire.

The questionnaire contains 12 hypothetical events and within this, for each section, with a series of four sub-questions. Six of the hypothetical events are positive events (i.e., “*You do a project that is highly appraised*”), and six are negative events (i.e., “*You have been looking for a job unsuccessfully for some time*”). See appendix 27 for the full scale. The four sub-questions questions follow the same arrangement. The first question asked for the participant to provide an explanation for the given event (i.e., Hypothetical event: You meet a friend who compliments you on your appearance. Sub-question 1: Write down the one major cause). The remaining three



questions ask the participants to use a 7-point scale to rank the explanation from three dimensions: internal versus external; stable versus unstable; and global versus specific. (Example is shown in figure 2.2) Each dimension is a measure of a participant's tendency to explain the event personally or from environmental factors, their temporal consistency, happens in other situations, respectively (Seligman, 2002).

When scoring the ASQ for explanatory style, there are six positive and six negative events, each with three subscales; Internal Positive, Stable Positive and Global Positive; Internal Negative, Stable Negative, and Global Negative. To calculate ASQ total score, one must total the negative questions and subtract this total from the positive questions total. The total score will place the participant on a linear line from having an optimistic to a pessimistic explanatory style (Abramson, Seligman, & Teasdale, 1978). However, in this thesis, the three optimism scores and three pessimism scores will be calculated, as optimism and pessimism are considered as separate constructs. The optimism and pessimism three dimensions will be explored further concerning implicit and explicit optimism constructs in study 2 (chapter 4).

The ASQ has 24 questions within the questionnaire and an example question is shown in figure 2.2.

1. YOU MEET A FRIEND WHO COMPLIMENTS YOU ON YOUR APPEARANCE.

1.1) Write down the one major cause:

1.2) Is the cause of your friend's compliment due to something about you or something about the other person or circumstance?

Totally due to the other person or circumstances

1

2

3

4

5

6

7

Totally due to me

*Figure 2-2: Example question from ASQ*

### 2.2.3 Scale Optimism-Pessimism-2 questionnaire (SOP2)

The SOP2 is a questionnaire measuring state dispositional optimism and pessimism, and contains two single items (Kemper, Beierlein, Kovaleva, & Rammstedt, 2013). Figure 2.3 shows an example of the optimism question and the 7-point Likert scale (the pessimism question can be found in appendix 2).

#### 2.2.3.1 Psychometric properties of SOP2

The SOP2 (Kemper, Wassermann, Hoppe, Beierlein, & Rammstedt, 2012) is a two-dimensional assessment of optimism and pessimism with just two items. Kemper et al. (2013) found the reliability correlation between optimism and pessimism to be strong at  $r = -0.86$ . Rammstedt and Beierlein (2014) found the reliability to range between 0.74 to 0.83, and have a test-retest stability of  $r = 0.59$ . In Kemper's study, convergent and discriminant validity was found to be moderately correlated ( $r = 0.68$ ) with the LOT-R. Research has supported the SOP2 being both reliable and valid.

#### 2.2.3.2 Strengths and Limitations

As this scale was only developed in 2012 it has not been used in a wide selection of studies. However, due to its reported high reliability, it will be used to investigate optimism constructs (Chapter 4). The SOP2 questionnaire is very short, and this has been considered a limitation of the scale. Short questionnaires have been criticised for potentially being psychometrically problematic in regards to reliability and validity (Kruyen, Emons, & Sijtsma, 2013; Rammstedt & Beierlein, 2014). However, the short-scale limitation has been countered by some researchers, such as Ziegler, Kemper and Kruyen, (2014) who argue that there is more demand for shorter scales, as fatigue can also pose reliability issues. Heene, Bollmann, and Bühner (2014) also suggest that there is less room for error in short scales compared to longer scales, but suggest that short scales should still be used with caution. Therefore, justifying the use of this scale in investigating the constructs of implicit and explicit optimism, but not using the scale in chapters 3 and 6.

#### 2.2.3.3 Data analysis

The SOP2 has two questions and two factors: one optimism and one pessimism (shown in figure 2.3). (Kemper et al., 2012).

Optimists are people who look to the future with confidence and who mostly expect good things to happen. How would you describe yourself? How optimistic are you in general?

<b>Not at all optimistic</b>							<b>Very optimistic</b>
1	2	3	4	5	6	7	

Figure 2-3: The optimism question

### 2.2.4 DASS-21 (Depression Anxiety Stress Scale)

As the final study in this thesis focuses on positive psychology interventions to measure any changes in optimism and overall wellbeing, a measure of general wellbeing is important to incorporate. The DASS-21 is a shortened version of the 42 items DASS questionnaire (Lovibond & Lovibond, 1995).

The DASS-21 has 21 items broken down into three sections: stress, depression and anxiety. An example item from each section is shown below:

Stress scale, *“I was intolerant of anything that kept me from getting on with what I was doing”*;

Depression scale, *“I felt that life was meaningless”*.

Anxiety scale, *“I was aware of the action of my heart in the absence of physical exertion”*.

The DASS-21 has been found to have good reliability and validity and is hence good measurement of wellbeing (Henry & Crawford, 2005).

#### 2.2.4.1 Psychometric properties of the Depression Anxiety Stress Scales (DASS)

The psychometric properties have been studied in both non-clinical and clinical samples, and have both yielded promising results. In a non-clinical population there was good internal consistency (0.85 to 0.94) and a strong three-factor depression, anxiety and stress structure revealed in factor analysis (Lovibond & Lovibond, 1995a). Henry and Crawford (2005) found the DASS-21 to have an overall internal consistency of  $\alpha=0.88$  (Depression  $\alpha= 0.82$ , Anxiety  $\alpha= 0.90$ , Stress  $\alpha= 0.93$ ). The psychometric properties of the DASS in a clinical sample was also found to have a

favourable internal consistency ( $\alpha = 0.96, 0.89$  and  $0.93$ ; (Brown, Bruce, Chorpita, Korotitscw, & Barlow, 1997). Test-retest at short durations (e.g. one week) has also been shown to be favourable results ( $r_s = 0.37-0.81$ ; Asghari and Dibajnia, (2008)). The DASS-21 has been translated into several different languages, with Zlomke (2009) observing a Japanese version to have good Cronbach's alpha for depression (0.83); anxiety (0.74) and stress (0.79).

#### 2.2.4.2 Data analysis

To score the DASS-21, data is categorised into three categories pertaining to depression, anxiety and stress. As the DASS-21 is the shortened version the categories scores was multiplied by two (x2) (Lovibond & Lovibond, 1995).

### 2.3 Explicit measures and Implicit measures in previous optimism research

Within this thesis, the explicit LOT-R was employed in all studies to investigate optimism and the relationship to implicit optimism (in chapters 3, 4 and 6). The explicit LOT-R questionnaire has previously been utilised in research to investigate implicit optimism. For example, Kosnes et al. (2013) investigated implicit (IRAP) positive and negative future thinking and whether this was a predictor of depressive symptoms. The study included the LOT-R questionnaire to further investigate predictors of depressive symptoms. However, the findings did not reveal any significant correlations between the implicit and explicit scores. In contrast, Segerstrom (2016) found that the LOT-R and the emotional implicit Stroop task both had an association with positive stimuli in the Stroop task and optimism LOT-R scores. The differences in significance may be due to the different implicit measures. However, researchers have argued about the implicit and explicit relationship, and if implicit and explicit measures are measuring the same construct (Nosek & Smyth, 2007; Wilson et al., 2000). Additionally, the LOT-R has good psychometric properties (please see section 2.2.1) and is a widely used measure for explicit optimism (Schou-Bredal, 2017). Therefore, within this thesis, the LOT-R was utilised to investigate the relationship between implicit and explicit optimism (please see chapter 1).

### 2.4 Implicit measure: Optimism measurements

Despite there being advantages to self-report measures, they can be susceptible to social desirability and demand characteristic bias. Demand characteristic bias may

produce non-genuine responses due to participant interpretation of an experiment or study, causing them to change their answers to fit the purpose (Rosenthal & Rosnow, 2009). To overcome these biases, implicit measures, including measures of attentional bias, have been explored as alternatives.

Methodology involving the Stroop task, Dot-probe, attentional blink and the visual probe task (VPT) have all been used in the study of optimism (Fox, 2001; Klarén, 2018; Pool, Brosch, Delplanque, & Sander, 2016; Segerstrom, 2001). An Implicit Association Test (IAT) has, however, never before been created to investigate optimism.

The implicit measures help overcome potential limitations of the self-report measures such as introspection (Gawronski, & Bodenhausen, 2007). In other words, implicit measures can tap into unconscious representations that introspection does not allow. Findings from implicit measures, including the IAT, are often interpreted as evidence for unconscious representations, and often demonstrate alternate findings as compared to self-report measures (Lane, Banaji, Nosek, & Greenwald, 2007). This lack of introspection may not be the only factor that causes low correlations between implicit and explicit measures per se (Gawronski, Lebel, & Peters, 2007). Researchers have argued that low correlations between implicit and explicit measures may be partly due to a lack of *conceptual correspondence*; that is the abstractness of the measurements of beliefs/attitudes may be being measured differently (Ajzen & Fishbein, 1977). Furthermore, differences between *structural fit*, means that there may be different degrees of methodological similarities (i.e. differences) between implicit and explicit measures (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005).

Another potential advantage of implicit measures is low susceptibility to self-presentation and social desirability. A number of implicit measures are designed to overcome this by using timed responses that are assumed to be uncontrollable. Additionally, participants may be unaware that they are being assessed on their perceptions, or their cognitive capacity is 'too full' to change their immediate spontaneous response (Asendorpf & Banse, 2002). This suggests that motivational distortions are less likely or less susceptible in implicit measures that include reaction time as their main variables, such as the IAT and VPT scores. Indeed,

researchers, such as Dunham, Scott Baron and Banaji (2006) and Teachman, Gapinski, Brownell, Rawlins and Jeyaram (2003) suggest that the implicit methods provide a “bona fide pipeline” to investigate individuals attitudes, emotions and/or beliefs. They further suggest that the IAT accesses associations between two concepts (e.g., attitudes, emotions and/or beliefs) that individuals may not be aware of. Unfortunately, it has been suggested that some researchers have misused implicit measures such as the IAT and have suggested that findings could be used in lie-detection or that resultant findings are more “real” than other measures (Karpinski & Hilton, 2001). The findings of the IAT may occur due to several different reasons and not always self-presentation and social desirability. Researchers have argued that the results may be different from the explicit measures due to participants not being aware of their own biases (attitudes, emotions or beliefs) and report different biases in the self-report responses. Alternatively, perhaps maybe they are aware of their biases/emotions and chooses to genuinely reject them as they believe that the bias /emotions does not represent them. Finally, participants may be fully aware of their biases/emotions, and they choose not to report them in the self-report methods due to self-presentation concerns and social desirability. Only the last explanation supports the assumption that implicit measures overcome self-presentation and social desirability (Lane et al., 2007). Therefore, it is possible that the implicit measures are overcoming self- presentation and social desirability biases, but other explanations may bias for the results. Regardless, this still supports that implicit measures have been found to be measuring the uncontrollable responses.

Implicit measures have been suggested to measure more long-term stable trait attitudes and beliefs, represented via an individual’s long-term experiences, however, not as long-term trait as explicit measures (Gawronski, Morrison, Phills, & Galdi, 2017). This is compared to explicit (questionnaire) measures that have been suggested to report newer acquired attitudes and beliefs (Petty, Tormala, Briñol, Blair, & Jarvis, 2006; Rydell & McConnell, 2006). Further supporting this is research suggesting that old attitudes and beliefs are not overridden by recently acquired attitudes and beliefs, but coexist with allegedly old stable implicit attitudes and beliefs (Petty et al, 2006). Therefore, Gawronski (2007), suggests that older attitudes, emotions and beliefs measured by implicit measures should show a higher level of robustness compared to explicit self-report measurements.

It has also been suggested that explicit and implicit measurements may be measuring different concepts; implicit measurements may provide an indirect means for activation of associations in memory (associative processes), whereas explicit measures reflect the answers to questions to access an outcome (Greenwald, 1998). The latter needs to be a validation process (propositional process), suggesting that implicit and explicit measurement processes represent different characteristics of mental representations. Furthermore, the implicit activation of association can occur independently, even if the association is considered accurate or otherwise by an individual (Gawronski & Bodenhausen, 2014). Therefore, implicit and explicit measures may yield different findings with respect to optimism and pessimism. This was explored further in the research presented including investigating implicit and explicit measures of optimism, using the IAT (Chapters 3, 4 and 6) and VPT (Chapter 4).

#### 2.4.1 Spatial domain for attentional bias

Several studies investigating implicit measures have focused on the spatial domain of attentional bias (Petersen & Posner, 2012). The IAT and VPT both measure spatial attention. Some implicit measures use reaction times with visual images and words on a screen, and this requires visual attention. Visual attention is split into two domains: temporal and spatial attention (Carrasco, 2011). Spatial attention allows individuals to recognise and locate selected objects in space, and temporal attention allows individuals to recognise and locate selected objects over time. Studies have shown that these two domains work independently from each other (Mackay & Juola, 2007). Of note, in the IAT and VPT visual images and words are manipulated in the spatial domain.

##### 2.4.1.1 The implicit association test (IAT)

Greenwald and Banaji (1995) argued that before the IAT many early individual indirect measures of implicit measures had low to moderate reliability. They introduced the IAT to overcome and increase the reliability of the implicit measures, especially internal consistency. This need for a reliable implicit measure made the IAT popular and widely accepted; furthermore, it was easily applicable to many topic areas (Teige-Mocigemba, Klauer, & Sherman, 2016). The premise behind the IAT is that it uses response times to indirectly infer underlying beliefs. This is a contrast to

self-report measures that ask directly how participants think or feel. The IAT's mechanism is assumed to be void of introspection and compares instead the strengths of associations within a given concept via measuring reaction time responses (Ottaway, Hayden, & Oakes, 2001). The IAT is suggested to access the strength of association between attribute categories (e.g. optimism vs pessimism) and target categories (e.g. Self vs other). Both of these categories are arranged on bipolar dimensions and different combined categories (e.g. Blocks 3, 6 and Blocks 4, 7) allowing comparison of response latencies (shown in table 2.1).

For example, in an IAT measuring optimism and pessimism self and other words could be categorised into different positive or negative categories. In different trials, optimism or pessimism images would be categorised into positive or negative categories. Optimism and other would be paired together on different trials (pessimism and self), and the categories optimism and self would be paired together (pessimism and other), this allows the trials to be counterbalanced (Greenwald, Mcghee, & Schwartz, 1998). The participant's answers using a response key as rapidly as possible.

The different categories of response times are compared across the two conditions to understand the participant's strongest association. In the case of optimism and pessimism, for example, if a participant responded faster or had a faster response time to items representing optimism paired with self-words, it would be assumed that the participant associates with optimistic beliefs (Greenwald et al., 1998). In contrast, if a participant responded faster to items representing pessimism with self-words, it would be assumed that the participant associates with pessimism beliefs. The rationale behind the IAT is that a faster response time should be observed when an individual strongly associates with a given construct that it is paired together (e.g., 'optimism and self' trials). This is compared to slower responses when the construct is not paired with an associated construct (e.g., 'optimism and other' trials). Thus, in the IAT it is argued that the individual reflects the held belief with their automatic cognitive association. This concept of automaticity allows some of the potential limitations of self-report measures to be overcome (Greenwald et al., 1998).

Personality, attitudes and beliefs are suggested by IAT researchers to be represented in labels within the trials (Nosek, Greenwald & Banaji, 2005). Grumm



and Von Collani (2007) used the IAT to investigate implicit personality. They designed an IAT in which personal details were identified as the 'self' category. Details such as family name and month of birth were used within these trials, alongside unrelated details identified as the 'other' category (an example is shown in figure 2.4 and figure 2.5). These were details such as different family name and different month of birth, which were unrelated to the participant. Grumm and von Collani found that the individuals related to the 'self' category within the IAT, and produced faster reaction times to the 'self' category and an associated personality type. The study found a significant relationship between individual's responses on the Big Five questionnaire and their personality IAT. Within this PhD research, a similar approach of using 'self' and 'other' categories with positive and negative words was used (shown in table 2.2).

Participants are asked to respond as quickly as they can to the given stimuli in the form of words or images, which represents one of the four categories (positive, negative, self or other). These four categories are categorised by two responses, with the assumption that it will be quicker and easier to respond to the associated category. For example, a quicker response time (i.e., Pressing the left key faster on the keyboard in trial three) will be shown for optimism and self for optimistic individuals. In chapter 3, the participants used a Response Pad RB-840 by Cedrus to respond to the trials. Using the Response Pad participants were asked to select a category by pressing 'L' for images/words relating to the top left-hand side category and 'R' for images/words relating to the top right-hand side category. In chapter 4 and 6, the participants used a keyboard to respond to the trials. Using the Keyboard, participants were asked to select a category by pressing 'E' for images/words relating to the left-hand side and 'I' for images/words relating to the right-hand side.

<p><b>Block three (Self/ positive) (Other / negative)</b>  Self/ positive                      Other / negative</p> <p style="text-align: center;">Image (or words)</p>	<p><b>Block six (Self/ negative) (Other / positive)</b>  Self/ negative                      Other / positive</p> <p style="text-align: center;">Image (or words)</p>
<p><b>Block four (Self/ positive) (Other / negative)</b>  Other / negative                      Self/ positive</p> <p style="text-align: center;">Image (or words)</p>	<p><b>Block seven (Self/ negative) (Other / positive)</b>  Other / positive                      Self/ negative</p> <p style="text-align: center;">Image (or words)</p>

Figure 2.4: Four different example trials for each block

Positive / Self	Negative/ Other
John	

Figure 2.5: Example of an IAT trial: Personal details first name 'John' and match with Positive/Self category

Table 2.1: Example of seven blocks for the optimism IAT

<b>Block</b>	<b>No of trials</b>	<b>Function</b>	<b>Left Key (Order 1) Stimuli</b>	<b>Right Key (Order 1)</b>	<b>Trial category Wording</b>
1	20	Practice (Removed from analysis)	Self-words	Other-words	Positive- self / Negative – other (words)
2	20	Practice (Removed from analysis)	Optimism images	Pessimism images	Positive / Negative words
3	40	Trial (Removed from analysis)	Positive + self	Negative + other	Positive- self / Negative – other (words)
<b>4</b>	<b>40</b>	<b>Trial</b>	<b>Positive + self</b>	<b>Negative + other</b>	<b>Positive- self / Negative – other (words)</b>
5	20	Practice (Removed from analysis)	Other- Words	Self- words	Negative / Positive (words)
6	40	Trial (Removed from analysis)	Negative + Self	Positive + Other	Negative- self / Positive – other (words)

7                      40                      Trial                      Negative + self    Positive + other    Negative - self / Positive – other (words)

*Table 2.2: Personal details asked for in a standard IAT*

<b>Stimuli characterising participants</b> <b>(related words) ‘Self’ words</b>	<b>Stimuli not characterising participants</b> <b>(unrelated words) ‘Other’ words</b>
Family name	Different Family name
First name	Different first name
Month of birth	Different Month of birth
Place of birth	Different Place of birth
Gender	Different Gender
Zodiac	Different zodiac

## An example: IAT procedures

The participants were asked to fill in related personal information, such as family name, first name, month of birth, place of birth, They were also asked to fill in non-related words, such as different family name, different first name, different month of birth. The participants were formed that the non related words needed to be not personal or anything that they personally associate with.

Participants will began with 20 practice words trials (Block 1)  
Participants given 20 practice images trials (Block 2) Please find the instructions for both below

Please begin with 20 practice trials

Please place your fingers on the A button and L button on the keyboard. Images representing the positive or negative categories at the top will appear one-by-one in the middle of the screen. When the words belongs to a positive word on the top left, press the left button; when the words belongs to a negative word on the top right, press the right button. words belong to only one category.

If you make an error, an X will appear - fix the error by hitting the other key.

This is a timed sorting task. GO AS FAST AS YOU CAN while making as few mistakes as possible.

Please press the space bar to begin

Participants given 40 words and images (Block 4)

Participants given 40 words and images (Block 5)

Participants given 40 words and images (Block 6)

Please find the instructions for all blocks below

Please place your fingers on the A and L buttons on the key board. Images representing the positive or negative categories at the top will appear one-by-one in the middle of the screen. When the image belongs to a positive word on top the left, press the A button; when the image belongs to a negative word on the top right, press the L button. Images belong to only one category. If you make an error, an X will appear - fix the error by hitting the other key.

This is a timed sorting task. GO AS FAST AS YOU CAN while making as few mistakes as possible. Going too slow or making too many errors will result in an uninterpretable score. This task will take about 10 minutes to complete

Please press the space bar to begin

Each block will have a short break between each one, and these are the instructions shown to the participants.

Please take a short break, before the next block begins  
Please press the space bar when you are ready to begin

The instructions at the end of the IAT are shown below

Thank you for completing the task  
Please press the space bar to read the debrief

*Figure 2.6: IAT instructions in the participants*

The IAT was adapted from Inquisit experimental software ([www.millisecond.com](http://www.millisecond.com)). Two practice blocks were given to allow participants familiarity with the task. Trials were presented randomly, and blocks counterbalanced by switching positive and negative words. In accordance with current standard IAT procedures, participants were asked in the instructions (shown in figure 2.6) to respond as quickly and accurately as possible. They were also asked to respond to the stimuli using categories in the top right and left-hand corners using the right or left key, respectively (Teige-Mocigemba et al., 2016). Incorrect responses were asked to be corrected by the participants, as Greenwald, Nosek and Banaji (2003) recommend this as it introduces a built-in error penalty. The participants in this thesis were not presented with their possible outcome feedback scores given that test-retest was a major aspect of the current thesis research.

#### 2.4.1.1.1 Psychometric properties of IAT

The IAT is a procedure for measuring implicit cognition and not a single measurement for a specific topic; therefore, there is no one single valid IAT personification that can be used. However, the specific psychometric properties of the optimism IAT designed and used in the current investigations are discussed in chapter 3 and chapter 4.

#### 2.4.1.1.2 Reliability

The reliability of the IAT has been measured via internal consistency and test-retest reliability. The IAT allows for millisecond response latency measurement. However, error variance can easily occur in the trials, via distraction (e.g. noise) or an eyeblink that adds unwanted time to the latency response (Lane, Banaji, Nosek, & Greenwald, 2007). Generally, therefore, internal consistency for implicit reaction time measures has been shown to be lower than for self-report measures (Buchner & Wippich, 2000). However, the IAT has the highest reliability as compared to other implicit measures, such as the Go/No-Go association task, which has been found to have a split-half reliability of just  $r = 0.20$  (Nosek, Banaji, & Nosek, 2001), and the priming method, which has an acceptable split-half reliability  $r = 0.60$  (Bosson, Swann, & Pennebaker, 2000). Schmukle and Egloff (2004) suggest that generally, the split-half reliability range for the IAT has acceptable reliability of  $r = 0.70$ .

Cunningham, Preacher and Banaji (2001) investigated several different IAT's and found satisfactory internal consistency, i.e., Cronbach alpha,  $\alpha = 0.78$ . Furthermore, the IAT internal consistency split-half was investigated using a meta-analysis of 50 studies on a range of topics and found a good Cronbach alpha  $\alpha = 0.79$  (Hofmann et al., 2005a). Therefore, a new IAT would be expected to have an acceptable internal consistency of around  $\alpha = 0.70$ .

Lane et al. (2007) found IAT test-retest studies resulted in a wide range of reliability from less than satisfactory,  $r = 0.25$ , to acceptable,  $r = 0.69$ , with an estimated mean of about  $r = 0.50$ . This suggests that the IAT has a generally acceptable test-retest reliability. However, implicit tests have been found to have weak test-retest results as compared to explicit self-report measures, and previous research has shown that it is common for IAT to demonstrate an  $r$  below 0.50 for the test-retest reliability Lane et al., 2007). The IAT does, however, show more reliable scores compared to the implicit Stroop Task, which ranged from a weak  $r = -0.05$  to  $r = 0.63$ , and implicit Initials Birthday Preference Task, which averaged  $r = 0.03$  (Bosson et al., 2000). This indicates that previous IAT's have shown promising test-retest reliability scores. Therefore, a new IAT would be expected to have acceptable test-retest reliability, i.e., in the range of  $r = 0.60$  to  $r = 0.70$ .

#### 2.4.1.1.3 Validity – Relationship with explicit measures

Convergent-discriminant validity is a measurement that is a type of subordinate validity and is concerned with if different constructs correlates with each other (Campbell & Fiske, 1959, cited in Nosek & Smyth, 2007). Thus convergent-discriminant validity can be investigated by examining the correlation strengths of the IAT with explicit self-report measures (Lane et al., 2007). However, there is much controversy as to whether implicit and explicit measures actually should relate to each other. Early work by Greenwald (1998) found a distinctive difference between implicit and explicit cognitions, and only a weak relationship between them. However, as the development of research unfolded, more researchers found a range of correlations from weak to high. For example, research by Lane (2007) found that 17 public online website IAT's correlated weak  $r = 0.13$  to an acceptable  $r = 0.75$  range. Similarly, IATs in laboratory-based settings have shown a slight positive moderate correlation with relevant explicit self-report measures (Bosson et al., 2000;



Jellison, McConnell, & Gabriel, 2004). This is consistent with a meta-analysis of 126 IAT. This revealed IATs and explicit measures ranged in correlation from a weak  $r = -0.25$  to an acceptable  $r = 0.60$ , with a mean correlation of  $r = 0.19$  (Hofmann, Gawronski, Gschwendner, Le, & Schmitt, 2005b). Therefore, a new IAT would be expected to have an acceptable correlation of approximately  $r = 0.60$  with relevant explicit self-report measures to be considered to have convergent-discriminant validity. Furthermore, the argument about whether the IAT and explicit measure should correlate was further investigated by Wilson, Lindsey and Schooler (2000) who suggested that even if they do correlate they are distinct constructs. The constructs of the optimism IAT and explicit measures will be investigated in chapter 4.

Further validity of an IAT (in this case the optimism IAT developed in chapter 3) will be measured with Known Group Validity. In establishing the worth of any measure, it is important for the measure to be able to discriminate between groups. Indeed, to be able to differentiate between groups based on prior knowledge is a way of investigating the validity of a measure (Field, 2014) (Nosek et al., 2007). Therefore, using prior knowledge from the explicit LOT-R, in which no differences in dispositional optimism as a function of gender are found (Hinz et al., 2017; Schou-Bredal et al., 2017), the optimism IAT would also be expected to demonstrate no difference between optimism and pessimism scores as a consequence of gender. To expand, known face validity has been used in previous IATs to help predict the validity of the measure. Nosek and Banaji (2002) used previous research to predict gender role expectations of art and maths and found their IAT to be a valid measure. Here, it was predicted that women would have greater implicit associations with self/art and men would have greater implicit associations with self/maths. The findings supported study predictions and, therefore, reinforced validation of the measure. Furthermore, De Houwer, Custers, and De Clercq (2006) found smokers associated stronger with implicit smoking stimuli than non-smokers. To validate the smoking IAT measure these findings were predicted before the IAT was conducted. As a result, and given the IAT within the current research is designed to measure optimism, use Known face validity it would be predicted that gender does not influence optimism and pessimism IAT results.

#### 2.4.1.1.4 Limitations of the IAT

One of the limitations of the IAT is the assumption that individuals can suppress or ignore a second stimulus. In other words, participants are slower to words that are incongruent to them (but faster to words that are congruent). Here, the participant needs to suppress or ignore incongruent information, and this reflects their general cognitive ability to suppress or ignore the incongruent information. However, having a cognitive inability to suppress or ignore incongruent information might affect IAT scores and mistakenly reveal a higher score or bias (McFarland & Crouch, 2002).

A further limitation is the question of the possibility to fake results, which would then question the validity. Whilst one of the main arguments in support of using IATs is that they overcome or are resistant to social desirability, studies have shown that faking is possible (Kim, 2003). This faking has been demonstrated by participants slowing down reaction times to intentionally match the pairing that is desired. Hu, Rosenfeld, and Bodenhausen (2012) asked participants to speed up their responses to the incongruent words and slow down their responses to congruent words to explore whether results could be faked. The findings indicated that results could be reversed and the IAT could be faked. However, this strategy has been found to be very rare in IATs (Cvencek, Greenwald, Brown, Gray, & Snowden, n.d.).

The wording of the instructions of an IAT has also been found to have an effect on findings. For example, a study by Wallaert, Ward and Mann, (2010) found that deliberately obscuring the real association can heighten the awareness of the association and influence the outcome. In this study, using words such as “Please be careful not to stereotype in the next block” significantly changed the association outcomes. Therefore, a new IAT needs to ensure careful wording.

Further questioning of the validity of an IAT may occur if a participant is unfamiliar with the concept or wording that is proposed, and asking a participant to choose a category without fully understanding (Ottaway et al., 2001). However, in this research, when creating the optimism IAT this was addressed and used personal (Self words) and not personal (Other words) words to try and overcome this limitation. The optimism IAT will be test-retested in chapter 3 to explore the reliability of the IAT.

There have been some recent criticisms of the IAT. These include the weak correlation between implicit and explicit measures and if the methods are measuring the same thing (Machery 2016, 2017). However, other researchers argue that they are measuring different constructs (i.e., explicit and implicit are two different constructs), and this is why they do not correlate with each other (Rosenthal & Rosnow, 2009; Greenwald, 2001). The relationship between the explicit and implicit measures are further investigated in this thesis. Moreover, reviews in the literature have found that not all IATs are equally reliable. The IAT method has been employed to investigate many different topic areas (e.g., self-esteem, political evaluations or race) (Bar-Anan & Nosek 2014; Gawronski & De Houwer, 2014) and some topic areas may be better adapted to using implicit measures to investigate the topic area than others (Brownstein, Madva, & Gawronski, 2020). The reliability of the optimism IAT will be investigated in this thesis.

The IAT was previously used as a way of understanding individual differences (Greenwald, 2008), but Payne et al. (2018) argue that the IAT should prioritise the situational context (i.e., the IAT measures the situation rather than the individual difference); research has found that IATs conducted in similar regions or countries correlate. For instance, Hehman (2017) found different regions of the USA were associated with higher levels of implicit racial bias. These regional implicit findings were echoed by numerous studies (Leitner et al. 2018; Marini et al. 2013; Orchard & Price 2017; Rae et al. 2015). Brownstein, Madva, and Gawronski (2020) suggest that this situational context needs to be investigated in further research; however, this is beyond the scope of this thesis.

Researchers have suggested that another limitation to the IAT is that the different IATs have different briefing information attached to them which may affect performance. Relatedly, individuals have prior knowledge about the IAT, and this prior knowledge can affect the response times given (Cameron et al., 2012; Hofmann, Gawronski, et al., 2005). This prior knowledge may mean that participants could predict or manipulate their response time scores in the IAT (Hahn & Gawronski, 2019). This limitation does challenge the hypothesis that IAT responses are made unaware (Brownstein, Madva, & Gawronski, 2020), as previously discussed in chapter 1. On the other hand, Howell and Ratliff (2017) and Krickel, (2018) argue that the participants are unaware when giving responses to the IAT, as

many participants are surprised by the feedback (response scores) they received once they completed the IAT. They suggest that the surprising feedback should be interpreted as evidence that they are unaware when completing the IAT. These criticisms of the IAT will be taken into consideration when interpreting and developing the optimism IAT.

A final criticism is that researchers have observed that repeated administration of an IAT can decrease the strength of findings. Therefore, this issue can be addressed by analysing IAT D scores as explored below. (Greenwald, Nosek, & Banaji, 2003).

#### 2.4.1.1.5 Data analysis

The D score rescales an individual's IAT latency scores by utilising within-participant latency variability (Cai, Sriram, Greenwald, & McFarland, 2004). The D score is the millisecond difference scores, which is divided by the standard deviation (Greenwald et al., 2003). The D score is seen as the standard method to interpret IAT results, as it is tallied trial by trial. Using D scores has been found to reduce variability related to speeded responses and captures associated strengths relating to individual differences. Scores are typically taken from blocks 4 and 7, as suggested by Greenwald (2004; see also table 2.2) to correlate findings using D-scores (Cai et al., 2004).

According to Greenwald (2003), the IAT recommended calculation is as follows. Trial practice blocks 1, 2 and 5 removed and not scored. Any latency responses under 300 milliseconds are considered too fast and removed, and over 3000 milliseconds are considered too slow and removed. Any participant whose scores meet these criteria for more than 10% of the IAT should also be excluded from the analysis. According to Greenwald, Nosek and Banaji (1998) blocks 3 and 6 are also classed as practice tests, as previous research suggests these blocks have higher error rates and should be excluded from the analysis. The D scores for optimism and pessimism were calculated by the mean D scores from block blocks 4 (optimism and self) and 7 (Pessimism and self). The overall D score is the mean of the two scores, however, in this thesis the stance that optimism and pessimism are separate and will have optimism and pessimism D scores.

The D score can be a positive or a negative score and range from -2.0 to 2.0 with 0 indicating no difference in the latency response of the variables of interest - in this case optimism and pessimism. Thus, in the present research, positive scores indicate an association with optimism images and self-words, and negative scores an association with pessimism images and self-words. Therefore, it would be expected that an optimistic individual would have a score higher than 0 in the optimism IAT, and a pessimistic individual a score lower than 0.

Within this thesis research a new optimism IAT will be created, and the reliability and validity of the measure are investigated in chapter 3. To explore the IAT, composite reliability will be measured using Cronbach's alpha and test-retest for further reliability. For validity convergent-discriminant validity and Known face validity will be investigated (DeVellis, 2003). Furthermore, an exploratory factor analysis (EFA) will be used to explore the factors in the optimism IAT (chapter 3). A further implicit and explicit EFA is undertaken in chapter 4. The optimism IAT will be further piloted in chapter 6 in a positive psychology intervention, as one of the main topics of positive psychology is optimism (Seligman, 2001).

#### 2.4.1.2 Visual Probe task (VPT)

The visual probe task (VPT) will be used to investigate the relationship between the explicit LOT-R and the implicit IAT. The VPT will further be used to investigate the convergent-discriminant validity of the optimism IAT developed. The VPT is an implicit measure of attentional bias (Mobini & Grant, 2007). The VPT (also known as the dot-probe task) was developed by MacLeod et al. (1986) and is one of the most popular methods to measure attentional bias (Jones, Christiansen, & Field, 2018).

In the VPT images or words can be used. However, Kolassa et al., (2009) found that VPT using image stimuli demonstrate greater ecological validity. Furthermore, similar to more natural environments, when using the VPT multiple (i.e. two) stimuli compete for attention, allowing attentional biases to be observed (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007).

In a typical VPT two stimuli are presented: one neutral and one emotion-related, which are shown briefly on a given trial. Then following these stimuli, a small probe is shown in replacement of one of the images. When the participant sees an image to

which they have a strong association, they show an attentional bias towards the image. Hence their responses are faster to the probe that replaces the said (typically emotion) stimuli (Chan, Ho, Law, & Pau, 2013). The participants are asked to respond as fast as possible to the probe to allow a reaction time index to be calculated.

The VPT was adapted from a programme on Inquisit experimental software ([www.millisecond.com](http://www.millisecond.com)). The VPT was presented on a University PC that was not connected to the internet, with a 19-inch screen, 72 pixels per inch resolution (PPI) and with a refresh rate of hertz (Hz). A total of 80 trials with 16 neutral trials for the control, 32 Positive-Neutral trials and 32 Negative-Neutral trials. All trials were presented in random order and were counterbalanced. Each trial had two faces, either Positive-Neutral (Neutral- Positive); Negative-Neutral (Neutral-Negative); Neutral-Neutral. One face was displayed on the right and the other face on the left. There were 40 congruent trials (negative or positive images), mixed with 40 incongruent trials (neutral images), and the probe appears in place of one of the congruent or incongruent images. In total, the trials were presented in 10 blocks, allowing the participant a break. Therefore, as shown in figure 2.6 there were eight different types of trials.

	Congruent	Incongruent
Pessimistic (Negative)	Negative - Neutral	Negative - Neutral
	Neutral – Negative	Neutral - Negative
Optimistic (Positive)	Positive - Neutral	Positive - Neutral
	Neutral – Positive	Neutral - Positive

Figure 2.6: Trial types in the VPT

The Neutral-Neutral trials were used to ensure that the VPT is measuring optimism and pessimism attentional bias, and the participants were fully engaged. The neutral-neutral trials also gives a base line for the reaction times, to examine if the reaction times were quicker or if there was a difference in the positive congruent trials or negative congruent trials (Legerstee et al., 2009).

Participants were asked to sit in front of the computer, approximately 60cm from the screen. The VPT began with the instructions for the participant and informed them of

each stage of the task (please see appendix 11), then the trials began with a white central cross fixation point, this appeared for 500 milliseconds (ms) on the screen. During this time at 300 ms, the cross-fixation point changed to red to show that the faces were about to appear (Mogg & Bradley, 1998). The central cross fixation point was to ensure that the participant's gaze was in the middle of the screen before the two images appeared on the screen. Once the cross-fixation point had disappeared the images appeared for 200ms immediately after. The Inquisit software pseudo-randomly selected the sequence of the images. Following the images, an asterisk appears immediately after in the location of one of the images. The asterisk stays on the screen until the participant has given a response, please see figure 2.7 for an example procedure. The participants were asked to respond as quickly and accurately as they can. To help participants not to adopt a biased response strategy, the inter-trial intervals were randomly varied between 750ms and 1250ms. This strategy was to stop participants guessing the timing of each trial, helping prevent time-locked motor responses, favouring one side, or even predicting the side (Smith & Graybiel, 2014; Garner 2010).

***Trial***

500ms (length of time shown)	200ms Images (length of time shown)	Appears until a response	Feedback if the answer given is incorrect
A cross in the middle of the screen	Positive/Negative image and Neutral image presentation on each side	An asterisk on a white background where the positive/negative or neutral images were on one side	

*Figure 2.7: An example of one trial in the VPT*

The images were all presented on a white background and measured 3.5cm x 4cm. Within the VPT, there were a total of 20 positive images, 20 negative images and 40 neutral images. The images were presented 5cm from the central cross fixation point, one on the left and one on the right. The participants used a Response Pad RB-840 by Cedrus to respond to the trials. Using the Response Pad participants

were asked to select the location of the asterisk by pressing 'L' for images on the left and 'R' for images on the right.

According to Waters, Kokkoris, Mogg, Bradley and Pine (2010) using the location of the asterisk (probe) has advantages, as it requires low cognitive demand, there is less counterbalancing of any more probe-type factors and therefore creating a shorter task overall. The cognitive inability was a potential limitation with the IAT (McFarland & Crouch, 2002) and VPT has been suggested to be able to overcome this limitation. The participants began the VPT with two examples (not recorded) and ten practice trials. They were instructed to answer as quickly and accurately as possible. The reaction times to the trials were recorded automatically by Inquisit experimental software. Therefore, it is the hypothesis that the VPT would show a faster reaction time to the congruent probe trials compared to the incongruent probe trials. In contrast, faster reaction times to the incongruent trials indicate diminished attention to the congruent stimulus, or superior attention to the neutral stimulus. Furthermore, faster reaction time to the Positive or Negative stimuli would occur depending on the attentional bias to the stimuli (Posner, Snyder, & Davidson, 1980).

#### 2.4.1.2.1 Psychometric properties of VPT

The VPT has been used in a number of different areas of research. Researchers have found small to medium internal consistency in the VPT, such as that by Christiansen, Mansfield, Duckworth, Field, & Jones (2015) investigating social drinking ( $\alpha = 0.19$  to  $\alpha = 0.76$ ). Marks, Pike, Stoops and Rush, (2014) study of VPT attentional bias in respect to cocaine-related images revealed a low test-retest result ( $r = 0.24$ ,  $p = 0.16$ ). However, the convergent-discriminant validity of the VPT in a number of studies has been found to be good. For example, Christiansen et al. (2015) investigated VPT with eye-tracking techniques found good validity ( $\alpha = 0.76$ ). However, Jones et al. (2018) suggest that little research has been undertaken to examine the psychometric properties of the VPT and raise concerns in relation to its test-retest reliability and internal consistency. This stated, based upon the above any new VPT task would be expected to demonstrate a medium internal consistency of  $\alpha = 0.70$ .



#### 2.4.1.2.2 Data analysis

In the analysis of VPT data any incorrect responses should be deleted. Trials with reaction times any shorter than 200ms and any longer than 1200ms should also be removed (Thoern, Grueschow, Ehlert, Ruff, & Kleim, 2016)). The specific VPT employed in the current thesis (see Chapters 3) was analysed by examining the overall effect of congruency for optimism and pessimism. Here, attentional bias scores were calculated for optimism and pessimism, separately, to determine any interaction effects and to investigate these components of attentional bias independently. To calculate the attentional bias scores, a formula proposed by MacLeod, Mathews and Tata (1986) was used, which involved subtracting congruent trials from incongruent trials (the neutral faces). The neutral stimuli acts as a baseline from the optimism or pessimism scores (see figure 2.8 for an example calculation). Therefore, positive scores reveal an attentional bias towards the optimism/pessimism stimulus; or attention directed away from the neutral stimuli. Similarly, if the attentional bias score is negative, an attentional bias is directed away from the optimism/pessimism stimulus; or attention is directed towards the neutral stimuli. Furthermore, a score of zero shows an absence of attentional bias to any of the stimuli. As suggested by Koster, Crombez, Verschuere, and De Houwer (2004), neutral-neutral trials were not analysed in this thesis, given the focus on the relationship between explicit and implicit measures of optimism and pessimism.

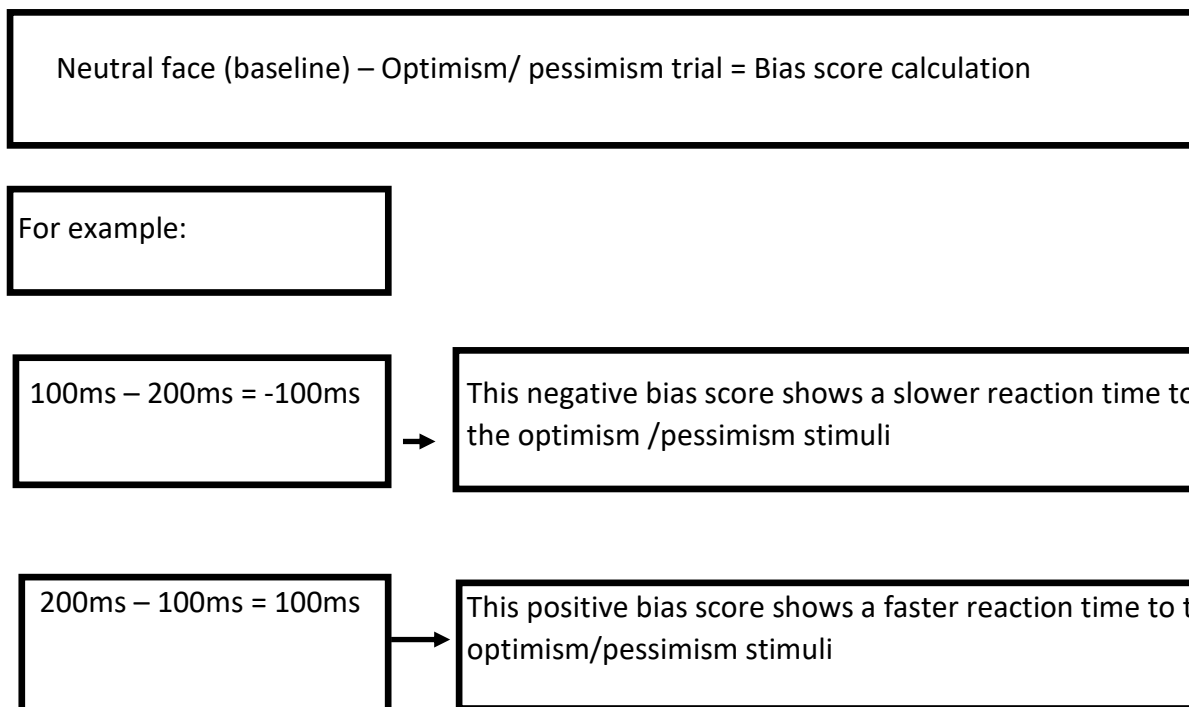


Figure 2.8: Example of an attentional bias calculation.

#### 2.4.2 Stimuli for the implicit measures

The images stimuli for the VPT and IAT were selected from the International Affective Picture System (IAPS); these are real-world images (Bradley & Lang, 2007). The images were ranked from negative to positive on a Likert scale from 1 to 9. Additionally, the images were ranked from low arousal to high arousal on a Likert scale from 1 to 9. Dufey, Fernandez and Mayol (2011) found that the IAPS images had good reliability, the internal consistency was  $\alpha = 0.976$  for the valence and  $\alpha = 0.979$  for the arousal dimension. Furthermore, the study found high levels of consistency between the valence  $r = 0.94$  and arousal  $r = 0.78$  dimensions. The IAT and VPT used the IAPS images as stimuli in the tasks. This thesis did not ask the participants to rate any of the images for the IAT and VPT, the rating for the images was taken from the IAPS database. Images are shown in appendix 10 and 12.

### 2.4.2.1 Implicit Association task

The images used were ranked with IAPS values from 1–3 for negative (images) valences, 4–5 were categorised as neutral, and 6–9 were categorised as positive (images) valence. These rankings were in line with typical classifications for negative, neutral and positive images. The images are further ranked by low and medium arousal. Furthermore, the scoring in the IAT used the mean scores of the low and medium arousal images. Using low and medium arousal images allows for counterbalancing of the positive and negative images. The high arousal (5-9) images were not used as these may be measuring different variables beyond optimism and pessimism (e.g., euphoria vs. fear/threat). Images are shown in appendix 12.

Table 2.1: IAPS image category rating scores used in IAT

<b>1-3 valance negative (Total of 40 images)</b>	<b>4-5 valance neutral (Not needed)</b>	<b>6-9 valance positive (Total of 40 images)</b>
1-3 arousal low		1-3 arousal low
4 arousal medium		4 arousal medium
5-9 arousal high		5-9 arousal high

### 2.4.2.2 VPT images

To maintain consistently, the same images used in the IAT were also used in the VPT. The images were ranked with IAPS values from 1–3 for negative valences, 4–5 were categorised as neutral, and 6–9 were categorised as positive images. These rankings were chosen accordingly as they were in line with typical classifications for negative, neutral and positive images (Charles, Mather, & Carstensen, 2003).

The VPT images used low and medium arousal scores and negative, neutral and positive categories. Using low and medium arousal images allows for counterbalancing of the positive and negative images. The high arousal images were not used as they may be measuring different variables beyond optimism and pessimism. Images are shown in appendix 10.

Table 2.2: IAPS image category rating scores used in VPT.

<b>1-3 valance negative (Total images 20)</b>	<b>4-5 valance neutral (Total images 40)</b>	<b>6-9 valance positive (Total images 20)</b>
1-3 arousal low	1-3 arousal low	1-3 arousal low
4-5 arousal Medium	4-5 arousal Medium	4-5 arousal Medium

### 2.4.3 Software

#### 2.4.3.1 Qualtrics

Qualtrics ([www.qualtrics.com](http://www.qualtrics.com)) is an online survey tool that was used to host various measures. The hosted survey in Qualtrics was provided via the University of Derby. The IAT was embedded in Millisecond Inquisit, but linked to the Qualtrics survey.

#### 2.4.3.2 Inquisit – Millisecond software

The IAT and VPT were run in Inquisit, and the specific generic IAT and VPT codes already available from Millisecond as an open-source file (Sriram & Greenwald, 2009). The wording was adapted and changed for the VPT and optimism IAT. However, the format of the IAT and VPT was kept consistent. The consent form, information sheet, and debrief were either face to face or through Qualtrics.

### 2.5 Ethical consideration for all the studies

Ethical approval was obtained from the University of Derby Ethics Committee. In addition, the research adhered to the principles of the British Psychological society’s (BPS) code of conduct and ethics (BPS, 2009). Each study ethics has been obtained shown in appendix 28.

#### 2.5.1 Informed consent

All participants were provided with an information sheet and asked to sign a consent form before beginning the studies. The face to face data collection included a further verbal briefing and the participants were given the opportunity to ask questions. The online data collection was given a full information sheet and the researcher's contact details if the participant had any questions. The consent form was given in all of the

studies and the participants were required to tick box for the consent, for taking part and that they had read the information sheet. This was to ensure that the participants were giving full informed consent. The retest studies that participants were given the same consent forms. The participants were informed that they had the right to withdraw even with the test-retest and all of the data would be destroyed.

### 2.5.2 Confidentiality

All the data was reported anonymously and treated confidentially. The participants all created their own I.D codes for confidentiality purposes and the raw data securely stored for six years. All online surveys were transferred to a password-protected University of Derby server and was deleted from any portable devices. All physical consent forms and paper surveys were separately sorted in a locked filing cabinet in a locked office at the University of Derby. The consent forms would be only accessed if a request for withdrawal was requested. The raw data was only seen by the researcher and the supervisors.

### 2.5.3 Protection from Harm

The right to withdraw was emphasised throughout the consent and the debriefing of each of the studies, and a contact email address of the researcher and supervisors. The participants were advised to contact their GP (or student Well-being if they were a student) if the study highlighted any dis-stress. The participants were informed that the images in the tasks may cause some distress and they are free to stop the tasks at any time. However, the studies were not on dis-stressing topics.

### 2.5.4 Deception and debriefing

They were debriefed and informed of their right to withdraw up to two weeks after completing the studies. There was no deception in any of the studies.

## 2.6 Summary

The purpose of the present chapter has been to discuss implicit and explicit measures that can be used in the study of Optimism and Pessimism, including a rationale as to why. Indeed, the LOT-R has been incorporated into the present research because it is a well-used psychometrically robust scale underpinning the majority of previous optimism research (Hinz et al., 2017) (Scheier et al., 1994; Sierra et al., 2013). The ASQ was incorporated because it is the most widely used explanatory style optimism, and has found to be a psychometrically robust scale (Hu,

Zhang, & Wang, 2015). The SOP2 is a newer and shorter measure of optimism and this was used in study 2, to investigate the constructs of optimism and pessimism. Furthermore, the SOP2 has found to be a psychometrically robust scale (Rammstedt & Beierlein, 2014) The DASS-21 was included for the final study to investigate increase of well-being, as the scale is written in English and Japanese, and was found to be a psychometrically robust scale (Brown et al., 1997).

In considering implicit measures, the VPT and IAT were discussed. The VPT has found to be a previously successful measure of measuring implicit optimism (Fox, 2008). Furthermore, the IAT has been incorporated into the present research to investigate if a new optimism IAT is a valid and reliable measure of implicit optimism.

# Chapter 3: Exploring Optimism IAT and Implicit and explicit measures.

## 3.1 Introduction

The aim of this chapter is to investigate the relationship between implicit and explicit measures of optimism, and to gain a greater understanding of the processes underpinning the implicit association test (IAT). Explicit self-report methods (e.g. questionnaires) have helped to determine relationships within optimism (Scheier et al., 1994). However, explicit methods have been found to have several social influences, such as social desirability, as discussed in chapter 1 and 2. In contrast, implicit methods have been suggested to assess an individual's automatic response and may be better predictors of personality (Greenwald, 1998). Within this present chapter, implicit optimistic attentional bias and explicit self-report questionnaires through a few different measures was investigated.

### 3.1.1 Implicit and explicit optimism

Greenwald (1995) suggested that we process social information in two modes. In the explicit mode, individuals are aware and able to control or self-reflect their responses. Therefore, participants may give socially desirable answers in self-report questionnaires, creating a bias to an individual's preferred personality. In contrast, in the implicit mode, individuals are unaware, and their responses are automatic, intuitive, routine or impulsive (Greenwald, 1998).

To date, an understanding of the optimistic personality has been dominated by explicit self-report methods. There has been limited research on implicit measures of optimism; which has mainly involved using the Stroop test (Karademas, Kafetsios, & Sideridis, 2007; Segerstrom, 2001) or visual probe task (Fox, 2008). Importantly, while the Implicit Association Test (IAT) has been found to be a useful tool for measuring an individual's personality traits (Grumm & von Collani, 2007), an IAT for optimism presently does not exist.

The IAT has been developed to measure the evaluative association between two implicit attitudes, concepts or beliefs. The procedure investigates measures of automatic attitudes, concepts or beliefs of a person's implicit evaluation, by timing

the difference in reaction times to words or images on a computer screen. Using this method, it would be expected that the individual would have a quicker reaction time to the category they associated with most strongly. Greenwald, Farnham, Greenwald, McGhee, and Schwartz, (2000) stated that the IAT allows little vulnerability to self-presentational distortions and has been established to create an indirect measure of an individual's response. It is argued that the test does not rely on introspection to create a response. Fazio, Jackson, Dunton and Williams, (1995) stated that the IAT has shown favourable results to predict behaviours and proven to be a useful implicit instrument. Xiao, Zheng, Wang, Cui, and Chen (2015) described the IAT as an encouraging method to assess an individual's implicit attitude by indirectly measuring the strength of association between objective and attribute categories.

Furthermore, within this chapter, the relationship between IAT and another implicit measure of optimism, the visual probe task (VPT) was investigated. The VPT uses images to investigate the attentional bias towards the given stimuli, as discussed in chapter 2. In VPT, the fastest reaction times have the strongest association (attentional bias) to the given stimuli. In other words, the participants show an attentional bias towards an image, so their responses are faster to the stimuli (Chan et al., 2013). Fox (2008) conducted a study that used an optimism VPT and several explicit questionnaires. The study examined the relationship between an individual's genotype and optimism. Importantly, Fox demonstrated that individuals homozygous for the long allele (LL) gene, which has been associated with trait optimism, showed a strong bias towards the positive or optimistic stimuli. The study suggested that genetically driven traits may lead individuals to have a more optimistic bias. This supports the notion that optimistic individuals have a stronger association or attentional bias towards the positive stimuli in the VPT. Therefore, within this chapter it would expect to find an attentional bias towards the optimistic stimuli for optimistic individuals. Within this chapter, the VPT and IAT was used to further investigate the relationship between optimism and attentional bias.

### 3.1.2 Models of implicit and explicit measures

The relationship and the constructs between implicit and explicit measures have been questioned by researchers (Saunders, Wong, & Wong, 2017; Sriram &



Greenwald, 2009). Researchers have suggested three different models that could explain the relationships found between the implicit and explicit measures; the additive model (Karpinski & Hilton, 2001), interactive model (Perugini, 2005) and double-dissociation model (Hofmann, Friese, & Strack, 2009).

The additive model suggests that explicit and implicit measures should be seen as different measures of the same attitude, personality or belief. The model suggests that we should compare the attitude, personality or belief to an iceberg. Explicit attitudes, personalities or beliefs at the top of the iceberg as the conscious control and implicit attitudes, personalities or beliefs as the unconscious, at the bottom of the iceberg. This model suggests that implicit and explicit are two separate constructs, but are conceptually related (Karpinski & Hilton, 2001).

A further model suggested to explain the implicit and explicit relationship is the interactive model (multiplicative), and this suggests that the implicit and explicit attitudes or beliefs interact to influence behaviour (Perugini, 2005). For example, someone has mixed feelings about the topic or has contradictory beliefs and would explicitly express one thing and then implicitly shows different result; this may be due to contradictory beliefs. For example, Frost, Ko, and James (2007) found individuals who scored high on the implicit conditional reasoning task for aggression, scored low on the self-report aggression questionnaire. Furthermore, Jordan (2003) found that individuals who displayed narcissistic behaviour scored high in the explicit self-report self-esteem questionnaire and low in implicit self-esteem IAT.

Finally, the double-dissociation model suggests that a relationship should be found, suggesting that both implicit and explicit measures should predict spontaneous and controlled responses, respectively (Hofmann et al., 2009). Hofmann, Friese and Strack, (2009) found that the IAT was able to predict less controlled behaviours when under a high cognitive load. Additionally, Asendorpf and Banse (2002) found that the shy trait moderately correlated between the IAT and self-report measures, when the participants were asked to predict shy behaviour in realistic social situations. This model suggests that explicit and implicit measures are related, and both should be able to predict the same responses. In summary, the three different models have slightly different theoretical focus; however, the additive model may

support the previous research (Greenwald, 1998). The relationship between the implicit and explicit measures has been explored in this chapter.

### 3.1.3 Exploratory Factor Analysis for the IAT

Additionally, the optimism IAT is a newly developed measure; therefore, further insight into the reliability and validity was explored. To create a reliable and valid implicit association test (IAT) for optimism, a factor analysis (FA) was used to determine the underlying group constructs. Generally, a factor analysis is used to assess a scale when it is being developed (Worthington & Whittaker, 2006); however, the factor analysis in this chapter was used to evaluate the trials within the IAT. The FA aids with assessing the validity of a measure, and to determine the number of factors that make up the IAT variables and to establish the different factors or dimensions (Worthington & Whittaker, 2006). The FA assesses whether or not all of the trials are used within the IAT to produce the optimism and pessimism measures. Furthermore, the FA determined what trials or constructs load onto factors within the IAT; was expected that optimism/self and pessimism/self would be separate factors assuming a two dimensional model of optimism; the separate factors were expected as the LOT-R optimism measure found optimism and pessimism to be two separate constructs (Cano-García et al., 2015).

According to Worthington and Whittaker (2006), there are two types of FA that are part of the Classical Measurement Theory. These are Exploratory Factor Analysis (EFA) (this chapter) and Confirmatory Factor Analysis (CFA). EFA is defined as a starting point to investigating the validity of the IAT, and usually, the CFA is conducted after (DeVellis, 2003). Within this chapter, the exploratory factor analysis was used to examine the optimism IAT. The aim of the EFA was to examine the trials of the IAT to explore the validity and reliability of the measure. The EFA ultimately examined the factor structure of the trials within the IAT.

The factor analysis method in this chapter used the Exploratory Factor Analysis (EFA), rather than CFA. The EFA uses a large set of variables (IAT trials) to help establish any underlying dimensions or constructs, and assess the individual items in the IAT. Therefore, any trials in the IAT that are not related to optimism/pessimism or are measuring the same concept, were assessed and removed if necessary. This process helped to investigate the optimism IAT and what it is measuring. The EFA

involves using the analysis alongside the researcher's knowledge of the theory to determine the results (DeVellis, 2003).

Thus, the purpose of this chapter was to investigate the reliability and validity of the Implicit Association Test (IAT) as a means to investigate optimism. In addition, its relationship to explicit (LOT-R) optimism and the implicit optimism (VPT) measure was investigated.

### 3.1.4 Research Aims and Hypotheses

Some of the aims within this thesis were met by the objectives of this chapter:

1. To investigate the strength of the relationship between one explicit self-report questionnaire and two implicit tasks.
2. To create a valid and reliable implicit association test (IAT) for optimism.
3. To examine the factor structure of the optimism IAT.

Based on previous research, the following hypotheses was tested:

- 1) There would be a significant relationship between implicit and explicit optimism measures.
- 2) There would be a significant relationship between the implicit measures of optimism.
- 3) The optimism IAT would be valid and reliable.

## 3.2 Methods

### 3.2.1 Design

To achieve the aims of this chapter, the design of this study used a quantitative laboratory-based one-week test-retest study. A within-subject design was used to examine the relationship between explicit and implicit optimism measures.

Additionally, the within-subjects design further investigated the validity and reliability of the IAT. The study used a correlational design; thus, the dependent variable is the LOT-R, IAT and VPT scores. In addition, the difference between time was examined, therefore, the independent variable is the time one and time two.

Furthermore, research has suggested that the VPT needs to be conducted on a computer that is not connected to the internet, to ensure no bias from the internet speed (Risløv Staugaard, 2009) (Discussed in chapter 2). Therefore, this study was undertaken on the same computer in a laboratory setting for both the VPT and IAT.

To further investigate the reliability and validity of the IAT, a Known-group validity and EFA was conducted on the time one data in this study. The Known-group validity was used to discriminate between groups, based on prior knowledge (gender), as a way of investigating the validity of the measure (Field, 2014; Nosek et al., 2007). Grumm & von Collani (2007) The Known Group Validity was investigated for optimism and pessimism, and it is expected that a valid measure would have no difference between gender in the IAT. A recent study by Schou-Bredal et al. (2017) replicated the findings and found the LOT-R has no gender differences and small differences in regards to age. Therefore, within this thesis gender or age differences was not be investigated in dispositional optimism. Therefore, it would be assumed that implicit optimism may find no differences between gender and optimism. Hence, if similar findings of no differences to gender are found then the IAT may be considered a valid measure.

### 3.2.2 Participants

An opportunity sample of 60 university students was recruited for the test-retest study. The participants were given ten psychology participant points from the University of Derby as an incentive for taking part. The inclusion criteria were the participants needed to be over 18 years old. Participants were recruited through posters, blackboard and emails (Appendix 4 and 5). The age of the participant's age ranged from 18 to 59 ( $M= 25.25$ ,  $SD= 11.11$ ) (42 females; 16 males; 3 preferred not to say).

For the EFA, the first half of the test-retest data was used; therefore, a total of 75 participants were recruited for the study. This included the 60 participants from the test-retest element of the study. The age of the participant's age ranged from 18 to 59 ( $M= 26.3$ ,  $SD=10.5$ ) (49 females and 26 males).

### 3.2.3 Materials

The materials required for this study were; explicit Lot-R (See chapter 2, section 2.2.1 for a description) (See appendix 1 for a copy of the LOT-R), IAT and VPT (See chapter 2, section 2.4.1 for a description) (See appendix 11 and 12 for a copy of the IAT and VPT).

### 3.2.4 Procedure

Participants were given an information sheet and consent form (appendix 7). The participants were then randomly given the LOT-R, IAT and VPT. Both the IAT and VPT were conducted on Inquisit computer software within the University of Derby laboratory. After completing the study, the participants were given a written debrief at time one (Appendix 14) and then asked to return to complete the same study one week later, where they were randomly given the LOT-R, IAT or VPT again, during time two. After completing the time two study, the participants were given a full debrief (Appendix 15).

### 3.2.5 Exploratory Factor Analysis (EFA) Methodology

The EFA was conducted, using the time one data in this study, to explore the IATs reliability and validity. The EFA comprised of 75 participants from time one data.

#### 3.2.5.1 Sample size

The EFA needs to have an adequate sample size to investigate the factors, as Worthington and Whittaker (2006) have suggested that larger sample sizes lead to better scale development. Worthington and Whittaker (2006) also suggested that 75 participants are categorised as a poor sample size; however, this EFA is investigating the IAT trials and not creating a new scale, and these sample size categories are classed as general guidelines. Regardless, the larger the sample size, the greater the correlation and stability, which could also lead to being categorised as more replicable. In contrast, smaller sample sizes could lead to issues with stability of the correlation and may not fully represent the general population (Worthington & Whittaker, 2006; DeVellis, 2003). However, if the sample size was too large, caution would have needed to be taken upon findings with small correlations, which show to be significant, as in this case the Bartlett's test becomes meaningless (Tabachnick, Fidell, & Osterlind, 2001). While a sample size of 75 may be considered a limitation, an EFA should give an overview of the validity and reliability of the optimism IAT. The EFA in this chapter is an initial investigation into the validity and reliability of the optimism IAT, and a further EFA (implicit and explicit) was investigated in chapter 4.

### 3.2.5.2 Factorability of the Data

To examine the IAT, the factorability of the data set can be determined by the strength of the correlation between the variables (Worthington & Whittaker, 2006). The factorability can be assessed by using the Bartlett's (1950) test of sphericity and the Kaiser-Meyer-Olkin (KMO) (Hill, 2011), to measure the sampling adequacy. The Bartlett's test uses the probability of 0 correlation in the matrix; therefore, to be factorable the significance in the matrix needs to differ from zero. The KMO is another measure of investigating the factors to see if the correlation is due to chance, using the values between 0 and 1. Therefore, the values would suggest that 0 score is due to chance, and 1 score is not due to chance (Tabachnick, Fidell, & Osterlind, 2001). Tabachnick et al. (2007) suggested that values greater than 0.6 are recommended to be classed as not by chance. A KMO of less than 0.5 is suggested that additional data may need to be collected, or the variables need to be reconsidered (Kaiser, 1974). The Bartlett's test and KMO were used to examine the factorability of the IAT data set to determine what strength of correlation between the trials (variables).

### 3.2.5.3 Factor interpretation and solution evaluation

The EFA is used to find which of the items (trials) load onto which of the factors, and by how much, if any, of the items need to be removed from the IAT. To be considered as a factor the items should have loading values between 0.3 and 0.9, and the factors should fit previous theories (Jackson, Gillaspay, & Purc-Stephenson, 2009). Any 'poorly defined' factors can be identified, which could be factors that have too few items loading onto them, too many cross-loading factors, or not fitting with any previous theories (Brown, Begun, Bender, Ferguson, & Thompson, 2015). Any 'poorly behaved items' can be identified, this could be items that load too highly to more than one factor, or items that have small loading factors across a lot of different factors (Worthington & Whittaker, 2006).

The EFA is required to see if the trials have any relationship between the variables. A CFA by Greenwald and Farnham (2000) investigated a self-esteem IAT and found cross-loading correlations above 0.90 within the implicit self-esteem. Therefore, it would be expected that the optimism IAT items would have correlations around 0.90 and fit with a previously considered theory or constructs of optimism.

### 3.2.6 Analytic strategy

#### 3.2.6.1 Explicit and implicit measures - Preliminary analysis LOT-R, VPT and IAT

The statistical software package SPSS 25 (IBM, 2012) was used to process the data.

- Dispositional optimism (LOT-R) was used as the explicit measure in this study, as previous research found good reliability (optimism 0.70 and pessimism 0.66) and validity (Hinz et al., 2017), for the questionnaire. Therefore, it was a good measure to use when investigating the relationship between implicit and explicit optimism. Thus, a Pearson's correlation was used to investigate the optimism and pessimism relationship in time one and two.
- A two-factorial ANOVA into optimism/pessimism and congruent/incongruent VPT analysis was performed, followed by a paired T-test at time one and two. Then a Spearman's correlation to examine the relationship between time one and time two.
- A T-test followed by a paired sample t-test at time 1 and 2 was conducted to investigate the reliability in terms of test-retest of the IAT, followed by Pearson's correlation to examine the relationship between time one and time two.

#### 3.2.6.2 IAT Known Group validity

As previously mentioned in chapter 2, there is some controversy in regards to the convergent-discriminant validity; therefore, the Known Group validity was measured. It is important for an IAT to be able to discriminate between groups, and to be able to differentiate between groups based on prior knowledge is a way of investigating the validity of the measure (Field, 2014; Nosek et al., 2007). Therefore, using the prior knowledge from the explicit LOT-R, which found no difference with gender in the dispositional optimism (Hinz et al., 2017b; Schou-Bredal et al., 2017), the optimism IAT would expect to find no difference with gender between the optimism and pessimism scores.

The Known Group validity has been used in previous IATs to help to predict the validity of the measure. Nosek et al., (2002) used previous research to predict that gender role expectations of art and maths and found the IAT to be a valid measure. It was predicted that women would implicitly associate with self/art more and men associated with self/maths more. The predictions supported the findings in the study and, therefore, reinforced the validation of the measure. Furthermore, Houwer, Custers and Clercq, (2006) found smokers associated stronger with the smoking implicit stimuli than the non-smoker's group. To validate the smoking IAT measure the findings were predicted before the IAT was conducted. As a result, this optimism IAT used a Known Group validity to compare gender differences. As a prediction, it would be expected that optimism and pessimism would have no differences within gender, and to investigate the known group validity, a between-group ANOVA was used.

#### 3.2.6.3 IAT EFA

An EFA was used to investigate the reliability and validity of the IAT using the IAT D scores for 75 participants in time one of the study. A total of 80 trials were examined using the EFA, which included 40 optimism/self-pessimism/other and 40 pessimism/self-optimism/other (Greenwald, 2001).

#### 3.2.6.4 LOT-R, VPT and IAT

The LOT-R, VPT and IAT conducted a spearman correlation to explore the aim of this chapter and investigate the relationship between implicit and explicit measures of optimism.

### 3.3 Results

#### 3.3.1 Data preparation

When preparing the data, a participant was excluded from the analysing due to poor performance on the IAT; the scores showed more than 10% of the reaction times were over 3000ms and therefore the participant scores were excluded. This resulted in 59 participants (41 females; 16 males; 3 preferred not to say) completing the test-retest study. For the EFA 74 participants (48 females; 26 males; 3 preferred not to say) completing the study. The data showed 346 outliers overall for all participants; therefore, the IAT was winsorsied to replace the data below 300ms and above



3000ms, and VPT data was replaced below 200ms and above 1200ms. The winsorising was suggested by Price et al. (2015), the study compared the attentional bias scores from the data-driven outlier removal technique and outliers that were rescaled (winsorised; Erceg-Hurn & Mirosevich, 2008). The winsorising procedure increased the power of the data by reducing the impact the outliers had on the data set. Therefore, this study used the winsorising technique on the attentional bias scores.

### 3.3.2 LOT-R Preliminary analysis

For the purpose of this study into optimism and pessimism LOT-R, an analysis using Pearson’s correlation was used to examine the relationship between time one and time two. The LOT-R Internal Consistency Cronbach alpha was  $\alpha= 0.73$  for time one. The LOT-R Internal Consistency Cronbach alpha was  $\alpha= 0.87$  for time two. The LOT-R Internal Consistency Cronbach alpha was  $\alpha= 0.85$  for time one and two. Previous studies showed similar Cronbach alpha  $\alpha= 0.68$  (Glaesmer et al., 2012) and  $\alpha= 0.78$  (Carver & Scheier, 1994; Segerstrom, 2010). Therefore, this study used the overall optimism and pessimism total scores for the correlation. The mean scores are shown in table 3.1, and the overall mean scores for optimism and pessimism are shown in 3.2.

*Table 3.1: Mean LOT-R scores (with Standard Deviations in parentheses) as measures of dispositional optimism for time 1 and 2*

LOT-R Questions	Time 1	Time 2
LOT-R Q1 Optimism	1.90 (1.17)	1.85 (0.99)
LOT-R Q3 Optimism	2.51 (1.14)	2.42 (1.12)
LOT-R Q6 Optimism	2.46 (1.09)	2.42 (1.11)
LOT-R Q2 Pessimism	1.76 (1.10)	2.02 (1.11)
LOT-R Q4 Pessimism	2.15 (1.17)	2.02 (1.07)
LOT-R Q5 Pessimism	2.08 (1.09)	2.08 (1.07)

*Table 3.2: Mean LOT-R scores (with Standard Deviations in parentheses) for overall optimism and pessimism*

Optimism	Pessimism	Optimism	Pessimism
Time 1 mean	Time 1 mean	Time 2 mean	Time 2 mean

2.67 (0.85)	2.00 (0.89)	2.23 (1.08)	2.04 (1.08)
-------------	-------------	-------------	-------------

The normality of the mean data was examined by eyeballing boxplots and histograms, examining skewness and kurtosis, and lastly the z scores. The histograms and boxplots showed generally normal distribution, but the data did not show any outliers. The Z scores were examined and found all the scores lay inside the +/- 1.96 criterion for a small less than 100 sample size (Field, 2014) (see table 3.3). Therefore, the data was normally distributed, and a parametric Pearson's bivariate correlation was used to examine the LOT-R scores.

Table 3.3: Skewness, Kurtosis, ZSkewness (Z score), and ZKurtosis (Z score) of the optimism time 1, pessimism time 1, optimism time 2 and pessimism time 2 LOT-R scores

Optimism Time 1				Pessimism Time 1			
Skew	Kurt	Zskew	Zkurtosis	Skew	Kurt	Zskew	Zkurtosis
0.11	-0.66	0.34	-1.08	0.17	-0.76	0.53	-1.23
Optimism Time 2				Pessimism Time 2			
Skew	Kurt	Zskew	Zkurtosis	Skew	Kurt	Zskew	Zkurtosis
0.34	-0.65	1.10	-1.06	0.29	-0.55	1.10	-0.90

A bivariate Pearson's correlation was used to examine the optimism and pessimism mean scores relationship between time one and time two. There was a strong positive significant relationship between pessimism time one and pessimism time two ( $r = 0.661$ ,  $p < 0.001$ ). A medium positive significant relationship between optimism time one and pessimism time one ( $r = 0.428$ ,  $p = 0.001$ ), optimism time two and pessimism time two ( $r = 0.40$ ,  $p = 0.002$ ), optimism time one and optimism time two ( $r = 0.42$ ,  $p = 0.002$ ). There was a weak positive significant relationship between pessimism time one and optimism time two ( $r = 0.258$ ,  $p = 0.048$ ). There was no significant relationship between optimism time one and pessimism time two ( $r = 0.10$ ,  $p = 0.435$ ). Therefore, indicating a strong association for the LOT-R mean optimism and pessimism scores between pessimism time one and pessimism time two. An association between optimism time one and pessimism time one, optimism time two and pessimism time two, optimism time one and optimism time two, pessimism time one and optimism time two (Field, 2014). The results show overall good reliability for the test-retest in the LOT-R. Therefore, indicating that there is good internal consistency for the optimism and pessimism in the LOT-R.

The total scores of optimism and pessimism between time one and two are shown in table 3.4 and figure 3.1. As the results show a good internal consistency and Cronbach alpha in this study, the total score calculation was used in the explicit and implicit main analysis in this chapter, as suggested by Scheier et al. (1994).

Table 3.4: Total LOT-R scores for time one and two

<b>Optimism Time 1</b>	<b>Pessimism Time 1</b>	<b>Optimism Time 2</b>	<b>Pessimism Time 2</b>
6.86	6	6.69	6.12

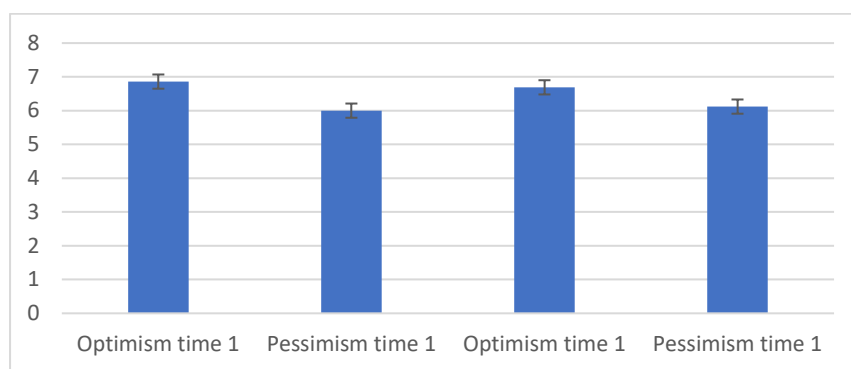


Figure 3-1: A graph showing the total LOT-R scores for time one and two

According to the table, this indicates a slightly more optimistic scores for time one and time two. To examine the optimism and pessimism total scores relationship between time one and time two a bivariate Pearson's correlation was used. There was a weak to very good positive significant relationship between all the time points. Pessimism time one and pessimism time two ( $r= 0.716$ ,  $p< 0.001$ ), optimism time one and pessimism time one ( $r= 0.428$ ,  $p = 0.001$ ), optimism time two and pessimism time two ( $r=0.637$ ,  $p< 0.001$ ), optimism time one and optimism time two ( $r = 0.806$ ,  $p< 0.001$ ), pessimism time one and optimism time 2 ( $r= 0.484$ ,  $p< 0.001$ ), optimism time one and pessimism time two ( $r = 0.499$ ,  $p< 0.001$ ). Therefore, indicating an association for the LOT-R mean optimism and pessimism total scores for time one and two (Field, 2014). The results show overall good reliability for the test-retest in the LOT-R. Furthermore, similar findings were found in previous studies, showing an acceptable test-retest correlation 0.68, 0.60, 0.56 and 0.79

(Carver & Scheier, 1994; Segerstrom, 2010). Therefore, further indicating that there is a good internal consistency for the optimism and pessimism LOT-R.

### 3.3.3 VPT Preliminary analysis

A two-factorial ANOVA into optimism/pessimism and congruent/incongruent VPT analysis was performed, followed by a paired T-test at time 1 and 2. Then a Spearman's correlation to examine the relationship between time one and time two.

Once the data was screened, and 408% of incorrect responses were deleted. The trials with reaction times shorter than 200ms and longer than 1200ms were removed (Thoern et al., 2016). Cronbach's Alpha showed unacceptable internal consistency ( $\alpha = -0.44$ ) for time one VPT and a good internal consistency ( $\alpha = -0.82$ ) for time two VPT. The time 1 and 2 means scores are shown in table 3.5.

#### 3.3.3.1 Reaction times

##### 3.3.3.2 Time 1

Table 3.5 shows the mean reaction times for optimism, pessimism, congruent and incongruent. To examine the time one congruency effect, Thoern et al. (2016) suggested a 2x2 factorial repeated measures ANOVA with optimism/pessimism and congruent/incongruent. Results revealed no main effect for pessimism ( $F(1, 58) = 1.80, p = 0.185$ ), pessimism and optimism ( $F(1, 58) = 0.001, p = 0.981$ ). However, there was a significant interaction for optimism ( $F(1, 58) = 4.63, p = 0.036$ ). Therefore, showing that there was no significant difference between congruent optimism and congruent pessimism, or pessimism congruent and incongruent. However, there was a significant difference between congruent and incongruent optimism. Therefore, a follow-up t-test was conducted for optimism congruent and incongruent, ( $t(58) = -1.03, p = 0.309$ ), hence indicating no significant difference in attentional bias away from the optimism stimuli.

##### 3.3.3.3 Time 2

Table 3.5 shows the mean reaction times for optimism, pessimism, congruent and incongruent. To examine the time two congruency effect, Thoern et al. (2016) suggested a 2x2 factorial repeated measures ANOVA with optimism/pessimism and congruent/incongruent. Results revealed no main effect for pessimism ( $F(1, 58) = 2.33, p = 0.132$ ), optimism ( $F(1, 58) = 1.84, p = 0.181$ ), or pessimism and optimism

( $F(1, 58) = 0.001, p = 0.974$ ). Therefore, showing that there was no significant difference between optimism congruent and incongruent, and pessimism congruent and incongruent. Furthermore, there was no significant difference between congruent optimism and congruent pessimism.

Table 3.5: Mean VPT reaction times at time 1 and 2 (with Standard Deviations in parentheses) as measures of optimism, pessimism and congruency

	<b>Optimism Time 1 Congruent</b>	<b>Optimism Time 1 Incongruent</b>	<b>Pessimism Time 1 Congruent</b>	<b>Pessimism Time 1 Incongruent</b>	<b>Optimism Time 2 Congruent</b>	<b>Optimism Time 2 Incongruent</b>	<b>Pessimism Time 2 Congruent</b>	<b>Pessimism Time 2 Incongruent</b>
<b>Reaction times</b>	366.54 (72.47)	358.19 (74.22)	372.20 (72.21)	380.29 (95.43)	373.08 (83.85)	364.25 (75.25)	356.70 (60.68)	365.04 (85.27)

### 3.3.3.4 Attentional bias scores

The reaction times found no differences between optimism and pessimism; therefore, the attentional bias scores were examined to clarify any interaction effects. The formula proposed by Macleod and Mathews (1988) (see chapter 2) was used to calculate the attentional bias scores. The attentional bias scores for time one and two are shown in table 3.6 and figure 3.2.

Table 3.6: Mean Attentional bias (with Standard Deviations in Parentheses) for optimism and pessimism for time 1 and 2

Valence	Optimism time 1	Pessimism time 1	Optimism time 2	Pessimism time 2
Attentional bias means scores	-8.35 (62.42)	8.09 (62.59)	-8.83 (74.45)	8.34 (69.78)

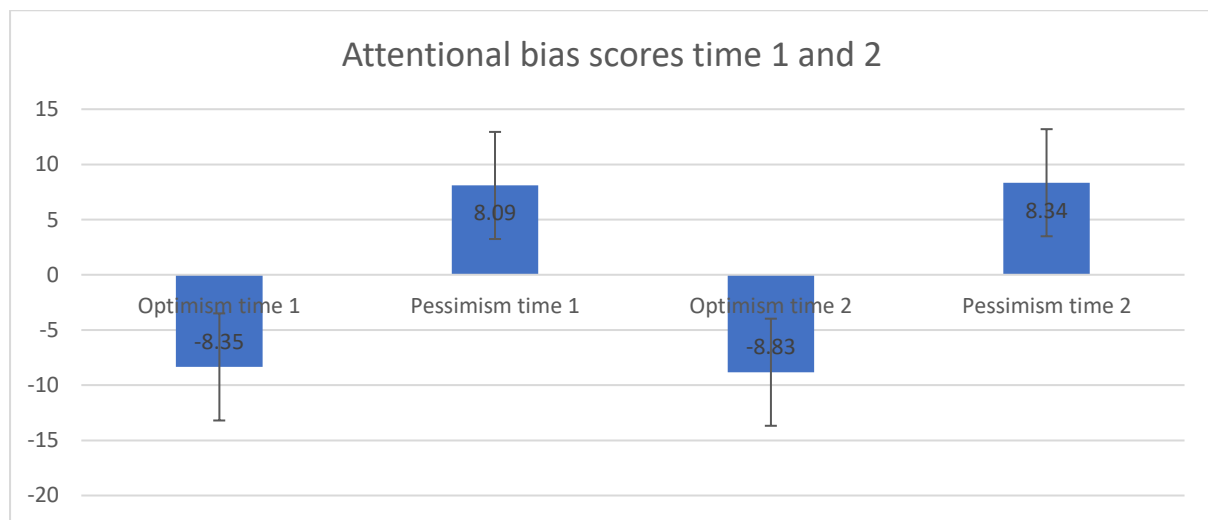


Figure 3-2: Attentional bias VPT score for optimism and pessimism for time 1 and 2

#### 3.3.3.4.1 Attentional bias time 1 and time 2

A paired sample t-test was used to compare optimism and pessimism attentional bias scores in time one. There were no significant difference between optimism and pessimism attentional bias scores in time one ( $t(58) = -1.25$ ,  $p = 0.216$ ), with a very small effect size Cohen's  $d = -0.01$ . There were no significant difference between optimism and pessimism attentional bias scores in time two ( $t(58) = -.021$ ,  $p =$

0.983), with a very small effect size Cohen's  $d = -0.01$ . Therefore, indicating that there was no significant difference between the optimism and pessimism attentional bias scores showing that statistically optimism or pessimism was not more greatly observed in the sample in time one or two.

#### 3.3.3.5 Attentional bias relationship between time 1 and 2

The normality of the data was examined by eyeballing boxplots and histograms, skewness and kurtosis were examined, and lastly the z scores. The histograms and boxplots showed generally normal distribution, but the data did show some outliers. These outliers were identified in 'Attentional bias pessimism time one' (20) and 'Attentional bias optimism time two' (33). However, when the Z scores were examined only two of the scores (optimism time one,  $Z_{skew} = 0.87$  and  $Z_{kurtosis} = 0.21$ ) lay inside the  $\pm 1.96$  criterion for a small sample size (Field, 2014) (see table 3.7). Therefore, the data was not normally distributed, and a non-parametric Spearman's bivariate correlation was used to examine the VPT attentional bias scores.



Table 3.7: Skewness, Kurtosis, ZSkewness (Z score), and ZKurtosis (Z score) of the optimism time 1, pessimism time 1, optimism time 2 and pessimism time 2 attentional bias scores

Optimism Time 1				Pessimism Time 1			Optimism Time 2				Pessimism Time 2			
Skew	Kurt	Zskew	Zkurtosis	Skew	Kurt	Zskew	Skew	Kurt	Zskew	Zkurtosis	Skew	Kurt	Zskew	Zkurtosis
0.27	0.13	0.87	0.21	-1.18	3.36	3.81	1.034	3.274	3.32	5.34	0.939	1.821	3.02	2.97

A bivariate Spearman's correlation was used to examine the attentional bias relationship between time one and time two (Marks et al., 2014). Table 3.8 shows the relationship between the attentional bias scores between the two time points (time one and two). The results indicated a positive weak significant relationship between pessimism time one and two, and optimism time one and two. A negative weak significant relationship was found between Optimism and pessimism time two. However, a non-significant weak relationship was found between optimism and pessimism time one, optimism time one and two, optimism time one and pessimism time two. Therefore, pessimism time one and two, optimism and pessimism times one and two had a weak strength of association between the attentional bias scores, indicating a weak relationship between the scores (Field, 2014). Thus, showing some weak correlations between optimism and pessimism attentional bias scores.

### 3.3.4 IAT Preliminary analysis

#### 3.3.4.1 IAT D scores

Based upon the recommendation for analysing IAT provided by Greenwald, Nosek and Banaji (2003) the D scores were used to further examine the IAT scores. A T-test was used to examine any differences between optimism and pessimism scores in time one and time two (Shown in table 3.8 and figure 3.3). The normality of the data was examined by eyeballing boxplots and histograms, skewness and kurtosis were examined, and lastly the z scores. The histograms and boxplots showed generally normal distribution, but the data did show one outlier. This outlier was identified in 'optimism time two' (28). The Z scores were examined, and all of the scores lay inside the +/- 1.96 criterion for a small sample size (Field, 2014) (see table 3.9). Therefore, the data was normally distributed, and a parametric Pearson's correlation was used to examine the relationship between the time one and time two IAT D scores. Cronbach's Alpha showed very good internal consistency ( $\alpha = 0.83$ ) for time one IAT and an unacceptable internal consistency ( $\alpha = 0.50$ ) for time two IAT. However, the internal consistency Cronbach Alpha ( $\alpha = 0.19$ ) was very weak for time one and two.

Table 3.8: Mean IAT D scores (with Standard Deviations in parentheses) as measures of optimism

Optimism mean D scores time 1	Pessimism mean D scores time 1	Optimism D scores mean time 2	Pessimism D scores mean time 2
-1.57(0.20)	0.82(0.24)	-1.57 (0.19)	0.78 (0.23)

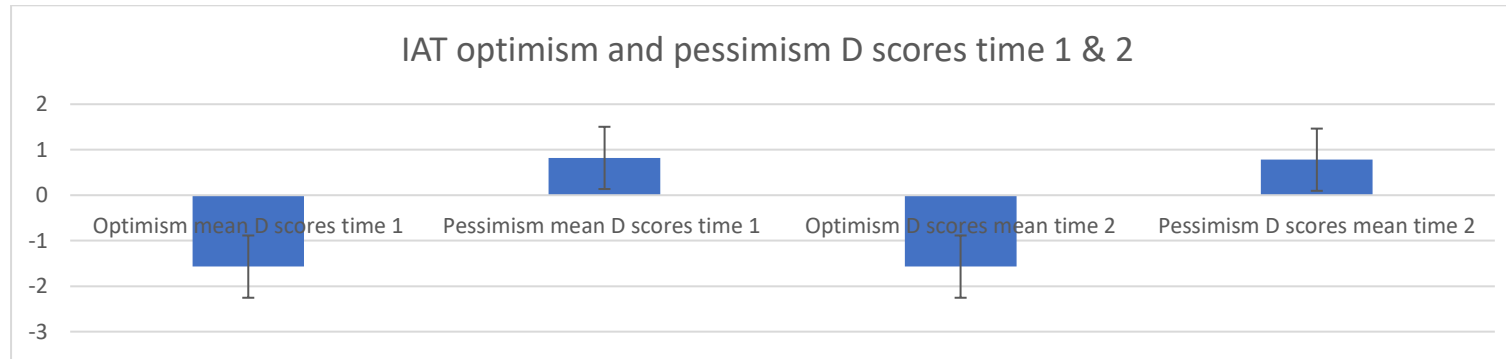


Figure 3.3: Showing the D score means for time 1 and 2

Table 3.9: Showing Descriptive Statistics (Mean), and Skewness and Kurtosis (Divided By SE) of IAT

Optimism Time 1				Pessimism Time 1			Optimism Time 2				Pessimism Time 2			
Skew	Kurt	Zskew	Zkurtosis	Skew	Kurt	Zskew	Skew	Kurt	Zskew	Zkurtosis	Skew	Kurt	Zskew	Zkurtosis
0.30	-0.70	0.97	-1.13	-0.06	-0.93	-0.18	0.33	1.64	1.06	0.27	1.13	-0.64	0.41	-1.04

The table is indicating that the pessimism mean D scores have an association with pessimism and self-words. Furthermore, the optimism mean D scores have a stronger association with optimism and other words.

Table 3.9 shows the mean D scores for optimism and pessimism. To confirm that the D scores are significantly different from zero in the time one effect, Greenwald (2000) suggested a T-test with optimism and pessimism. The results shows for time one a significant difference effect for optimism with a large negative effect size Cohen's  $d = -9.44$ ,  $t(58) = -72.48$ ,  $p < 0.001$ , and a significant difference effect for pessimism with a minor effect size Cohen's  $d = 2.33$ ,  $t(58) = 17.91$ ,  $p < 0.001$ . The results shows for time two a significant difference effect for optimism with a large effect size Cohen's  $d = -10.78$ ,  $t(58) = -82.81$ ,  $p < 0.001$ , and a significant difference effect for pessimism with a small effect size Cohen's  $d = 2.53$ ,  $t(58) = 19.41$ ,  $p < 0.001$ . Indicating that optimism for time one and two had a large effect size, and all the scores for time one and two were significantly different.

To examine the D scores relationship between time one and time two a bivariate Pearson's correlation was used (Greenwald, 2003). There was a strong positive significant relationship between pessimism time one and pessimism time two ( $r = 0.776$ ,  $p < 0.001$ ). The results showed a negative medium significant relationship between pessimism time one and optimism time one ( $r = -0.514$ ,  $p < 0.001$ ), and between optimism time one and pessimism time two ( $r = -0.485$ ,  $p < 0.001$ ). A weak negative significant relationship between optimism time two and pessimism time two ( $r = -0.258$ ,  $p = 0.049$ ), and a weak positive slightly significant relationship between optimism time one and optimism time two ( $r = 0.255$ ,  $p = 0.051$ ). A weak negative non-significant relationship between optimism time two and pessimism time one ( $r = -0.037$ ,  $p = 0.783$ ). Therefore, indicating a strong relationship between pessimism time one and pessimism time two. A medium relationship between optimism time one and pessimism time one, optimism time one and pessimism time two within the IAT D scores (Field, 2014). The results show overall good to acceptable reliability for the test-retest in the IAT. Therefore, indicating that there is acceptable internal consistency for the optimism and pessimism IAT. Apart from optimism time two and pessimism time one.

### 3.3.4.2 Known-Group Validity IAT

The Known-Group validity of the IAT was conducted to investigate any differences between gender (male and female) and the findings then compared to previous research (Field, 2014; Nosek et al., 2007) (see for the discussion 3.4.4.1.1). A between-subject ANOVA was used to examine any differences between gender (female and male) in time one in the IAT scores (Shown in table 3.10). An ANOVA was used to examine gender (female and male) in time one between groups in optimism and pessimism. Results revealed no difference for pessimism ( $F(1, 55) = 0.067, p = 0.543$ ), optimism ( $F(1, 55) = 0.374, p = 0.535$ ). Therefore, indicating no significant difference in gender in optimism and pessimism groups.

Table 3-10: Gender demographics in IAT time one

Gender	Total
Female	41
Male	15
<b>Total</b>	<b>56</b>

### 3.3.4.3 Exploratory factor analysis (EFA)

An Exploratory factor analysis (EFA) was conducted on 80 items (trials) (Blocks 4 and 7) to establish the effectiveness of the IAT and the items within the task. The data was examined for the factorability normality of the correlation matrix. The sample size was classed as poor according to Field (2014), however, the EFA can determine the usefulness of the items within the IAT. Within the EFA 90% of the data was used to explore the relationship between the IAT trials. The Kaiser-Meyer-Olkin measure showed a good sampling adequacy ( $KMO = 0.771$ ) (Field, 2014) Bartlett's Test of Sphericity was significant ( $X^2(2415) = 23152.267, p < .001$ ) thus suggesting that the correlations in the matrix are factorable as it was significantly different from zero. As the EFA is investigated the items of the IAT and what factors are in the IAT, a Varimax rotation method was used. The Varimax rotation (Orthogonal rotation) is one of the most commonly used factor rotations, as the rotation identifies each variable with factors (Russell, 2002).

As none of the items was less than  $r < 0.2$  in the Item-Total Correlation, none of the trials were considered for removal (Velicer & Fava, 1998). The analysis showed the

lowest value was  $r = 0.763$ , shown in figure 3.5. The IAT needs the optimism/self and pessimism/self to be individually highly correlated as the IAT is measuring reaction times to different categories; therefore, anything greater than 0.8 was not considered as repetition and would not be deleted (Rockwell, 1975). The analysis showed the highest value was  $r = 0.959$ . None of the items had perfect multicollinearity and did not need removing. Therefore, all of the 80 items were continued to be included in the IAT, as all items were all  $> 0.2$ . Cronbach's Alpha showed a good internal consistency ( $\alpha = 0.970$ ).

The EFA showed based on Principal Axis Factoring (PAF) Kaiser's criterion Eigenvalues  $> 1$  and eyeballing the scree plot, a two-factor solution was revealed. The pattern matrix rotation suggested that all of the items were cross-loaded onto two of the factors, all of the factors had higher loadings than  $< 0.4$  (Velicer and Fava, 1998), and therefore, none of the items was removed. Before further interpretations, a two-factor solution extract was run and revealed two clear factors. Kaiser's criterion for Eigenvalues presented a two-factor solution shown in figure 3.4 mapping factors figure and 3.5 Scree Plot. The two factors are interpreted as the following: Factor one – 'Pessimism/Self and Optimism/Other'; Factor two – 'Optimism/Self and Pessimism/Other'.

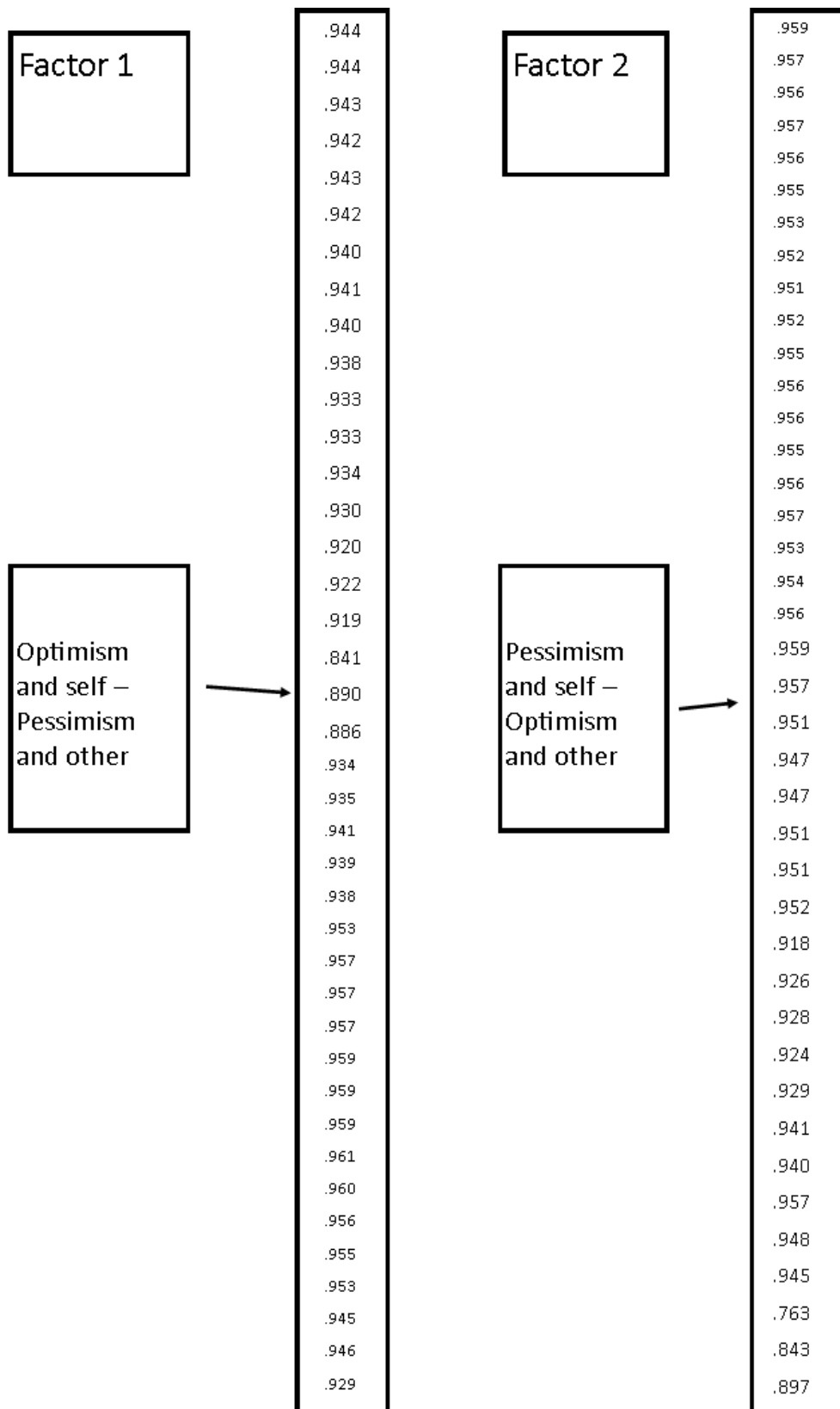


Figure 3.4. showing the mapping factors: Rotated Component Matrix

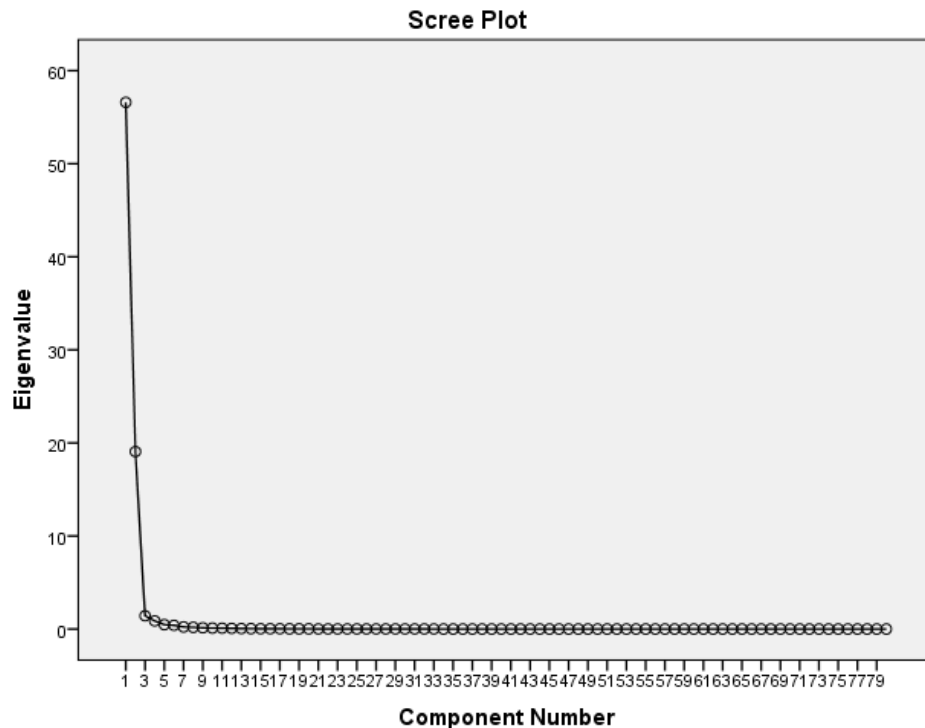


Figure 3-5: Scree Plot Showing Eigenvalues and Factor Number

### 3.3.5 Descriptive statistics: LOT-R, VPT and IAT

The main analysis examined the 59 participants in the test-retest and the relationship between explicit (LOT-R) and implicit (VPT and IAT) measures. A bivariate Spearman's correlation was used to examine the relationship as all of the data was not normally distributed (See tables 3.12). Overall Cronbach's Alpha showed a weak internal consistency ( $\alpha = 0.305$ ) for time one and ( $\alpha = 0.519$ ) for time two. The Cronbach's Alpha showed good internal consistency between time one and two ( $\alpha = 0.658$ ).

### 3.3.6 Spearman's correlations: LOT-R, VPT and IAT

A non-parametric Spearman's correlations was conducted on the LOT-R, VPT and IAT to investigate the relationship between the implicit and explicit optimism. The Spearman's correlation was used, as the VPT was not normally distributed, to investigate the reliability and the convergent-discriminant validity of the optimism explicit and implicit measures. The table 3.11 showed mostly weak non-significant correlations between the explicit (LOT-R) and implicit (VPT and IAT) measures of



optimism. Indicating overall, most of the scores showed no relationship between explicit and implicit optimism.

Table 3-11: Showing the Spearman's correlation between Optimism and Pessimism LOT-R, VPT and IAT

	LOT-R O1	LOT-R P1	LOT-R O2	LOT-R P2	IAT O1	IAT P1	IAT O2	IAT P2	PT O1	VPT P1	VPT O2	VPT P2
LOT-R O1	*	<b>0.434</b> <b>0.001</b>	<b>0.817</b> <b>0.00</b>	<b>0.498 0.000</b> 0.222	-0.161 0.222	0.072 0.589 0.343	0.126 0.537	0.082 0.879	0.02 0.67	0.057 0.297	0.138 0.297	0.119 0.367
LOT-R P1	<b>0.434</b> <b>0.001</b>	*	<b>0.469</b> <b>0.000</b>	<b>0.721 0.000</b> 0.173	-0.18 0.173	0.257 0.05 0.014	0.317 0.36	0.121 0.374	-0.118 0.374	0.016 0.902	-0.083 0.374	-0.103 0.436
LOT-R O2	<b>0.817</b> <b>0.000</b>	<b>0.469</b> <b>0.000</b>	*	<b>0.602 0.000</b> 0.877	-0.021 0.877	0.081 0.544 0.611	0.068 0.428	0.105 0.592	-0.071 0.922	-0.013 0.922	0.102 0.442	-0.018 0.893
LOT-R P2	<b>0.498</b> <b>0.00</b>	<b>0.721</b> <b>0.000</b>	<b>0.602</b> <b>0.00</b>	*	-0.119 0.368	0.122 0.357 0.374	0.118 0.222	0.162 0.325	-0.13 0.325	-0.067 0.613	-0.13 0.328	-0.174 0.187
IAT O1	-0.16 0.222	-0.18 0.173	-0.02 0.877	-0.12 0.368	*	<b>-0.481 0.00</b> <b>0.054</b>	<b>-0.252</b> <b>0.00</b>	<b>-0.451</b> <b>0.00</b>	0.125 0.346	0.16 0.225	0.199 0.13	0.162 0.22
IAT P1	0.072 0.589	0.257 0.05	0.081 0.544	0.122 0.357	<b>-0.481</b> <b>0.000</b>	*	<b>-0.03</b> <b>0.821</b>	<b>0.756</b> <b>0.000</b>	-0.132 0.318	-0.006 0.962	-0.074 0.576	-0.199 0.13
IAT O2	0.13 0.328	0.327 0.011	0.07 0.598	0.128 0.334	<b>0.252</b> <b>0.054</b>	<b>-0.03 0.821</b> <b>0.054</b>	*	<b>-0.246</b> <b>0.06</b>	0.141 0.287	0.378 0.003	0.263 0.044	0.292 0.025
IAT P2	0.084 0.527	0.111 0.401	0.112 0.397	0.152 0.251	<b>-0.41</b> <b>0.000</b>	<b>0.756 0.00</b> <b>0.06</b>	<b>-0.246</b> <b>0.06</b>	*	-0.182 0.169	-0.139 0.293	-0.155 0.241	-0.242 0.065
VPT O1	0.02 0.879	-0.118 0.374	-0.071 0.592	-0.13 0.325	0.125 0.346	-0.132 0.318	0.143 0.278	-0.167 0.207	*	<b>-0.197</b> <b>0.162</b>	<b>0.269</b> <b>0.054</b>	<b>-0.178</b> <b>0.188</b>
VPT P1	0.057 0.67	0.016 0.902	-0.013 0.922	-0.067 0.613	0.16 0.225	-0.006 0.962	0.374 0.004	-0.127 0.339	<b>-0.197</b> <b>0.162</b>	*	<b>-0.178</b> <b>0.188</b>	<b>0.301 0.03</b>
VPT O2	0.138 0.297	-0.083 0.53	0.102 0.442	-0.13 0.328	0.199 0.13	-0.074 0.576	0.261 0.046	-0.146 0.271	<b>0.269</b> <b>0.054</b>	<b>-0.077</b> <b>0.607</b>	*	<b>-0.297</b> <b>0.034</b>

VPT P2	0.119	-0.103	-0.018	-0.174	0.162	-0.199	0.13	0.286	-0.24	<b>-0.178</b>	<b>0.301</b>	<b>-0.297</b>	*
	0.367	0.436	0.893	0.187	0.22			0.028	0.068	<b>0.188</b>	<b>0.03</b>	<b>0.034</b>	

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## G Power

According to GPower (Faul, Erdfelder, & Lang, 2009) on a Post hoc power analysis for the effect size with a sample size of 59 a lower critical  $r$  -0.26 and upper critical  $r$  = 0.26., power ( $1-\beta$  err prob) = 0.64 score was needed (Shown in figure 3.6).

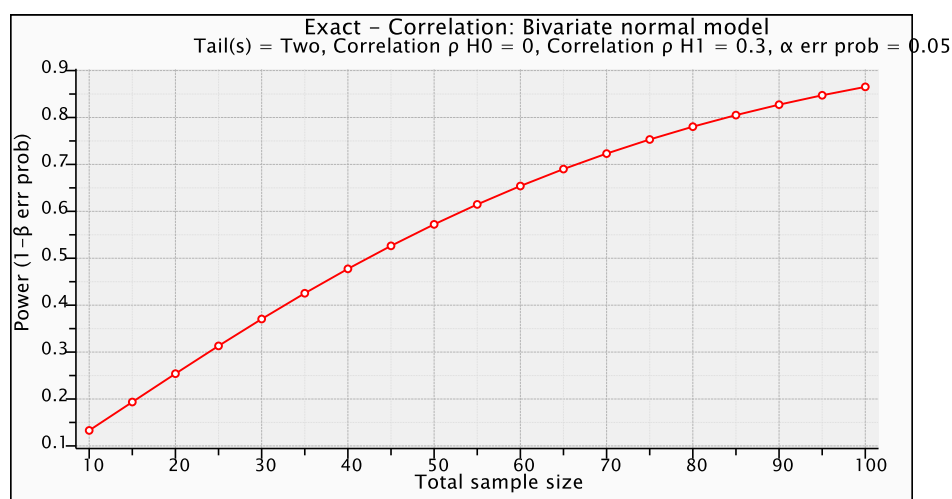


Figure 3.6: G Power statistics of calculated effect size

## 3.4 Discussion

### 3.4.1 Summary of Results

Within this chapter, the strength of the relationships between implicit and explicit measures of optimism was tested, and also tested if the IAT is a valid and reliable measure of optimism. The present findings indicated that the implicit and explicit optimism measures are mostly reliable as measures on their own. However, the weak, non-significant relationships between explicit LOT-R, implicit VPT and implicit IAT suggested that the measures are generally not reliable.

To further investigate the IAT, the validity was investigated by Known group validity and EFA, and both methods suggested that the IAT was a valid measure. The EFA showed a two-factor solution; optimism/self-pessimism/other and pessimism/self-optimism/other. This suggests implicit and explicit relationships are not reliable, but

the IAT may be a valid measure due to the significant findings of the Known-Group validity. The findings of this study are discussed in detail below.

### 3.4.2 LOT-R Results

On first inspection, the participants scored slightly higher on the LOT-R towards the optimism dimension compared to the pessimism dimension; however, optimism and pessimism scores were very close at both time one and two. However, the scores did show higher scores, but these were not significantly higher. The explicit LOT-R in this study found a good test-retest internal consistency reliability and these were similar findings to previous studies (Glaesmer et al., 2012). The findings indicated a medium to large relationship between the optimism and pessimism LOT-R scores, and this was found at the two-time points. However, the results showed a positive relationship between optimism and pessimism. It was previously assumed that the relationship between optimism and pessimism correlation should be negative.

However, previous studies have also found the relationship ranges from small to moderately negatively or positively related (Herzberg, Glaesmer, Hoyer, & Herzberg, 2006). The findings of this study could be due to the difference in factors, such as age and education. For example, Herzberg (2006) analysed a sample of 46,133 participants and found young well educated adults showed more negative results, while older less-educated adults correlated closer to zero. The age was also shown in other studies, such as Armbruster, Pieper, Klotsche, and Hoyer (2015). Cano-García et al. (2015) found positive correlations for the older group in the study. A further explanation for the lack of negative correlation between optimism and pessimism is the so-called acquiescence (yes-set) effect; this is the tendency to give positive answers to questions without considering the questions (Cano-García et al., 2015). This effect has been suggested to affect constructs that are theoretically opposite or one-dimensional. This acquiescence effect could be a consideration for the LOT-R, as it has been suggested to be a one-dimensional measure (Scheier et al., 1994). The acquiescence effect has been found to be more pronounced in older low educated adults (Savalei & Falk, 2014). As the participants in this study ranged from 18 to 59, but with a mean age of 25.25 and from a university population, this explanation is unlikely to support the reason why optimism and pessimism findings were not opposite and were showing a positive correlation. However, the acquiescence effect must be considered as a possible limitation in this study;

furthermore, the population for this study was a student population, and therefore, the generalisability to the general population could be questionable. In conclusion, this study could be indicating that optimism and pessimism are two independent constructs; however, other populations may find different findings for age and gender.

The theory that optimism and pessimism are two independent constructs in the LOT-R may explain the relationship found in this study. As previously mentioned in chapter 2, the stance that optimism and pessimism are separate constructs is taken, as supported by previous researchers (Chang et al., 1997; Creed, Patton, & Bartrum, 2002; Røysamb & Strype, 2002). The positive relationship between the LOT-R optimism and pessimism is supported by the Metacognitive theory (Wells, 2008); this theory suggests the beliefs and expectations about the world have set rules and appraisals for an individual and things are actively constructed and revised when assessing a given activity. Therefore, individuals may have different metacognitions for optimism and pessimism and consider them different constructs, and consider each separately as an adaptive coping strategy and so having a level of optimism and pessimism is an adaptive quality. This suggests that individuals can be optimistic and pessimistic at the same time (Herzberg et al., 2006) and having the metacognitive beliefs about optimism and pessimism may influence how individual answer the LOT-R questionnaire. Therefore, answering high or low for optimism and pessimism scores could give a positive relationship between the two constructs. As this thesis is suggesting that there are some limitations to self-report questionnaires, the metacognitive theory, also suggests a limitation with individuals being able to adapt their beliefs or expectations. In summary, the LOT-R found similar results to previous studies suggesting the measure to be reliable and valid. However, also suggesting that optimism and pessimism as separate constructs and should be considered separately in this thesis.

### 3.4.3 VPT Results

The VPT for this study showed the participants scored slightly for the attentional bias was towards pessimism, as the participants showed more attention towards the pessimistic stimuli. The optimism attentional bias scores suggested an attentional bias towards the neutral stimuli and away from optimism. This suggests that the

participants were slightly more pessimistic; however, these results were not found to be all significant. The internal consistency was lower than expected for time one; however, the results showed a medium internal consistency. For time two the results showed a good internal consistency, which was higher than the expected results. These findings are in line with Christiansen et al. (2015), as the study found the VPT to have small to medium internal consistency. Therefore, indicating that the VPT for this study had internal consistency on the items. However, the VPT for this study had an overall low effect size and would need a larger sample size to become significant to the general population. The findings also showed small non-significant relationship with the optimism and pessimism attentional bias scores. This indicates that optimism and pessimism are separate constructs and the VPT could be considered to be two-dimensional.

However, the implicit VPT findings in this study show no significant difference was found between the optimism/pessimism and congruent/incongruent time latency scores, apart from in time one optimism congruent/incongruent showed a difference between the scores. These results show that there was no difference between the optimism and neutral faces, showing that there was no significant attentional bias to optimism. Apart from optimism time one that did find a difference between the neutral faces and optimism, indicating that there was a significant difference in quicker reaction times to the neutral stimuli. The participants in this study showed a preference for the neutral faces rather than the optimistic faces. This may suggest that the participants in this study were not optimistic. It may also suggest that this VPT is measuring optimism and not pessimism. As the other time points suggest there was not a significant difference between the neutral faces and the optimism/pessimism faces. These findings that the test-retest is not significant may be in line with other recent findings, as attentional bias methods have been challenged (Jones et al., 2018). Christiansen and Schoenmakers (2015) suggest that weak findings are often over-interpreted, and the null or not significant findings are ignored. This study found the test-retest to have unreliable results and similar results have been found in previous studies for the internal reliability and test-retest reliability. The test-retest reliability is important within a study as it suggests the validity of the measures and the VPT was found in this study to be not significant. Poor internal consistency and reliability challenge the conclusions that can be made

from the VPT (Rodebaugh et al., 2016), furthermore, causes challenges to reproducibility and overestimation of the effect sizes (Parsons, 2018; Zimmerman & Zumbo, 2015). The poor test-retest and half split of the VPT has been found in a number of different studies and topics, such as Emery and Simons (2015) who found weak relationships for half-split ( $r = -0.19$ ) and test-retest ( $r = 0.13$ ), and Marks et al. (2014), also found a weak relationship for the test-retest ( $r = 0.24$ ). In summary, the findings in this study were consistent with many other VPT studies.

The weak findings may be due to the type of stimuli the VPT used and the context to real life (Field and Christiansen, 2012). For example, an alcohol related VPT may show a selection of different drinks, but not the preferred drink of an individual. The participant may not like the types of drinks being shown. Christiansen, Mansfield, Duckworth, Field, and Jones, (2015) found that personalising the VPT to the participants' preference in the congruent stimuli increased the internal consistency ( $\alpha = 0.73$ ). Increasing the internal consistency of this study may have been possible in the optimism VPT, as the participants may have responded better to personalised images, rather than generic images. However, this VPT used faces as stimuli and this is different to preference stimuli (i.e. alcohol stimuli). Furthermore, the poor reliability has been suggested to be related to how the data is handled for the analysis. This study followed the recommended data handling for the VPT (Thoern, 2016); however, all technique has been under question. The VPT has been criticised for using different procedures and techniques. For example, Field and Powell, (2007); Miller and Fillmore, (2010); Townshend and Duka, (2001) all conducted studies into alcohol usage and were all found to have different data handling techniques; therefore, this could potentially result in different findings. The handling of data techniques of removing the low and high latency scores has been criticised, and other techniques have been suggested, such as winsorising. This study did winsorize the data to support the data set as suggested by Price et al. (2015), to reduce the impact of the removed latency scores. The limitations of this study should have been reduced by winsorizing the data; nevertheless, this did not create valid or reliable results in this study.

The findings in this study did not support the findings found by Fox (2008), which found a strong attentional bias to optimism stimuli in the visual probe task. However, this may be due to the limitations of this study, as the images were taken from IAPS



and were not the same images used in Fox's study. Before starting this study, the author was contacted to ask about the stimuli used in their study; however, there was no returned email. Therefore, images taken from IAPS were used; however, there have been some limitations to using photographic faces in the stimuli. The visual probe task or dot-probe task was developed by Macleod, Mathews and Tata (1986) to measure the attentional bias. However, using photographic images in the visual probe has shown to be inconsistent. For example, Risløv Staugaard (2009) found in a study, very poor reliability when investigating the VPT using photographic images. A study by Staugaard (2009) investigated two studies that used photographic images in the visual probe methods and found unreliable results. The studies were classed as unsuitable for attentional bias and individual difference research. In further research, the VPT for optimism and within the context of this study could have used faces as stimuli, but not photographic faces. This may have given more reliable findings in the optimism attentional bias. To strengthen this study and the VPT using images that were not photographic stimuli may have given more significant results. The images may not be the only presentation issue; one study changed the image locations. Instead of right and left, the study put the stimuli top and bottom. The study on alcohol images showed a significant attentional bias to the bottom stimuli only. However, this study was only one study and the findings need to be replicated (Price et al., 2015). To sum up, the non-significant reliability in this study may be due to the stimuli used, and if the methods were used again in future implicit VPT research, different stimuli may be an important factor.

In summary, the VPT in previous research has been found to be a questionable measure of attentional bias, and the VPT in this study was not very reliable or valid measure; however, there may be reasons for this. The limitations of this study could have been overcome by a few different aspects. Previous studies have shown that using photographic images in a VPT study can give inconsistent results (Staugaard, 2009). In any future research, the stimuli for the optimism VPT would need to be carefully considered, and the results may be found to be closer to Fox's (2008) study. Jones et al. (2018) suggest that continued effects are needed to improve the psychometric properties of the VPT. Therefore, the VPT was not used in any further studies in this thesis, as the VPT's psychometric properties were not very reliable or

valid measure, and the aim of this thesis was to create a valid and reliable IAT for optimism.

#### 3.4.4 IAT Results

Turning attention to the IAT, there was an association between pessimism and self and showed the participants to be more pessimistic. The participants associated stronger with optimism and other category, showing less association with optimism and self. The reaction times in time one and time two showed significant differences between optimism and pessimism. The results in this study showed that the IAT is measuring two different measures, optimism and pessimism, as there was a difference between optimism and pessimism scores. Therefore, suggesting that optimism and pessimism are two-dimensional and two separate constructs. Furthermore, within this study, the IAT had very good internal consistency and reliability between optimism and pessimism in time one. There was a strong to medium relationship between time one in optimism and pessimism. The findings for internal consistency were above what many other studies have found, for example, Hofmann et al., (2005) conducted a systematic review of 126 studies and found a good internal consistency for the IAT. However, the IAT's internal consistency was based on the procedure and not the topic of the IAT, and different topics may lead to different results. The internal consistency within the IAT time two was lower, but in line with previous research, as it was found to be in an acceptable range (Lane et al, 2007). However, the overall internal consistency between time one and two were found to be weak and not acceptable; however, these findings are not unusual.

The test-retest results are similar to those reported in the literature for the reliability of the IAT. This study found the relationship between time one and two to be weak and not significant, these findings accord with previous research. For example, Lane et al. (2007) study of implicit attitude found reliability scores for the IAT ranging from less than satisfactory to acceptable. As suggested a number of studies have found problems with the IAT reliability over time (Schmukle & Egloff, 2004; Steffens, 2016). The IAT may be questioned due to the reliability of the test-retest results, but is the IAT measuring something else, such as emotion instead of mood or personality. It could be questioned to whether attentional bias or the IAT is measuring short term emotions rather than a mood. Moods are often seen as having a longer duration than

emotions, and usually have lower intensity (George, 2000). Therefore, the IAT may be measuring an individual's current emotional state, and therefore the test-retest would not be considered a useful tool. Another possibility is that the IAT is measuring state optimism and not trait optimism. Optimism has mostly been investigated as trait personality (Seligman, 1998); however, there is an argument that optimism is a state. State optimism suggests that optimism levels could change over hours, days or months (Kluemper, Little, & Degroot, 2009). This could explain the weak relationship between time one and time two in the IAT. This state and trait optimism argument was explored further in chapter 6.

#### 3.4.4.1.1 IAT Known-Group validity results

To further explore the validity of the IAT, a Known-group validity measure was conducted, and this indicated no differences between genders in the optimism or pessimism groups. The Known-Group validity for the IAT was conducted to investigate any differences between gender (male and female) and then compared the non-significant findings to previous research. As previously mentioned, it is important for an IAT to be able to discriminate between groups to investigate the validity of the IAT, and this is based on prior knowledge as a way of investigating the validity of the measure (Field, 2014; Nosek et al., 2007). The findings in this study were supported by previous research, which suggested that the IAT had known-group validity, which was similar findings in the optimism LOT-R, as the IAT and LOT-R both found no differences between optimism and gender. The findings are supported by Hinz et al., (2017) and Schou-Bredal et al., (2017) as the studies found no differences concerning gender and optimism. Consequently, the known-group validity in this study is showing the optimism IAT to have validity, to further explore the validity of the IAT an EFA was conducted.

#### 3.4.4.2 IAT EFA Results

The EFA used 80 IAT trials, using time 1 scores, to examine the validity and the constructs of the optimism IAT. The EFA showed very good internal consistency and reliability and found that no items needed to be removed. Two clear factors mapped onto the items in the EFA; Factor one – Pessimism/Self- Optimism/Other and Factor two- Optimism/Self -Pessimism/Other. Each factor had 40 items in each and correlated highly with each factor.

The two separate factors that were shown in this EFA suggests that optimism and pessimism are two separate constructs, and this supports previous research. Optimism and pessimism have been considered two-dimensional and separate constructs by some researchers (Zengera et al., 2013), and supports some views of two-dimensional dispositional optimism (Creed, Patton, & Bartrum, 2002). The dimensions of optimism were further investigated and discussed in chapter 4. However, the optimism IAT has found optimism and pessimism to be two separate constructs.

One of the limitations to the EFA in this study was the sample size was considered poor (Field, 2014) and increasing the same sample would have strengthened the findings further. However, this EFA further supports the reliability and validity of this IAT, and considering all of the findings from the IAT in this chapter the optimism IAT is found to be a reliable and valid measure. Therefore, accepting the hypothesis that the IAT is a reliable and valid measure. However, some of the limitations have been discussed in this chapter, so more investigation is needed to explore what the optimism IAT is measuring. Therefore, within the next chapter (4) the IAT was further explored with a further EFA.

#### 3.4.5 LOT-R, VPT and IAT results, overall limitations and suggestions for future research

Overall, the participants scored slightly more pessimistically on the implicit measures (VPT and IAT), than the explicit LOT-R which were slightly higher in optimism, however, these scores were not significantly different and therefore not reliable. This may suggest that the implicit measures are overcoming social desirability and demand characteristics bias that the explicit measure may be susceptible to (Rosenthal, Rosnow, 2009; Greenwald, 2001). The implicit measures may be tapping into the unconscious representations that introspection does not allow (Bosson et al., 2000; Greenwald, Farnham, Greenwald, McGhee, & K Schwartz, 2000). However, the explicit and implicit results may be due to other reasons. One of the aims of this chapter was to investigate the relationship between the explicit and implicit measures of optimism. The hypothesis that there would be a relationship between these measures has not been accepted, as the relationship between the implicit and explicit measures showed very weak to none-significant results.

The convergent-discriminant validity of the IAT was evaluated by investigating its relationship with the explicit measure, as the validity is based on the idea that the measure needs to correlate with another measure with the same constructs (Campbell & Fiske, 1959). Therefore, evaluating the convergent-discriminant validity of the IAT with the explicit self-report LOT-R could investigate the optimism measure (Greenwald, Nosek, Banaji, 2003, Nosek, Greenwald, 2007). The IAT had, at best, a weak relationship with the LOT-R indicating poor convergent-discriminant validity. These findings are not unusual in the literature (e.g., Greenwald, 1998; Bosson et al., 2000; Jellison, McConnell, & Gabriel, 2004); the relationships between implicit and explicit measures have been questioned. Greenwald's (1998) initial research found the implicit and explicit cognition to be distinctively different and found a weak relationship between them. More recent research has found a variety of results, a study of 17 different IATs taken from a public website found the correlation with the explicit measure to be weak to good. The online IATs found weak relationships with the explicit measure for several different IATs, such as age attitude, skin-tone attitude, disability attitude, weight attitudes, race-weapons stereotypes, American-native stereotype, child-race attitudes and gender-career stereotype (Lane et al., 2007). Furthermore, a meta-analysis of 126 IATs found the implicit and explicit relationship to correlate from very weak to strong, with an average of a weak relationship (Hofmann et al., 2005). This suggests that the IAT and explicit measures are weakly related, suggesting that this is a poor measure of internal consistency and could imply that the implicit and explicit are different constructs.

The IAT relationship with the explicit measure has been found to be inconsistent; this may be due to the IAT measuring different constructs. There is evidence that implicit and explicit measures are distinct separate constructs (Wilson et al., 2000). Nosek and Smyth (2007) conducted a study with 287 undergraduate students, across 57 different attitudes and found that explicit and implicit measures loaded onto two separate factors. The results suggested that implicit and explicit measures are single constructs. They concluded that implicit and explicit measures are related, but distinct constructs. Therefore, the constructs of the optimism IAT was examined further in chapter 4. However, the relationship between implicit and explicit measures should not be considered as robust evidence for validity in the IAT.

Furthermore, as the implicit and explicit measures in this study found weak to non-significant relationships, this could be explained by the additive model. The model suggests that explicit attitudes, personalities or beliefs at the top of the iceberg as the conscious control and implicit attitudes, personalities or beliefs at the bottom (Karpinski & Hilton, 2001). This model would further suggest that implicit and explicit are two separate constructs (Perugini, 2005), and this supports the EFA factors that were found in this study. The additive model is not often used; nevertheless, the model supports the findings within this chapter, as no relationship was found between the implicit and explicit measures of optimism. The implicit and explicit constructs were further investigated in chapter 4.

A further model suggested to explain the implicit and explicit relationship is the interactive model (multiplicative), and this suggests that the implicit and explicit attitudes or beliefs interact to influence behaviour (Perugini, 2005). For example, someone has mixed feelings about the topic or has contradictory beliefs and would explicitly express one thing and then implicitly shows different result; this may be due to contradictory beliefs. In this study, individuals may want to be optimistic as the LOT-R suggested in the findings, but the implicit showed the findings to be overall more pessimistic in both the VPT and IAT. Further research has found similar findings to support this model. Such as, Frost et al. (2007) who found individuals who scored highly on the implicit conditional reasoning task for aggression, scored low on the self-report aggression questionnaire. Furthermore, Jordan (2003) found that individuals who displayed narcissistic behaviour scored high in the explicit self-report self-esteem questionnaire and low in implicit self-esteem IAT.

Another model has been suggested for the implicit and explicit relationship, but does not explain the findings in this study; however, the model could be considered for further implicit and explicit findings. The Double-Dissociation model suggests that a relationship should be found, suggesting that both implicit and explicit measures should predict spontaneous and controlled responses respectively (Hofmann et al., 2009). Hofmann, Friese and Strack, (2009) found that the IAT was able to predict less controlled behaviours when under a high cognitive load. Asendorpf and Banse, (2002) found that the shy trait moderately correlated between the IAT and self-report measures when the participants were asked to predict shy behaviour in realistic social situations. This model suggests that explicit and implicit measures are related,

and both should be able to predict the same responses. The findings in this study do not support this model, as the findings suggest that there is a weak relationship between implicit and explicit optimism.

Another limitation of this study relates to the implicit methods and the assumption that attentional bias is a stable construct. If implicit methods are not a stable construct, this could explain the test-retest findings in this study. Attentional bias may fluctuate within the given task and this makes the assumption problematic (Zvielli, Amir, Goldstein, & Bernstein, 2016; Zvielli, Bernstein, & Koster, 2015, Iacoviello et al., 2014). This limitation was considered through a study into VPT smoking and found deprived smokers reacted differently in phasic bursts throughout the VPT (Zvielli et al., 2015), therefore, suggesting that the attentional bias may fluctuate over the task or over longer periods. In this study, this may suggest that optimism and pessimism may fluctuate during the course of the VPT and IAT. Consequently, the implicit measures (IAT and VPT) maybe capturing the emotion of optimism or state optimism rather than the implicit personality trait, this was further investigated in chapter 6. In addition, optimism is currently argued that it is either a personality 'trait' or a flexible 'state'. The main focus of optimism research has primarily investigated the physical and psychological advantages of trait optimism. Trait optimism is a personality characteristic and is part of your personality. While state optimism changes with what has happened throughout the months and days (Kluemper, 2009). The findings in this chapter would support that optimism may be a 'state' that changes over time, and the implicit measure maybe capturing the emotion of 'state' optimism.

This study had a number of overall limitations to the method and these could be improved in further research. The size of the sample was relatively small, and increasing the sample could have given clearer results and explored the findings further. Furthermore, the implicit methods (VPT and IAT) did not correlate and this limitation may be due to the methodological limitations discussed in this chapter. However, the lack of a relationship between the VPT and IAT may suggest issues with the implicit methods. For example, the VPT or IAT could be measuring

something different from optimism. Therefore, further investigation into the relationship between two different implicit methods (optimism VPT and IAT) should be the focus of future research. Nevertheless, the IAT found some significant results, consequently, will be further investigated in chapter 4.

Additionally, for future research, replicating this study with a larger sample size would help to explore the optimism implicit explicit relationship further. Additionally, the participants were given University of Derby Psychology Participation Points as an incentive to take part in the study; however, this could have created a bias on the results as most of the participants were psychology students at the University of Derby.

Furthermore, the implicit measures have been questioned, and Parsons (2017) suggests that cognitive bias measures are not of high quality and are underreported. The unreliability of the cognitive bias measures is further supported by Gawronski, Deutsch, and Banse, 2011; Parsons, 2017; Vasey, Dalgleish, and Silverman, 2003. Therefore, the reliability and validity of the optimism IAT method were further investigated in chapter 4. The next chapter used an EFA to explore the IAT and explicit optimism. Creating a new optimism IAT could help to develop a further understanding of optimism and the constructs of what optimism is. To question whether an attentional bias implicit measure can measure optimism. Therefore, the positivist realist viewpoint was continued in the next chapter to further examine the relationship between implicit and explicit optimism, as the viewpoint has highlighted and helped us to further understand the relationship between the implicit and explicit methods in an objective and value-free manner.

### 3.4.6 Conclusion

To conclude, the study aims were to create a reliable and valid IAT, and to explore the explicit and implicit relationship. These aims were addressed by employing explicit LOT-R and implicit IAT and VPT to investigate the relationships. The findings suggested that there was no relationship found between implicit and explicit measures. The lack of relationship could be explained by the additive model, and, therefore, implicit and explicit measures may be two separate constructs. Additionally, implicit optimism and pessimism were found to be two-dimensional and separate constructs. Furthermore, the implicit measures may be measuring emotion



and/or state optimism. The IAT found promising results for reliability and validity (due to the significant findings of the Known-Group validity); this was further explored in study 2 (chapter 4).

# Chapter 4: Exploratory Factor Analysis (EFA) – Exploring the constructs of the optimism

The study in this chapter builds on the findings in chapter 3 and aims to examine the factor structure of optimism, using an optimism IAT and explicit questionnaires. Chapter 3 found no relationship between implicit and explicit measures; to investigate this further an EFA in this chapter was used to explore the constructs of implicit and explicit optimism. The EFA used explanatory style optimism (AQS), dispositional optimism (LOT-R and SOP2) and implicit (IAT) measures to additional insight into the constructs of optimism.

## 4.1 Introduction

Many researchers have disagreed about what optimism is and what the constructs of optimism are. Can optimism be fully explained by explanatory style optimism theory or dispositional optimism theory? Is optimism one dimensional, two dimensional or three dimensional? Are implicit and explicit optimism measuring similar constructs? Within this chapter, the relationship between these arguments was explored and test if the implicit (IAT) fits within any optimism argument. For example, what dimension is implicit optimism, are implicit measures measured explained by explanatory style optimism theory or dispositional optimism theory. It is important to determine what the optimism IAT developed in the previous chapter is measuring and whether any of the present dimensional constructs or theories associated with this implicit measure (IAT). An EFA was used to investigate the items of the questionnaires and implicit items, to remove any items that do not significantly contribute to any factor and to remove items in the explicit questionnaires that are redundant, i.e. measuring the same thing. The rationale for this is to investigate what the constructs of the IAT and optimism are. Therefore, there is a need to complete an EFA to investigate which optimism construct would be optimal for further investigating optimism. The construct of optimism and the IAT's convergent validity were explored with these measures: IAT, LOT-R, ASQ and SOP2.

## 4.2 Arguments and constructs of optimism

### 4.2.1 Optimism main theories

The precise nature of optimism has been the subject of argument. As outlined in chapter 1, there are two main theories of optimism; dispositional optimism and explanatory style optimism. Dispositional optimism is the optimistic belief that good things will happen; this belief and expectations are generally found in all elements of life (Carver et al., 2010). The explanatory style optimism approach suggests that individuals react to their optimistic or pessimistic tendencies in daily life to explain the events that are happening to them; how they describe themselves or their situation in terms of optimism or pessimism is their explanatory style (Forgeard & Seligman, 2012).

However, several discrepancies have been found within the literature in regard to dispositional optimism and explanatory style optimism. For example, Carver and Gaines (1987) found that low dispositional optimism was a predictor of postpartum depression, whereas Manly, McMahon, Bradley, and Davidson (1982) found that explanatory style optimism was not related. Hirsch, Wolford, LaLonde, Brunk, and Morris (2007) found a positive relationship between explanatory style optimism, and hopelessness and suicidal ideation. However, within the same study, neither was related to dispositional optimism. Hjelle, Belongia, and Nesser (1996) and Hjelle, Busch, and Warren (1996) found that the explanatory style and dispositional optimism only weakly to moderately correlated. Scheier and Carver (1993) argued that dispositional optimism and explanatory style optimism are linked conceptually. As a result, many studies have questioned the relationship between dispositional optimism and explanatory style optimism (Chang, 2001). Furthermore, there is an assumption that the link between dispositional optimism and explanatory style optimism is that they both focus on the expectations that individuals have about optimistic or pessimistic consequences (Scheier and Carver, 1992).

Even though previous research suggests discrepancies between the theories, dispositional optimism and explanatory style optimism have been linked together in the literature for a long time. In contrast to previous research, Richards & Keller (2006a) found a significant correlation between explanatory style and dispositional measurements of optimism. Other research has found similar findings in research

relating to depression and well-being (Carver et al., 2010; Forgeard & Seligman, 2012). To further support the link between explanatory style optimism and expectation, a study with 114 college students, were asked to write down their expectations for their results on an exam and then after the exam fill in an explanatory style questionnaire. The study concluded that the students that expected to do badly on the exams showed significantly lower scores. This also correlated with the scores on the explanatory style questionnaire that showed lower scores related to pessimism on the questionnaire (Metalsky, 1993). Therefore, this suggests that dispositional optimism and explanatory style optimism were theoretically measuring the same thing.

Dispositional optimism and explanatory style optimism are linked theoretically through the measuring of optimism and suggested that both have the assumption of expectations. However, there has been some inconsistency within the literature and this chapter further explored the relationship between them. The dispositional optimism (LOT-R and SOP2) and explanation style optimism (ASQ) was used in this thesis to further investigate any relationships. Moreover, the measurements (LOT-R and ASQ) of the two theories have found in previous research to have low to modest association between the negative aspects of the ASQ and LOT-R (Ahrens & Haaga, 1993; Gillham, Shatté, Reivich, & Seligman, 2001). Therefore, within this chapter, the two theories and the relationship between them was investigated. Additionally, EFA was used to determine if the IAT and explicit dispositional optimism or explanatory style optimism measures are factored together or are similar constructs. In summary, previous research has suggested that dispositional optimism and explanatory style optimism are only linked conceptually. The link between dispositional optimism and explanatory style optimism is suggested to be that they are both interested in positive and/or negative expectations about the future (Garber, 2000). It was therefore anticipated that implicit and explicit measures would have different factors and constructs within the EFA.

#### 4.2.2 Optimism dimensions

In addition to debates about dispositional optimism and explanatory style optimism, there is, as previously outlined in chapter 2, an argument as to whether optimism is one dimensional (Unidimensional), two dimensional (Bidimensional), or three

dimensional. The unidimensional approach suggests that optimism and pessimism are at the opposite ends of a single scale. The bidimensional suggests that optimism and pessimism are two dimensional, and are two separate concepts. Consequently, optimism is separate from pessimism, suggesting that an individual can be optimistic and pessimistic at the same time; they are independent dimensions. The three-dimensional argument is described within explanatory style (attribution style) optimism; internal/external, stable/unstable and global/specific. Internal/external denotes to whether an individual believes that they have control or power over events. The stable/unstable dimension characterises whether a person believes a repeated event will be the same or can be changed. The Global/Specific dimension denotes to whether a person's explanation generalises the event to others beyond the exact event happening (Seligman, 2001). Researchers have suggested that the dominant opinion is that optimism and pessimism is two dimensional (Sierra et al., 2013). However, many researchers have argued about the dimensions of optimism, and this brings into question which constructs, would be best to investigate an individual's implicit and explicit optimism. Therefore, within this chapter an EFA was examined implicit and explicit optimism and to investigate the arguments that surround optimism; this helped to provide a better understanding of dispositional optimism, explanatory style optimism and the optimism dimensions. Additionally, the relationship between implicit and explicit optimism, and the extent to which they support optimism arguments were evaluated.

#### 4.3 Exploratory Factor Analysis (EFA)

EFA chapter was used in this chapter to explore the optimism and the optimism IAT to investigate what constructs it may be measuring. Therefore, using the optimism IAT and explicit self-report questionnaires to measure the possible different constructs of optimism. As there are a few arguments to the constructs of optimism and what is being measured implicitly and explicitly, the EFA was used. The EFA is a useful tool for refining measures, testing hypotheses, checking uni-dimensionality, and evaluating construct validity (CONWAY & HUFFCUTT, 2003). The EFA has no expectations of the number of factors and is used for exploring the data or dimensions; a confirmatory factor analysis (CFA) was not used as a new theory or scale was not being proposed (Thompson, 2004). As there is limited research around implicit and explicit optimism an EFA would be appropriate to explore the

different constructs. The EFA and reliability analysis was conducted using SPSS version 25 software. The EFA explored the optimism IAT and the explicit questionnaires; this was to investigate the different arguments around optimism

#### 4.4 Research Aims and Hypotheses

The aim of this chapter is to conduct an EFA on the implicit and explicit measures to investigate the constructs of optimism using a different sample of participants than chapter 3. The purpose of the present study is to investigate three questionnaire measures of optimism and an IAT.

The objectives for this thesis were met by these aims of this chapter:

1. To investigate the elements of optimism; dimensions and theories.
2. To investigate the factor structure of optimism
3. To investigate the relationship between implicit and explicit measures of optimism.

Based on previous research the hypothesis predicted: 1) A significant relationship between implicit and explicit optimism measures. 2) The optimism IAT would be valid and reliable.

#### 4.5 Methods

##### 4.5.1 Data collection online and laboratory

Data collection was undertaken both online and within a laboratory setting in this study; there were a number of benefits associated with this dual approach. As a recruitment strategy, online data collection is a way of reaching a wide range of participants. Indeed, online methods can take advantage of far-reaching social media platforms, such as Facebook and Twitter. The online method also offers a low-cost way of accessing participants (Andersson & Titov, 2014). From a participant's perspective, online engagement offers greater anonymity and can minimise the participant's feeling of threat or discomfort face to face with the researcher (Coutts & Jann, 2011). Another benefit of the online method is in terms of the quality of the data. Traditionally, university studies have relied upon psychology students to participate in psychology studies, which results in a skewing of the data, as outlined in chapter 3. Conversely, online recruitment can help to obtain a more

representative sample of the general population (Chen, Schonger, & Wickens, 2016).

In spite of the benefits, there are, however, a number of downsides to an online approach. Firstly, open access does not automatically guarantee a large number of participants; people may not see the call for participants, or they may see the call but not be attracted to participate. A more significant challenge concerns the lack of control. The researcher cannot guarantee the undivided attention of the participant during the task; the participant may be distracted by multi-tasking, for example, impacting the validity of the scores (Couper et al., 2001). Furthermore, as the researcher is not present, the instructions may not be fully understood or even read through, creating more room for errors (Kayrouz et al., 2016; Ramsey, Thompson, McKenzie, & Rosenbaum, 2016). When working with participant reaction times, the speed of the computer processor cannot be controlled; online respondents who are accessing tests remotely, are likely to be using different computer hardware and software, with varying processing powers. Different web browsers may also have different processing times, which further leads to uncertain reaction times. Furthermore, monitors have various refresh rates and keyboards have different sampling rates (Morgan, Andover, Barclay, & Gaudet, 2003).

In contrast to online methods, laboratory studies are able to be more controlled. As outlined in chapter 3, previous research suggests that the implicit VPT is best undertaken on the same computer and without internet for every participant in order to control reaction times. Despite this, elsewhere in the literature, research has demonstrated that reaction time differences between laboratory and online studies are only trivial. Wiers and Stacy (2005) compared the IAT scores in a laboratory and online on Inquisit software and found no difference in the results. The study was replicated by Nosek, Banaji and Greenwald (2002) investigating attitudes and stereotypes. The findings suggested again that the data collected online and in the laboratory did not differ significantly.

Whilst the IAT appears to deliver consistent findings online and in the laboratory, the same cannot be said for the Attributional Style Questionnaire (ASQ). There is evidence that the ASQ is difficult to complete without a researcher present (Dykema

et al, 1996), due to problems with participants ability to understand the questionnaire. Therefore, to overcome any such problems, ASQ data in this study was collected in the laboratory setting, with the author/researcher present. Furthermore, the permission obtained to use the ASQ stated that the questionnaire had to be conducted in paper format (See appendix 27) (Seligman, 2002).

Balancing the pros and cons of online and laboratory settings, and the paper-based administration requirements of the ASQ, this study employed both methods to collect the data.

In total, 85 university student participants completed the tasks online and, 15 chose to participate in the laboratory setting. The LOT-R, SOP2 and IAT scores were investigated for any differences between online and laboratory participants within this chapter.

#### 4.5.2 Design

As described above, the study collected data via two different methods, a Qualtrics online survey and a laboratory-based study. All participants were required to complete a paper-based ASQ (see above and see appendix 3); therefore all participants collected the consent form, information sheets and ASQ in person from the researcher. Then participants either completed the LOT-R, SOP2 and IAT in the laboratory or in their own time/place. A correlational design was used to examine the constructs of implicit and explicit optimism. Relationships between optimism and pessimism were explored. The EFA examined the relationships between the measures; therefore, the dependent variables are the LOT-R, IAT, SOP2 and ASQ scores.

#### 4.5.3 Participants

A total of 100 participants were recruited for the study, by opportunity sampling. Furthermore, Worthington and Whittaker (2006) suggested that 100 participants is an adequate sample size for a EFA. Participants were psychology students from the University of Derby, recruited through lectures, posters, the university online student resource 'Blackboard' and emails (Appendix 17). Participants were given eight psychology participant points as an incentive for taking part. The inclusion



criteria were that the participants needed to be over 18 years old; the age of participants ranged from 18 to 62 (70 females; 29 males; 1 preferred not to say) ( $M=32.38$ ,  $SD=11.11$ ).

#### 4.5.4 Materials

The materials required for this study were; explicit Lot-R (see chapter 2, section 2.2.1) (see appendix 1 for a copy of the LOT-R), IAT (see chapter 2, section 2.4.1) (see appendix 19 for a copy of the IAT), SOP2 (see chapter 2, section 2.2.1) (see appendix 2 for a copy of the SOP2), and ASQ (see chapter 2, section 2.2.1) (see appendix 27 for a copy and permission of the ASQ). The LOT-R and SOP2 were administered online using Qualtrics software and linked to Inquisit to complete the IAT; the ASQ was printed.

#### 4.5.5 Procedure

After the participants were recruited, they were given a time slot to meet the researcher in one of the University of Derby laboratories. The participants could choose to complete the tests in the laboratory or to take the resources away and complete the online tests in their own time, returning the paper based ASQ later. This allowed greater flexibility for the participants. The procedure for the study began with the participants being given an information sheet and consent form (Appendix 17).

The Qualtrics software automatically randomised the sequencing of the LOT-R, IAT, and SOP2 tasks. Given the ASQ was administered via paper, for the laboratory participants, randomisation was achieved by giving participants the task to do either before or after the computerised tasks. For participants who chose to complete the tasks in their own time and place, randomisation of the ASQ could not be guaranteed.

The study was conducted with two separate procedures:

Procedure 1: the participants who chose to complete the tasks online, met the researcher in person and were given paper versions of the consent form and the ASQ, SOP2 and LOT-R. They were also given an online link to the IAT to complete

in their own time and location. The participants were asked to return to the laboratory to hand in their completed paper based ASQ.

Procedure 2: The participants who chose to complete the tasks in person, were given a time slot to come to the laboratory. They were given paper versions of the consent form, the ASQ, the LOT-R and the SOP2. The IAT was administered via the laboratory computer.

After completing the study, the participants were given a written debrief (appendix 20).

#### 4.5.6 Analytic strategy

The present study investigated the aim of the chapter by exploring the current arguments surrounding optimism (e.g. dispositional, explanatory, dimensional, implicit and explicit). A factor analysis was used to explore the factors of the explicit questionnaires and implicit measure and to further explore the understanding of dispositional optimism, explanatory style optimism, optimism dimensions.

Exploratory Factor Analysis (EFA) aids in identifying factor structure (Kubzansky, 2004), and was used to explore the constructs and dimensions of the implicit (IAT) and explicit (LOT-R, SOP2 and ASQ) measures. Within the EFA the Principal Axis Factoring (PAF) was used as the main factoring method; it is generally accepted that this is one of the main methods used in factor analysis (Worthington & Whittaker, 2006). The EFA has been criticised for being subjective as the results can be determined by the researcher (Thompson, 2004). To overcome this criticism, Tabachnick, Fidell & Osterlind (2001) suggested that the number of factors should be based on pragmatics and analysts should apply sound judgment rather than relying on theory. It was therefore concluded that for the present study, the factor analytic approach would allow implicit and explicit optimism to be explored and reduce the bias towards the other arguments within optimism, such as social desirability.

## 4.6 Results

### 4.7 Data preparation

An EFA was conducted on IAT, LOT-R, SOP2 and ASQ. This resulted in 100 participants completing the study. The data from the IAT showed 298 outliers throughout the data; therefore, the data was winsorsied to replace the data below 300ms and above 3000ms (Greenwald, 200; Prince et al., 2015).

### 4.8 Exploratory Factor Analysis (EFA)

#### 4.8.1 LOT-R Preliminary analysis

For the purpose of this study into optimism and pessimism LOT-R analysis a Pearson's correlation to examine the relationship between optimism and pessimism. These results were examined and compared to study 1 (Chapter 3).

The optimism and pessimism scores are shown in table 4.1. The LOT-R Internal Consistency Cronbach alpha was  $\alpha = 0.75$ . As previously mentioned in chapters 2 and 3 studies showed similar Cronbach alpha  $\alpha = 0.68$  (Glaesmer et al., 2012b) and  $\alpha = 0.78$  (Carver & Scheier, Segerstrom, 2010). Therefore, this study used the overall optimism and pessimism total score results for the correlation.

The normality of the mean data was examined by eyeballing boxplots and histograms, skewness and kurtosis were examined, and lastly the z scores. The histograms and boxplots showed generally normal distribution, but the data didn't show some outliers. The Z scores were examined and found all the scores lay inside the  $\pm 1.96$  criterion for a small sample, i.e., less than 100 (Field, 2014) (see table 4.2). Therefore, the data was normally distributed and a parametric Pearson's bivariate correlation was used to examine the LOT-R scores.

Table 4.1: Total LOT-R scores

Optimism	Pessimism
8.4	9.02

Table 4.2: Skewness, Kurtosis, ZSkewness (Z score), and ZKurtosis (Z score) of the optimism and pessimism LOT-R scores

Optimism			Pessimism				
Skew	Kurt	Zskew	Zkurtosis	Skew	Kurt	Zskew	Zkurtosis
-0.06	-0.324	-0.257	-0.678	-0.14	-0.38	-0.341	-0.791

To examine the optimism and pessimism mean scores relationship between time one and time two a bivariate Pearson’s correlation was used. There was a strong positive significant relationship between optimism and pessimism ( $r= 0.60$ ,  $p< 0.001$ ). Therefore, indicating a strong association and very good reliability for the LOT-R mean optimism and pessimism (Field, 2014).

#### 4.8.2 SOP2 Preliminary analysis

For the purpose of this study into optimism and pessimism

The SOP2 Internal Consistency Cronbach alpha was  $\alpha= 0.63$ , showing that the SOP2 had medium reliability. The mean scores are shown in table 3.1 and the overall mean scores for optimism and pessimism are shown in table 4.3.

Table 4.3: Mean SOP2 (with Standard Deviations in parentheses) scores

<b>OPTIMISM</b>	<b>PESSIMISM</b>
4.47 (1.49)	3.37 (1.46)

The normality of the mean data was examined by eyeballing boxplots and histograms, skewness and kurtosis were examined, and lastly the z scores. The histograms and boxplots showed generally normal distribution, but the data didn’t show some outliers. The Z scores were examined and found all the scores lay inside the  $\pm 1.96$  criterion for a small sample size, i.e less than 100 (Field, 2014) (see table 4.4). Therefore, the data was normally distributed, and a parametric Pearson’s bivariate correlation was used to examine the SOP2 scores.

Table 4.4: Skewness, Kurtosis, ZSkewness (Z score), and ZKurtosis (Z score) of the optimism and pessimism SOP2 scores

<b>Optimism</b>				<b>Pessimism</b>			
<b>Skew</b>	<b>Kurt</b>	<b>Zskew</b>	<b>Zkurtosis</b>	<b>Skew</b>	<b>Kurt</b>	<b>Zskew</b>	<b>Zkurtosis</b>
-0.93	-0.57	-3.86	-1.19	0.32	-0.83	1.34	-1.73

To examine the optimism and pessimism mean scores relationship a bivariate non-parametric Spearman’s rho correlation was used. There was a large positive significant relationship between pessimism time one and pessimism time two ( $r= - 0.76$ ,  $p< 0.001$ ). Therefore, this indicated a strong association for the optimism and

pessimism mean optimism and pessimism scores. 2 (Field, 2014). The results show reliability for the test-retest in the SOP2 task for was overall good. Therefore, this indicated that there a good internal consistency for the optimism and pessimism LOT-R.

#### 4.8.3 ASQ Preliminary analysis

For the purpose of this study into optimism and pessimism ASQ analysis a Pearson’s correlation to examine the relationship between time one and time two.

The ASQ Internal Consistency Cronbach alpha was  $\alpha= 0.379$ . The mean scores are shown in table 4.5.

*Table 4.5: Mean scores for overall optimism and pessimism*

Optimism			Pessimism		
Internal Positive	Stable Positive	Stable Positive	Internal Negative	Stable Negative	Global Negative
4.66	4.97	4.63	4.39	4.41	4.13

The normality of the mean data was examined by eyeballing boxplots and histograms, skewness and kurtosis were examined, and lastly the z scores. The histograms and boxplots showed generally normal distribution, but the data didn’t show some outliers. The Z scores were examined and found all the scores lay inside the +/- 1.96 criterion for a small sample, i.e., less than 100, apart from ‘Stable Negative’ that lay outside Zskew =-1.721 and Zkurtosis =2.472 (Field, 2014) (see table 4.6). The data was not normally distributed and, therefore, a non-parametric Spearman’s bivariate correlation was used to examine the ASQ scores.

Table 4.6: Skewness, Kurtosis, ZSkewness (Z score), and ZKurtosis (Z score) of the optimism time and pessimism time ASQ scores

<b>Optimism</b>											
Internal Positive				Stable Positive				Globe Positive			
Skew	Kurt	Zskew	Zkurtosis	Skew	Kurt	Zskew	Zkurtosis	Skew	Kurt	Zskew	Zkurtosis
0.203	0.381	0.842	0.797	0.150	-0.478	0.622	-0.320	-0.245	-0.153	-1.016	-0.320

<b>Pessimism</b>											
Internal Negative				Stable Negative				Globe Negative			
Skew	Kurt	Zskew	Zkurtosis	Skew	Kurt	Zskew	Zkurtosis	Skew	Kurt	Zskew	Zkurtosis
0.086	-0.115	0.356	-0.240	-0.415	1.182	-1.721	2.472	-0.229	0.303	-0.950	0.633

To examine the ASQ relationship between optimism and pessimism bivariate Spearman's correlations were used (Seligman, 2011). There was a medium positive significant relationship between optimism internal and optimism stable ( $r= 0.321$ ,  $p= 0.001$ ), optimism internal and optimism global ( $r= -0.514$ ,  $p< 0.001$ ), optimism stable and global ( $r= -0.339$ ,  $p= 0.001$ ), optimism global and pessimism global ( $r= 0.227$ ,  $p= 0.023$ ), pessimism internal and stable ( $r= 0.259$ ,  $p= 0.019$ ), pessimism global and stable ( $r= 0.457$ ,  $p< 0.001$ ). There was a medium negative significant relationship between optimism stable and pessimism internal ( $r= -0.216$ ,  $p= 0.031$ ) and optimism stable and global ( $r= -0.339$ ,  $p= 0.001$ ) A negative non-significant relationship between optimism internal and pessimism internal ( $r= -0.119$ ,  $p= 0.239$ ), optimism internal and pessimism global ( $r= -0.190$ ,  $p= 0.058$ ), optimism global and pessimism internal ( $r= -0.174$ ,  $p= 0.084$ ), optimism internal and pessimism internal ( $r= -0.141$ ,  $p= 0.163$ ), optimism stable and pessimism stable ( $r= 0.163$ ,  $p= 0.104$ ). Therefore, this indicated a medium significant relationship between the three dimensions of optimism and three dimensions of pessimism. However, there was a non-significant relationship between optimism and pessimism.

#### 4.8.4 IAT Preliminary analysis

For the purpose of this study into optimism and pessimism IAT analysis, a t-test followed by a paired test was conducted. Then a Spearman's correlation to examine the relationship between time one and time two.

Once the data was screened and 298 of incorrect responses were deleted. The trials with reaction times shorter than 300ms and longer than 3000ms were removed (Greenwald et al, 2009). Description data for each IAT is presented in table 4.7, which used the scoring recommendation from Greenwald (2000) for descriptive data.

##### 4.8.4.1 IAT D scores

Based upon the recommendation for analysing IAT provided by Greenwald, Nosek and Banaji (2003) the D scores were used. A t-test was used to examine any differences between optimism and pessimism scores. The normality of the data was examined by eyeballing boxplots and histograms, skewness and kurtosis were examined, and lastly the z scores. The histograms and boxplots showed generally normal distribution, but the data did show some outliers. These outliers were identified in 'Pessimism' D scores (53,20,60). However, when the Z scores were

examined only one of the scores (Optimism, Zskew = 0.88) lay inside the +/- 1.96 criterion for a small sample size (Field, 2014) (see table 4.8). Therefore, the data was not normally distributed and a non-parametric Spearman's bivariate correlation was used to examine the relationship between the time one and time two IAT D measurements. Cronbach's Alpha showed good internal consistency ( $\alpha = 0.98$ ).

Table 4.7: Mean IAT D scores (with Standard Deviations in parentheses) as measures of optimism

Optimism mean D scores	Pessimism mean D scores
-0.21 (0.19)	0.75 (0.23)

Table 4.8: Showing Skewness and Kurtosis (Divided By SE) for IAT

Pessimism				Optimism			
Skew	Kurt	Zskew	Zkurtosis	Skew	Kurt	Zskew	Zkurtosis
-1.33	2.30	-5.51	4.82	0.21	-1.95	0.88	-4.08

To confirm that the D scores are significantly different from zero, Greenwald (2000) suggested a paired t-test for optimism and pessimism. The results showed a significant difference for optimism and pessimism  $t(99) = -5.688, p < 0.001$ . Indicating a significant difference between the optimism and pessimism D scores.

To examine the D scores relationship between optimism and pessimism a bivariate Spearman's correlation was used (Greenwald, 2003). There was a medium negative significant relationship between optimism time one and pessimism time one ( $r = -0.340, p = 0.001$ ), Therefore, this indicated a medium association between the optimism and pessimism D measurements scores (Field, 2014).

#### 4.8.5 Differences between online and laboratory data collection

Paired sample t-tests were conducted to investigate any differences between the online and laboratory participants in the LOT-R, SOP2 and IAT D scores. The results showed a significant difference between the LOT-R online and LOT-R laboratory optimism  $t(14) = -2.235, p = 0.042$ , with a medium effect size Cohen's  $d = 0.470$ . The results showed no significant difference between the LOT-R online and LOT-R laboratory pessimism  $t(14) = -0.494, p = 0.629$ , with a medium effect size Cohen's  $d =$



0.510. The results showed no significant difference between the SOP2 online and SOP2 laboratory optimism  $t(14) = -1.042$ ,  $p = 0.315$ , with a very large effect size Cohen's  $d = 1.947$ . The results showed a significant difference between the SOP2 online and SOP2 laboratory pessimism  $t(14) = 5.797$ ,  $p < 0.001$ , with a medium effect size Cohen's  $d = 0.404$ . The results showed no significant difference between the IAT online and IAT laboratory optimism  $t(14) = -0.835$ ,  $p = 0.418$ , with a medium effect size Cohen's  $d = 0.332$ . The results showed no significant difference between the IAT online and IAT laboratory pessimism  $t(14) = 0.600$ ,  $p = 0.558$ , with a small effect size Cohen's  $d = 0.201$ . Indicating a significant difference between the optimism LOT-R online and laboratory scores. Furthermore, a significant difference between the pessimism SOP2 online and laboratory scores. Therefore, this indicated a medium difference between online and laboratory scores for the optimism LOT-R and pessimism SOP2 questionnaires.

#### 4.8.6 Descriptive statistics

#### 4.8.7 EFA

An EFA was conducted on the constructs of the optimism IAT. The EFA used all the trials to examine if any of the factors are similar constructs to explicit measures of optimism. The explicit measures are explanatory attribution style (Seligman, 2005), optimism and pessimism scale and dispositional LOT-R questionnaire. Using the analysis method to help to explore the hypothesis that the implicit measure is measuring different constructs of optimism, dispositional, explanatory or state or trait optimism.

##### 4.8.7.1 Data normality

An EFA was conducted on 80 items (trials) in the IAT (using the D scores) (Blocks 4 and 7), ASQ, SOP2 and LOT-R. The data was examined for the factorability normality of the correlation matrix. The sample size was classed as good according to Field (2014). The Kaiser-Meyer-Olkin measure showed a good sampling adequacy ( $KMO = 0.75$ ) (Field, 2013; Hutcheson & Sofroniou, 1999). Bartlett's Test of Sphericity was significant ( $X^2(4005) = 46917.90$ ,  $p < 0.001$ ) thus suggesting that the correlations in the matrix are factorable as it was significantly different from zero. Therefore, an EFA can be used to investigate the IAT, ASQ, SOP2 and LOT-R, a direct oblimin rotation method was used.

As none of the items was less than  $r < 0.2$  in the Item-Total Correlation, none of the trials were considered for removal (Velicer & Fava, 1998). The analysis showed the lowest value was  $r = 0.65$ , shown in figure 4.1. The IAT needs the optimism/self and pessimism/self to be individually highly correlated as the IAT is measuring reaction times to different categories; therefore, anything greater than 0.8 was not considered as repetition and would not be deleted (Rockwell, 1975). The analysis showed the highest value was  $r = 1.00$ . Some of the items had perfect multicollinearity; however, as the highest values were the IAT they did not need removing, as the IAT is measuring association.

The EFA showed based on Principal Axis Factoring (PAF) Kaiser's criterion Eigenvalues  $> 1$  and eyeballing the scree plot, a five-factor solution was revealed. The pattern matrix rotation suggested that all of the items were cross-loaded onto five of the factors, all of the factors had higher loadings than  $< 0.4$  (Velicer & Fava, 1998), and therefore, none of the items were removed. Kaiser's criterion for Eigenvalues presented a five-factor solution shown in figure 4.1 mapping factors and figure 4.2 Scree Plot.

The five factors are interpreted as the following:

Factor one – 'Pessimism/Self and Optimism/Other';

Factor two – 'Optimism/Self and Pessimism/Other'.

Factor three – 'LOT-R and SOP2'

Factor four – 'ASQ Optimism – Internal, Stable, Global'

Factor five – 'ASQ Pessimism – Internal, Stable, Global'

Factor one	Factor	Factor three – 'LOT-	Factor	Factor five
'Pessimism/Self and Optimism/Other' IAT	two – 'Optimism/Self and Pessimism/Other' IAT	R and SOP2'	four – 'ASQ Optimism – Internal, Stable, Global'	– 'ASQ Pessimism – Internal, Stable, Global'

0.992	0.738	0.842	0.633 (I)	0.481 (I)
1.000	0.807	0.748	0.658 (S)	0.843 (S)
0.999	0.872	-0.815 (SOP2)	0.810 (G)	0.761 (G)
0.999	0.896	0.805 (SOP2)		
1.000	0.927			
1.000	0.945			
1.000	0.960			
1.000	0.962			
1.000	0.972			
0.999	0.973			
0.999	0.980			
0.999	0.983			
0.999	0.984			
0.999	0.983			
0.999	0.985			
0.998	0.985			
0.998	0.988			
0.999	0.991			
1.000	0.994			
1.000	0.996			
1.000	1.000			
1.000	1.000			
1.000	1.002			
1.000	0.999			
1.000	0.999			
1.000	0.998			
1.000	1.000			
1.000	1.000			
1.000	1.002			
1.000	1.001			
1.000	1.001			
1.000	1.001			
1.000	1.001			
1.000	1.001			
1.000	1.001			
1.000	1.002			
1.000	1.002			
1.000	1.002			
1.000	1.003			
0.986	1.004			

Figure 4-1: Mapping the IAT, SOP2, ASQ and IAT factors: Rotated Component Matrix

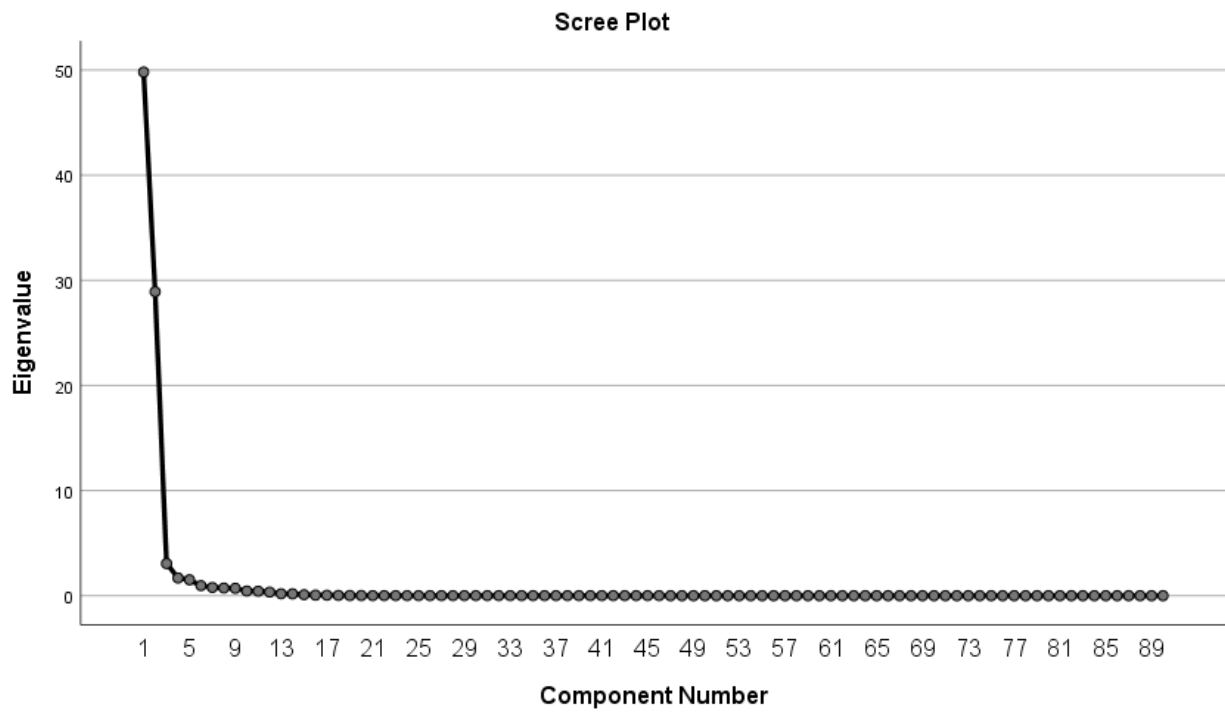


Figure 4-2: Scree plot showing Eigenvalues and Factor Number

## 4.9 Discussion and conclusion

### 4.9.1 Summary of results

This chapter explored the findings of the LOT-R, SOP2, ASQ and IAT and presents the individual reliabilities. Individually the measures are considered mostly reliable and mostly show a good internal relationship. To explore the aim of this study an EFA was conducted to investigate the constructs of optimism and furthermore if any factors or constructs relate to the implicit method (IAT). The findings suggest that for the most part optimism and pessimism could be two dimensional and separate constructs. Furthermore, explanatory, dispositional and implicit (IAT) factors have been found to be different constructs as they were identified as separate factors. Therefore, the hypothesis that there would be a significant relationship between implicit and explicit optimism measures has not been accepted, as the relationship between the implicit and explicit measures showed very weak to none-significant results. Furthermore, the hypothesis that the optimism IAT was valid and reliable, has been accepted. The IAT showed promising results for validity and reliability; the EFA evaluated the construct for the validity of the IAT individual trials which provides further support for the optimism IAT validity (Conway & Huffcut, 2003) and a good internal consistency for the IAT. Additionally, the EFA suggest the IAT was a two-dimensional separate construct. The EFA investigated the IAT for different construct and found two different constructs for optimism and pessimism. Therefore, this suggests that the IAT has concurrent validity, as there were relationships found for the optimism trials and relationships found for the pessimism trials.

### 4.9.2 LOT-R Results

The findings for the LOT-R showed a good internal consistency and these finding support previous findings and the findings in chapter 3 (Glaesmer, Rief, Martin and Mewes, 2012; Carver & Scheier, Segerstrom, 2010; Gustems-Carnicer, 2017). The LOT-R results indicated a strong relationship between optimism and pessimism, and these findings were supported in Study 1 and explained by the Metacognitive theory (Wells, 2000). As previously discussed in chapter 3, it could be that individuals are optimistic and pessimistic at the same time (Herzberg et al., 2006). The LOT-R has continued to provide reliable results for optimism. The LOT-R has

shown to be a reliable measure throughout previous research and in this thesis, therefore, the final study used the LOT-R within the positive psychology interventions.

#### 4.9.3 SOP2 Results

The findings for the SOP2 showed good internal consistency and a negative significant relationship between optimism and pessimism, suggesting in these results that optimism and pessimism are opposite constructs and could be considered as one-dimensional. These findings are supported by previous research; Kemper (2013) found a large negative relationship at  $r = -0.86$  between optimism and pessimism. However, previous researchers have suggested that caution must be taken when using short scales, they have been criticised for potential psychometric problems associated with reliability and validity (Heene et al., 2014; Krueger et al., 2013; Rammstedt & Beierlein, 2014).

#### 4.9.4 ASQ Results

The findings for the ASQ showed a weak internal consistency and questionable reliability. These results were lower than previous research, such as Hankin and Abramson, (2002) and Lackner (2015) who found very good internal consistency for the ASQ. This may be due to some of the participants taking the questionnaire way to fill in on their own, and researchers have previously mentioned that the ASQ can be hard to fill in without guidance (Dykema et al., 1996). The optimism internal, stable, and global showed medium positive and negative significant relationships. The pessimism internal, stable and global showed a weak to medium positive and negative significant relationships. This indicated that the relationship between the optimism and pessimism three dimensions were not strongly related. Furthermore, only optimism global and pessimism global showed a weak positive significant relationship. The internal and stable optimism and pessimism indicated no correlation between the results. These findings support Hewitt et al. (2004) study, suggesting that optimism internality/externality, stability/instability, and globality/locality are correlated, and pessimism internality/externality, stability/instability, and globality/locality are correlated. Further research found a low correlation between optimism and pessimism, suggesting that they could be separate constructs (Bunce & Peterson, 1997).

These findings may be explained to some extent by the data collection method used in this study, as the majority of participants took the tests away to complete; this introduces a lack of control. The data collection method also for the ASQ is specifically problematic; researchers have suggested that the questionnaire can be a little difficult to complete without researcher support (Dykema, Bergbower, Doctora, & Peterson, 1996). However, taking the ASQ away to complete reduces another reported problem of social desirability from face to face administration (Nederhof, 1985).

#### 4.9.5 IAT Results

The presented findings of the IAT D scores showed good internal consistency; this supports the results in chapter 3, further suggesting that the IAT is a valid and reliable measure for implicit optimism. The optimism and pessimism scores were not statistically similar but did show a negative, medium correlation. The negative relationship, which was also found in study 1 suggests that optimism and pessimism are opposite constructs. Furthermore, the relationship between optimism and pessimism are distinct but related constructs (Kubzansky, Kubzansky, & Maselko, 2004).

#### 4.9.6 EFA Results

The EFA showed that none of the items from the LOT-R, IAT, ASQ or SOP2 needed to be removed, the correlations were all medium to strong (Field, 2014). The EFA used 80 IAT trials to examine the constructs of the optimism IAT and any cross loading factor with the other measures of optimism. The LOT-R had the two optimism and pessimism total scores, and the SOP2 had the optimism and pessimism mean scores.

Five factors were selected from the EFA, they were; Factor one – ‘Pessimism/Self and Optimism/Other’ IAT, Factor two ‘Optimism/Self and Pessimism/Other’ IAT, Factor three – ‘LOT-R and SOP2’, Factor four – ‘ASQ Optimism – ‘Internal, Stable, Global’, Factor five – ‘ASQ Pessimism – ‘Internal, Stable, Global’. (Shown in table 4.9). The breakdown of the IAT blocks for Pessimism/Self and Optimism/Other’ and ‘Optimism/Self and Pessimism/Other’ is shown in table 4.10.

Table 4.9: Showing how the factors map onto the IAT, ASQ and LOT-R

<b>Factors</b>	Factor one	Factor two	Factor three	Factor four	Factor five
<b>Measures</b>	IAT – Pessimism	IAT – Optimism	Dispositional optimism (LOT-R and SOP2)	ASQ Optimism	ASQ Pessimism
<b>Trials or scores</b>	Block 7 from the task (all for the trials in the block)	Block 4 from the task (all for the trials in the block)	All of the scores	All of the optimism scores	All of the pessimism scores
<b>Types</b>	Pessimism/Self and Optimism/Other' IAT	Optimism/Self and Pessimism/Other' IAT		Internal, Stable, Global all the optimism dimensions	Internal, Stable, Global all the pessimism dimensions



Table 4.10: Example of seven blocks for the optimism IAT and showing the factors

Block	No of trials	Function	Left Key (Order 1) Stimuli	Right Key (Order 1)	Trial category Wording
1	20	Practice (Removed from analysis)	Self-words	Other-words	Positive- self / Negative – other (words)
2	20	Practice (Removed from analysis)	Optimism images	Pessimism images	Positive / Negative words
3	40	Trial (Removed from the analysis)	Positive + self	Negative + other	Positive- self / Negative – other (words)
4	40	Trial	Positive + self	Negative + other	<b>Positive- self / Negative – other (words)</b> <b>All trials were in factor two</b>
5	20	Practice (Removed from analysis)	Other- Words	Self- words	Negative / Positive (words)
6	40	Trial (Removed from the analysis)	Negative + Self	Positive + Other	Negative- self / Positive – other (words)
7	40	Trial	Negative + self	Positive + other	<b>Negative - self / Positive – other (words)</b> <b>All trials were in factor one</b>

The five-factor solution has been examined individually below.

- Factor one – Pessimism/Self and Optimism/Other IAT

The first factor has 40 items from block 7 (Shown in table 3.10) in the IAT, and this is the pessimism and ‘self’ with optimism and ‘other’ category. The items showed a strong correlation to factor one, and each item had a strong to perfect multicollinearity. While Brown et al. (2015) suggest there needs to be a similarity between the items, they should not correlate above 0.90. However, these strong to perfect relationships are not a concern in this task as the implicit measure is based on reaction times and repeating similar tasks to find the mean and D scores. Furthermore, the EFA in study 1, with only the IAT, suggested that none of the items needed to be removed. This factor further suggests that pessimism is separate and two dimensional from optimism, this is supported by the results from the EFA in Study 1 and previous findings (Chang, 1994).

- Factor two - Optimism/Self and Pessimism/Other IAT

The second factor has 40 items from block 4 (Shown in table 3.10) in the IAT, and this is the optimism and ‘self’ with pessimism and ‘other’ category. The items showed a strong correlation to factor two, and each item had a strong to perfect multicollinearity. These strong to perfect relationships are not a concern in this task as the implicit measure is based on reaction times and repeating similar tasks to find the mean score. This further supports the results in Study 1 indicating that optimism is a separate construct from pessimism and is two dimensional. Jonge, Trijp, Renes (2007) stated that optimism and pessimism are conceptually distinct; this is in line with these findings.

Factor one and factor two indicate similar results to Study 1, suggesting that that optimism and pessimism are separate constructs for implicit measures. The suggestion that optimism and pessimism are separate constructs has been made by previous research, but further to this, these results may suggest that implicit optimism is two dimensional.

- Factor three – LOT-R and SOP2

The third factor had four items, which included the optimism and pessimism scores for the LOT-R and SOP2, both of these measures are both dispositional optimism (Kemper, Beierlein, Kovaleva, & Rammstedt, 2013; Scheier & Carver, 1992).

Previous studies have explored the relationship between LOT-R and SOP2 and found a good convergent correlation of  $r = 0.68$  (Kemper, Wassermann, Maria; Hoppe, Annekatrin; Beierlein, Constanze; Rammstedt, Beatrice, 2015). This supports that LOT-R and SOP2 are related, and this suggests that they are measuring the same thing. Furthermore, suggest that both LOT-R and SOP2 factor together within the dispositional optimism theory.

- Factor four – ASQ Optimism – Internal, Stable, and Global

The fourth factor had three items, and these were optimism internal, stable, and global ASQ. These factors were associated with a medium to a strong relationship to the optimism internal, stable, and global scores.

- Factor five – ASQ Pessimism – Internal, Stable, and Global

The fifth factor is the ASQ pessimism and the three dimensions were internal, stable and global. These factors were associated with a medium to strong relationship to the pessimism internal, stable, and global.

Factors four and five are in line with previous research that suggests that explanatory style optimism and pessimism are separate constructs (Corr and Gray, 1996; Bunce & Peterson, 1997). Peterson et al (1982) found positive and negative attributions were found to be uncorrelated ( $r = 0.02$ ), thus supporting these findings that explanatory optimism and pessimism are separate constructs. Furthermore, the preliminary results showed a weak, negative, non-significant relationship between optimism and pessimism internal, stable, and global dimensions, a further indication that optimism and pessimism are separate constructs.

#### 4.9.7 Overview of all the factors

All five factors were distinct and different, and each factor fitted with previously theories and the previous findings in Study 1. The five-factor solution fitted in with

previous research, factors one and two shows optimism and pessimism IAT. This suggests that implicit optimism and pessimism are two dimensional and are separate constructs, and supports the argument that optimism is more situation-specific and that a person is capable of being optimistic and pessimistic at the same time or over time (Chang, 1994; Zenger et al, 2013). For example, the participants may be feeling optimistic about the questionnaire one week and not so optimistic the week after. The two-dimensional argument is further supported by factors four and five as the explanatory style optimism ASQ found optimism and pessimism to be two dimensional. However, factor three found the dispositional optimism LOT-R and SOP2 optimism and pessimism to be within the same factor. This could suggest that factor three is one-dimensional and that dispositional optimism is a single dimensional construct (Scheier, 1994). Researchers have argued that two-dimensional optimism and pessimism constructs are caused by 'method bias' and are created by differences in the direction of item wording, rather than the meaning of the item content (Hjelle et al., 1996; Scheier & Carver, 1985). However, this argument may not be as relevant to the IAT as the items in the task are words and images, therefore suggesting that the two-dimensional findings could overcome the method bias. This further supports the stance of this thesis that optimism and pessimism are two dimensional. The five factors may be explained by each measure of optimism being only theoretically linked; they all may be measuring something slightly different.

The main theories of optimism, dispositional optimism and explanatory style optimism, have been suggested to be linked theoretically as they are both measuring optimism and are only conceptually similar (Scheier and Carver, 1993; Gillham, 2001). Both dispositional optimism and explanatory style optimism have the assumption optimism and pessimism is the expectations that are held for the future. The present findings suggest that the two theories may only be linked conceptually as dispositional optimism loaded onto factor three and explanatory style optimism loaded onto four and five. However, caution was undertaken when interpreting these results as the ASQ preliminary findings showed weak relationships between the scores. The factors indicate that dispositional optimism and explanatory style optimism may be conceptually linked; this brings into question the implicit (IAT) measures.

The finding suggests the IAT has separate factors from the dispositional optimism and explanatory style optimism. These findings further support findings from study 1; there was a limited relationship between implicit and explicit optimism. These findings further support that implicit and explicit measures could be distinct separate constructs (Wilson et al., 2000). The notion that implicit and explicit optimism are separate constructs fits with the previously mentioned additive model (see Chapter 3) where explicit optimism is at the top of the iceberg, as the conscious control, and implicit optimism, the unconscious, at the bottom (Karpinski and Hilton, 2001). This further supports the dual processing theory and suggests that people process information in two modes, the implicit and explicit (Hall & Lindzey 1978).

#### 4.9.8 Online and laboratory differences

The findings suggest that the optimism LOT-R and pessimism SOP2 scores were significantly different with a medium effect size for the online and laboratory data collection. Indicating that participants responded significantly different in the laboratory setting compared to the online version. However, there were no differences found between the IAT scores for the online and laboratory participants, these results echoed the findings of Wiers and Stacy (2005) who also found no differences between the different methods of collecting data for the IAT.

Nevertheless, these findings do need to be considered with caution as the sample size of 15 participants was very small. The small sample size was due to only 15 participants completing the study in the laboratory setting. Therefore, to increase the confidence of the findings, further investigation into any differences between the online and laboratory participants would need a larger sample size.

#### 4.9.9 Differences in findings study 1 and study 2

The findings for optimism IAT D scores in study 1 (chapter 3) and study 2 (chapter 4) indicated a slight difference. The optimism D score in this chapter was closer to zero and showed that the participants were slightly more optimistic. The differences in the D scores may be due to different participants, even though both samples were both university students. Nevertheless, the biggest difference between the two studies was that study 1 was completed in the laboratory setting, whereas this study (study 2) was mainly online. These differences may have made an impact on the different scores, as previously discussed. However, further research is needed to further

investigate if the mode of delivery (online or in the laboratory) made a difference to the IAT D scores.

#### 4.9.10 Limitations and suggestions for future research

The limitations in this study could be addressed in further research and this may help to further explore the optimism constructs. In this study the laboratory face to face data collection was very limited and increasing this to 50% of the participants could have allowed for an investigation into the differences into online and laboratory implicit research. This would have further allowed the investigation of differences into the level of social desirability could have been further explored and the difference having a researcher present makes to implicit or explicit findings. An additional limitation was the sample size; 100 participants is the recommended minimum for an EFA (Kline, 2014). However, Tabachnick and Fidell, (2001) suggested that 100 participant sample size was considered to be in the poor range for an EFA. An increase in the sample size may have further supported the findings in this study and found clearer factors for three, four and five. Furthermore, Barnhoorn, Haasnoot, Bocanegra and Van Steenbergen, (2015) suggested that for reaction time studies, such as using the IAT, that a larger sample size can help to reduce the non-systematic noise and should be less sensitive to small effects of reaction times. A further limitation to this study was that 70% of the participants were females; this was due to recruiting an opportunity sample. However, a more even split between the genders would ensure less gender bias within the studies (Holdcroft, 2007).

Nevertheless, the study's methodology was taken from a positivistic epistemology grounded in realist ontology which obtained results in an objective, value-free manner and with knowledge drawn from observations (Barker, Pistrang, & Elliott, 2002). The methodology has helped us to further understand the relationship between implicit and explicit optimism.

Future research could investigate if all implicit measures are found to be separate factors from explicit optimism and conducting further insight may be further investigate if optimism is opposite and a separate construct to pessimism. However, investigating in a real-world application (i.e., in the workplace) would determine further the validity and reliability of the IAT measure. Therefore, relate to real life;

however, a systematic review is the next chapter (6) a systematic review of the literature of positive psychology intervention and optimism. Overall, this chapter suggests that optimism and pessimism are two separate constructs, and an individual can be optimistic and pessimistic at the same time. Furthermore, dispositional optimism and explanatory style optimism, implicit and explicit optimism are all separate constructs and maybe measuring slightly different types of optimism. However, more research would be needed to explore this.

#### 4.9.11 Conclusion

In conclusion, an EFA was conducted to investigate the constructs of optimism and, implicit and explicit methods. The EFA was used to explore the constructs of LOT-R, SOP2, ASQ and IAT, and to further investigate if the IAT relates to dispositional optimism or explanatory style optimism. The findings suggest that there were five different factors; optimism IAT, pessimism IAT, LOT-R and SOP2, optimism ASQ and pessimism ASQ. These would suggest that dispositional optimism, explanatory style optimism and implicit measures are different constructs. Furthermore, the findings suggest the implicit optimism and explanatory style optimism are two dimensional, i.e., optimism and pessimism are two separate constructs.

# Chapter 5: Systematic review - Using positive psychology interventions in the workplace to increase optimism

## 5.1 Optimism in the workplace

Increasing optimism within the workplace has been linked to many different positive outcomes; increasing optimism for working individuals has the following benefits: decrease stress and less likelihood of burnout (Hayes & Weathington, 2007); better mood, coping and stronger immunity in response to stress (Segerstorm, 1998); increased problem solving (Chang, 1996); improved employee performance (Medlin & Green, 2009); higher acceptance of change (Wanbery, 2000); increase motivation (Mishra, Bhatnagar, & Gupta, 2013); and even, greater sales productivity (Mishra, Patnaik, & Mishra, 2016). Seligman (2012) described one of the benefits of positive psychology interventions (PPI) was increased optimism. Therefore, using PPIs to increase optimism in the workplace may lead to benefits for employees and employers.

## 5.2 Optimism and wellbeing

The World Health Organisation's (2014) definition of well-being is "*Mental health is defined as a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community*".

Frequently well-being is split into distinct two types; hedonic (subject well-being) and eudemonic (psychological well-being). Hedonic well-being's main focus is pleasure and happiness (Diener, Suh, Lucas, & Smith, 1999), and eudemonic well-being main focus is personal growth which has been a focus of positive psychology (Ryff, 1995; Seligman 1998; Seligman, 2005). Positive psychology has developed and used interventions to increase psychological wellbeing, with some work focused on investigating dispositional and explanatory style optimism (Seligman, 2005). Krok and Telka (2019) state that optimism is a mediator and positive relates to subjective



wellbeing. The systematic review in this chapter is interested in psychological wellbeing in the field of positive psychology and interventions to improve psychological well-being.

High levels of dispositional optimism have been linked to enhanced levels of well-being and good health (Renaud et al., 2016). Well-being and dispositional optimism have been investigated in numerous studies, mainly using the LOT and LOT-R. For example, a study of 504 high school students that scored high on the dispositional optimism scored low on the psychological distress (Creed, Patton, & Bartrum, 2002b). In support of this Isaacowitz (2005) found that dispositional optimism correlated highly with life satisfaction and showed lower scores for the depressive symptoms. This positive relationship between well-being and dispositional optimism was reinforced by Ferguson and Goodwin (2010), which found higher levels of dispositional optimism correlated with positive affect in 225 adult's study. Furthermore, Gustems-Carnicer (2017) found a positive link between dispositional optimism (LOT-R) and psychological well-being and together the results showed an association between optimism, well-being and higher academic progress in 291 college students. Overall, many studies have found an association between dispositional optimism and well-being.

Explanatory style optimism has also been used to explore levels of wellbeing; Wise and Rosqvist (2006) suggested that a person's explanatory style has a prolonged and significant impact of their wellbeing. Thus, an optimistic explanatory style can be a protective factor, and a pessimistic explanatory style may negatively impact wellbeing. For example, in a four-week study of 167 college students, found optimistic attributional styles correlates with decreased stress levels (Kleiman, Liu, and Riskind, 2013). Additionally, the link between an optimistic explanatory style and wellbeing has been investigated by a number of different studies and found similar results in studies, such as patients with advanced cancer (Applebaum, Stein, Rosenfeld, & Breitbart, 2012), breast cancer patients (Colby & Shifren, 2013), heart transplant patients (Jowsey et al., 2012). In general, many studies have found an association between explanatory style optimism and well-being.

Wellbeing and optimism have been explored in dispositional optimism and explanatory optimism and have found a positive link between being more optimistic

and increased levels of wellbeing. Studies have investigated the relationship between dispositional optimism, attributional style optimism and well-being. The findings have revealed a positive significant relationship between dispositional optimism, attributional style optimism and well-being, which suggests that they would be a good measure to investigate increased well-being (Zhang, Miao, 2014; Conversano, 2010). An element of positive psychology is to intentionally increase positive wellbeing, this is through positive psychology interventions.

### 5.3 Positive psychology

Layous, Chancellor and Lyubomirsky (2014) stated that intentionally concentrating on positive wellbeing can help to reduce the negative thoughts, behaviour and emotions; these have been linked to risk factors to multiple mental disorders. Secondly, positive outcomes such as work, relationships and health can be increased by promoting positive wellbeing. Positive psychology interventions have been found in lots of studies to promote and maintain positive mental health, and even have protective factors against some mental health conditions. Researchers have found that individuals can intentionally and successfully increase their happiness level (Sin and Lyubomirsky, 2009). It has been theorised that the link between how individuals choose to spend their time and how they respond to different situations, account for a significant part of their happiness (Lyubomirsky, 2005). Therefore, spending some time intentionally increasing wellbeing would be beneficial and positive psychology has shown important developments in trying to intentionally increase well-being. To further support positive psychology intentionally increasing wellbeing a number of positive psychology interventions have been developed (Seligman, 2010). A meta-analysis of randomised controlled trials (RCT) of PPIs found that post, three month and six months follow up found that well-being was significantly increased at post three months and six months follow up (Bolier, 2013).

### 5.4 Positive psychology interventions

PPIs have been found to increase wellbeing and a meta-analysis showed from a population of 4000+ healthy and depressed individuals there was a direct benefit from PPIs (Sin and Lyubomirsky, 2009). PPIs have been defined as “*treatment methods or intentional activities that aim to cultivate positive feelings, behaviours or*

*cognitions... (p)rograms, interventions, or treatments aimed at fixing, remedying, or healing something that is pathological or deficient- as opposed to building strengths- do not fit the definition of a PPI*" (Sin and Lyubomirsky, 2009, 468). Boniwell and Tunariu (2019) highlight the difference between usual psychology interventions and PPIs.

There are many different types of PPIs and ACTIONS has been described as an acronym for characterising and differentiating between them (Boniwell, 2017).

A – Active interventions – sports and physical activities.

C – Calming interventions – mindfulness and meditation

T – Thinking or taking stock – Working through positive and negative past events into present situations.

I – Identity- related actions- personal strengths

O- Optimization- actioning and setting goals, looking to the future and improving the current situation

N- Nourishing- taking care of oneself and taking pleasure in activities, and self-soothing.

S- Social actions- establishing and maintain positive relationships (Hefferon & Boniwell, 2011).

PPIs as the types of interventions found by 'ACTIONS' and may have found to be effective at increasing wellbeing. For example, the 'Active' intervention has found that positive activities, such as dance, tai chi, walking and yoga, and increased well-being. Similarly, Calming interventions which centre on mindfulness meditation and is one of the main PPI within positive psychology. Mindfulness is defined as the awareness and attention to the present experiences and events (Brown and Ryan, 2003). The mindfulness technique has been practised for many years and requires the individual to be present in the moment without judgement. Studies, such as Davidson et al.'s (2003), found neurological changes in the brain after partaking in mindfulness meditation, especially activity in the left hemisphere, which is a link to positive emotions. A meta-analysis of 47 studies found that mindfulness meditation was an effective intervention for increasing well-being (Grossman et al., 2004). A

further meta-analysis in 2015, found 28 studies that used mindfulness in the school setting and results found mindfulness as a good tool for increasing well-being (Felever, 2016).

The Thinking interventions are considered to be when an individual works through positive and negative past and present events, these types of Thinking interventions stem from CBT, ACT, and expressive writing. There are a number of different interventions within this element, firstly is expressive writing intervention and there are a few variations of the expressive writing. However, Burton and King (2008) found that expressively writing for two minutes every day reduced the number of visits to the doctors and increased well-being. Secondly, is the expressing gratitude intervention and this focuses on savouring positive events (Boniwell, 2019). The most frequently used technique is the three good things that an individual is grateful for that day, this technique has been found to increase wellbeing if it is used regularly (Boehm and Lyubomirsky, 2009). Lastly, is the counting your blessing intervention and there are a few variations of this intervention, such as write down three good things (Emmons and McCullough, 2003), spot the positives (Boniwell, 2017), write down three good things at the start and the end of the day (Seligman et al, 2005). All of these types of Thinking interventions have evidence associated with increased well-being. A study by Lia and O'Carroll (2017) found that the three good things PPI had a positive effect on well-being.

The Identity interventions are interested in defining ourselves and identifying and developing our strengths. Research has shown that using a strengths test by Seligman et al (2005) has shown that identify strengths can increase well-being, increase happiness, and decrease stress for up to six months. King (2001) developed a 'best possible self' intervention; this is a narrative description of one's own best possible self when everything you wish for has come true. Research showed that practising this for 15-30 minutes for three to four days increased well-being and decrease illness for up to five months (Sheldon and Lyubomirsky, 2006). A best possible self-review by Loveday, Lovell (2018) found the intervention to be effective online or face to face. From the 30 studies in the review, the best possible self was effective at increasing optimism and well-being. Optimising interventions are about working towards a desired future, such as goal setting, psychological capital and coaching (Boniwell et al., 2019). The Nourishing intervention mostly focuses on

savouring, such as taking pleasure in things, taking care of oneself and self-soothing (Bryant and Veroff, 2007). Bryant and Veroff (2007) define savouring as 'the capacity to attend to, appreciate and enhance the positive experiences in one's life'.

Savouring has found to increase wellbeing in the past (reminiscing), present (savouring the moment) and future (anticipating) (Boniwell, 2019). Lastly, social interventions are interventions, such as, acts of kindness and gratitude visits. The acts of kindness are engaging in acts of kindness to others, such as holding the door open for others. These interventions are to increase self-regard, social interaction and charitable feelings (Boniwell, 2019). The kindness interventions have been found to be effective in increasing happiness by the intentional behavioural activity of kindness (Otake et al., 2006). The gratitude visit has found to be one of the most powerful ways of increasing wellbeing, and this intervention is visiting or sending a letter to someone who has never been thanked (Seligman, 2005). Thus, all of the intervention types have some support to increase well-being.

Many studies have been conducted on the effectiveness of PPIs. To early meta-analysis found by Sin et al. (2009) and Boiler et al. (2013) found from their meta-analysis found slightly larger effects on PPIs increasing wellbeing ( $r=0.29$  and  $r=0.17$ ). However, a meta-analysis by White, Uttl, and Holder (2019) found from 97 studies that the increase in wellbeing was significant, but the effect was small ( $r=.10$ ), the findings suggest that the effectiveness of the interventions have been suggested to be smaller than previously reported. The findings suggest these results are reliable and significant even with publication bias, the PPIs were shown to be a little less effective than reported by Sin and Lyubomirsky (2009) and Boiler et al. (2013). Some studies show that there is evidence that some studies may be better than others, but a moderator analysis was not done, therefore one can not tell if some studies were better than others. More research into the effectiveness of the different PPIs is need. Furthermore, a common limitation was that many studies had small sample sizes in the interventions. The systematic review in this chapter has considered if there is an increase in optimism using the PPIs. Overall, this systematic review considered all of the 'ACTIONS' PPIs and the impact the interventions have on increasing optimism.

## 5.5 Positive psychology interventions (PPI) and optimism

To date, only one meta-analysis has examined psychology interventions and optimism. Malouff and Schutte's (2017) review investigated all psychological interventions (not only PPIs) was found to increase optimism. The study examined twenty-nine studies with a total of 3319 participants and found that optimism was increased ( $g=0.41$ ; 98% CI=0.29, 0.53) with the interventions. The largest increase of optimism was found by PPIs best possible self intervention and used an active control group ( $g=0.64$ ; CI=0.42, 0.39) (Malouff & Schutte, 2016). The increase of optimism was measured in many different studies, however, a high percentage of these were in a student population (Malouff and Schutte, 2017).

Many of the studies measure optimism by using the LOT-R (Scheier, Carver and Bridge, 1994), ASQ (Seligman, 2005), PsyCap-24 (Luthans, Avey, Avolio, Norman, & Combs, 2006). The PsyCap-24 has an optimism element to the questionnaire, however, this systematic review only included this measure if the optimism element has been reported separately. Studies have suggested that PPIs may have a small effect on increasing wellbeing, but interventions have been found to increase optimism and well-being (White, 2019; Malouff, 2016). Therefore, this systematic review investigated in PPIs increased optimism and the effectiveness in the workplace.

## 5.6 PPI within the workplace, and benefits

Positive psychology interventions have been used within the workplace to increase wellbeing (Meyers, van Woerkom, & Bakker, 2013). There are many benefits of introducing PPIs in the workplace, as today's global economy can be turbulent and competitive, employees are facing decreased job security, an economic downturn and increased job demands (American psychological association 2007; Annual Report, 2007). These factors have led to reports of work as a significant source of stress and lower levels of job satisfaction (American Psychological Association, 2007; Ray and Rizzacasa 2012). Positive psychological interventions within the workplace have been found to have dramatic and enduring effects on psychological wellbeing (Lyubomirsky et al. 2005). The benefits of PPIs are not only effective in the workplace for an individual, but they also increase personal positive emotions.

Individuals that regularly have positive emotions have been shown to live longer (Danner, Snowdon and Friesen, 2001), have higher incomes (Diener, Nickerson, Lucas and Sandvik, 2002), and higher marital satisfaction (Harker and Keltner, 2001).

Studies investigating PPIs in the workplace are slowly starting to increase; a systematic review in 2013 found 15 studies that investigated wellbeing (Meyers et al., 2013). The meta-analysis found an increase in wellbeing using the PPIs, reporting that 87% of the studies increased wellbeing. The PPIs included in the review were loving kindness, meditation, appreciation, coaching, resilience and fostering psychological capital. Furthermore, the review found that a second effect of using PPIs in the workplace was diminished stress and lessened burnout (Meyers et al., 2013). Nonetheless, the increased wellbeing, diminished stress and lessened burnout findings need to be interpreted with caution, as there was a wide variety of different PPIs in the small number of studies included in the systematic review, which makes it difficult to make a comparison of the overall effectiveness of the PPIs in the workplace (Kletter, Harris, & Brown, 2021). Nevertheless, given the reported effectiveness of increasing wellbeing in the workplace, it would appear promising that PPIs would increase optimism in the workplace.

### 5.7 Real-world application, PPIs and optimism

As discussed in this chapter, previous research has shown that there are many benefits to increasing optimism in the workplace using PPIs (Meyers et al., 2013; Seligman, 2012). The previous chapters have investigated the implicit and explicit optimism measures with university students, therefore, investigating implicit and explicit optimism within a real-world application could further investigate the ecological validity and reliability (Holleman, Hooge, Kemner, & Hessels, 2020) of the IAT and if optimism is changeable over time (in chapters 5 and 6). This chapter has systematically reviewed the literature for implicit and explicit optimism measures in a real-life application (i.e., the workplace). In other words, within the systematic review, the literature was searched to investigate if there was any previous implicit or explicit optimism measures used to investigate if optimism is changeable over time using PPIs in a real-life workplace.

### 5.7.1 Research Aims and Hypotheses

Based on the literature above the following research question has been addressed; To what extent do positive psychology interventions in the workplace increase optimism. Therefore, the aim of this chapter was to systematically review the literature for PPIs in the workplace that measure the outcome of optimism.

The objective was:

- 1) To conduct a systematic review and meta-analysis that investigates PPIs effect on optimism in the workplace.

Based on the literature outlined above it was hypothesised that positive psychology interventions can increase optimism in the workplace.

## 5.8 Methods

### 5.8.1 Overview

The present meta-analysis procedures were guided by Cochrane Collaboration and PRISMA guidelines (Higgins & Green, 2011; Moher et al., 2009; Higgins et al., 2019). The PRISMA was used as a protocol for selecting the included studies (Moher et al., 2009). The CASP was used to critically appraise the selected studies. The Cochrane Collaboration was used to assess the risk of the selected studies (Higgins & Green, 2011). The systematic review followed the stringent criteria to help make robust conclusions about the effectiveness of the PPIs (Higgins & Green, 2011).

The data extraction process is shown in the PRISMA flow diagram shown in table 5.1 (Moher et al, 2009). The three included studies were independently assessed for quality using CASP (Critical appraisal skills programme) (CASP, 2018). Finally, the Cochrane's risk of bias was performed on each of the selected studies (Cochrane, 2019).

### 5.8.2 Inclusion and exclusion criteria

This meta-analysis used a number of inclusion and exclusion criteria to explore the aim and question of this chapter. The inclusion and exclusion criteria were used as



guidance for screening and selection of relevant studies, shown in table 5.1 (Boland, Cherry & Dickson, 2014).

*Table 5.1: Studies Inclusion/Exclusion criteria*

<b>Inclusion and exclusion criteria</b>	
1) An experiential or quasi-experimental investigation of positive psychology intervention	8) Participants: Must have not to be diagnosed with a mental health illness. E.g., depression
2) Adults 18+	9) Written in English
3) In the workplace / working adults	10) Peer-reviewed journals
4) The intervention outcome measurement was optimism	11) Primary study
5) Quantitative research	12) Study: must have at least one PPI (positive psychology interventions)
6) Published after 2000 as this is when positive psychology was first proposed as a discipline	13) The interventions that were intended to increase hope was excluded (Alarcon, Bowling, and Khazon (2013) suggested from a meta-analysis that hope and optimism are distinguishable from each other)
7) The intervention has a control group	

### 5.8.3 Data sources

Electronic databases were used to extract the data, including Google Scholar, PsychINFO, Research gate, Cochrane’s library, Medline, Clinical Trials, and Web of Science. The searches covered the period of time from January 2000 to the 18<sup>th</sup> July 2018. The timeframe was guided by the start of the development of positive psychology in 2000 (Seligman, 2001). Additionally, the references were hand-searched in the studies that met the inclusion criteria (Lipsey & Wilson, 2001) and a previous systematic review that investigated interventions to increase optimism by Malouff and Schutte (2017). The breakdown of the searches is found in the PRISMA flowchart (figure 5.1) and, the excluded studies and the reasons for exclusion can be found in table 5.1.

#### 5.8.4 Search and screening

The search strategy used the Boolean operators ('And' and 'OR') and 'wildcard' symbol (\*) and the wording are shown in table 5.2. The screening involved identify any duplicates across the databases, screening the titles and abstracts using the inclusion/exclusion criteria, and acquiring full-text versions of all the selected papers. The reference lists were searched in the selected papers to examine any missed papers. Once the search and screening were completed the studies were stored in bibliographical software, the Mendeley Reference Manager version 1.12.2 (2014).

Table 5.2: Search strategy and screening, searching titles and abstracts (databases)

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Search term
Positive psych* intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult
Positive organisational intervention* 'AND' optimi* 'AND' Workplace
Gratitude intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult
Forgiveness intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult
Savouring intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult
Building strengths intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult
Meaning oriented intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult
Creativity intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult
Resiliency intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult
Courage intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult
Humour intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult
Engagement and flow intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult
Compassion intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult
Acts of kindness intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult
Mindfulness and meditative intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult
Physical positive psychology intervention* 'AND' optimi* 'AND' workplace 'AND'/'OR' Adult

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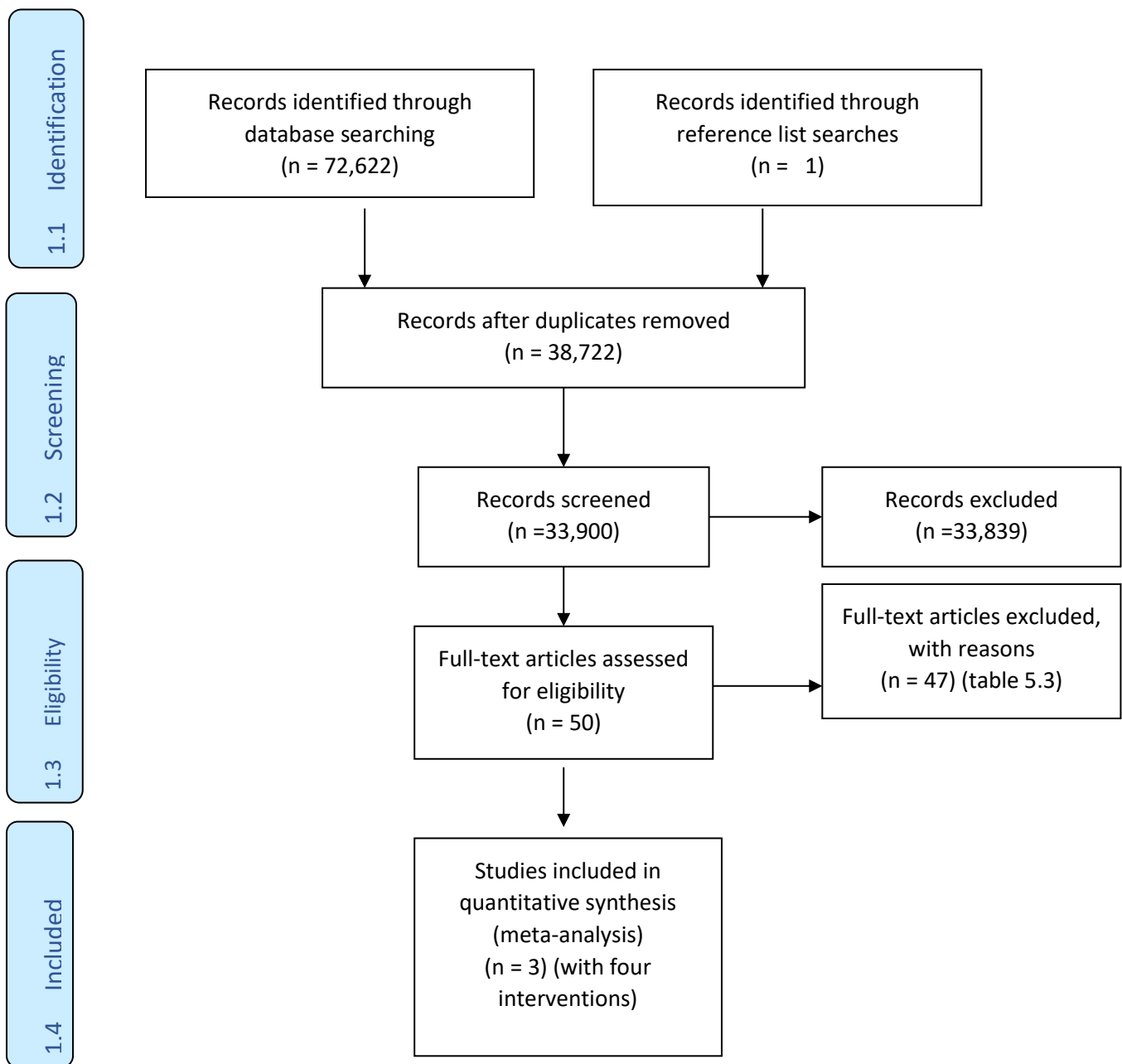


Figure 5-1: The data extraction PRISMA flow diagram was used to find all eligible studies for inclusion in the systematic review (Moher, Liberati, Tetzlaff, & Altman, 2000)

Table 5.3: Excluded papers from extraction sheet

Full text excluded articles	Reason for exclusion	Full text excluded articles	Reason for exclusion	Full text excluded articles	Reason for exclusion	Full text excluded articles	Reason for exclusion	Full text excluded articles	Reason for exclusion
Meyers et al. (2015)	Student population	13. Amutio (2015)	Not measuring optimism	25. Fortney et al. (2013)	Not measuring optimism	35. Diener et al. (2002)	Not measuring optimism	47. Luthans et al. (2010)	Not measuring optimism
Luthans et al. (2006)	Not a primary study	14. Baker (2011)	Not peer reviewed study	26. Zwack et al. (2013)	Not measuring quantitative optimism	36. Kabat-Zinn (2003)	Not peer reviewed study		
Peter et al. (2013)	Student population	15. Otsuka (2012)	Not measuring optimism	27. Luthans et al. (2005)	Not PPI	37. Hatinen et al. (2007)	No PPI		
Luthans et al. (2008)	Not PPI	16. Winslow (2017)	Not measuring optimism	28. Parker (1998)	Not after 2000 and not measuring optimism	38. Seligman et al. (2005)	Not peer reviewed study		
Luthans et al. (2007)	Not measuring optimism	17. O'Malle (2011)	Not a primary study	29. Lyubomirsky (2005)	Not a primary study	39. Chan (2011)	Not measuring optimism		
Tamlin et al. (2018)	Student population	18. Arnold (2007)	Not used positive psychology intervention	30. Emmons et al. (2003)	Student population	40. Avey et al. (2010)	No PPIs		

Steinfort et al. (2015)	Not peer reviewed	19. littman-Ovadia (2014)	Not in the workplace	31. Darshan et al. (2016)	No control group in study	41. Page et al. (2013)	Not measuring optimism
Sanderson et al. (2017)	Not peer reviewed	20. Meevissen (2011)	Not in the workplace	32. Sheldon et al. (2006)	Not in the workplace	42. Kirk et al. (2011)	Not measuring optimism
Mellor et al. (2016)	Not quantitative measure	21. Geraghty (2010)	Not in the workplace	33. Fordyce, (1977)	Before 2000 and not in the workplace	43. MacLeod et al. (2008)	Not measuring optimism
Kitchen (2016)	Not peer reviewed	22. Demerouti (2011)	No positive psychology interventions	34. Gable et al. (2004)	Not in the workplace	44. Yuan et al. (2014)	Not measuring optimism
Hope (2011)	Not measuring optimism	23. Jackowska (2016)	No optimism measure	35. Hodges et al. (2012)	Not peer reviewed	45. Mehta, et al. (2016)	Not measuring optimism
Van Dongen (2011)	Not measuring optimism	24. Perez (2015)	No optimism measure	36. Cohn et al. (2009)	Not in the workplace	46. Demerouti et al. (2011)	Not measuring optimism

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### 5.8.5 Data extraction

The screening and selection of relevant studies directed by the inclusion and exclusion criteria (Boland, Cherry, & Dickson, 2013). The steps taken were to remove any duplicates across the databases, screen all titles and abstracts and obtain all full texts of selected research papers. The research papers that were eligible for inclusion from the titles and abstracts were assessed for eligibility using the full texted research papers. There were 50 papers identified from the databases and an extraction sheet was used to assess the eligibility of the papers using the inclusion and exclusion criteria. The 50 research papers were independently examined by a second researcher and then cross-examined, there was no disagreement in the selected papers. From the extraction sheet, 47 research papers were excluded and the excluded studies are shown in table 5.3. Hence, three studies were selected and according to Cochrane two studies is enough to perform a meta-analysis (Ryan, 2016), therefore, a meta-analysis was conducted with the three papers, and one study had two PPI interventions. Consequently, a meta-analysis that included four interventions from three selected papers was performed (see table 5.4 for selected studies).

Table 5.4 Studies included in the meta-analysis

Authors and Country	Positive psychology interventions/ ACTIONS	Hours of training / how times intervention executed	How long does the intervention last	Online or face to face	Number of participants	Per cent female	Optimism measure	Assessment weeks from training ends
Hart et al. (2014, a) / Sweden	Gratefulness workshop	2 hour introduction, 4 x one hours workshop	10 weeks	Face to face	37	87	LOT-R	24
Hart et al. (2014, b) / Sweden	Positive thinking workshop	2 hour introduction, 4 x one hours workshop	10 weeks	Face to face	14	94	LOT-R	24
Lioysis et al., (2009) / Australian	Promoting adult resilience program workshop	90 minute workshops x 7	7 weeks	Online	28	-	LOT-R	0
Fredrickson et al. (2008) / USA	Loving kindness meditation	60 minutes group workshops	6 weeks	Face to face and online	139	48.2	LOT-R	1



### 5.8.6 Quality assessment and risk of bias

The three selected papers were independently examined and then cross-examined using the CASP checklist. The CASP is a critical appraisal tool to assess the quality of the selected studies, the checklist covers the validity and results of each study. There was no disagreement about the three studies and all three passed the critical appraisal from CASP (Critical Appraisal Skills Programme, 2018).

The risk of bias was assessed on the three selected studies, the Cochrane risk-of-bias for randomised trials (RoB 2) was used to assess the risk of bias. The domains are assessed by a judgment for selection, performance, attrition, reporting and others. The individual elements are assessed by high risk, low risk and not enough information, and then consequently are given an overall bias outcome from low risk, some concern and high risk. The three studies in this systematic review were all found to have some concerns about the risk of bias, shown in table 5.5. Therefore, this suggests that there may be a risk of publication bias within these studies.

Table 5.5 Risk of bias

Random selection					Awareness of intervention							Missing data			Assessors awareness			Reporting data				
1.1	1.2	1.3	Overall		2.1	2.2	2.3	2.4	2.5	2.6	Overall	3.1	3.2	3.3	4.1	4.2		5.1	5.2		Overall bias	
Liossis et al. (2009)	NI	NI	NI	Some concern	PY	-	NI	NI	PN	-	Some concern	N	N	N	High risk	PY	PY	High risk	N	N	Low risk	Some concern
Fredrickson et al. (2008)	NI	NI	NI	Some concern	N	-	NI	NI	N	-	Some concern	N	PN	N	High risk	PY	PN	Low risk	N	N	Low risk	Some concern
Harty et al. (2013)	NI	NI	NI	Some concern	PY	-	NI	NI	PN	-	Some concern	PY	N	N	Low risk	PN	PY	Low risk	N	N	Low risk	Some concern

NI= Not enough information; PY= Properly Yes; Y= Yes; PN= Properly No; N= No

### 5.8.7 Analysis strategy for meta-analysis

A meta-analysis was used to investigate the selected studies about optimism and positive psychology interventions in the workplace. The effect sizes in the selected papers were firstly assessed for heterogeneity, to check the percentage of variation between each of the studies (Higgins and Thompson, 2002). Then meta-analysis assesses the quality of the selected papers with an assessment of publication bias. Publication bias is the idea that the research papers selected may come from a biased publication and selection processes, this may be due to large effect sizes and significant results are more likely to be published (Borenstein, Hedges, Higgins, & Rothstein, 2009). There are other reasons that publication bias can be affected, such as available bias (studies that are published in journals that are free access are likely to be selected), language bias (studies that are published in English rather than other languages), and citation bias (studies with significant findings are more likely to be cited). The publication bias was graphically and statistically assessed in the meta-analysis for the potential occurrence and the degree of publication bias and this is to identify if there are any missing/omitted studies (Borenstein et al., 2009). The smaller the sample size, the higher the probability of publication bias. The meta-analysis uses a funnel plot to examine the publication bias, as the funnel plot uses a scatterplot to examine the effects sizes against the standard error of the effect size (Sterne & Harbord, 2004). Firstly, a visual inspection of each of the outcomes (all the interventions) in the funnel plot, it was inspected for any asymmetries of the distribution of the effect sizes, as any indication would indicate publication bias (Sterne et al., 2011). The funnel plots show studies with large effects at the top around the mean of the effect size, and the studies with smaller effect sizes spread across the bottom of the graph, this is due to the increased possibility of larger standard error (Borenstein et al., 2009; Marvidis, 2014). Furthermore, the effect size results were checked to make sure that the results are not entirely a product of publication bias (Marvidis, 2014). This was achieved by Rosenthal and Gleser, and Olkin methods were used to calculate the fail-safe N, this determines how many studies may be missing and would need to be included before obtaining effect size was statistically non-significant. The fail-safe suggests that the higher number of missing studies that lower the probability of publication bias (Marvidis, 2014). Finally, the impact of the publication bias was assessed by estimating the effect if the

bias was absent, by using the Duval and Tweedie's trim and fill method. The method removes the most extreme small studies from the funnel plot and then re-calculates the effect size to make the funnel plots more symmetrical around the new suggested effect size (Marvridis, 2014).

The heterogeneity was used to assess the variability of the effect sizes using the heterogeneity Q and  $I^2$  statistics and (Card and Casper, 2013). This is to determine the variability across the effect sizes and if the variability can be explained by sampling error (Marvridis, 2014). If the distribution of the effect sizes was significantly heterogeneous, the Q value would be significant and the hypothesis of homogeneity would be accepted (Borenstein et al., 2009). Furthermore, the  $I^2$  was assessed to calculate the extent of variability in the distribution of the effect sizes that may be owing to heterogeneity. This is calculated as the number of selected studies in this meta-analysis is relatively small and therefore, moderately low power (N=3). The  $I^2$  indicates how likely the difference between the effect size of the selected studies are associated with real differences in effect sizes. The range is from 0 to 100% and the higher the score the more heterogeneous the effect sizes are (Borenstein et al, 2009).

## 5.9 Results meta-analysis

### Calculating and interpreting effect size

The effect size is calculated to investigate the magnitude and direction of the difference between two variables (Borenstein et al., 2009). The calculation for the effect size is attained by subtracting two variable means and then dividing it by standard deviation or pooled standard deviation.

### Data analysis

The data was analysed using Meta-Essentials 1.1 Software ([www.meta-essentials.com](http://www.meta-essentials.com)). The four included randomised controlled trials had a total of 217 participants. Table 5.6 shows the contributions of each intervention in the meta-analysis, along with information describing the interventions. A forest plot of weighted effect size for individual interventions shown in figure 5.2.

The meta-analytic Hedges'  $g$  for the difference between the positive psychology interventions and the control groups for all 4 analysis was 0.30 (95% CIs. 0.22 - 0.38),  $p < 0.001$ , indicating that the positive psychology interventions produced a significant effect on optimism. The publication bias was assessed by the standard Duval and Tweedie's trim and fill bias analysis suggests that three studies have small sample sizes and the effect sizes have been re-calculated to be more symmetrical (Borenstein et al., 2009); none of the studies needed to be trimmed or filled. The re-calculated effects sizes are shown in a funnel plot of effect size plotted against standard error study size is shown in figure 5.2. The Rosenthal's fail-safe  $N$  showed that 11 studies with 0 effect size would be needed to make the meta-analytic result non-significant. This indicated that the lower number of studies suggested would suggest a higher probability of publication bias (Borenstein et al., 2009). However, the Rosenthal's fail-safe is calculated on significance, therefore, the Gleser and Olkin was examined and found similar results of 12 studies would be needed to make the meta-analytic results non-significant. The Gleser and Olkin use effects sizes to calculate the failsafe calculation and is considered a more reliable measure (Becker, 2007).

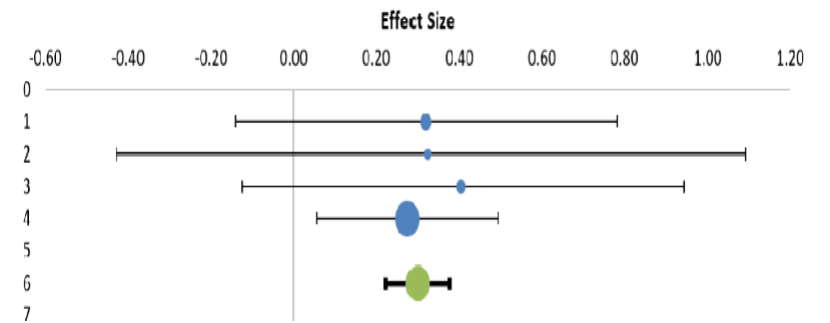
The included interventions showed significant homogeneity in effect sizes,  $Q(2) = 0.21$ ,  $p < 0.001$ ,  $I^2 = 0.00$ , indicating good agreement of effect sizes (Card & Casper,

2013). This indicated that there is little variability among the interventions and suggesting that there was no sampling error within the interventions (Borenstein et al., 2009; Suurmond, 2017). Therefore, the hypothesis that positive psychology interventions have shown to increase optimism in a working population can be accepted.

Table 5.4 Showing the included studies for the meta-analysis and the outcome statistics for each study

Study name / Interventions	Outcome statistics each study						Hedges's g and 95% CI
	Hedge's g	Standard error	CI lower limit	CI upper limit	Z value	P Value	

Harty et al. (2014, a)	LOT-R	0.32	0.23	-0.14	0.78	1.37	0.08
Harty et al. (2014, b)	LOT-R	0.32	0.37	-0.43	1.09	0.87	0.19
Liossis et al. (2009)	LOT-R	0.40	0.27	-0.12	0.94	1.51	0.06
Fredrickson et al. (2008)	LOT-R	0.27	0.11	0.06	0.49	2.47	0.01



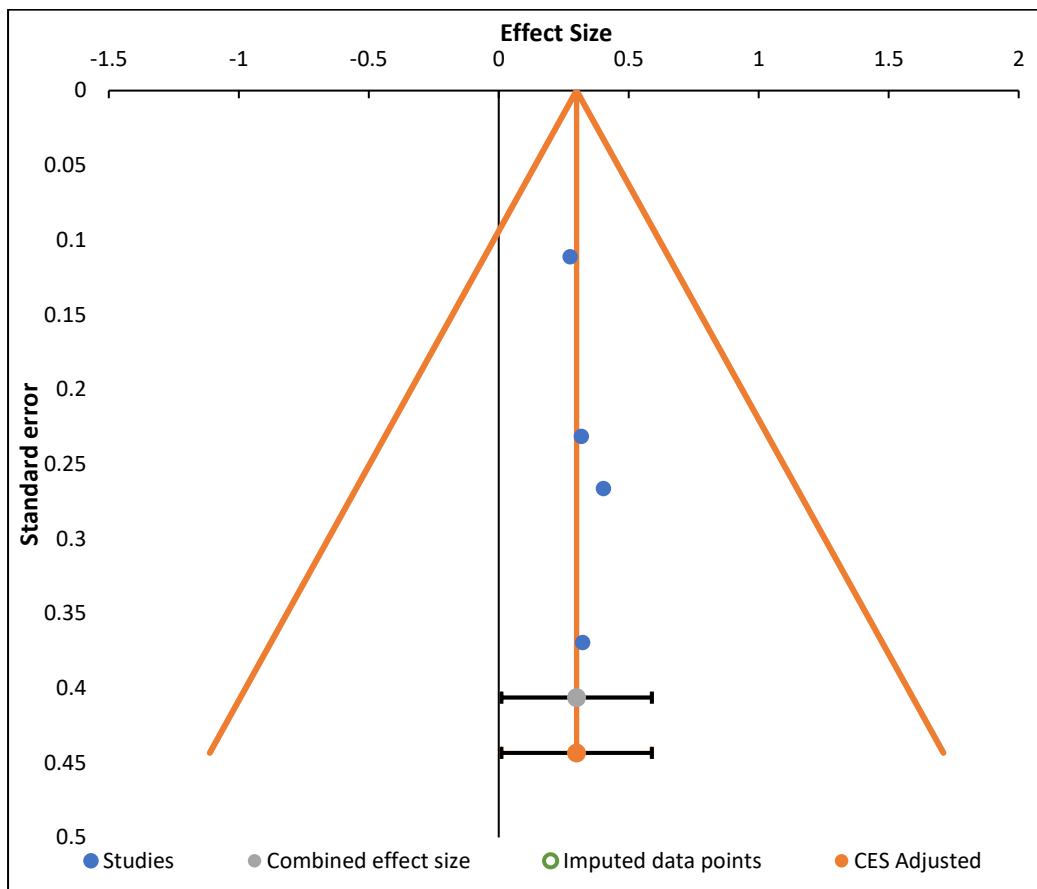


Figure 5-2 A funnel plot showing the effects sizes of the included studies in the meta-analysis

## 5.10 Discussion and conclusion

### 5.10.1 Main findings

The findings in this meta-analysis found similar results to the optimism meta-analysis by Malouff and Schutte (2016) but they were not identical to each other. The results in Malouff systematic review showed slightly higher effectiveness for the interventions. However, the interventions were not all positive psychology interventions or in the workplace. This systematic review aimed to better understand if PPIs in the workplace increased optimism. As reported, the selected studies showed a positive association to PPIs in the workplace and increasing optimism. Overall, the meta-analysis indicated a small, but significant effect of PPIs compared to control groups; therefore, showing that the PPIs in the workplace increase optimism. The effect size of individual studies ranged from small to medium between the selected studies (Cohen, 1988). The small effect size may be due to two of the studies having small sample sizes. The small sample sizes make it slightly more



difficult to draw a full conclusion about the impact of the PPIs, and caution was taken when interpreting the results. However, the selected studies were found to have homogeneity and indicated good agreement between the reported studies. Therefore, the hypothesis that positive psychology interventions can increase optimism in the workplace has been accepted, as the relationship between PPIs and increased optimism was significant.

### 5.10.2 Limitations

This systematic review may have had a few limitations, and these may have influenced the findings, such as studies limited to the English language and only using peer reviews studies. This may suggest that this systematic review may not have been entirely comprehensive. There may have a number of studies conducted in the workplace in different languages and the findings may suggest different findings. Furthermore, only using peer reviewed studies may have led to publication bias as the meta-analysis suggested in the results.

There is a need to consider the limitations of the studies in the systematic review and after the risk of biases were reviewed, it was suggested that there was 'some concern' for all three of the studies. When the risk of the bias was assessed using the RoB 2, five different risks for biases were assessed; random selection, awareness of intervention, missing data, assessors awareness and reporting data. The random selection of the participants for the interventions needed more information in all of the studies, which lead to some concern over the studies. If the studies had included more information it may have been clearer what had happened in the studies, and make the studies more relocatable and increase the reliability of the studies. The risk of bias for awareness of the intervention raised some concern as there was not enough information about the awareness of the interventions. For example, if the control group did not have to complete an intervention it may be clear which group they are in compared to the intervention group. This may be more of a risk if all the intervention groups work in the same work setting and discuss what each other are doing in the interventions. Furthermore, it may have also influenced the information in the questionnaires they were given, for example, reporting lower optimism scores. The missing data reported in the results needed to have more detail and therefore, was assessed as high risk for Lioysis et al. (2009) and Fredrickson et al. (2008). The

Liossis et al. (2009) did not clearly state to whether the researchers were aware of which individual was in which intervention, therefore, the risk was assessed as high for this element. The reporting data for all three studies showed the risk of bias to be low risk. Therefore, when the overall risk of bias was assessed using RoB 2, it suggests that there may be a risk of publication bias as some concerns were raised. In future, more information in the journal articles should be included to reduce the risk of bias and strengthen the findings.

### 5.10.3 Comparison with the literature

There is limited research into PPIs in the workplace, however, the literature is growing and different PPIs are being used in the workplace setting (Bakker, Oerlemans, 2016; Chacellor, 2015). A meta-analysis by Carolan, Harris, (2017) and Meyers (2017) found PPIs to be effective at increasing wellbeing, and Malouff and Schutte (2016) found that interventions are effective at increasing optimism. This systematic review found similar results and found that PPIs are effective at increasing optimum in the workplace. A larger sample size could have supported the studies in the systematic review and provider a greater insight to the effectiveness of the PPIs to increase optimism. The small sample sizes were suggested to be a limitation in many of the PPIs studies in a systematic review by White, Uttl (2019) and the same is true in this smaller review.

Once the systematic review was completed a further study was published in November 2018 that fitted the criteria of the systematic review. However, as the search was completed in July 2018, this study was not included in the meta-analysis. The study implicated PPIs that focused on expressing gratitude and acts of kindness. Within this study there were 93 participants in three groups; gratitude, acts of kindness and the control group. The findings suggest that the PPIs increased employee's optimism and happiness, furthermore, the highest level of happiness was found in the acts of kindness intervention group (Sanin-Posada, 2018).

### 5.10.4 Implications for research and practice

The PPIs in this systematic review was very limited and did not cover a wide selection of PPIs; however, none of the interventions were the same. To further investigate the effectiveness of increasing optimism in the workplace different interventions need to be investigated. Further research is needed to investigate

which PPIs are the most effective at increasing optimism in the workplace.

Therefore, to investigate further PPIs, chapter 6 investigated a piloted study into different PPI to explore if they can increase optimism.

The selected studies in this systematic review were a selection of face to face and online interventions and the effectiveness of each and if there is a difference between the methods needs more investigation. Therefore, to investigate this further chapter 6 used the online method to explore whether optimism can be increased with PPIs in the workplace. However, PPIs used to increase optimism do need further research into whether face to face methods are more or less effective than online methods.

The length of the interventions varied throughout the selected studies from six to ten weeks, therefore the length of the interventions needs future investigation to explore what is the optimum length of time for optimism to be increased in the workplace. As previous research has suggested there are many benefits to increasing optimism in the workplace (Chang, 2000; Segerstorm, 1998; Medlin, 2008; Schulman, 2013). However, workplaces are often subject to limited budgets (American Psychological Association, 2007), therefore, investigating the optimum length would be beneficial. Therefore, chapter 6 piloted a three-week PPI to investigate if optimism could be increased in the workplace.

All the selected studies measured optimism using dispositional (LOT-R) optimism and therefore, more research is needed to investigate explanatory optimism. This is due to chapter 4 finding that dispositional optimism and explanatory optimism are linked but are factorial different, this is supported by previous research (Scheier and Carver, 1993). However, the pilot study in chapter 6 used dispositional optimism (LOT-R) as previous studies had used this measure and found a significant increase in dispositional optimism.

#### 5.10.5 Conclusion

In conclusion, it is not clear which intervention is the best or the most effective. There are only a few studies that investigate increasing optimism in the workplace using PPIs, as the research in this area is early on and is developed and rising over the years. Overall, this systematic review uncovered explicit optimism measure (LOT-R) to investigate the increased optimism in PPIs in the workplace. However, this

systematic review did not find any studies that investigated implicit optimism in the workplace to investigate PPIs. Therefore, chapter 6 in this thesis has investigated implicit and explicit optimism when exploring the effectiveness of PPIs in the workplace.

# **Chapter 6: Acts of kindness positive psychology interventions in the workplace, exploring wellbeing and optimism implicit and explicit measures: a pilot study**

## 6.1 Introduction

## 6.2 Positive psychology interventions

Positive psychology interventions (PPIs) have been found to be a useful tool for increasing happiness and well-being (Seligman, 2005; Sin, 2009; Muller, 2016), furthermore, as the previous chapter has indicated, the PPIs are a valuable tool for increasing optimism. Optimism has been considered to be an important element of positive psychology and within the positive psychology interventions (Seligman & Csikszentmihalyi, 2000). Within this chapter the relationships between implicit and explicit optimism and two positive psychology interventions were investigated; acts of kindness to one's self and acts of kindness to others.

The PPIs are used to increase well-being and five consistent elements have been found to be able to increase well-being. According to Aked et al. (2008) after reviewing 400 research studies, based on scientific evidence these five elements were found to be important; connect, being active, take notice, continuous learning and give. Firstly, research suggests connecting with people around us and building relationships increases well-being and resilience. Secondly, being active is important for well-being to enhance well-being, mood and cognitive functioning (NEF Review of the Year 2014 – 2015 | New Economics Foundation, 2016). Thirdly, well-being can be increased by savouring the moments and taking notice of things around us. Fourthly, well-being can be increased by keep learning, by engaging our brains and challenging ourselves to enhance our well-being. The last element is random acts of kindness, with research demonstrating that individuals can experience high levels of well-being. Random acts of kindness could express be by giving something to someone or giving time to others (Boniwell, 2019). Therefore, within this study, the acts of kindness were explored to investigate if an intervention can increase well-being and optimism.

There have been many interventions online and face to face (White et al., 2019). Furthermore, a further meta-analysis was undertaken on web based interventions (not only PPIs) and found from 21 studies that interventions effectively increased wellbeing ( $g=0.37$ ) in the workplace (Carolan, Harris, & Cavanagh, 2017).

### 6.3 Acts of kindness

There are many different types of positive psychology interventions. One of the positive psychology interventions is an act of kindness, resulting to have found to significantly improve an individual's well-being (Canter, 2017; Curry and Rowland, 2018). A systematic review by Curry et al. (2018) found in 27 studies that the acts of kindness are effective at improving wellbeing. Nelson (2016) states that the most popular acts of kindness intervention focus on oneself (self-oriented behaviour). There is also a growing interest in acts of kindness to others (prosocial behaviour). In Nelson's study, 473 participants completed a six week intervention and the results found that both self-oriented and prosocial behaviour increased wellbeing compared to the control group. However, prosocial behaviour demonstrated a greater increase in well-being. Nelson (2016) further suggested that there is little research that compares kindness to self versus to others, therefore, this study further investigated differences between self-oriented (kindness to self) behaviour and prosocial (kindness to others) behaviour acts of kindness interventions.

Kindness can be explained by different types, such as love, sympathy, gratitude and heroism. These types can be explored by four different theories that relate to kindness; kin altruism, mutualism, reciprocal altruism, and competitive altruism. Generally, Kindness has been suggested to be the intended action to benefit others (Curry, 2016). Within this thesis the focus was on two different acts of kindness; to towards one's self and towards others. Acts of kindness have been associated with increasing wellbeing, recently kindness interventions have been used to boost subjective well-being (Curry, 2018). Random acts of kindness have been used and prompted by research groups, charities and government organisations. The interventions have been found to be effective, simple and inexpensive to run, and has helped to address problems such as mental and physical health conditions, social isolation and increasing happiness (Aked, Marks, Cordon, & Thompson, 2008; Aked & Thompson, 2011; Huppert, 2009). Overall, Lyubomirsky and Layous (2013)

suggest that positive activities; such as kindness and gratitude, improve wellbeing by fostering increased positive emotions and in turn then decreasing negative emotions.

#### 6.3.1.1 Kindness to others (prosocial behaviour)

Acts of kindness to others or prosocial behaviour are doing something kind for someone else (Penner, Dovidio, Piliavin, & Schroeder, 2005). Many researchers have investigated this topic and found that kindness to others substantial increases happiness and wellbeing (Chancellor et al., 2015; Layous et al., 2013; Lyubomirsky, Sheldon, et al., 2005; Nelson et al., 2015; Otake et al., 2006; Sheldon et al., 2012; Weinstein & Ryan, 2010). For example, Otake, et al. (2006) study included 167 Japanese participants and found that after only one week of kindness to others intervention, the participants demonstrated an increase in happiness compared to the control group. Furthermore, they found that the happy participants became more happy, kind and grateful. Additional research also found that acts of kindness interventions of spending money on others increased happiness and positive emotions (Dunn et al, 2008; Aknin et al, 2013). Furthermore, research has found that acts of kindness to others can increase an individual's optimism and happiness (Sanin-Posada, 2018). In sum Ko (2019) found prosocial behaviour of acts of kindness to others as a cost-effective way of increasing well-being.

#### 6.3.1.2 Kindness to one's self (self-oriented behaviour)

Self-compassion has been suggested by Neff (2003) to have three structures; self-kindness, common humanity and mindfulness. Within this thesis, the focus is on self-kindness or kindness to one's self, as this is an element of self-compassion. Beck, Rush, Shaw and Emery (1979) found that self-kindness reduced self-criticism, self-condemnation, blaming and rumination, and these traits have been found to be associated with depression. Self-kindness is being kind and having an understanding perspective to one's self, such as looking after yourself and using supportive language (Neff, 2003). The intervention within this study is focusing on looking after yourself and doing an act of kindness to one's self; the acts may be sitting reading a book, taking a relaxing bath or buying a top you wanted. Research has found many benefits of doing this and a review by MacBeth and Gumley (2012) has found in 20 studies that increasing self-compassion and self-kindness has protected against

depression, anxiety and stress, furthermore, findings have also shown to improve interpersonal functioning.

Research by Neff (2009a, 2009b, 2009c) demonstrated a link between self-compassion, self-kindness and optimism. The systematic review in chapter 5 found no studies that investigated acts of kindness PPIs and optimism in the workplace. However, studies into acts of kindness to one's self and optimism have been previously investigated in different populations. For example, Smeets (2014) developed a three-week self-compassion intervention and 52 college students undertook the intervention, the results indicated that one of the elements that were increased was optimism. A further study by Rizzato (2014) conducted a one-week online kindness to one's self intervention with 24 participants in the intervention group and 37 in the control group, the findings suggest the optimism was increased compared to the control group. These findings suggest the kindness to one's self increases optimism in the participants.

Due to the benefits of both acts of kindness to others and acts of kindness to one's self interventions, the study in this chapter investigated if the acts of kindness can increase optimism in English and Japanese populations. The study used both a Japanese and English work population to allow the research to get a wide range of cultures, participants and workplaces. Furthermore, including English and Japanese populations in this study widened the demographics of the population. As a review by Hendriks and Warren (2019) found that RCTs are predominately conducted in Western countries (78.2%), and the review suggests that there is a slow growth towards the globalisation of PPIs. Therefore, including English and Japanese populations works towards the globalisation of positive psychology.

#### 6.4 Implicit and explicit measures – Explicit and Implicit and PPI

This study gained a further understanding of the process of optimism, by investigating implicit and explicit measures of optimism after implementing PPIs. The study has further investigated optimism by using a number of previously mentioned positive techniques and inventions, to investigate whether optimism can be improved or increased within the implicit and explicit measures. Explicit self-report methods (e.g., questionnaires) have helped to determine the relationship within optimism. However, as previously mentioned, explicit methods have been found to be



susceptible to a number of social influences such as social desirability (Friese, Hofmann, & Schmitt, 2008). Explicit self-report measures are problematic as participants are capable of lying to themselves and the researcher. Furthermore, self-report measure may be susceptible to intentional deceit and self-presentational bias (Blair, 2002; Vartanian, Polivy, & Herman, 2004; Vitousek, Daly, & Heiser, 1991). Self-report measures take the opinion that participants construct their opinions carefully and rationally, which may not be the case for every participant (Zajonc, 1980). Additionally, it is under the reasonable assumption that every participant knows exactly how they feel and can self-report their feelings (Hixon & Swann, 1993). In contrast, implicit methods are based on an individual's automatic response and therefore, may be a better predictor of personality and emotions as they are less susceptible to social influences (Greenwald, 1998). Within the current literature and to the best of the researcher's knowledge, implicit measures have not been investigated using PPIs to examine any increases to well-being or optimism. The lack of implicit PPI research is further confirmed by White (2019) who conducted a meta-analysis of PPIs and the effectiveness of them. Implicit measures may allow for a deeper understanding of PPIs and if they affect emotions, as Roefs et al. (2011) stated that in comparison to the explicit measurements implicit measures have shown to be promising. Roefs further explains that the implicit tasks response is outside of conscious control and targets automatic beliefs and it overcomes the tendencies to give socially desirable answers. Therefore, this study has used the optimism IAT measure to investigate if PPIs can increase implicit optimism in a real-world application.

In addition, this study has built upon the previous findings and discussion in chapter 3 and further investigated if the implicit method (IAT) is measuring mood or emotion. Chapter 3's findings suggested that the IAT may have been measuring an emotion rather than a mood. As moods are often viewed as lasting longer in duration than emotions, and usually observed as having a lower intensity (George, 2000). In contrast, emotions are considered to be more short term and more intense in nature (Parkinson & Lea 1991), the implicit measure (IAT) may be measuring the increased emotions of the effectiveness of the PPIs. Consequently, this study utilised a three-week intervention to explore any increases to implicit optimism, and the results could suggest that individual experience increased positive emotions. In summary, this

study used implicit measures in the English population to explore implicit and explicit optimism in a real-world application.

## 6.5 Time of year – at work, Christmas, and New Year - Importance of study around Christmas

The study was conducted during a working week and continue over the Christmas and New Year period. Studies have found that Christmas and New Year can be a stressful time of year (Monman, 2018). This has been found to be from things such as financial implications associated with Christmas and increased family pressures. Previous research has found that mental health problems and illness have increased around Christmas (Friedberg (1990), and increased suicide attempts and self-harm raises days immediately after Christmas (Bergen and Hawton 2007; Carley 2004; Cullum et al. 1993; Jessen et al. 1999; Masterton 1991; Sansone and Sansone 2011; Zonda et al. 2008; as an exception Barker et al. 2014). Different cultures may find New Year to be stressful as Christmas may not be celebrated or not as focused upon (Kasser and Sheldon, 2002). Generally, Christmas and /or New Year is celebrated by English and Japanese cultures (Stanlaw, 2004), therefore, investigating the intervention over a three-week period to include the working week and the whole holiday period. Investigating whether this time period is a holiday period, Christmas holiday or a New Year celebration. Examining if these time period differences affect the effectiveness of the positive psychology intervention.

There have been several positive psychology studies over the Christmas and New Year period, such as questionnaires about happiness, around well-being (Kasser, 2002) and well-being before and after Christmas (Mutz (2016) and Christmas giving (Tremblay, 2014). However, PPIs over Christmas is very limited, therefore, this study has implicated a PPI to explore the potential of implementing an intervention at the Christmas and New Year period.

## 6.6 Cross-cultural design – English and Japanese

PPIs studies are predominately conducted in Western counties (78.2%) there is a slow growth towards the globalisation of PPIs (Hendriks and Warren, 2019). Therefore, this study had the opportunity to investigate English and Japanese working populations to further globalisation of positive psychology.

The two different cultures; Japanese and English were chosen because of their differing cultural attitudes and traditions. For instance, the Japanese culture is more of a collectivistic society and the culture of Japan values the group or community over the individual self (Ogihara, 2017). In contrast, the English culture is more individualistic and focuses more on individual goals and rights (Lewandowska-Tomaszczyk & Wilson, 2014). These cultural differences also need to be considered in the terms of independent and interdependent self-construal. Independent and interdependent self-construal refer to different self-representations people may have of themselves. In other words, how individuals view themselves, separate from others or fundamentally connected to others (Markus & Kitayama, 1991). For example, individuals who have an interdependent self-construal (collectivistic society) would view their central sense of self, as their relationships, groups they are part of and their social roles as part of their sense of self. In contrast, independent self-construal (individualistic) individuals view their sense of self, as individual attitudes, values, abilities and traits (Giacomin & Jordan, 2020). However, the notion of independent and interdependent self-construal is a little more debated than two clear different constructs (i.e., independent and interdependent) and research also suggests that they should be considered as two broad dimensions (Markus & Kitayama, 1991). While other researchers believe that self-construal is multi-dimensional and is broader than independent and interdependent (Oyserman, Coon, & Kemmelmeier, 2002). For instance, Cross (2016) suggested that self-construal has universal dimensions; independent, interdependent and relational. Relational self-construal individuals view their sense of self as in close and dyadic relationships. These social-construal differences are part of a debate around different culture types; consequently, within this thesis, there was an interest to investigate if there were any differences between English and Japanese culture and if these cultural differences influence the acts of kindness PPIs.

Additionally, within this thesis, the inclusion of two different cultures (English and Japanese) allows for the investigation of the celebrations around the same time of year (Christmas and New Year), as previously mentioned can be a stressful time of year (Monman, 2018). For example, the English culture generally celebrates Christmas and Japanese culture generally celebrates New Year. Therefore, the

interventions were conducted over Christmas and New Year time period to investigate the effectiveness.

### 6.6.1 Research Aims and Hypotheses

In conclusion, research into different PPIs are quite abundant, however, there is limited research into kindness to one's self versus kindness to others. Furthermore, there has found to be limited research into if the PPIs increase optimism in a working population. Additionally, there is no previous research into implicit and explicit optimism when PPIs have been implemented. Lastly, the time period of Christmas and New Year have only limited research into the effectiveness of PPIs. As there is limited research in these areas a feasibility study was conducted. Therefore, the objective of this chapter was to conduct a pilot study into employing PPIs to investigate if they can increase implicit and explicit optimism in a working population. consequently, this study tested the effectiveness of two PPIs (Acts of kindness to one's self or kindness to others) against a control group.

The aim of this chapter is:

- 1) To examine if a pilot positive psychology intervention increases optimism and are sustainable over time, using implicit and explicit measurements of optimism in an English and Japanese population.

Based on previous research, the following hypotheses were tested:

- 1) There would be a significant increase to implicit and explicit optimism when the acts of kindness to one's self and kindness to other interventions are exercised, compared to the control group.

## 6.7 Methods

### 6.7.1 Design

To achieve the aims of this chapter, the design of this study used a quantitative three-week online feasibility study. This study used a single-blind randomised controlled trial (RCT) design. The outcome variables measured were optimism and pessimism (LOT-R), and Well-being (Depression, Anxiety and stress (DASS-21) described in chapter 2). The RCT was based on three levels depending on the

participants' engagement with positive psychology interventions, which were: 'acts of kindness to one's self', 'acts of kindness to others' and 'no treatment/control'. The measurements were carried out at three different time points: baseline (pre-intervention), time 1 (3-week post-intervention) and follow up (1-month post-Time 1 measurement or 7 weeks post-intervention) (see Figure 6.1). The intervention started in mid-December and ended at the start of January.

### 6.7.2 Participants

An opportunity sample of 20 working adults was recruited for the test-retest study. The participants were given ten psychology participant points from the University of Derby as an incentive for taking part. The inclusion criteria were the participants needed to be over 18 years old and work over 24 hours a week. Participants were recruited through emails and social media (Appendix 23). A total of twenty participants were randomly assigned into one of the three different intervention groups (Shown in table 6.1). The IAT was only given to the English participants, as the aim of this thesis was to investigate the reliability and validity of the optimism IAT (English version), and the Japanese version has not been developed as of yet, so, therefore, was not used in this pilot study.

*Table 6.1: Participant gender and age by group*

Group/intervention	Male	Female	Total (N)
Acts of kindness to one's self	N=3	N=4	N=7
Acts of kindness to others'	N=2	N=5	N=7
No intervention/control	N=2	N=4	N=6

### 6.7.3 Materials

All the materials were presented on Qualtrics and accessed via email link. The participants followed this link to Qualtrics to complete all of the questionnaires. Furthermore, after completing the questionnaires on Qualtrics there was a link to Inquisit to complete the IAT. The following materials were given to the participants;

consent form, information sheet., demographics, questions about work and religious beliefs /Christmas / New Year, (to ensure that the participants fitted the criteria for the study) (Appendix 24), optimism IAT (Appendix 29), LOT- R (As previous research suggests that dispositional optimism has been the most popular measure used within positive psychology (Jiang, 2014) and was the only measure found in the systematic review in chapter 5) and DASS ( to investigate any increases to well-being) (Appendix 25). The English and Japanese versions of the LOT-R and DASS were found to be reliable and valid in both languages (Zlomke, 2009; Sumi, 2004), see chapter 2, section 2.2.1.1.2).

#### 6.7.4 Intervention

The participants were randomly assigned one of the three intervention groups.

The three interventions are described below:

- 1) Acts of kindness to others – Perform an act of kindness to another person every day for three weeks over the Christmas and New Year period. Then the participants were asked to write down the act at the end of the day.
- 2) Acts of kindness to one's self - Implement an act of kindness to themselves every day for three weeks over the Christmas and New Year period. Then the participants were asked to write down the act at the end of the day.
- 3) Control group (The control group was asked to fill in the pre, post and follow up measures, but not to complete any intervention. They were being given the opportunity to do the interventions at the end of the study if they wish to do them, but no data was collected from the interventions they complete).

#### 6.7.5 Procedure

An email invitation was sent to English and Japanese potential participants, with a link to Qualtrics software to express their interest in the intervention. Potential participants that expressed an interest, were randomly assigned an intervention group (acts of kindness to one's self, acts of kindness to others or the control group), were emailed a link to Qualtrics with information about the designated intervention, consent form, demographics and baseline questionnaires (Appendix 24).

The English participants were given a further link to the IAT to complete at every time point. However, the Japanese participants were not given the IAT as a Japanese's version of the optimism IAT has not been tested for reliability and validity, consequently, the Japanese's participants were not given the IAT.

All participants were asked to fill in the questionnaires at baseline, time 1 (week three) and follow up (1 month after), please see figure 6.1 for the Participation Schedules.

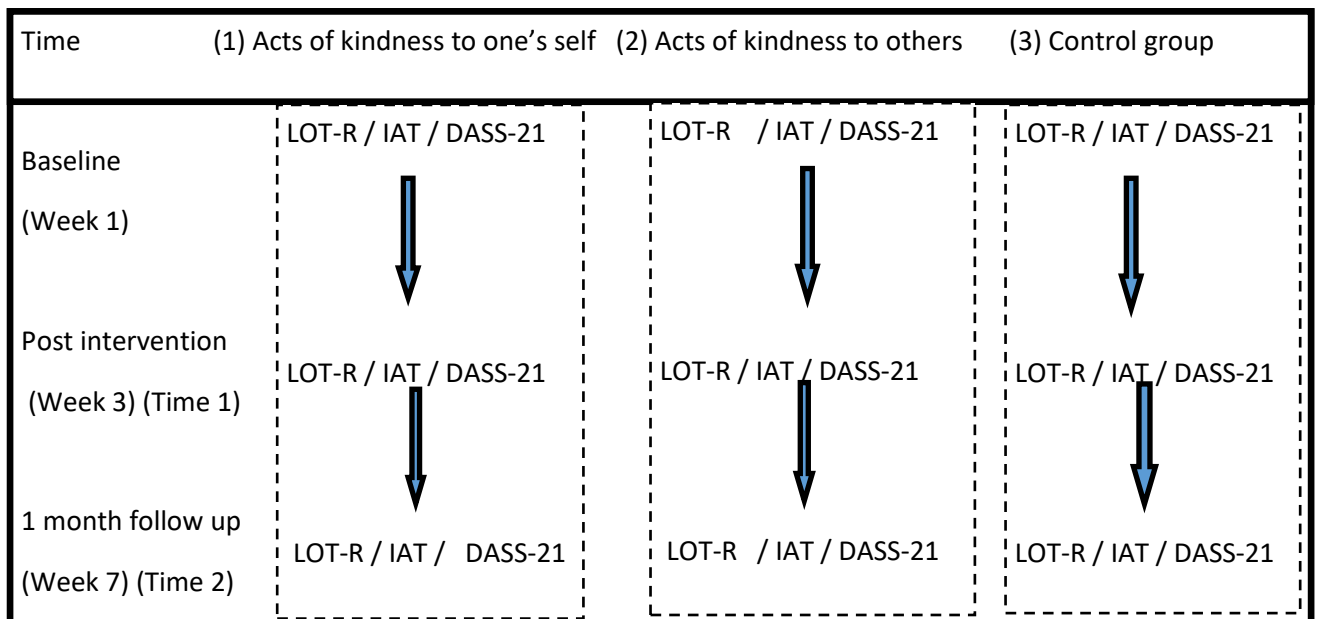


Figure 6-1: Participation Schedules for participants for Interventions and Control Group



### 6.7.6 Dropout rates

Originally, 24 participants were recruited for the study. Of these, 20 were included in the final analysis. The reasons for drop out are shown in Table 6.2.

Table 6.2: Reasons for drop out of the study

Detail of inclusion or removal	Number of participants
Completed the first questionnaire and gave consent	N=2
Did not respond after the first contact	N=1
Did not meet inclusion criteria	N=1

### 6.8 Analytic strategy

This pilot study compared two positive psychology interventions with a control group on a measure of optimism and well-being. Firstly, the normality of the data was examined by eyeballing boxplots and histograms, skewness and kurtosis were examined. The Z scores were examined and lay inside the +/- 1.96 criterion for a small sample size (Field, 2014). All of the variables were normally distributed, therefore allowing the use of parametric testing.

To investigate any time or group differences between LOT-R, DASS-21, a one-way Multivariate Analysis of Variance (MANOVA) was used. Furthermore, to help to protect from making Type 1 errors several analyse of variance (ANOVAs) were conducted on the dependent variables. Five one-way repeated measures ANOVA's were then conducted to investigate whether optimism (LOT-R optimism/pessimism) and wellbeing (DASS-21 Depression/Anxiety/Stress) where there were differences, t-tests were used to examine them.

### 6.9 Results

Table 6.3 showed the descriptive statistics and mean differences for Dass-21 (Depression, Anxiety, Stress), LOT-R (Optimism/Pessimism), IAT (Optimism/Pessimism) during baseline, time one and follow up on the three interventions.

Table 6.3: Descriptive statistics on baselines, time one and follow up and three positive psychology interventions for DASS-21, LOT-R and IAT scores

		Mean	Differences (+/-) From baseline to time one and from time one to follow up
Measures	Time Points		
DASS 21 -Depression			
Acts of kindness to self- intervention	Baseline	2.34	+0.091
	Time 1	2.22	+0.388
	Follow up	1.83	
DASS 21 -Depression Acts of kindness to others intervention	Baseline	1.90	
	Time 1	1.87	+0.037
	Follow up	1.97	-0.105
DASS 21 -Depression Control group	Baseline	2.43	
	Time 1	2.45	+0.013
	Follow up	2.22	+0.228
DASS 21 –Anxiety Acts of kindness to self- intervention	Baseline	2.12	
	Time 1	2.12	-0.001
	Follow up	1.60	+0.517
DASS 21 –Anxiety Acts of kindness to others intervention	Baseline	1.96	
	Time 1	1.71	+0.25
	Follow up	2.08	-0.37
DASS 21 –Anxiety Control group	Baseline	2.10	
	Time 1	2.13	-0.033
	Follow up	2.17	-0.036
DASS 21 -Stress			
Acts of kindness to self- intervention	Baseline	3.02	
	Time 1	3	+0.02
	Follow up	2	+1
DASS 21 -Stress Acts of kindness to others intervention	Baseline	2.57	
	Time 1	2.01	+0.562
	Follow up	2.01	+0.002

DASS 21 -Stress	Baseline	2.58	
Control group	Time 1	2.63	-0.056
	Follow up	2.03	-0.605
LOT-R- Optimism	Baseline	7.14	
Acts of kindness to self- intervention	Time 1	7	+0.142
	Follow up	6.71	+0.285
LOT-R- Optimism	Baseline	7.14	
Acts of kindness to other intervention	Time 1	7	+0.142
	Follow up	6	+1
LOT-R- Optimism	Baseline	6.83	
Control group	Time 1	7	-0.166
	Follow up	5.33	+1.66
LOT-R – Pessimism	Baseline	6.85	
Acts of kindness to self- intervention	Time 1	6.57	+0.28
	Follow up	3.57	+3
LOT-R – Pessimism	Baseline	8.57	
Acts of kindness to others intervention	Time 1	8.14	+0.42
	Follow up	9	-0.85
LOT-R – Pessimism	Baseline	9.83	
Control group	Time 1	8.66	+1.16
	Follow up	7.83	+0.83

---

English participants (N=6)

D scores

IAT – Optimism	Baseline	-1.53	
Acts of kindness to self- intervention	Time 1	-1.52	+0.01
	Follow up	-1.44	+0.08

IAT – Optimism	Baseline	-1.62	
Acts of kindness to other	Time 1	-1.75	+2.84
intervention	Follow up	-1.54	+0.21
IAT – Optimism	Baseline	-1.5	
Control group	Time 1	-1.54	-0.04
	Follow up	-1.5	+0.04
IAT –Pessimism	Baseline	0.84	
Acts of kindness to self-	Time 1	0.95	-0.11
intervention	Follow up	0.77	+0.18
IAT –Pessimism	Baseline	1.14	
Acts of kindness to others	Time 1	1.03	+0.11
intervention	Follow up	0.59	+0.44
IAT –Pessimism	Baseline	-0.37	
Control group	Time 1	-0.17	+0.2
	Follow up	-0.04	+0.13

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### 6.9.1 Main analysis

Statistical analysis (MANOVA) revealed no significant interactions between LOT-R, DASS-21 and the three interventions; acts of kindness to one's self, acts of kindness to others and the control group. There were no significant multivariate effect for baseline, time one and follow up, with a large effect size ( $F(30,6) = 1.179, p = 0.457, \text{Wilks' Lambda} = 0.21, \text{partial } \eta^2 = 0.855$ ). However, subsequent analysis (ANOVA) of each dependent variables indicated no significant difference between time or group interaction for any of the measures (see table 6.4).

#### 6.9.1.1 LOT-R optimism and pessimism results

There was no significant interaction effect for time of intervention for the LOT-R optimism, with a very small effect size (Table 6.4). Indicating that there was no difference between baseline, time one and follow up and the three interventions (acts of kindness to one's self, acts of kindness to others and control group). There was no significant interaction effect for time of intervention for the LOT-R pessimism, with a

small effect size. This indicated that there was no difference between baseline, time one and follow up and the three interventions (acts of kindness to one's self, acts of kindness to others and control group). (Please see table 6.4). Figures 6.2 and 6.3 show the estimated means between the three time points (baseline, time one, follow up) and interventions.

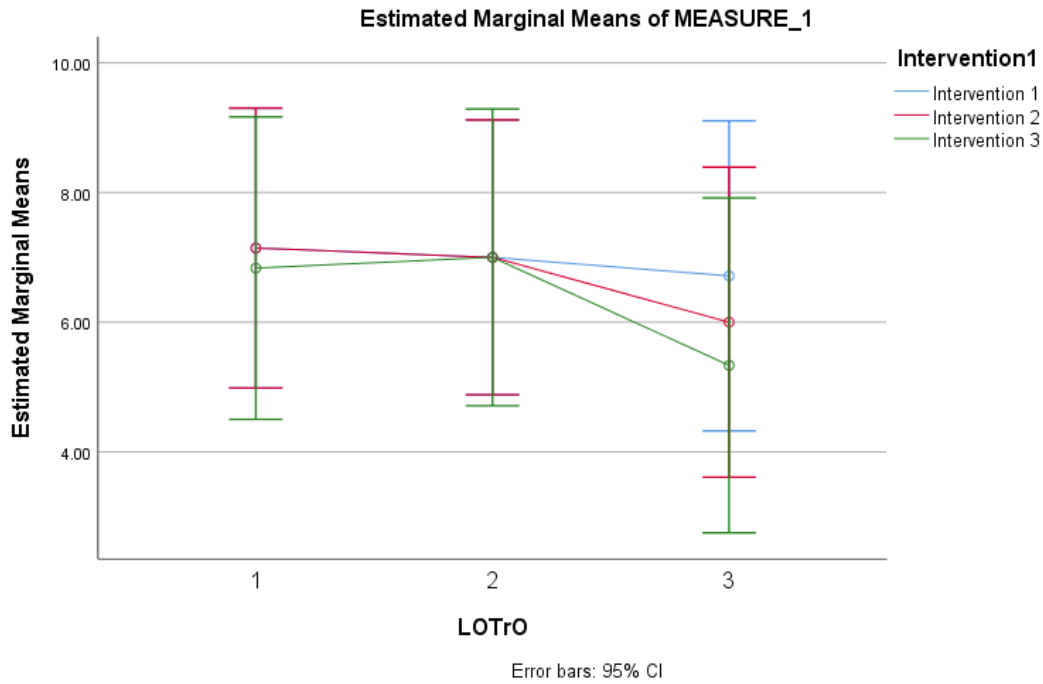


Figure 6-2: showing the three interventions for the LOT-R optimism scores

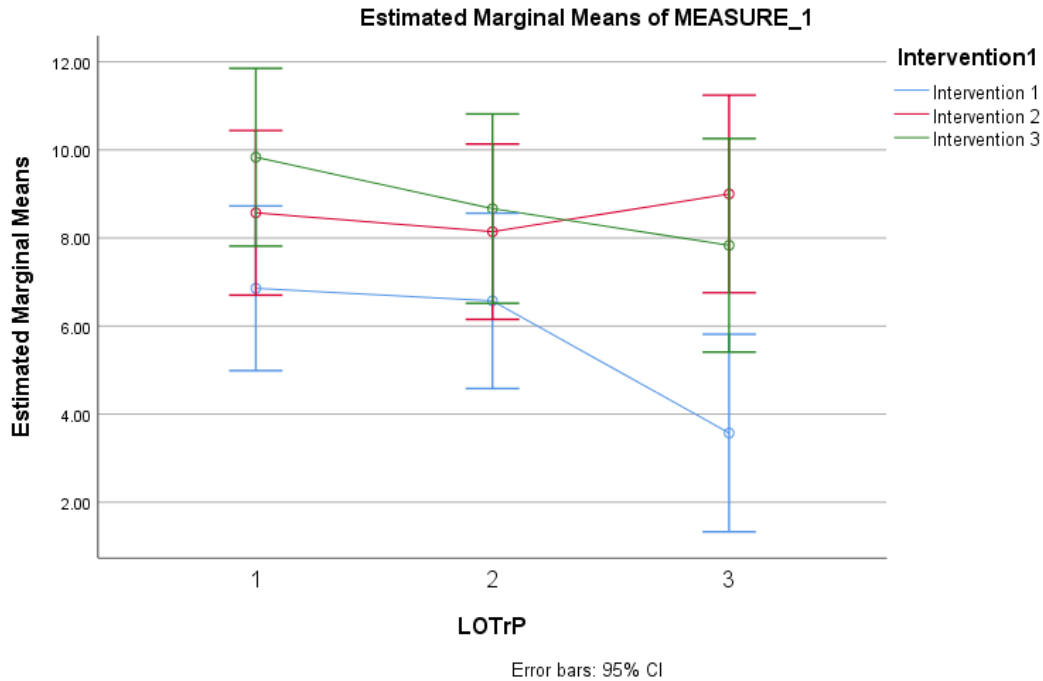


Figure 6-3: showing the three interventions for the LOT-R pessimism scores

#### 6.9.1.2 DASS-21 Depression, Anxiety and Stress results

There was no significant interaction effect for time of intervention for the DASS-21 depression, with a small effect size (Table 6.4). Indicating that there was no difference between baseline, time one and follow up and the three interventions (acts of kindness to one’s self, acts of kindness to others and control group). There was no significant interaction effect for time of intervention for the DASS-21 Anxiety, with a small effect size. Indicating that there was no difference between baseline, time one and follow up and the three interventions (acts of kindness to one’s self, acts of kindness to others and control group). There was no significant interaction effect for time of intervention for the DASS-21 Stress, with a small effect size. Indicating that there was no difference between baseline, time one and follow up and the three interventions (acts of kindness to one’s self, acts of kindness to others and control group). (Please see table 6.4). Figures 6.4, 6.5 and 6.6 show the estimated means between the three time points (baseline, time one, follow up) and interventions.

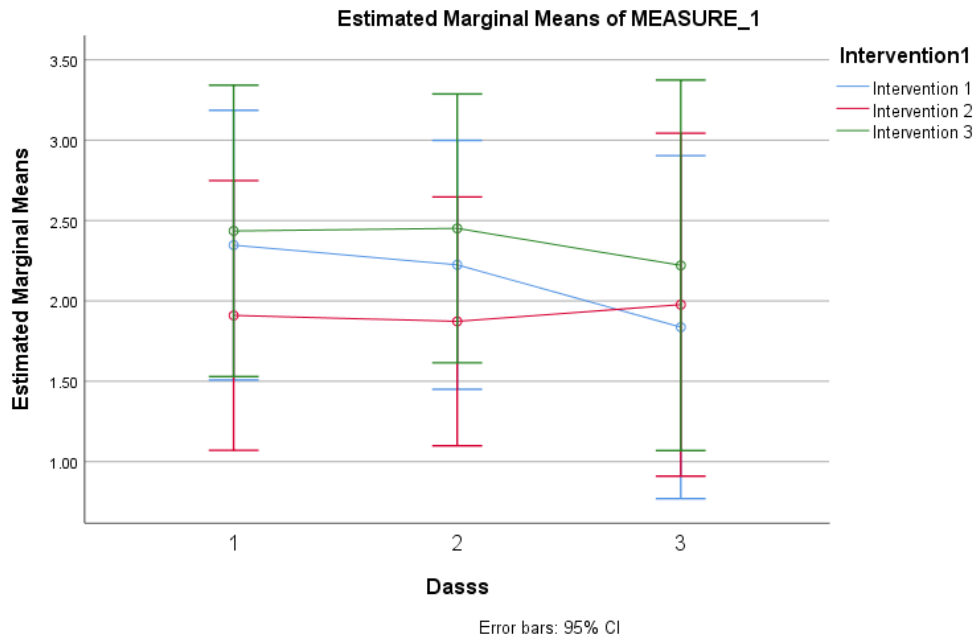


Figure 6-4: showing the three interventions for the DASS-21 depression scores

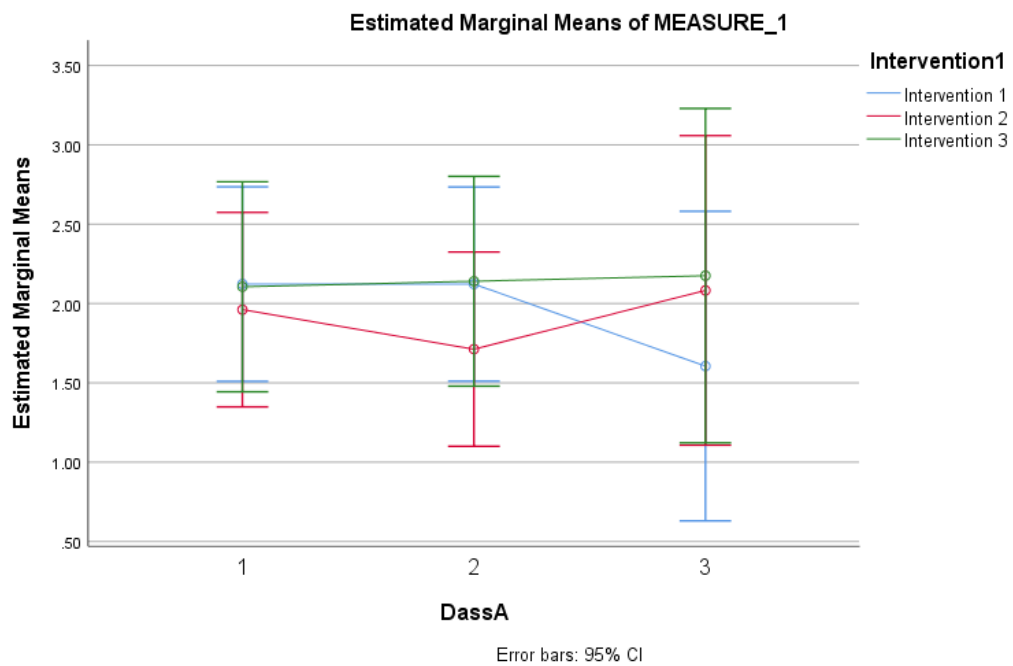


Figure 6-5: showing the three interventions for the DASS-21 anxiety scores

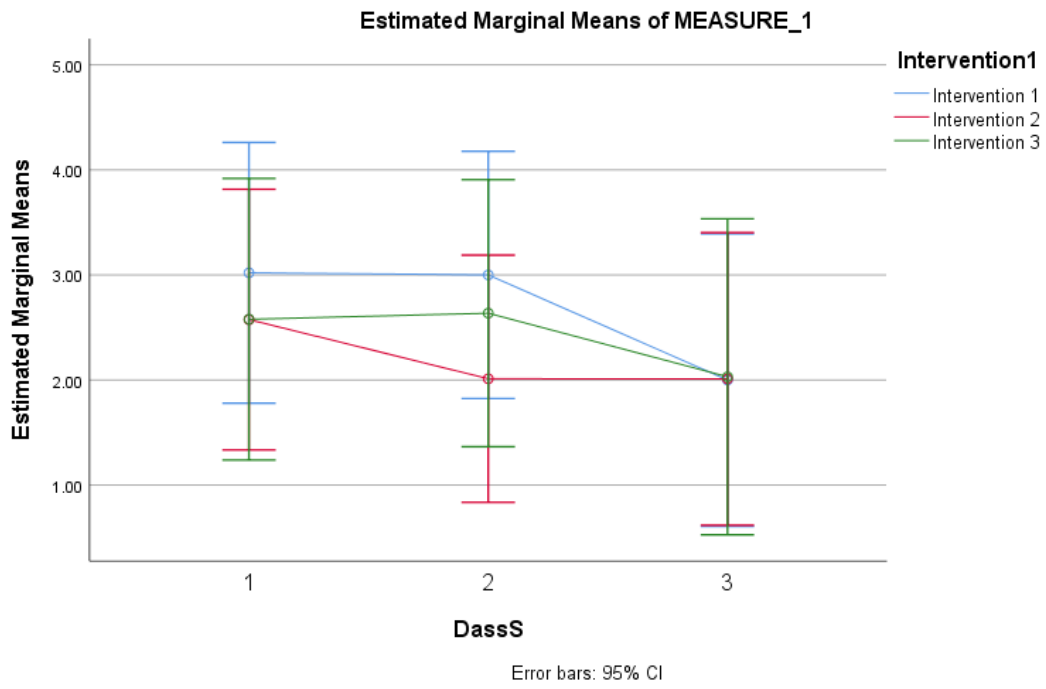


Figure 6-6: showing the three interventions for the DASS-21 stress scores



Table 6.4: Testing the differences between baselines, time one and follow up and three positive psychology interventions for DASS-21, LOT-R and IAT scores.

	Interventions	N	Types of significance score	Significance	Effect size (Partial $\eta^2$ )
	1) Acts of kindness to self intervention				
	2) Acts of kindness to others intervention				
	3) Control group				
<hr/>					
Measures					
DASS 21 - Depression	1	n=7	group and time	F(4,32)= 1.70, p= 0.173	0.176
	2	n=7			
	3	n=6			
DASS 21 – Anxiety	1	n=7	group and time	F(4,32)= 0.992, p=0.426	0.110
	2	n=7			
	3	n=6			
DASS 21 -Stress	1	n=7	group and time	F(4,32)=1.223, p=0.321	0.133
	2	n=7			
	3	n=6			
LOT-R- Optimism	1	n=7	group and time	F(4,32)=0.390, p=0.814	0.045
	2	n=7			
	3	n=6			

LOT-R – Pessimism	1	n=7	group and time	F(4,32)=11.50, p=0.226	0.158
	2	n=7			
	3	n=6			
IAT – Optimism	1	n=3	group and time	F(6,8)=0.190, p=0.971	0.125
	2	n=3			
	3	n=3			
IAT –Pessimism	1	n=3	group and time	F(6,8)=4.204, p=0.033	0.759
	2	n=3			
	3	n=3			

---

### 6.9.2 Sample size for a future explicit study -G Power

According to GPower (Faul, Erdfelder, Lang, & Buchner, 2009) on a Post hoc power analysis for the effect size with a sample size of 35, a critical F= 2.41 score would be needed (Shown in figure 6.7).

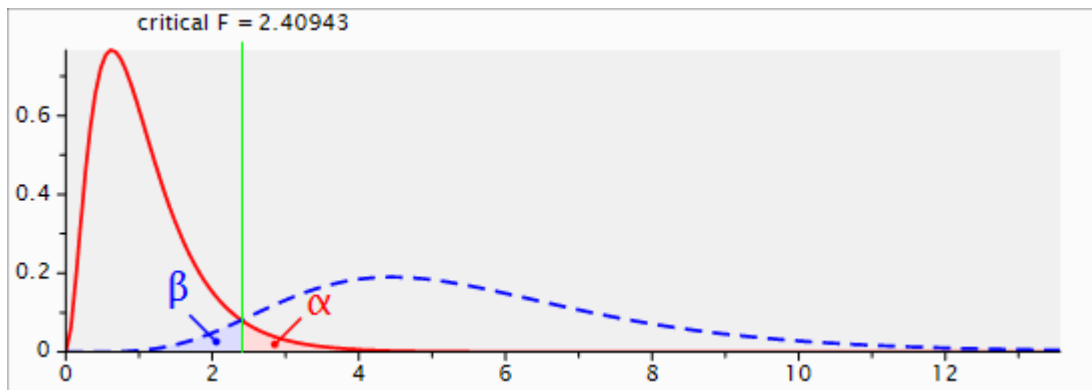


Figure 6-7: showing the effect size needed for future explicit measure studies

## 6.10 IAT D score Results

Once the data was screened and 51 of incorrect responses were deleted. The trials with reaction times shorter than 300ms were and longer than 3000ms were removed (Greenwald et al, 2009). Descriptive data are shown in table 6.5. For the purpose of this study into optimism and pessimism IAT, an ANOVA was conducted.

The normality of the data was examined by eyeballing boxplots and histograms, skewness and kurtosis were examined, and lastly the z scores. The histograms and boxplots showed generally normal distribution, but the data did show some outliers. These outliers were identified in 'optimism/self' baseline (8) and time 1 (9), 'pessimism/self' time 1 (8). The Z scores were examined and they all lay inside the +/- 1.96 criterion for a small sample size (Field, 2014) (see table .6.6). Therefore, the data were shown to be normally distributed.

Table 6.5: Mean IAT D scores as measures of optimism

	Optimism mean D scores	Pessimism mean D scores
Baseline	-1.55	0.535
Time 1	-1.54	0.605
Follow up	-1.49	0.44

Table 6.6: Skewness and Kurtosis (Divided By SE) of IAT

	Optimism				Pessimism			
	Skew	Kurt	Zskew	Zkurtosis	Skew	Kurt	Zskew	Zkurtosis
Baseline	0.877	1.182	1.22	0.844	-0.803	-0.987	-1.119	-0.705
Time 1	0.721	1.400	0.99	1.03	-1.040	-0.391	-1.450	-0.279
Follow up	-0.65	-0.571	-0.509	-0.407	-0.762	-0.587	-1.062	-0.419

Statistical analysis (ANOVA) revealed no significant interactions between the three time points and the three interventions; acts of kindness to one's self, acts of kindness to others and the control group. There were no significant multivariate effect for baseline, time one and follow up, with a large effect size ( $F(12,2) = 3.111$ ,

$p=0.269$ , Wilks' Lambda =0.003, partial  $\eta^2 = 0.949$ ). However, subsequent analysis (ANOVA) of each dependent variables indicated no significant difference between time or group interaction for any of the measures (see table 6.4).

### 6.10.1 Sample size for a future implicit study (G Power)

According to G Power (Faul, Erdfelder, Lang, & Buchner, 2009) on a Post hoc power analysis for the effect size with a sample size of 36, a critical F= 2.14 score would be needed to get significant results (Shown in figure 6.8).

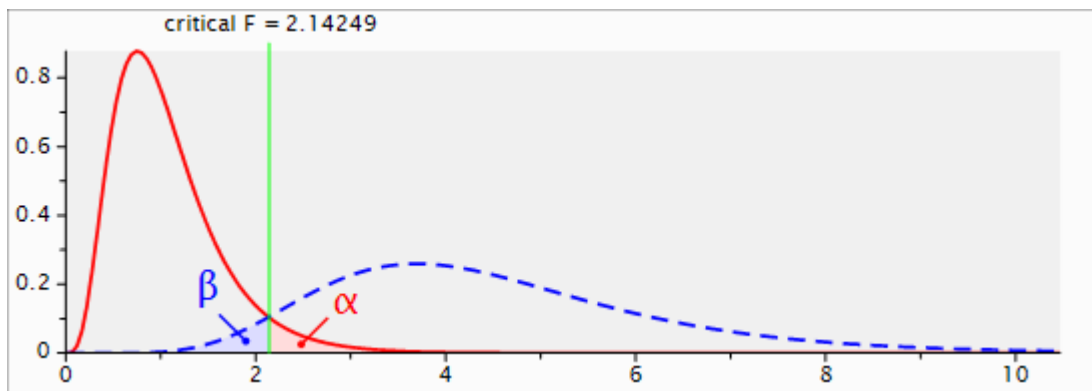


Figure 6-8: Showing the sample size needed for an implicit PPI intervention in future studies

### 6.11 IAT and LOT-R (Implicit and Explicit) Results MANOVA

Statistical analysis (MANOVA) revealed a significant interaction between LOT-R, IAT and the three interventions; acts of kindness to one's self, acts of kindness to others and the control group. There was significant multivariate effect for baseline, time one and follow up, with a large effect size ( $F(12,2)= 28.45$ ,  $p=0.034$ , Wilks' Lambda=0.00, partial  $\eta^2= 0.994$ ). These results suggest a significant difference the intervention groups, baseline and time one.

#### 6.11.1 Sample size for a future implicit and explicit study (G Power)

According to G Power (Faul, Erdfelder, Lang, & Buchner, 2009) on a Post hoc power analysis for the effect size with a sample size of 34, a critical F= 2.16 score would be needed for a further study (Shown in figure 6.9).

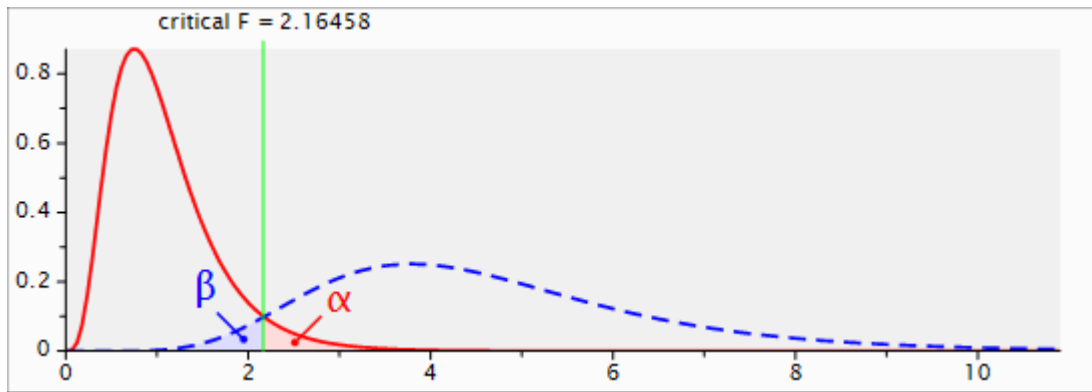


Figure 6-9: Showing the sample size needed for future studies with implicit and explicit measures for PPIs

## 6.12 Discussion

### 6.12.1 Summary of results

This feasibility pilot study suggests that by increasing the sample size to thirty-four participants for implicit and explicit measures, the study would, therefore, become feasible. The findings also suggested that there was no difference between the intervention groups and control group, furthermore, no differences were found between baseline, time one and follow up for most of the measures. However, the IAT for 'pessimism and self' found a significant difference between the intervention groups and control group; additionally, a difference was found between baselines, time one and follow. The none significant findings may be due to the small sample size, as the effect sizes for each measure show a medium to large relationship and this suggests that the results are promising if a larger study was implemented. The hypothesis that there would be a difference between the interventions has not been accepted, as the differences between the interventions over time and type of intervention showed very weak to none-significant results.

### 6.12.2 Comparison with previous chapters

The findings of the IAT were within a similar range within each study/chapter, apart from the pessimism IAT scores in the control group in this chapter. The scores in this group in this chapter showed a negative D score, whereas the previous pessimism IAT D scores were positive in the other chapters. These different findings may be due to different participant groups; for example, participants in chapters 3 and 4 were university students whereas chapter 6 participants were working adults. However,

the small sample size in this chapter may have lead to an anomalous sample with different scores; increasing the sample size in this study may give different findings.

### 6.12.3 Comparison with the literature

Research has found that PPIs are a useful tool to increase, happiness, well-being and optimism (Sin, 2009; Seligman, 2011). The relationship between implicit and explicit optimism and two positive psychology interventions and a control group have been investigated.

Conversely, the findings in this chapter may be in accordance with a systematic review by White (2019) and this review found that the effectiveness of the PPIs are much smaller than previously reported. Hence, this study finding none significant results may be due to the interventions not being effective over time. In the systematic review by White (2019), the aim was to re-analyse two of the most cited meta-analysis that examined the effectiveness of PPIs, Sin and Lyubomirsky (2009) and Bolier et al. (2013). This was due to White finding flaws in the analysis within the two most cited meta-analysis. One of the biggest flaws suggested was that the meta-analysis did not account for small sample size bias. Small sample size bias occurs when larger effects are reported by smaller studies compared to larger study and these can show less precise findings. The small size bias may be a consequence of publication bias, furthermore, significant results are more likely to be published compared to non-significant results and this is not dependant on sample size (Hedges, 1989). White (2019) and Morris (2008) suggested that small sample size becomes a problem in a meta-analysis, as different methods are implemented to overcome the bias. Once the small sample sizes were taken into account in White's review, the effectiveness of the interventions were found to be much lower. The findings suggest that the PPIs significantly increase well-being, but only with a small effectiveness (approximately  $r=0.10$ ). Furthermore, depression was found not to be significantly lowered by the PPIs within the two most cited meta-analyses. White (2019) further suggested that increasing sample sizes in the PPIs studies would give a greater insight into the effectiveness. While the effect size and sample size have to be viewed with caution, the effect size calculations in this study suggest that this is a feasible intervention and that the kindness interventions may show significant effectiveness in a trial with a larger sample size.

### 6.12.3.1 Kindness interventions

Act of kindness interventions have been found to significantly improve an individual's well-being (Curry et al., 2018; Holliday, Ward, & Awang, 2016) and the effect size findings in this study suggest a potential of being an effective intervention. The descriptive statistics suggest a promising trend between the acts of kindness to others and the intervention being effective over time. These findings would support Nelson (2016) who found through a six-week intervention that both self-oriented and prosocial behaviour increased wellbeing compared to the control group. Further supporting the results in this study was research by Sanín-Posada, Soria, and Vera-Villaroel (2018) who found that acts of kindness to others increased individual's optimism and happiness in a one-week intervention.

Additionally, the findings in this study suggest from the descriptive statistics that explicit optimism using the LOT-R trended towards increasing optimism with the acts of kindness to one's self interventions. These findings are supported by both Smeets (2014) and Rizzato and Murphy (2014) that found optimism was increased when an act of kindness to one's self was implemented. Additionally, a significant difference was found between the different interventions (acts of kindness to self, acts of kindness to others and the control group) for the pessimistic IAT. These findings are promising and suggest that doing a further study, building on this pilot study, would be feasible. The significant difference shows that the interventions are measuring differences between the different interventions for pessimistic IAT. In summary, the acts of kindness interventions to one's self and others are shown to be promising and increasing the sample size would be beneficial.

### 6.12.4 Limitations and suggestions for future research

This study had a number of overall limitations to the method and these could be improved in further research. The size of the sample for this study was small, although this was a pilot study to explore the feasibility, therefore, this study has found that increasing the sample size to around 35 participants would have strengthened the findings. The small sample size was a limitation to understanding the effectiveness of the Kindness PPIs, however, this feasibility study's sample size was on previous researchers' recommendation that a sample should be 10% of the larger study (Connelly, 2008; Treece & Treece, 1982). That being said, the sample



size in this study was small and a larger sample would strengthen the findings; the findings in this study suggest a larger study would be feasible. The non-significant findings were similar to Miller and Duncan (2015) who also conducted a pilot randomised control trial PPI for two different interventions and was interested in any differences compared to the control group. However, there is a need to be cautious when interpreting the findings of these PPI studies as there is a wide variation between PPIs. Moreover, there is a wide variation between PPIs within research and there is no fixed agreement to what represents a PPI (White, 2019). Additionally, the wide variation has an impact on the assessment of the effectiveness of the PPIs and this makes it difficult to make a definite comparison between PPIs (Kletter, Harris, & Brown, 2021). As the study was a pilot study, the results showed not to be significant between the groups. However, the findings suggest a trend towards reduced distress in all the conditions, therefore, increasing sample size may have investigated the effectiveness of the interventions further.

In addition, the implicit sample was relatively smaller compared to the overall study. The IAT findings in this chapter has built upon the previous findings in chapter 3 into whether the IAT is measuring mood or emotion. The findings support chapter 3's results and suggest that the IAT may be measuring an emotion rather than a mood. As emotions are considered to be shorter term and maybe more intense, and the results in this chapter suggesting a weak relationship between the time points. Furthermore, the findings may suggest that the IAT may be measuring the increased optimism emotion from the effectiveness of the PPIs. These findings could further support that optimism may be a short term 'state' rather than a personality trait. For future research, replicating this study with a larger sample size would help to explore the optimism implicit explicit relationship further and the effectiveness of the kindness PPIs.

One of the limitations of this study was that the control group did not do an intervention, this allowed the control group to know that they were in the control group. The knowledge that they were in the group control could have affected their results and they may have reported different results in the explicit measures. However, the IAT should have not been influenced by the knowledge of the intervention or control groups, as it overcomes social desirability. Future research

could have a control group to an activity that was not a PPI to examine the effectiveness with a larger sample size.

A further limitation that could have affected the findings in this study was cultural differences; Japanese (Eastern culture) and English (Western culture). These cultures were chosen because of their differing cultural attitudes and traditions, as English culture generally focuses on Christmas and Japanese culture generally focuses on New Year (Stanlaw, 2004). Therefore, the interventions were conducted over Christmas and New Year time period to investigate the effectiveness. However, these cultures could have affected the findings, as the different interventions may have influenced one culture more than others. As previously discussed, the Japanese culture is more of a collectivistic society (interdependent self-construal) (Ogihara, 2017) and the acts of kindness to others may not have had such a big impact on their wellbeing and optimism. This may be due to the culture of Japan valuing the group or community over the individual self. Therefore, would a greater increase to well-being and optimism be found in the acts of kindness to one's self intervention, as this is different from their usual culture. In contrast, the English culture is more individualistic (independent self-construal) and focuses more on the individual goals and rights (Lewandowska-Tomaszczyk & Wilson, 2014). Therefore, a greater increase to wellbeing and optimism may be found in the acts of kindness to others intervention, as their culture is usually more individualistic. However, some researcher have suggested that self-construal is multi-dimensional and is broader than independent and interdependent (Oyserman, Coon, & Kemmelmeier, 2002) and this could be investigated further in Japanese and English acts of kindness PPI study. Therefore, a future study could explore the relationship and differences between Japanese and English cultures, and the different kindness interventions.

Finally, the study in this chapter investigated dispositional optimism, as this was the most frequently used measure in positive psychology according to the systematic review in chapter 5. However, a study by Zhang (2014) found that dispositional optimism and attributional styles both correlated with subjective wellbeing. Therefore, a further study could investigate dispositional optimism and attributional style, compared any differences to the PPIs and further investigate the relationship between dispositional optimism and attributional style optimism.

### 6.13 Conclusion

The final study was a feasibility pilot study of twenty participants in two different kindness positive psychology interventions and a control group; acts of kindness to one's self and acts of kindness to others. Although the findings in chapter 6 were found to be non-significant, the effect size shows that increasing the sample size to around 35 participants would give significant results (Faul, Erdfelder, Lang, & Buchner, 2009).

## **Chapter 7: General discussion of thesis findings and future direction**

The final chapter presents a brief overview of the thesis, details of each chapter's findings, aims, thesis limitations and methodological reflection, unique findings and future directions. The three aims of this thesis were to, firstly, create an optimism implicit association task (IAT) and to investigate the relationship between implicit and explicit measures of optimism. Secondly, to investigate the relationship between implicit and explicit measures of optimism and examine their changes using positive psychology interventions. The third aim of this thesis was to explore if optimism is changeable over time. To achieve this aim, this thesis had six objectives: (a) to create a valid and reliable implicit association test (IAT) for optimism, (b) to investigate the relationship between one explicit self-report questionnaire and two implicit tasks, (c) to examine the factor structure of optimism, (d) to examine the factor structure of optimism, within optimism IAT and explicit questionnaires, (e) to conduct a systematic review that investigates (using the PRISMA checklist) optimism and PPIs in the workplace, and (f) to examine if a pilot PPI increases optimism and are sustainable over time, using implicit and explicit measurements of optimism in an English and Japanese working population. This thesis addressed the aims by investigating the relationship implicit and explicit measures of optimism, and examining these concepts using PPIs.

The overall focus of this thesis was implicit and explicit optimism, and the effectiveness of PPIs in a working population. Being optimistic has been found to have many benefits to individuals, such as better psychological adjustment to a variety of stressors, such as physical health, cardiovascular disease, immune system, chronic pain, cancer and AIDS (Räikkönen, Matthews, Flory, Owens, & Gump, 1999; Reed, Kemeny, Taylor, Wang, & Visscher, 1994; Scheier et al., 1989), better performance socially and academically (Demetriou & Schmitz-Sciborski, n.d.; Solberg Nes, Evans, & Segerstrom, 2009), decrease stress and less likely to burnout (Chang, 2000), better mood, coping and stronger immunity in response to stress (Segerstorm, 1998), increased problem solving (Chang, 1996). Therefore, when optimism levels are increased research suggests that it can be highly beneficial for

an individual, PPIs have been found in previous studies to be effective at increasing optimism and well-being (Seligman, 2005). Therefore, effective PPIs in a working population would be of great value. One of the main theories of positive psychology is PERMA (Seligman, 2011); within this thesis, the focus was on the P for positive emotions, as PPIs can provoke a feeling of joy associated with past experiences, an optimistic view of the future, and an appreciation of the value of the present (Seligman, 2011). Chapter 6's study investigated the effectiveness of increasing well-being and optimism. The findings suggest a promising similarity to previous studies on the effectiveness of PPIs to being able to effectively increase well-being and optimism (Boehm, Lyubomirsky, & Sheldon, 2011; Mongrain, Anselmo-Matthews, & Anselmo Matthews, 2012; Mongrain, Chin, & Shapira, 2011; Sergeant & Mongrain, 2011; Shapira & Mongrain, 2010).

However, the measurements to assess the effectiveness of the PPIs have only been investigated using explicit measures. Implicit and explicit techniques have been investigated together in a number of other different measures. Implicit optimism has previously been investigated using different methods, such as the Stroop task (Karademas et al., 2007) and VPT (Fox, 2008). Implicit measures have been suggested to overcome biases, such as social desirability, and researchers have argued that individual responses are automatic, intuitive, routine or impulsive compared to explicit measures that are more conscious and controlled (Greenwald, Nosek, & Banaji, 1998). Therefore, within this thesis, the relationship between implicit and explicit measures was explored and compared to investigate the effectiveness of the PPIs increasing optimism. Additionally, implicit optimism measures were examined for their similarity to explicit measures.

Further insight into the implicit measure, the IAT implicit measure has been used to investigate many different topics and has been found to be a reliable tool (Nosek, Banaji, & Nosek, 2001). Therefore, within this thesis, the first optimism IAT was developed and its reliability and validity were examined. The optimism IAT was also investigated in a real-world application in the working population. The chapters and studies investigated the reliability and validity of the optimism IAT.

To date, the understanding of optimism has been dominated by explicit self-report methods, and as previously discussed there may be limitations to explicit self-report

methods (Karademas, Kafetsios, & Sideridis, 2007; Greenwald, 1998; Segerstrom, 2001). Implicit measures are believed not to rely on introspection to create a response (Greenwald, 2000). Therefore, within chapter 3, two implicit measures were developed - IAT and VPT.

Chapter 3 demonstrated that there were no significant relationships between implicit and explicit optimisms, supporting previous research that suggests that explicit and implicit measures are only conceptually linked and are different constructs (Wilson et al, 2000). The additive model (Karpinski & Hilton, 2001) also suggests that they are different constructs, suggesting that implicit and explicit measures are separate. The model describes the concept as an iceberg with the conscious explicit attitudes, personalities or beliefs at the top and implicit attitudes, personalities or beliefs at the bottom (Karpinski & Hilton, 2001). Conversely, the lack of significant relationships between implicit and explicit measures may show that the implicit measures are overcoming biases, such as social desirability and demand characteristics bias that the explicit measure may be susceptible to (Rosenthal & Rosnow, 2009; Greenwald, 2001).

Not only did the findings suggest no relationship between implicit and explicit optimism, but there was also a limited relationship found between the implicit measures. These findings may be explained that that the attentional bias may fluctuate over the task or over longer time periods (Zvielli et al., 2015), and the findings in this thesis could suggest that implicit optimism may fluctuate. These findings could also support the argument that optimism is a state and changes over days, weeks or months (Kluemper, 2009). Furthermore, the implicit optimism tool may suggest that optimism may be an emotion rather than a longer lasting mood.

The implicit and explicit measures individually were found to be more reliable. The dispositional optimism measure showed good internal consistency reliability; however, the findings suggested that the relationship between optimism and pessimism was positive. This explicit positive relationship supports the Metacognitive Theory (Wells, 2000), as individuals may have different metacognitions for optimism and pessimism and consider them as different constructs, each serving as an adaptive coping strategy and so having a level of optimism and pessimism is an adaptive quality. Therefore, this suggests that individuals can be optimistic and

pessimistic at the same time (Herzberg, 2006) and having the metacognitive beliefs about optimism and pessimism may influence how individuals answer the LOT-R questionnaire.

The implicit VPT findings in chapter 3 showed to be good internal consistency at time one, these findings were in accordance with previous research by Christiansen, Mansfield, Duckworth, Field, and Jones, (2015). However, this was not found at time two. These findings may be due to the EFA indicating that the IAT has two factors instead of one, showing that the IAT is not just measuring one thing, therefore, presenting that the IAT is measuring two different constructs. As the factor structure showed two separate measures for time one, there is a need to do further work to investigate the EFA factors and the individual factors internal consistency. The EFA IAT factors need to be examined at time one and two to see if any items need to be removed at time two or if the individual factors need to be examined further or changed. This further work helped to further explore the unacceptable internal consistency at time two. Additionally, this measure had a number of limitations in the study, including the stimuli used, and changing these may have provided different findings. The findings in this thesis did not corroborate previous findings by Fox (2008), who found a strong attentional bias to optimism using the VPT. However, due to the lack of significant results in this study the VPT was not used in any following studies in this thesis.

One of the aims of this thesis was to investigate the reliability and validity of the optimism IAT, the results in chapter 3 were promising and suggest that the measure could be reliable and valid. The validity of the IAT was explored using Known-group validity and this was found to be good, as the results support the findings by Hinz et al. (2017) and Schou-Bredal et al. (2017). The IAT results in chapter 3 suggest the implicit optimism is a short-term emotion rather than a longer lasting mood. Furthermore, the short-term emotion could also interlink with optimism being a short term 'state' rather than a longer-term personality term. Lastly, this chapter explored the constructs of implicit optimism and found that optimism and pessimism are separate constructs and should be considered as separate two-dimensional constructs.

Therefore, this chapter 3 concluded that implicit and explicit optimism are separate constructs and optimism and pessimism are separate constructs. Therefore, further exploring of these constructs would be necessary. Overall, the findings in chapter 3 led to chapter 4 and the need to investigate what the constructs of optimism are and if implicit and explicit optimism are the same constructs.

The constructs of optimism were explored in chapter 4, the current arguments of optimism. The two main optimism theories are dispositional optimism and explanatory style optimism (Seligman, 2008). Dispositional optimism is the optimistic belief that good things will happen, this belief and expectations are generally in all elements of life (Carver et al., 2010). The Explanatory style optimism approach suggests that individuals react to their optimistic or pessimistic tendencies in daily life to explain the events that are happening to them; how they describe themselves or their situation either optimistically or pessimistically is their explanatory style (Forgeard & Seligman, 2012). Many researchers suggest that these two theories are only linked theoretically (Scheier and Carver, 1992) and they concern different constructs, which is supported by the findings in chapter 4. Chapter 4 found from an EFA that dispositional optimism and explanatory style optimism are two separate factors and different constructs.

Furthermore, the optimism dimensions have been an argument within the literature and this thesis further investigated the dimensions with an EFA. Additionally, the implicit and explicit constructs were further investigated with the EFA in chapter 4. The results indicated that optimism and pessimism are two-dimensional and separate constructs. Moreover, the implicit and explicit measures were found to be separate factors and different constructs.

Therefore, this chapter 4 supports the findings in chapter 3 and further suggests that the dispositional optimism and explanatory style optimism, implicit and explicit measures and optimism and pessimism are all separate constructs. Therefore, as there are many benefits to optimism, increasing optimism would be beneficial and one significant effective way of increasing optimism was positive psychology interventions. Therefore, the systematic review explored the effectiveness of PPIs in increasing optimism in a real world application.



The systematic review revealed three studies that investigated RCT with PPIs in the workplace and any increases to optimism. The meta-analysis found the studies to have homogeneity and indicated good agreement between the reported studies. However, two of the studies had small sample sizes, therefore caution was needed when interpreting the findings. The three studies were found to have some concern over the risk of bias and the risk of publication bias. The systematic review found the PPIs significantly increased optimism in the workplace. Therefore, the following chapter implemented PPIs in a working population to investigate any increases to implicit and explicit optimism.

The final study was a feasibility pilot study of twenty participants in two different kindness positive psychology interventions and a control group; acts of kindness to one's self and acts of kindness to others. Previous research suggests that prosocial behaviour (kindness to others) and oneself (self-oriented behaviour) were both effective at increasing optimism and well-being (Lyubomirsky & Layous, 2013; Sanin-Posada, 2018). Although the findings in chapter 6 were found to be non-significant, the effect size shows that increasing the sample size to around 35 participants would give significant results (Faul, Erdfelder, Lang, & Buchner, 2009).

Overall, study 1 in chapter 3 explored the relationship between explicit and implicit optimism and the reliability of the optimism IAT. These findings suggested that there was not a relationship between the implicit and explicit measures, but each individual measure were generally reliable on their own. Therefore, this raised the question about what the implicit and explicit measures are assessing, and relatedly what are the constructs of optimism. Therefore, study 2 in chapter 4 explored the constructs of optimism with an EFA. The findings in this study suggested that explicit dispositional optimism and explanatory style optimism, and implicit IAT are separate constructs. The constructs of optimism were explored in this thesis; therefore, the real-world application of the IAT was explored to investigate if optimism could be increased. Next, a systematic review (chapter 5) was undertaken to explore the literature to investigate if optimism could be increased using PPIs in a workplace. The findings from the systematic review and meta-analysis yielded only three articles; these studies all found that PPIs increased optimism in the workplace. This then developed the last study (3) and chapter 6, as previous research had suggested PPIs.

## 7.1 Aims of the thesis

The three aims of this thesis were all addressed, fully explored and found further supporting evidence for implicit and explicit optimism. One aim of the research was to create an optimism IAT to investigate the relationship between implicit and explicit measures of optimism. The development, validity and reliability of the optimism IAT was explored throughout the thesis in several of the chapters, and was shown to be a promising measure of implicit optimism. The known face validity and EFA for the IAT showed significant support for the optimism IAT. Additionally, the results from studies 1 and 2 showed that implicitly that optimism and pessimism are separate constructs. These are novel findings, as the optimism IAT has not been investigated before, however, this does need to be further explored in future research.

The second aim was to investigate the relationship between implicit and explicit measures of optimism, including associated changes when using positive psychology interventions. The relationship was explored within studies 1, 2 and 3, and no significant relationship was found between implicit and explicit measures. Hence, this research supports the additive model that implicit and explicit optimism are related, but are separate constructs. Supporting the argument that implicit and explicit may be related, but are measuring slightly different constructs on optimism.

The changes in implicit and explicit optimism using PPIs were explored in the systematic review in this thesis. The systematic review indicated that more research is needed into optimism in the workplace, and the studies need to have increased sample sizes. The findings also revealed that there were no optimism implicit measures investigating optimism. The results indicated that there was a gap in the research to investigate explicit and implicit optimism in the workplace, and using PPIs to investigate if optimism can be increased.

The second aim was further addressed in study 3, using a pilot study to investigate the effectiveness of kindness PPIs. The intervention over the Christmas and New Year period suggested the life events matter and having an intervention at this time of year could potentially be very effective. However, further work is needed to explore the benefits of PPIs over the Christmas and New Year period.

The third aim of this thesis is to investigate if optimism is changeable over time and each of the studies have suggested that optimism can be changed over time. The

studies suggest that implicit and explicit optimism can be changed over time, even if this is for a short period of time.

## 7.2 Thesis methodological reflection and limitations

A variety of limitations have been discussed throughout the thesis and many of the limitations could be addressed by further research. However, the studies within the thesis were a development of the previous studies to build on the current understanding of implicit and explicit optimism.

However, upon reflection, one methodological limitation of the implicit measures were the images used, even though they were taken from a psychology image database (IAPS). This database did provide novel images and images that the participants may not have seen before. However, the images themselves needed to be measured for the relevance to optimism and pessimism, before they were used in the implicit measures, and in particular, the IAT as a new measure was being developed. The images needed to be investigated to assess whether the images were measuring optimism and pessimism, and not merely positive and negative situations. Furthermore, the images may be subjective to the individual and not everyone finds all images optimistic, therefore, they may not be true representations of the participants' optimism level/state. This could be overcome by the IAT images being selected by the individual and making the IAT more personal to the person.

The IAT in this thesis has shown promising results for reliability and validity, however, further research is needed to further investigate if the IAT is measuring optimism/ pessimism or positive/negative or other constructs. Understanding precisely what IAT is measuring may be an issue with the IAPS database images, as previously mentioned. The lack of any relationship between the implicit and explicit optimism measures is a concern that needs to be addressed in future studies. For example, future research could investigate if other additional implicit optimism measures (such as the optimism Stroop task by Kafetsios and Sideeridis (2007)) correlate with the optimism IAT. Additionally, the individual images in the IAT need to be investigated to confirm that they are measuring optimism and pessimism.

To further strengthen the IAT the personal information needs to be further investigated. For example, from the feedback during the research, not everyone knew the Zodiac sign and therefore, in turn, this would not be personal information

and not associated with the participants. Therefore, this could have influenced the results from the IAT. In future, the Zodiac signs need to be removed from the personal information in the IAT. This would further support the reliability and validity of the IAT.

A further methodological reflection concerns the DASS-21 (Lovibond & Lovibond, 1995a) that was used to measure the well-being effects of the PPIs. While this measure did investigate any differences in depression, anxiety and stress levels, The DASS-21 was used for this thesis as it does measure if the PPIs did protect or lessen the depression, anxiety and stress levels. However, on reflection, other measures may have been more effective at investigating the levels of well-being. For example, the Warwick Edinburgh mental well-being scale (WEMWBS) (2008) could have been used (Fujiwara, Keohane, Clayton, & Hotopp, 2015). The WEMWBS has questions such as '*I've been thinking clearly and I've been feeling interested in other people*', these questions are directly related to levels of well-being. Furthermore, the WEMWBS has a question about optimism and this could have been compared to the explicit LOT-R and IAT. Therefore, in future research, the WEMWBS could be introduced as a measure of well-being in the acts of kindness interventions.

Finally, study 3 (chapter 6) within this thesis could support some methodological changes to support future work into the effectiveness of increasing implicit and explicit optimism in the workplace. The study was a pilot, and the results show that the study is feasible with a larger sample size of around 35 participants. However, a further consideration is the control group completes a non-related task to further compare the effectiveness of the intervention. The participants in the control group knew that they were in the control group, as they were not given a task to complete. Therefore, may have given slightly bias results, as they knew they were not completing the intervention. Consequently, future research could investigate a control group with a non-rated daily task.

### 7.3 Implicit Association task conclusions

The overall conclusion in this thesis is that the IAT showed some promising findings, however, further research into its reliability and validity is needed beyond this thesis. The findings in study one showed an overall acceptable to good reliability for the IAT, indicating that there was acceptable internal consistency for the optimism and

pessimism IAT. However, the test-retest reliability findings were weak to unacceptable. Nevertheless, the reliability and validity of the IAT were investigated in study one by Known group validity and EFA, and both methods suggested that the IAT was a valid measure. The EFA showed a two-factor solution (optimism and pessimism). This study showed that the implicit and explicit between relationships are not reliable, but the IAT may be a valid measure due to the significant findings of the Known-Group validity. Additionally, in study two the IAT showed promising results for validity; the EFA evaluated the construct for the validity of the IAT individual trials which provides further support for the optimism IAT's validity (Conway & Huffcut, 2003). Moreover, the findings in study two showed good internal consistency for the IAT. These findings suggest that the optimism IAT has shown some promise. However, as suggested throughout the thesis, there were a number of limitations to the optimism IAT and there is a need to conduct further investigation. For example, the findings in this thesis showed the explicit measures and the VPT were not related to the IAT. However, as previously discussed in chapter 3 the VPT had several methodology limitations in this thesis, and this may have influenced the results.

These limitations found in this thesis are consistent within the literature. For example, there have been some recent criticisms of the IAT including its weak relationship with explicit measures which raises question about if the methods are measuring the same construct well (Machery 2016, 2017). However, other researchers argue that implicit and explicit measures are assessing different constructs, and this is why they do not correlate with each other (Rosenthal & Rosnow, 2009; Greenwald, 2001). The relationship between the explicit and implicit measures within this thesis found also found no relationship between the methods. Furthermore, the IAT test retests scores in this thesis were also similar to previous research studies that found problems with the IAT reliability over time (Schmukle & Egloff, 2004; Steffens, 2016). Therefore, further research needs to investigate if the optimism IAT is measuring state optimism that changes over time or trait optimism that is stable over time. The state or trait optimism could be explored through implicit tasks (IAT) and qualitative interviews to explore any changes to optimism over time. Furthermore, exploring the test-retest limitation of the IAT and the issues with the reliability of the IAT.

An additional criticism is that not all IATs are equally reliable. The IAT method has been employed to investigate many different topics (Bar-Anan & Nosek 2014; Gawronski & De Houwer, 2014) and some topic areas may be better adapted to using implicit measures to investigate the topic area than others (Brownstein, Madva, & Gawronski, 2020). The reliability of the optimism IAT was promising, however, this does need further investigation as the test-retest findings were acceptable for study 1 and the relationship between IAT, VPT and explicit methods were not significant. Therefore, as previously suggested in this thesis the methodology within the IAT does need further investigation.

Further concerning the methodology, a suggested limitation to the IAT's is the wording of the instructions of an IAT has been found to affect findings. This limitation was addressed in the thesis, as the wording for the optimism IAT used by Greenwald (2000) suggested instructions, however, this limitation could be considered in further research and to investigate if the task is fully understood before the participants begin. Furthermore, further questioning of the validity of an IAT may occur if a participant is unfamiliar with the concept or wording that is used (Ottaway et al., 2001). The optimism IAT may be furthered question over the validity of the images used throughout the task. Further research is needed to validate the individual images to rate if they are measuring optimism and pessimism. Although there are limitations to the optimism IAT in this thesis, future research could investigate the reliability and validity further. Furthermore, the relationship between explicit and implicit optimism methods needs further research.

Overall, the future direction of the optimism IAT needs further development. This thesis has shown promising results; however, further research is needed to fully understand the validity and reliability of the optimism IAT. The individual images within the IAT need to be examined to understand if they are measuring optimism and pessimism. This could be explored in qualitative interviews about the different images or a quantitative method ranking the images. Furthermore, the optimism IAT needs to investigate any relationships between other implicit methods, such as the Stroop task. Investigating two optimism implicit measures could further help understand if IAT is measuring implicit optimism.

#### 7.4 Unique findings and future research

The unique contribution to existing knowledge was a number of factors within this thesis; developing a new optimism IAT, building on the implicit and explicit argument, building on the optimism arguments and further exploring the effectiveness of the kindness PPIs. Within this thesis a new optimism IAT was investigated for reliability and validity, whilst the findings have shown the measure to be promising further research is needed to explore the reliability and validity further. The unique findings in this thesis are firstly the newly developed IAT and, so far, the reliability and validity have been shown to be promising. However, further research is needed to explore the optimism IAT further and increasing the sample size and performing a CFA could support this. The CFA could help to confirm the traits within the IAT and the effectiveness of the IAT. Furthermore, in future research, the different constructs of optimism (such as what was conducted in chapter 4) within the IAT could be investigated in conjunction with another optimism implicit measure to investigate if the constructs correlated, such as using methods as eye-tracking (Kelberer, Kraines, & Wells, 2018; Lea, Qualter, Davis, Pérez-González, & Bangee, 2018) and Stroop task (Karademas, Kafetsios and Sideeridis 2007; Segerstrom, 2011). However, this optimism IAT has allowed further investigation into the current arguments around implicit and explicit measures. Many researchers have argued that implicit and explicit are linked; however, a few researchers have argued that they are only linked by theory. Each study throughout this thesis supported the additive model even though there was limited research on this.

Additionally, from the findings in this thesis optimism may be defined as two-dimensional, with optimism and pessimism being separate constructs. The findings support that implicit optimism may be a short term 'state' and changes over time. Therefore, the contribution to our knowledge of optimism would suggest that it is a two-dimensional state construct.

Furthermore, within the thesis, chapter 6 uncovered a potential for further research into implementing PPIs around Christmas and New Year, as this could help to alleviate some of the stresses associated with the time of year. Nevertheless, Nelson (2016) stated that limited research into kindness to others verse to one's self is very limited, and this thesis started to explore the differences between the effectiveness of the kindness interventions. However, introducing the culture element may help to

further investigate the differences in more depth and give a greater understanding around culture and individuals.

Future research into the effectiveness of the PPIs and to the effectiveness of increasing implicit and explicit optimism could be implicated in a variety of settings. The PPIs could be investigated using any of the ACTIONS (Boniwell, 2017);

A – Active interventions – sports and physical activities.

C – Calming interventions – mindfulness and meditation

T – Thinking or taking stock – Working through positive and negative past events into present situations.

I – Identity- related actions- personal strengths

O- Optimization- actioning and setting goals, looking to the future and improving the current situation

N- Nourishing- taking care of oneself and taking pleasure in activities, and self-soothing.

S- Social actions- establishing and maintain positive relationships (Boniwell, 2017).

The differences between the PPIs could be compared and investigate if all or any PPIs are effective at increasing implicit and explicit optimism. The implicit measure is an additional tool for measuring optimism and maybe measuring state optimism, however, this would be useful to examine any changes to the effectiveness of the PPIs. Furthermore, the interventions could be explored in different settings; such as schools, different workplaces and within universities. Also, they could be used to explore the comparison of the effectiveness of where the interventions are conducted, for example, face to face or online and if this impacts upon the effectiveness.

Within this thesis, different arguments to the constructs of implicit and explicit measures were explored. A positivistic epistemology grounded in realist ontology was used within this thesis, in which the studies obtained results in a objective, value-free manner and with knowledge drawn from result observations (Barker, Pistrang, & Elliott, 2002). However, in future research, the implicit and explicit arguments and constructs of optimism could explore the relationship through



different epistemologies and methodologies. For example, one direction to consider for future research is exploring the qualitative 'implicit relational knowing' or explore the implicit unconscious (Preston, 2008). There is research interested in making the unconscious conscious and getting a deeper understanding. The implicit optimism could be explored via interviews to explore what the difference between the conscious and unconscious optimism is. Researchers have expressed concerns around if the implicit measures are underreported and not high in quality (Gawronski, Deutsch, & Banse, 2011; Parsons et al., 2018; Vasey, Dalgleish, & Silverman, 2003). Overall, the findings in this thesis could be considered the baseline for future studies. There are immense benefits to the workplace if they adopt the kindness PPIs approach, which could benefit the core business as well as the individual. Different cultures may find different benefits through conducting slightly different kindness PPIs and implementing the right PPI could show substantial benefits. The wider implications of increasing optimism for individuals has been found to be sizeable and being able to measure the levels of implicit optimism could indicate changes in optimistic emotion. However, the findings suggest using implicit and explicit measures of optimism to investigate acts of kindness in the workplace is promising.

## 7.5 Conclusion

In conclusion, with this thesis, three aims were explored. Firstly, aim one was to create an optimism implicit association task (IAT) and to investigate the relationship between implicit and explicit measures of optimism. To address these aims three studies and a systematic review was conducted. The findings in studies 1, 2 and 3 showed promising results for the reliability and validity of the IAT. However, no relationship was found between implicit and explicit measures. There were a few limitations to the IAT, such as the images used; however, these could be addressed and explored with further research. The second aim was to investigate the relationship between implicit and explicit measures of optimism and examine changes in them using positive psychology interventions. The findings in study 3 suggest that increasing the sample size may show the intervention to be effective at increasing optimism in a working population. The third aim of the thesis investigated to explore whether optimism is changeable over time and, studies 1 and 3 suggest that optimism can be changed over time. Therefore, using PPIs to increase optimism should be possible and very beneficial within further studies. The overall conclusion

and the main contribution to the literature from this thesis is that optimism can be changed over time, optimism and pessimism were shown to be separate two-dimensional constructs, and implicit and explicit measures appear to be separate constructs. Finally, the acts of kindness to self and others PPIs showed the potential to increase implicit and explicit optimism and wellbeing.

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Olrk0leSHFI2LJSCQuFqNpYKjj%2FnGhOU1DomXURKKkEEOi2Z%2FuVeycCj  
4HKh%2BMQmIDlw3uUcORLuhS8IUUJAHhDkzxdH%2FOIYpCESs%2BctVjCv  
PJa%2Bg6h2fPghROV7%2FETqgl9kv3640%2FgLo9AiWH7B3QmEAMsZ353%  
2FSJpd%2B7J97am5hoqxOPNKAMQXyT%2BqEvmXXNyq21iJPOuGpCCOT8t  
ly6VpOkTzUNyP84gaW9HTtrKQaUUk7iQUERj%2FkhiakOs%2BVbt%2BQe9yQ  
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e%2BD7kDxOIDBDtPDOMfWo%2FziB8%2FoJHH1ZJbZRG6zwb9r41QAs70Q  
S%2F%2Bcx%2Fqq5urttlmrLg6pHcmtnlIRFzfopdT3bxfotoY23FDndLPL83sXL  
chkkHiEQaEi%2BhAeVj7h2R6jrMnNgYVIU9HlkoCBdKrb7fYnGUYIiZ0Ek9eXRj  
Wahy0iFh4dEX3f8d8Z1ICti88MguAZ0oY2xWEzU%3D&X-Amz-  
Algorithm=AWS4-HMAC-SHA256&X-Amz-Date=20191020T141813Z&X-Amz-  
SignedHeaders=host&X-Amz-Expires=300&X-Amz-  
Credential=ASIAQ3PHCVTY7I65X5F5%2F20191020%2Fus-east-  
1%2Fs3%2Faws4\_request&X-Amz-  
Signature=fb5d994d76ed511322fc88f54c01bc9b2043210e1e0c177c2c8a8398c  
c93af0d&hash=4169dd2cfd60ec49ef55f1df11ce4b9b42553e0e055b98616573a  
22311764ab2&host=68042c943591013ac2b2430a89b270f6af2c76d8dfd086a07  
176afe7c76c2c61&pii=S1697260013700292&tid=spdf-67cedebd-a4d1-4072-  
8e73-  
20f6d6a44c02&sid=ceb329af968e8543ce79914505f5d093f729gxrbq&type=clie  
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# Appendices

## 1. Appendix 1 LOT-R questionnaire

### LOT-R Life Orientation Test-Revised

Please be as honest and accurate as you can throughout. Try not to let your response to one statement influence your responses to other statements. There are no "correct" or "incorrect" answers. Answer according to your own feelings, rather than how you think "most people" would answer.

A = I agree a lot

B = I agree a little

C = I neither agree nor disagree

D = I DISagree a little

E = I DISagree a lot

1. In uncertain times, I usually expect the best.
2. It's easy for me to relax.
3. If something can go wrong for me, it will.
4. I'm always optimistic about my future.
5. I enjoy my friends a lot.
6. It's important for me to keep busy.
7. I hardly ever expect things to go my way.
8. I don't get upset too easily.
9. I rarely count on good things happening to me.
10. Overall, I expect more good things to happen to me than bad.



1. Appendix 2 SOP2 questionnaire

SOP2 (English version)

The next question deals with optimism.  
Optimists are people who look to the future with confidence and who mostly expect good things to happen. How would you describe yourself?

How optimistic are you in general?

Not at all optimistic						Very optimistic
1	2	3	4	5	6	7

The next question is about pessimism.  
Pessimists are people who are full of doubt when they look to the future and who mostly expect bad things to happen. How would you describe yourself?

How pessimistic are you in general?

Not at all pessimistic						Very pessimistic
1	2	3	4	5	6	7

1. Appendix 3: Permission for ASQ



Positive Psychology Center  
3701 Market Street, Suite 200  
Philadelphia, PA 19104  
Phone: 215.898.7173  
<http://ppc.se.upenn.edu/>

**Permission to Use the Attributional Style Questionnaire**

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The Attributional Style Questionnaire (ASQ) is copyrighted material and may only be used with the written permission of the author, Dr. Martin E.P. Seligman. This letter grants you permission to use the ASQ solely for non-commercial academic research purposes or by a licensed clinical psychologist for the diagnosis of patients. The ASQ may not be used for any commercial or for-profit purposes under any circumstances. You are not authorized to revise, adapt, or create any derivative materials from the ASQ.

You may only administer the ASQ in a paper format. Though we may send you the ASQ in an electronic format, we do this solely as a convenience to expedite your receipt of this material. You are not authorized to administer or distribute the ASQ electronically, nor to post the ASQ in any online environment (e.g., website).

Sincerely,

## 2. Appendix 4

### **Chapter 3 – study 1**

*(Participation information about participating in the study.)*

My name is Ann Kirkman and I am a PGR student at the University of Derby. I am looking to recruit participants for my research study. The purpose of this research is to investigate implicit and explicit measures in relationship to optimistic personality traits. The experiment will be in two phases, phase one will last approximately 60 minutes and phase two will last another 60 minutes one week later. You will be asked to complete one explicit optimism questionnaires and two implicit optimism computer tasks. A total of 10 participation points will be awarded to you. Participation is anonymous and confidential, and you have the right to withdraw at any point up to 2 weeks after taking part in the study.

If you would like to take part in the study, please email Ann Kirkman on xxxx to book a time. If you have any concerns or questions, please email: xxxx or supervisor 1: David Sheffield xxxx. Supervisor 2: Frances Maratos xxxx

3. Appendix 5

Recruitment poster /Recruitment email / Blackboard

**Investigating the relationship between implicit and explicit measures of optimism.**

My name is Ann Kirkman and I am a PGR student at the University of Derby. I am looking to recruit participants for my study.

The purpose of this research is to investigate implicit and explicit measures of optimism.

The experiment will last approximately 60 minutes and a further 60 minutes one week later.

The study will be conducted in room.....

You will be awarded **10 participant points** in total.

You will be asked to complete one optimism questionnaire and two computer tasks.

Participation is anonymous and confidential, and you have the right to withdraw at any point up to 2 weeks after taking part in the study.

If you would like to take part in the study, please email Ann Kirkman xxxx to book a time.

If you have any concerns or questions, please email: xxxx Or supervisors: David Sheffield on xxxx. Frances Maratos xxxx.

**Investigating the relationship between implicit and explicit measures of optimism.**

My name is Ann Kirkman and I am a PGR student at the University of Derby. I am looking to recruit participants for my study.

The purpose of this research is to investigate implicit and explicit measures optimism.

The experiment will last approximately 60 minutes and a further 60 minutes one week later.

The study will be conducted in room.....

You will be awarded **10 participant points** in total.

You will be asked to complete one optimism questionnaires and three computer tasks.

If you would like to take part in the study, please fill in the table below:

	Date		
Time	Name	Course	Email address

Participation is anonymous and confidential, and you have the right to withdraw at any point up to 2 weeks after taking part in the study.

If you have any concerns or questions, please email: xxxx Or supervisors: David Sheffield xxxx. Frances Maratos, xxxx

4. Appendix 6

Participant Information sheet

**Investigating the relationship between implicit and explicit measures of optimism.**

Please read the following information before participating in the experiment, which explains what is involved.

The purpose of this research is to investigate implicit and explicit measures in relationship to optimistic personality traits. The study will comprise of one optimism questionnaires and two computer tests measuring your reaction times to different words/images.

*The study is in two parts and I ask that you would return a week later to complete the second part.*

*The experiment will last approximately **60 minutes** each time.*

*The experiment will last approximately 2 hours in total.*

*You will receive **10 participant points** in total.*

**If you should agree to participate in the study, you will be asked to do the following:**

- Answer one optimism questionnaires
- Complete 2 tasks on the computer. This involves different images and words appearing on a screen and pressing the relevant key. Full instructions will be given on the computer screen before the task begins. There may be a few images that you find a little upsetting within the computer timed tasks.

If you have any further questions, please ask the experimenter. If you decide to take part, you are free to stop and withdraw at any time. The study is completely voluntary.

The results will be collected for the purpose of completing my PhD, presentations at conferences, posters and journal articles.

There are no direct benefits for you by participating in this experiment, but you would be contributing to the wider understanding of implicit and explicit measures in relationship to optimistic personality traits. There are no long term side effects expected as a result of taking part in this study.

The data collected is anonymous and you will be given an ID number. This will be the first two letters of your name and the last four digits of your phone number.

One of the computer tasks will ask you for six pieces of personal information, such as your Family name, First name, Month of birth, Place of birth, Gender and star zodiac sign. This information will not be used within analyses; it will only be used within the different trials within the computer task. The results will remain anonymous, using your personal ID number.

All the data and information collected in the experiment will remain anonymous. All the research data will be kept in a safe place and only seen by the experimenter and the supervisors. The data will be kept for a minimum of six years. You have the right to withdraw from the study and have your data destroyed up to two weeks after you take part in the study. If you wish to withdraw from the study, please email [xxxx](#) and quote your ID number.

Participant ID number.....

Thank you for taking the time to read this information, and if you have any concerns or questions please email:

Ann Kirkman on [xxxx](#) or

Supervisor 1: David Sheffield xxxx Supervisor 2: Frances Maratos xxxx

5. Appendix 7

**Consent form**

**Investigating the relationship between implicit and explicit measures of optimism.**

I am a PGR student at University of Derby conducting a psychology project. The focus of the study is to investigate implicit and explicit measures in relationship to optimistic personality traits.

**Please Initial Box**

I confirm that I have read and understand the information sheet for the study and have had the opportunity to ask questions.

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.

I agree to take part in the outlined study.

The data collected is anonymous and you will create a personal ID number. This will be the first two letters to your first name and the last four digits of your phone number.

Please sign to confirm that you have read and understood the information, and that you are 18 years of age or older, and have given consent to participate.

Participant Signature.....Date.....  
Participant ID number.....

Thank you for taking the time to read this information. If you have any concerns or questions, please email: [xxxx](#) Or supervisors: David Sheffield xxxx Frances Maratos  
xxxx



6. Appendix 8

<u>Demographics</u>	
• Please indicate your age in years:	
• Please select your gender:	Female / Male  If other, please specify:  Prefer not to say
3. Please indicate your ethnic group:	White British, White Other European, White American, Other White, Indian, Pakistani, Bangladeshi, Chinese, Japanese, South East Asian, Other Asian, African, Caribbean, Black, Native American, Hispanic, Polynesian, Arab, Mixed or multiple ethnic groups, Other  If other, please specify:  Prefer not to say
4. Please indicate your country of origin:	Prefer not to say

7. Appendix 9

Visual probe images

- **Visual probe test**

The image category ratings

<b>1-3 valance negative (Total images 20)</b>	<b>4-5 valance neutral (Total images 40)</b>	<b>6-9 valance positive (Total images 20)</b>
1-3 arousal low 4-5 arousal Medium	1-3 arousal low 4-5 arousal Medium	1-3 arousal low 4-5 arousal Medium

8. Appendix 10 Visual probe task images

**1-3 valance negative (Total images 20)**

1-3 arousal low

4-5 arousal Medium

**4-5 valance neutral (Total images 40)**

1-3 arousal low

4-5 arousal Medium

**6-9 valance positive (Total images 20)**

1-3 arousal low

4-5 arousal Medium

Positive images

4-5 arousal medium

Negative images

1-3 arousal low

4-5 arousal medium

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Neutral images

1-3 arousal low

Content removed due to copyright reasons

Content removed due to copyright reasons

4-5 arousal medium

Content removed due to copyright reasons

## 8. Appendix 11

### The instructions and procedure for the Visual probe task

The first screen will appear with the instructions

Please place your fingers on the right and left buttons on the button box. You will be presented with a fixation point at the centre of the screen followed by a pair of images. These images are of various faces.

You are to look at and focus on both of the pictures while they are on the screen. Do not focus in the centre.

You will need to move your eyes back and forth to focus on each of the pictures while they are on the screen.

Once the images disappear from the screen, an : will appear on either the left or right side of the screen.

Your task is to respond as quickly as possible to the : by pressing the left button if the : is on the left side of the screen or the right button if the : is on the right side of the screen.

Once you respond to the :, another fixation point will appear followed by the presentation of a new set of images. You will perform several of these trials.

Any questions? Are you ready to begin? Please keep your attention on the computer screen and remember to respond as quickly as possible.

Please press the blue button to begin.

Then a fixation cross will appear in the middle of the screen for 500ms and then disappear.

+

Please take a short break, before the next block begins

Please press the blue button when you are ready to begin

These will be the instructions shown to the participant, at the end of the break.

Please place your fingers on the right and left buttons on the button box.  
You will be presented with a fixation point at the centre of the screen followed by a pair of images. These images are of various faces.

You are to look at and focus on both of the pictures while they are on the screen.  
Do not focus in the centre.  
You will need to move your eyes back and forth to focus on each of the pictures while they are on the screen.

Once the images disappear from the screen, an : will appear on either the left or right side of the screen.  
Your task is to respond as quickly as possible to the : by pressing the left button if the : is on the left side of the screen  
or the right key if the : is on the right side of the screen.

Once you respond to the :, another fixation point will appear followed by the presentation of a new set of images. You will perform several of these trials.

Any questions? Are you ready to begin? Please keep your attention on the computer screen and remember to respond as quickly as possible.

Please press the blue button key to begin.

The end information shown to the participant

Thank you for completing the task, please let the experimenter know you are now finished





Happy	Sad
-------	-----

The words for the practice trials in the IAT

Positive practice words	Negative practice words
Fine	Harmful
Joyful	Complaint
Hopeful	Upset
Optimistic	Pessimistic

The image category ratings

<b>1-3.5 valance negative (Total of 40 images)</b>	<b>3.5-5.5 valance neutral (Not needed)</b>	<b>5.5-9 valance positive (Total of 40 images)</b>
1-3 arousal low 4 arousal medium 5-9 arousal high		1-3 arousal low 4 arousal medium 5-9 arousal high

## 10. Appendix 13

IAT images

Positive images

1-3 arousal low

4 arousal medium

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reasons

5-9 arousal high

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reasons

Content removed due to copyright reasons

Negative images  
1-3 arousal low

Content removed due to copyright reasons

#### 4 arousal medium

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Content removed due to copyright reasons

5-9 arousal high

Content removed due to copyright  
reasons



11. Appendix 14

(Debrief information for first part of the study)

**Debriefing information**

**Investigating the relationship between implicit and explicit measures of optimism.**

Participant ID Number.....

Thank you for taking part in today's experiment.

*I would like to ask you to return next week to complete the study. The study will consist of the same tasks as in today's experiment.*

The purpose of this study is to try and gain a greater understanding of the process of optimism, by investigating both implicit and explicit measures of optimism.

Optimism has been found to be an important factor in the adjustment to a variety of stressors, such as physical health, the cardiovascular system and immune system. Optimism has been described as confidence and hopefulness about the success or future of something. The present study is to investigate optimism by using both implicit and explicit measures.

Any information that I collect from you is confidential. The data will be analysed anonymously and used only for statistical purposes by myself and my supervisors. You have the right to withdraw from the study at any time, without giving a reason for doing so and have your data destroyed up to two weeks after the study. Your participant ID number will be used from data collection through to analysing the data. Please make a note of your participant ID number so your data can be identified should you wish to have your data destroyed, and to enable you to complete the study next week. The results will be collected for the purpose of completing my PhD, for conferences, posters and journal articles.

If you are unable to return to complete the study next week, but would like further information please email me xxxx

Thank you for taking part in the study, and if you have any concerns or questions please email:

Ann Kirkman on xxxx. Supervisors: David Sheffield xxxx) Frances Maratos xxxx

You can also contact the Student Wellbeing Centre, Ground Floor, T-Block at Kedleston Road, on the University of Derby campus or visit a GP.

Thank you for taking part in my study.

## 12. Appendix 15

(Debrief information for second part of the study)

### Debriefing information

#### **Investigating the relationship between implicit and explicit measures of optimism.**

Participant ID Number.....

*Thank you for taking part in the experiment.*

The purpose of this study is to try and gain a greater understanding of the process of optimism, by investigating both implicit and explicit measures of optimism. Optimism has been found to be an important factor in the adjustment to a variety of stressors, such as physical health, cardiovascular system and the immune system. Optimism has been described as the confidence and hopefulness about the success or future of something. However, Greenwald (1995) suggested that we process social information in two ways, the explicit and implicit modes. Explicit memory is the conscious, deliberately recalling of previous information and experiences. Explicit self-report methods, such as questionnaires, have helped to investigate the relationship within optimism. This stated, explicit methods have been found to have a number of social influences, such as individuals giving answers that may be seen as more favourable to others. Greenwald (1995) suggested that individuals are aware and able to control or reflect their responses to questionnaires. In contrast, implicit methods have been found to give an individual's automatic response and may be a better predictor of personality (Greenwald, 1998). It has been suggested that responses to implicit measures are automatic, intuitive, routine or impulsive (Greenwald, 1998), Therefore accessing an individual's real personality traits. The purpose of this study is to try and gain a greater understanding of the process of optimism, by investigating both implicit and explicit measures of optimism.

Any information that I collect from you is confidential. The data will be analysed anonymously and used only for statistical purposes by myself and my supervisors. You have the right to withdraw from the study at any time, without giving a reason for doing so and have your data destroyed up to two weeks after the study. Your participant ID number will be used from data collection through to analysing the data. Please make a note of your participant ID number so your data can be identified should you wish to have your data destroyed. The results collected are for the purpose of completing my PhD, potential presentation at conferences, posters and journal articles.

If you are interested in reading any further information on implicit and explicit measures, please read these articles:

Greenwald, A, and Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychology review*. 102, 4- 27.

Greenwald, A, McGhee D and Schwartz, J. (1998). Measuring differences in implicit cognition: The implicit association test. *Journal of personality and Social psychology*. 74, 6, 1464- 1480.

Thank you for taking part in the study, and if you have any concerns or questions please email:

Ann Kirkman on xxxx Supervisors David Sheffield xxxx Frances Maratos xxxx

You can also contact the Student Wellbeing Centre, Ground Floor, T-Block at Kedleston Road, on the University of Derby campus or visit a GP.

Thank you for taking part in my study.

## Chapter 4 – Study 2

### 13. Appendix 16

*(Participation information about participating in the study.)*

My name is Ann Kirkman and I am a PGR student at the University of Derby. I am looking to recruit participants for my research study. The purpose of this research is to investigate implicit and explicit measures in relationship to optimistic personalities. The experiment will last around 30 minutes. You will be asked to complete three explicit questionnaires and one implicit computer timed optimism task. The implicit task will be a timed task that is associating words and images to different stimuli. You will earn four participation points completing this study. If you wish to participate, please follow the link to complete the study..... Participation is anonymous and confidential, and you have the right to withdraw at any point up to 2 weeks after taking part in the study. If you would like to take part in the study, please fill in the questionnaires online. If you have any concerns or questions, please email: xxxx or supervisor 1: David Sheffield on xxxx Supervisor 2: Frances Maratos xxxx

Recruitment poster /Recruitment email / Blackboard

### **A factor analysis of explicit optimistic questionnaires**

My name is Ann Kirkman and I am a PGR student at the University of Derby. I am looking to recruit participants for my study.

The purpose of this research is to investigate implicit and explicit measures of optimism.

The experiment will last approximately 30 minutes.  
You will earn four participation points for this study.

You will be asked to complete three questionnaires and one implicit task. The task will be associating words and images to different stimuli.

Please follow the link to complete the study.

Participation is anonymous and confidential, and you have the right to withdraw at any point up to 2 weeks after taking part in the study.

If you would like to take part in the study, please fill in the online questionnaires.

If you have any concerns or questions, please email xxxx or supervisor 1: David Sheffield on xxxx Supervisor 2: Frances Maratos xxxx

Participant Information sheet

**A factor analysis of explicit optimistic questionnaires**

Please read the following information before participating in the experiment, which explains what is involved.

The purpose of this research is to investigate implicit and explicit measures in relationship to optimistic personality traits.

*The experiment will last approximately 30 minutes.  
You will earn four participation points for completing this study.*

**If you should agree to participate in the study, you will be asked to do the following:**

- Answer three optimism questionnaires.
- Complete one timed tasks on the computer. This involves different images and words appearing on a screen and pressing the relevant key. Full instructions will be given on the computer screen before the task begins. There may be a few images that you find a little upsetting within the computer timed tasks.

If you have any further questions, please email the experimenter (xxxx). If you decide to take part, you are free to stop and withdraw at any time. The study is completely voluntary.

The results will be collected for the purpose of completing my PhD, presentations at conferences, posters and journal articles.

There are no direct benefits for you by participating in this experiment, but you would be contributing to the wider understanding of implicit and explicit measures in relationship to optimistic personality traits. There are no long term side effects expected as a result of taking part in this study.

The data collected is anonymous and you will be given an ID number. This will be the first two letters of your name and the last four digits of your phone number.

One of the computer tasks will ask you for six pieces of personal information, such as your Family name, First name, Month of birth, Place of birth, Gender and star zodiac sign. This information will not be used within analyses; it will only be used within the different trials within the computer task. The results will remain anonymous, using your personal ID number.

All the data and information collected in the experiment will remain anonymous. All the research data will be kept in a safe place and only seen by the experimenter and the supervisors. The data will be kept for a minimum of six years. You have the right to withdraw from the study and have your data destroyed up to two weeks after you take part in the study. If you wish to withdraw from the study, please email [xxxxx](#) and quote your ID number.

Participant ID number.....

Thank you for taking the time to read this information, and if you have any concerns or questions please email:

Ann Kirkman on xxx

Supervisor 1: David Sheffield [xxxx](#) Supervisor 2: Frances Maratos [xxxx](#)

15. Appendix 18

**Consent form**  
**A factor analysis of explicit optimistic questionnaires**

I am a PGR student at the University of Derby conducting a psychology project. The focus of the study is to investigate implicit and explicit measures in relationship to optimistic personality traits.

**Please Initial  
Box**

I confirm that I have read and understand the information sheet for the study and have had the opportunity to ask questions.

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason.

I agree to take part in the outlined study.

The data collected is anonymous and you will create a personal ID number. This will be the first two letters of your first name and the last four digits of your phone number.

Please sign to confirm that you have read and understood the information, and that you are 18 years of age or older, and have given consent to participate.

Participant Signature /  
Participants name.....Date.....  
Participant ID number.....

Thank you for taking the time to read this information, and if you have any concerns or questions please email Ann Kirkman on xxxx\_Supervisors: David Sheffield xxxx Maratos xxxx



## Demographics

<u>Demographics</u>	
• Please indicate your age in years:	
• Please select your gender:	Female / Male  If other, please specify:  Prefer not to say
3. Please indicate your ethnic group:	White British, White Other European, White American, Other White, Indian, Pakistani, Bangladeshi, Chinese, Japanese, South East Asian, Other Asian, African, Caribbean, Black, Native American, Hispanic, Polynesian, Arab, Mixed or multiple ethnic groups, Other  If other, please specify:  Prefer not to say
4. Please indicate your country of origin:	Prefer not to say



Satisfied	Greedy
Pleasant	Unpleasant
Sunny	Unjust
Happy	Sad

Practice words for the practice trials

Positive practice words	Negative practice words
Fine	Harmful
Joyful	Complaint
Hopeful	Upset
Optimistic	Pessimistic

### The instructions and procedure for the Implicit Association Test (IAT)

The participants will be asked to fill in some personal information, before starting the IAT, on Inquisit (As shown below). Then I will fill in some unrelated personal information, into Inquisit (As shown in the table 1 below).

Table 1

<b>Stimuli characterising participants (related words)</b> <b>'Self' words</b>	<b>Stimuli not characterising participants (unrelated words)</b> <b>'Other' words</b>
Family name	Different Family name
First name	Different Frist name
Month of birth	Different Month of birth
Place of birth	Different Place of birth
Gender	Different Gender
Zodiac	Different zodiac

6. There will be two untimed practice blocks with 20 trials, followed by four timed blocks. The participants will use a keyboard to give the response

Please begin with 20 practice trials

Please place your fingers on the A button and L button on the keyboard. Images representing the positive or negative categories at the top will appear one-by-one in the middle of the screen. When the image belongs to a positive word on the top left, press the left button; when the image belongs to a negative word on the top right, press the right button. Images belong to only one category. If you make an error, an X will appear - fix the error by hitting the other key.

This is a timed sorting task. GO AS FAST AS YOU CAN while making as few mistakes as possible.

Please press the space bar to begin

7. Block three (The instructions the participants will see before they begin)  
((Self/ positive) Left side (Other / negative) Right side words)

Please place your fingers on the A and L buttons on the key board. Images representing the positive or negative categories at the top will appear one-by-one in the middle of the screen. When the image belongs to a positive word on top the left, press the A button; when the image belongs to a negative word on the top right, press the L button. Images belong to only one category. If you make an error, an X will appear - fix the error by hitting the other key.

This is a timed sorting task. GO AS FAST AS YOU CAN while making as few mistakes as possible. Going too slow or making too many errors will result in an uninterpretable score. This task will take about 10 minutes to complete

Please press the space bar to begin

9. A short break between each block, the instructions are shown below:

Please take a short break, before the next block begins

Please press the space bar when you are ready to begin

Thank you for completing the task

Please press the space bar to read the debrief

## 17. Appendix 20

### **Debriefing information**

#### A factor analysis of explicit optimistic questionnaires

Participant ID Number.....

*Thank you for taking part in the experiment.*

The purpose of this study is to try and gain a greater understanding of the process of optimism, by investigating the explicit questionnaire measurements of optimism. Optimism has been found to be an important factor in the adjustment to a variety of stressors, such as physical health, cardiovascular system and the immune system. Optimism has been described as the confidence and hopefulness about the success or future of something.

Optimism can be defined in two main ways. Firstly, Scheier and Carver (1994), describes optimism as dispositional optimism, this is 'the global generalising tendency to believe that one will generally experience good versus bad outcomes in life'. This can also mean, optimists look on the bright side of life and a pessimist believes that if something will go wrong for them, it will. Secondly, Seligman defines optimism as a positive explanatory style concept. He proposed that everyone has their own explanatory style.

An argument is whether optimism is one (Unidimensional), two-dimensional (Bidimensional), or multidimensional? Are they one dimensional and opposite ends of a lateral scale. Is optimism two dimensional and is separate from pessimism, and can an individual be optimistic and pessimistic at the same time, are they independent dimensions? Many researchers have argued about the dimensions of optimism, and this brings into question which questionnaires would be best to investigate individual's optimism.

A further current argument within optimism research is whether it is state or trait. The main focus of optimism research has primarily investigated the physical and psychological advantages of trait optimism. Trait optimism is a personality characteristic and is part of your personality. While, state optimism changes with what has happened throughout the months and days. The question is would state or trait optimism be best to investigate optimism. Therefore, this study will investigate the different optimism questionnaires to find the most suitable questionnaires for optimism research.

This study will try to gain a further greater understanding of the process of optimism, by investigating implicit and explicit measures of optimism. Explicit self-report methods (e.g. questionnaires) have helped to determine the relationship within optimism. However, explicit methods have been found to be susceptible to a number

of social influences, such as individuals giving answers that may be seen as more favourable to others. In contrast, implicit methods are based on an individual's automatic response and may be a better predictor of personality as they are less susceptible to social influences (Greenwald, 1998). The implicit tasks have been developed to measure the evaluative association between two implicit attitudes. The procedure investigates measures of automatic attitudes, concepts or beliefs of a person's implicit evaluation, by timing the difference in reaction times to words or images on a computer screen. It would be expected that the individual would have a quicker reaction time to the category they associated with most strongly (Greenwald, 2000).

Any information that I collect from you is confidential. The data will be analysed anonymously and used only for statistical purposes by myself and my supervisors. You have the right to withdraw from the study at any time, without giving a reason for doing so and have your data destroyed up to two weeks after the study. Your participant ID number will be used from data collection through to analysing the data. Please make a note of your participant ID number so your data can be identified should you wish to have your data destroyed. The results collected are for completing my PhD, potential presentation at conferences, posters and journal articles.

If you are interested in reading any further information on optimism questionnaires measures and implicit tests, please read these articles:

Chang, E and D'Zurilla, T. (1994). Assessing the Dimensionality of Optimism and Pessimism Using a Multimeasure Approach 1. *Cognitive Therapy and Research*. 18, 2, 143 -160.

Greenwald, A, McGhee D and Schwartz, J. (1998). Measuring differences in implicit cognition: The implicit association test. *Journal of personality and Social psychology*. 74, 6, 1464- 1480.

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A re-evaluation of the Life Orientation Test. *Journal of Personality and Social Psychology*, 67, 1063-1078.

Thank you for taking part in the study, and if you have any concerns or questions please email:

Ann Kirkman on [xxxx](#) or my supervisor David Sheffield on xxxx. Supervisor:  
Frances Maratos xxxx

You can also contact the Student Wellbeing Centre, Ground Floor, T-Block at Kedleston Road, on the Derby university campus or visit a GP.

Thank you for taking part in my study.

Chapter 6 study 3

18. [Appendix 21](#)

**TEXT OF EMAIL INVITATION FOR STUDY**

Dear

My name is Ann Kirkman and I am a PhD student at the University of Derby. I am looking to recruit participants for my research study. The purpose of this research is to investigate the effectiveness of positive psychology interventions and using implicit and explicit measures of optimism to examine any differences. The explicit measures are self-report questionnaires. The implicit measures are timing differences in reaction times to words or images on a computer screen.

You will be emailed the link to complete the questionnaires. If you wish to participate, please email xxxx

Participation is anonymous and confidential, and you have the right to withdraw at any point up to 2 weeks after taking part in the study

If you have any concerns or questions, please email: xxxx or supervisor 1: Prof David Sheffield on xxxx Supervisor 2: Dr Frances Maratos xxxx.



19. Appendix 22

Recruitment poster /Recruitment email / Blackboard

My name is Ann Kirkman and I am a PhD student at the University of Derby. I am looking to recruit participants for my study.

The purpose of this research is to investigate the effectiveness of positive psychology interventions and using implicit and explicit measures of optimism to examine any differences. The explicit measures are self-report questionnaires. The implicit measures are timing differences in reaction times to words or images on a computer screen.

. You will be asked to complete a two minute daily positive psychology intervention for three weeks.

During the intervention you will be asked to complete questionnaires and an implicit task on four separate occasions

If you wish to participate in study, please email xxxx

Participation is anonymous and confidential, and you have the right to withdraw at any point up to 2 weeks after taking part in the study.

If you have any concerns or questions, please email [xxxx](#) or supervisor 1: Prof David Sheffield on [xxxx](#) Supervisor 2: Dr Frances Maratos [xxxx](#)

## 20. Appendix 23: All three interventions consent forms and information sheets

### Appendix 3a Intervention 1

#### Participant Information sheet

Please read the following information before participating in the research, which explains what is involved.

The purpose of this research is to investigate the effectiveness of positive psychology interventions and using implicit and explicit measures of optimism to examine any differences. The explicit measures are self-report questionnaires. The implicit measures are timing differences in reaction times to words or images on a computer screen.

You will be asked to complete one daily act of kindness to someone else and write down the act at the end of the day. This act could be holding the door open for someone or making them a cup of tea. You will be asked to do this for three weeks, including over the Christmas holiday period.

An email will be sent to you on four occasions during the study. I would ask that you would follow the link and complete the questionnaires and implicit task.

- Firstly, an email with consent, information sheet, questionnaires and implicit task. This would take around 25 minutes to complete.
- Secondly after one week you would be asked to complete questionnaires and an implicit task. This would take around 15 minutes to complete.
- Third email will be three weeks after the start of the study and again this would be questionnaires and an implicit task. This would take around 20 minutes to complete).
- Lastly, an email one month after the end of the study with questionnaires and an implicit task. This would take around 20 minutes to complete.

\* The implicit task involves different images and words appearing on a screen and pressing the relevant key. Full instructions will be given on the computer screen before the task begins. There may be a few images that you may find a little upsetting within the computer timed tasks.

The questionnaires and tasks will need to be completed on a PC or Mac.

Unfortunately, if you work less than 24 hours per week you will not be able to take part in the research.

If you have any further questions, please email the researcher (xxxx) If you decide to take part, you are free to stop and withdraw at any time. The study is completely voluntary.

The results will be collected for the purpose of completing my PhD, presentations at conferences, posters and journal articles.

There are no direct benefits for you by participating in this research, but you would be contributing to the wider understanding of implicit and explicit measures in relationship to optimistic personality traits. There are no long-term side effects expected as a result of taking part in this study.

The data collected is anonymous and you will be given an ID number. This will be the first two letters of your name and the last four digits of your phone number. For

example, if your name is John Smith and your number is 0000001234, then your ID would be JS1234.

One of the computer tasks will ask you for six pieces of personal information, such as your Family name, First name, Month of birth, Place of birth, Gender and star zodiac sign. This information will not be used within analyses; it will only be used within the different trials within the computer task. The results will remain anonymous, using your personal ID number.

All the data and information collected in the research will remain anonymous. All the research data will be kept in a safe place and only seen by the researcher and the supervisors. The data will be kept for a minimum of six years. You have the right to withdraw from the study and have your data destroyed up to two weeks after you take part in the study. If you wish to withdraw from the study, please email xxxx and quote your ID number.

Participant ID number.....

Thank you for taking the time to read this information, and if you have any concerns or questions please email: Ann Kirkman xxxx or Supervisor 1: Prof David Sheffield on xxxx. Supervisor 2: Dr Frances Maratos on xxxx

## Appendix 3b Intervention 2

### Participant Information sheet

Please read the following information before participating in the research, which explains what is involved.

The purpose of this research is to investigate the effectiveness of positive psychology interventions and using implicit and explicit measures of optimism to examine any differences. The explicit measures are self-report questionnaires. The implicit measures are timing differences in reaction times to words or images on a computer screen.

You will be asked to complete one daily act of kindness to yourself and write down at the end of day the act. This act could be reading a book you have been wanting to read, going for a walk or taking a relaxing bath. You will be asked to do this for three weeks, including over the Christmas holiday period.

An email will be sent to you on four occasions during the study. I would ask that you would follow the link and complete the questionnaires and implicit task.

- Firstly, an email with consent, information sheet, questionnaires and implicit task. This would take around 25 minutes to complete.
- Secondly after one week you would be asked to complete questionnaires and an implicit task. This would take around 15 minutes to complete.
- Third email will be three weeks after the start of the study and again this would be questionnaires and an implicit task. This would take around 20 minutes to complete).
- Lastly, an email one month after the end of the study with questionnaires and an implicit task. This would take around 20 minutes to complete.

\* The implicit task involves different images and words appearing on a screen and pressing the relevant key. Full instructions will be given on the computer screen before the task begins. There may be a few images that you may find a little upsetting within the computer timed tasks.

The questionnaires and tasks will need to be completed on a PC or Mac. Unfortunately, if you work less than 24 hours per week you will not be able to take part in the research.

If you have any further questions, please email the researcher (A.kirkman@derby.ac.uk). If you decide to take part, you are free to stop and withdraw at any time. The study is completely voluntary.

The results will be collected for the purpose of completing my PhD, presentations at conferences, posters and journal articles.

There are no direct benefits for you by participating in this research, but you would be contributing to the wider understanding of implicit and explicit measures in relationship to optimistic personality traits. There are no long-term side effects expected as a result of taking part in this study.

The data collected is anonymous and you will be given an ID number. This will be the first two letters of your name and the last four digits of your phone number. For example, if your name is John Smith and your number is 0000001234, then your ID would be JS1234.

One of the computer tasks will ask you for six pieces of personal information, such as your Family name, First name, Month of birth, Place of birth, Gender and star zodiac sign. This information will not be used within analyses; it will only be used within the different trials within the computer task. The results will remain anonymous, using your personal ID number.

All the data and information collected in the research will remain anonymous. All the research data will be kept in a safe place and only seen by the researcher and the supervisors. The data will be kept for a minimum of six years. You have the right to withdraw from the study and have your data destroyed up to two weeks after you take part in the study. If you wish to withdraw from the study, please email xxxx and quote your ID number.

Participant ID number.....

Thank you for taking the time to read this information, and if you have any concerns or questions please email: Ann Kirkman on xxxx or Supervisor 1: Prof David Sheffield on xxxx. Supervisor 2: Dr Frances Maratos on xxxx

### Appendix 3c Intervention 3 Participant Information sheet

Please read the following information before participating in the research, which explains what is involved.

The purpose of this research is to investigate the effectiveness of positive psychology interventions and using implicit and explicit measures of optimism to examine any differences. The explicit measures are self-report questionnaires. The implicit measures are timing differences in reaction times to words or images on a computer screen.

You will be asked to answer questionnaires on four different occasions before and after the Christmas period.

An email will be sent to you on four occasions during the study. I would ask that you would follow the link and complete the questionnaires and implicit task.

- Firstly, an email with consent, information sheet, questionnaires and implicit task. This would take around 25 minutes to complete.
- Secondly after one week you would be asked to complete questionnaires and an implicit task. This would take around 15 minutes to complete.
- Third email will be three weeks after the start of the study and again this would be questionnaires and an implicit task. This would take around 20 minutes to complete).
- Lastly, an email one month after the end of the study with questionnaires and an implicit task. This would take around 20 minutes to complete.

\* The implicit task involves different images and words appearing on a screen and pressing the relevant key. Full instructions will be given on the computer screen before the task begins. There may be a few images that you may find a little upsetting within the computer timed tasks.

The questionnaires and tasks will need to be completed on a PC or Mac. Unfortunately, if you work less than 24 hours per week you will not be able to take part in the research.

If you have any further questions, please email the researcher (A.kirkman@derby.ac.uk). If you decide to take part, you are free to stop and withdraw at any time. The study is completely voluntary.

The results will be collected for the purpose of completing my PhD, presentations at conferences, posters and journal articles.

There are no direct benefits for you by participating in this research, but you would be contributing to the wider understanding of implicit and explicit measures in relationship to optimistic personality traits. There are no long-term side effects expected as a result of taking part in this study.

The data collected is anonymous and you will be given an ID number. This will be the first two letters of your name and the last four digits of your phone number. For example, if your name is John Smith and your number is 0000001234, then your ID would be JS1234.

One of the computer tasks will ask you for six pieces of personal information, such as your Family name, First name, Month of birth, Place of birth, Gender and star zodiac sign. This information will not be used within analyses; it will only be used within the different trials within the computer task. The results will remain anonymous, using your personal ID number.

All the data and information collected in the research will remain anonymous. All the research data will be kept in a safe place and only seen by the researcher and the supervisors. The data will be kept for a minimum of six years. You have the right to withdraw from the study and have your data destroyed up to two weeks after you take part in the study. If you wish to withdraw from the study, please email xxxx and quote your ID number.

Participant ID number.....

Thank you for taking the time to read this information, and if you have any concerns or questions please email: Ann Kirkman on xxxx or Supervisor 1: Prof David Sheffield on xxxx. Supervisor 2: Dr Frances Maratos on xxxx

### Consent form

Please tick to confirm that you have read and understood the information, and that you are 18 years of age or older, and have given consent to participate.

**Please tick the boxes**

I confirm that I have read and understand the information sheet for the study and have had the opportunity to ask questions.

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason.

I agree to take part in the outlined study.

I work over 24 hours a week

The data collected is anonymous and you will create a personal ID number. This will be the first two letters of your first name and the last four digits of your phone number. For example if your name is John Smith and your number is 0000001234, then your ID would be JO1234.

Participant ID number.....

21. Appendix 24

**Questionnaire and demographics**

**1. What is your age?**

- 18 to 24 years
- 25 to 34 years
- 35 to 44 years
- 45 to 54 years
- 55 to 64 years
- Age 65 or older

**2. What is your gender?**

Female

Male

Prefer not a say

**3. Please indicate your ethnic group:**

White British, White Other European, White American, Other White, Indian, Pakistani, Bangladeshi, Chinese, Japanese, South East Asian, Other Asian, African, Caribbean, Black, Native American, Hispanic, Polynesian, Arab, Mixed or multiple ethnic groups, Other

If other, please specify:

Prefer not to say

4. Which country do you live?

5. How many hours do you work a week on average?

6. What type of work do you do?

7. Will you be working over the Christmas period?

8. What is your religious belief?

9. Do you celebrate Christmas? Yes /No

10. Do you celebrate new year? Yes/No

11. Do you find the Christmas period stressful? Strongly agree, agree, disagree, strongly disagree

12. Do you find the New year period stressful? Strongly agree, agree, disagree, strongly disagree

13. How do you spend the Christmas and New year period? E.G with family or friends

## 22. Appendix 25

### DASS 21

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

*The rating scale is as follows:*

0 Did not apply to me at all

1 Applied to me to some degree, or some of the time

2 Applied to me to a considerable degree, or a good part of time

3 Applied to me very much, or most of the time

1 I found it hard to wind down 0 1 2 3

2 I was aware of dryness of my mouth 0 1 2 3

3 I couldn't seem to experience any positive feeling at all 0 1 2 3

4 I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)

0 1 2 3

5 I found it difficult to work up the initiative to do things 0 1 2 3

6 I tended to over-react to situations 0 1 2 3

7 I experienced trembling (eg, in the hands) 0 1 2 3

8 I felt that I was using a lot of nervous energy 0 1 2 3

9 I was worried about situations in which I might panic and make a fool of myself

0 1 2 3

10 I felt that I had nothing to look forward to 0 1 2 3

11 I found myself getting agitated 0 1 2 3

12 I found it difficult to relax 0 1 2 3

13 I felt down-hearted and blue 0 1 2 3

14 I was intolerant of anything that kept me from getting on with what I was doing

0 1 2 3

15 I felt I was close to panic 0 1 2 3

16 I was unable to become enthusiastic about anything 0 1 2 3

17 I felt I wasn't worth much as a person 0 1 2 3

18 I felt that I was rather touchy 0 1 2 3

19 I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)

0 1 2 3

20 I felt scared without any good reason 0 1 2 3

21 I felt that life was meaningless 0 1 2 3



### Debriefing information

*Thank you for taking part in the research.*

The purpose of this research is to investigate the effectiveness of positive psychology interventions and using implicit and explicit measures of optimism to examine any differences. Layous, Chancellor and Lyubomirsky (2014) stated that intentionally concentrating on positive wellbeing can help to reduce the negative thoughts, behaviour and emotions; these have been linked to risk factors to multiple mental disorders. Secondly, positive outcomes such as work, relationships and health can be increased by promoting positive wellbeing. Positive psychology interventions have been found in lots of studies to promote and maintain positive mental health, and even have protective factors against some mental health conditions. Researchers have found that individuals can intentionally and successfully increase their happiness level (Sin and Lyubomirsky, 2009). It has been theorized that the link between how individuals choose to spend their time and how they respond to different situations, account for a significant part of their happiness (Lyubomirsky, 2005). Therefore, spending some time intentionally increasing wellbeing would be beneficial and positive psychology has shown important developments in trying to intentionally increase wellbeing (Seligman, 2010). Furthermore, this study will try to gain a further greater understanding of the process of optimism, by investigating implicit and explicit measures of optimism. Explicit self-report methods (e.g. questionnaires) have helped to determine the relationship within optimism. However, explicit methods have been found to be susceptible to a number of social influences, such as individuals giving answers that may be seen as more favourable to others. In contrast, implicit methods are based on an individual's automatic response and may be a better predictor of personality as they are less susceptible to social influences (Greenwald, 1998). The implicit tasks have been developed to measure the evaluative association between two implicit attitudes. The procedure investigates measures of automatic attitudes, concepts or beliefs of a person's implicit evaluation, by timing the difference in reaction times to words or images on a computer screen. It would be expected that the individual would have a quicker reaction time to the category they associated with most strongly (Greenwald, 2000).

Any information that I collect from you is confidential. The data will be analysed anonymously and used only for statistical purposes by myself and my supervisors. You have the right to withdraw from the study at any time, without giving a reason for doing so and have your data destroyed up to two weeks after the study. Your participant ID number will be used from data collection through to analysing the data. Please make a note of your participant ID number so your data can be identified should you wish to have your data destroyed. The results collected are for completing my PhD, potential presentation at conferences, posters and journal articles.

If you are interested in reading any further information on optimism questionnaires measures and implicit tests, please read these articles:

Chang, E and D'Zurilla, T. (1994). Assessing the Dimensionality of Optimism and Pessimism Using a Multimeasure Approach 1. *Cognitive Therapy and Research*. 18, 2, 143 -160.

Greenwald, A, McGhee D and Schwartz, J. (1998). Measuring differences in implicit cognition: The implicit association test. *Journal of personality and Social psychology*. 74, 6, 1464- 1480.

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A re-evaluation of the Life Orientation Test. *Journal of Personality and Social Psychology*, 67, 1063-1078.  
Seligman, M. (2006). *Learned optimism*. United states, Vintage books.

Thank you for taking part in the study, and if you have any concerns or questions please email:

Ann Kirkman on [xxxx](#). Supervisor Prof David Sheffield xxxx or Dr Frances Maratos xxxx

If you have any further concerns around wellbeing please visit a GP.

Thank you for taking part in my study.

24. Appendix 27

Attributional Style Questionnaire

Name: \_\_\_\_\_

Date \_\_\_ / \_\_\_ / \_\_\_\_\_

DIRECTIONS

- 1) Read each situation and vividly imagine it happening to you.
- 2) Decide what you believe to be the one major cause of the situation if it happened to you.
- 3) Write this cause in the blank provided.
- 4) Answer the three questions about the cause by circling one number per question. Do not circle the words.
- 5) Go on to the next situation.

1. YOU MEET A FRIEND WHO COMPLIMENTS YOU ON YOUR APPEARANCE.

1.1) Write down the one major cause:

1.2) Is the cause of your friend's compliment due to something about you or something about the other person or circumstance? Totally due to the other person or circumstances

- 1
- 2
- 3
- 4
- 5
- 6

7 Totally due to me

1.3) In the future when you are with your friends, will this cause again be present?

Will never again be present

1

2

3

4

5

6

7 Will always be present

1.4) Is the cause something that just affects interacting with friends or does it also influence other areas of your life? Influences just this particular situation

1

2

3

4

5

6

7 Influences all situations in my life

2. YOU HAVE BEEN LOOKING FOR A JOB UNSUCCESSFULLY FOR SOME TIME.

2.1) Write down the one major cause:

2.2) Is the cause of your unsuccessful job search due to something about you or something about other people or circumstances? Totally due to other people or circumstances

1

2

3

4

5

6

7 Totally due to me

2.3) In the future when looking for a job, will this cause again be present?

Will never be present again

1

2

3

4

5

6

7 Will always be present

2.4) Is the cause something that just influences looking for a job or does it also influence other areas of your life? Influences just this particular situation

- 1
- 2
- 3
- 4
- 5
- 6

7 Influences all situations in my life

### 3. YOU BECOME VERY RICH.

3.1) Write down the one major cause:

3.2) Is the cause of your becoming rich due to something about you or something about other people or circumstances? Totally due to other people or circumstances

- 1
- 2
- 3
- 4
- 5
- 6

7 Totally due to me

3.3) In your financial future, will this cause again be present?

Will never again be present

- 1
- 2
- 3
- 4
- 5
- 6

7 Will always be present

3.4) Is the cause something that just affects obtaining money or does it also influence other areas of your life? Influences just this particular situation

- 1
- 2
- 3
- 4
- 5
- 6

7 Influences all situations in my life

4. A FRIEND COMES TO YOU WITH A PROBLEM AND YOU DON'T TRY TO HELP THEM.

4.1) Write down the one major cause:

4.2) Is the cause of your not helping your friend due to something about you or something about other people or circumstances? Totally due to other people or circumstances

1

2

3

4

5

6

7 Totally due to me

4.3) In the future when a friend comes to you with a problem, will this cause again be present?

Will never again be present

1

2

3

4

5

6

7 Will always be present

4.4) Is this cause something that just affects what happens when a friend comes to you with a problem or does it also influence other areas of your life? Influences just this particular situation

1

2

3

4

5

6

7 Influences all situations in my life

5. YOU GIVE AN IMPORTANT TALK IN FRONT OF A GROUP AND THE AUDIENCE REACTS NEGATIVELY.

5.1) Write down the one major cause:

5.2) Is the cause of the audience reacting negatively due to something about you or something about other people or circumstances? Totally due to other people or circumstances

1

- 2
- 3
- 4
- 5
- 6
- 7 Totally due to me

5.3) In the future when giving talks, will this cause again be present?

Will never again be present

- 1
- 2
- 3
- 4
- 5
- 6
- 7 Will always be present

5.4) Is the cause something that just influences giving talks or does it also influence the other areas of your life? Influences just this particular situation

- 1
- 2
- 3
- 4
- 5
- 6
- 7 Influences all situations in my life

## 6. YOU DO A PROJECT WHICH IS HIGHLY PRAISED.

6.1) Write down the one major cause:

6.2) Is the cause of being praised due to something about you or something about other people or circumstances? Totally due to other people or circumstances

- 1
- 2
- 3
- 4
- 5
- 6
- 7 Totally due to me

6.3) In the future when doing a project, will this cause again be present?

Will never again be present

- 1
- 2
- 3
- 4
- 5

6

7 Will always be present

6.4) Is the cause something that just influences doing projects or does it also influence other areas of your life? Influences just this particular situation

1

2

3

4

5

6

7 Influences all situations in my life

7. YOU MEET A FRIEND WHO ACTS HOSTILELY TOWARDS YOU.

7.1) Write down the one major cause:

7.2) Is the cause of your friend acting hostile due to something about you or something about other people or circumstances? Totally due to other people or circumstances

1

2

3

4

5

6

7 Totally due to me

7.3) In the future when interacting with friends, will this cause again be present?  
Will never again be present

1

2

3

4

5

6

7 Will always be present

7.4) Is the cause something that just influences interacting with friends or does it also influence other areas of your life? Influences just this particular situation

1

2

3

4

5

6

7 Influences all situations in my life



8. YOU CAN'T GET ALL THE WORK DONE THAT OTHERS EXPECT OF YOU.

8.1) Write down the one major cause:

8.2) Is the cause of your not getting the work done due to something about you or something about other people or circumstances? Totally due to other people or circumstances

1

2

3

4

5

6

7 Totally due to me

8.3) In the future when doing the work that others expect, will this cause again be present?

Will never again be present

1

2

3

4

5

6

7 Will always be present

8.4) Is the cause something that just affects doing work that others expect of you or does it also influence other areas of your life? Influences just this particular situation

1

2

3

4

5

6

7 Influences all situations in my life

9. YOUR SPOUSE (BOYFRIEND/GIRLFRIEND) HAS BEEN TREATING YOU MORE LOVINGLY.

9.1) Write down the one major cause:

9.2) Is the cause of your spouse (boyfriend/girlfriend) treating you more lovingly due to something about you or something about other people or circumstances? Totally due to other people or circumstances

1

2

3

4

5

6

7 Totally due to me

9.3) In future interactions with your spouse (boyfriend/girlfriend), will this cause again be present? Will never again be present

1

2

3

4

5

6

7 Will always be present

9.4) Is this cause something that just affects how your spouse (boyfriend/girlfriend) treats you or does it also influence other areas of your life? Influences just this particular situation

1

2

3

4

5

6

7 Influences all situations in my life

10. YOU APPLY FOR A POSITION THAT YOU WANT VERY BADLY (e.g., IMPORTANT JOB, GRADUATE SCHOOL ADMISSION, etc.) AND YOU GET IT.

10.1) Write down the one major cause:

10.2) Is the cause of your getting the position due to something about you or something about other people or circumstances? Totally due to other people or circumstances

- 1
- 2
- 3
- 4
- 5
- 6
- 7 Totally due to me

10.3) In the future when applying for a position, will this cause again be present?  
Will never again be present

- 1
- 2
- 3
- 4
- 5
- 6
- 7 Will always be present

10.4) Is this cause something that just influences applying for a position or does it also influence other areas of your life? Influences just this particular situation

- 1
- 2
- 3
- 4
- 5
- 6
- 7 Influences all situations in my life

## 25. [Appendix 28 Ethical approval](#)

### ***Approval Letter: Human Sciences Research Ethics Committee***

#### ***University of Derby***

Date: 1<sup>st</sup> November 2016

Co-vice Chair, Human Sciences Research Ethics Committee, University of Derby

Dear Ann,

**Ethics Ref No: 20-15-AK**

Thank you for submitting this revised application to the Psychology Research Ethics Committee.

I have now reviewed the revised documents you sent following the feedback you received on your initial application, and I am satisfied that all of the issues raised have been dealt with. The application can now therefore be approved.

The following documents have now been re-reviewed:

1. Ethics application form

If any changes to the study described in the application or supporting documentation is necessary, you must notify the committee and may be required to make a resubmission of the application.

Please note ethical approval for application 20-15-AK is valid for a period of 5 years i.e. 1<sup>st</sup> November 2021.

Good luck with the study.

Yours sincerely

Chapter 4 – study 3

***Approval Letter: Human Sciences Research Ethics Committee***

***University of Derby***

Date: 2<sup>nd</sup> October 2017

Deputy Chair, Human Sciences Research Ethics Committee, University of Derby

Dear Ann,

**Ethics Ref No: 68-1617-AKp**

Thank you for submitting this revised application to the Human Sciences Research Ethics Committee.

I have now reviewed the revised documents you sent following the feedback you received on your initial application, and I am satisfied that all of the issues raised have been dealt with. The application can now therefore be approved.

The following documents have now been re-reviewed:

2. Ethics application form
3. Appended Materials

If any changes to the study described in the application or supporting documentation is necessary, you must notify the committee and may be required to make a resubmission of the application.

Please note ethical approval for application 68-1617-AKp is valid for a period of 5 years i.e. 2<sup>nd</sup> October 2022.

Good luck with the study.

Yours sincerely,

Chapter 6 - Study 3

### ***Approval Letter***

Date: 13<sup>th</sup> February 2019

Dear Ann,

#### **Investigating the effectiveness of positive psychology interventions: 271118-AK**

Thank you for submitting your application to the UDOL Research Ethics Committee and reporting the additions to your approved form.

The additions raised no issue, therefore you can proceed your research with this new version.

If any change to the study described in the application or to the supporting documentation is necessary, you are required to make a resubmission and await approval prior to any change.

You should provide a project update to the UDOL ethics chair on a 12-month basis and provide a summary report at the end of the project. Please review the flowchart 'processes after ethical approval' to ensure you are familiar with these requirements.

Yours sincerely,

Member of UDOL Research Ethics Committee

***Approval Letter***

Date: 18/12/18

Dear Ann,

**Investigating the effectiveness of positive psychology interventions: 271118-AK**

Thank you for submitting your application to the UDOL Research Ethics Committee and reporting the additions to your approved form.

The additions raised no issue, therefore you can proceed your research with this new version.

If any change to the study described in the application or to the supporting documentation is necessary, you are required to make a resubmission and await approval prior to any change.

You should provide a project update to the UDOL ethics chair on a 12-month basis and provide a summary report at the end of the project. Please review the flowchart 'processes after ethical approval' to ensure you are familiar with these requirements.

Yours sincerely,

Member of UDOL Research Ethics Committee



Happy	Sad
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Table 5

Positive practice words	Negative practice words
Fine	Harmful
Joyful	Complaint
Hopeful	Upset
Optimistic	Pessimistic

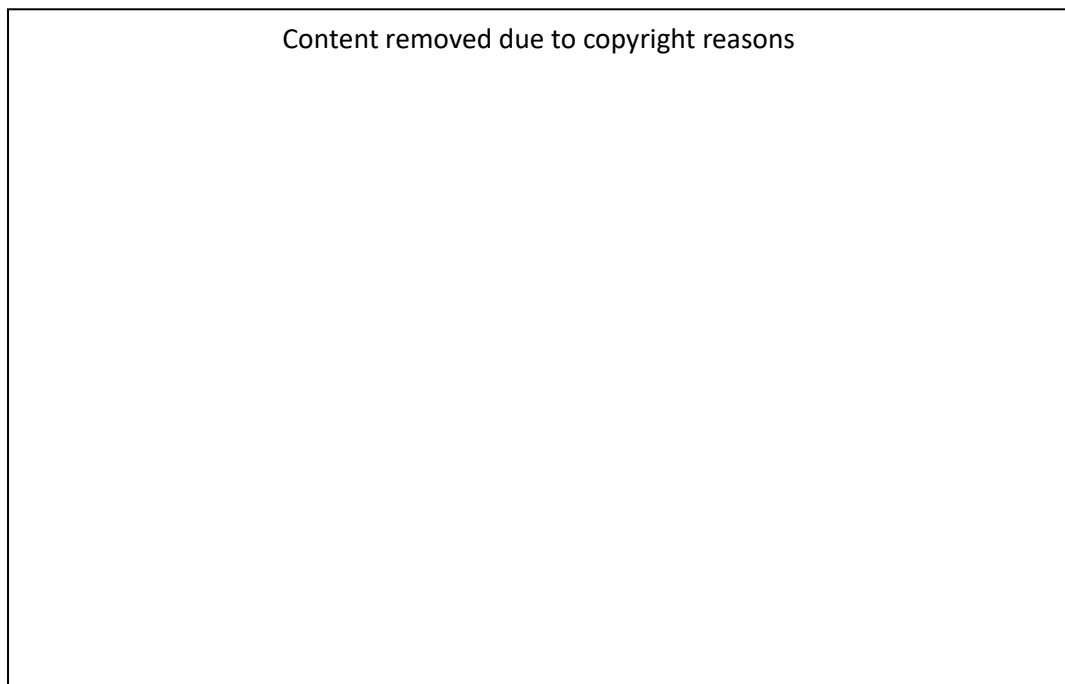
The image category ratings

<b>1-3.5 valance negative (Total of 40 images)</b>	<b>3.5-5.5 valance neutral (Not needed)</b>	<b>5.5-9 valance positive (Total of 40 images)</b>
1-3 arousal low 4 arousal medium 5-9 arousal high		1-3 arousal low 4 arousal medium 5-9 arousal high

The IAT within Inquisit has the different arousal categories will have all the number of images in each category counterbalanced. For example, low arousal will have 10 images in each of the valance categories.

Positive images

1-3 arousal low



4 arousal medium



Content removed due to copyright reasons

5-9 arousal high

Negative images

1-3 arousal low

4 arousal medium

5-9 arousal high

