Anxiety and the Clarity of Future Self-Thoughts: Exploration of Mediators and Interventions

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The work in Chapter 3 (Study 2) of the thesis has appeared in publication as follows: Duffy, J., Cole, S.N., Charura, D., & Shevchenko, J. (2024). Depression and looming cognitive style: Examining the mediating effect of perceived control. *Journal of Affective Disorders Reports*. 15, 2666-9153. https://doi.org/10.1016/j.jadr.2023.100698. I was responsible for the conception and design of the study, the acquisition, analysis and interpretation of the data, drafting the manuscript and approving the final version. The contribution of the other authors was the conception and design of the study, revising manuscript and approving the final version.

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Abstract

The research presented within the present thesis investigated the role of clarity, or mental immersion, in generalised anxiety and examined the effectiveness of a positive future imagery technique, the Best Possible Self (BPS) technique, for reducing symptoms. Previous research, within the field of prospection, shows that anxious individuals experience more mental immersion in negative future thoughts. For instance, when compared to a healthy control group, individuals with generalised anxiety disorder report negative events as clearer, more intense, and associated with greater pre-experiencing. Chapter 2 replicated the findings from existing research showing that generalised anxiety was associated with the tendency to envision negative future self-thoughts more clearly. Chapter 3 explored potential mechanisms through which clarity may influence symptomology, showing that self-esteem mediated the relationship between clarity and anxiety. Chapter 4 assessed the effectiveness of the BPS technique in reducing anxiety and demonstrated that the intervention significantly reduced symptomology after two or more sessions over four days, with self-esteem partially mediating these effects. Collectively, these findings suggest that the clarity of future self-imagery plays a significant role in anxiety and that enhancing positive self-imagery with the BPS task could provide a practical and scalable tool for anxiety reduction.

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Glossary

Generalised Anxiety Disorder: A psychiatric condition characterised by persistent, uncontrollable and multifocal worry (e.g., related to school, work, finances, relationships). Individuals can also experience physiological symptoms including restlessness, reduced concentration, and muscle tension.

Generalised Anxiety Symptomology: Refers to the severity and frequency of anxiety symptoms measured on a continuum. Individuals with low symptomology may experience adaptive, protective anxiety, whereas high symptomology impairs daily functioning.

Future Imagery: The mental construction or simulation of possible future events.

Possible Selves: Future self-definitions that are housed within the self-schema and represent hoped-for or feared identities. They are abstract in nature, reflecting beliefs and expectations about one's potential future identity.

Prospection: A broad term describing future-orientated cognition, encompassing both episodic (autobiographical, scenario-based) and semantic (general, abstract) information. Prospection can include simulations, predictions, planning, and intentions.

Clarity (of future imagery): The perceived realness or vividness of an imagined future event.

Self-Esteem: The evaluative component of the self that reflects feelings of self-worth. High self-esteem is associated with positive self-perceptions, whereas low self-esteem can contribute to anxiety symptomology.

Looming Cognitive Style (LCS): A cognitive bias where threats are mentally imagined as rapidly approaching or intensifying over time. LCS is considered a cognitive vulnerability factor for anxiety disorders, particularly GAD.

Self-Schema: Core beliefs about the self that influence interpretation of experiences, including future and past self-concepts. Individuals with anxiety, often display core beliefs that emphasise vulnerability and inadequacy which can reinforce negative patterns of thinking.

Worry: Repetitive, negative, and predominantly verbal thoughts about potential threats, often phrased as "what if" questions. It functions as a cognitive strategy aimed at predicting or preventing danger but can become maladaptive when it is excessive or uncontrollable.

Best Possible Self Technique (BPS): A positive psychology technique that involves vividly imagining one's ideal future self. It is typically completed as a writing exercise, where individuals describe their best possible future in detail, but it can also be completed verbally or pictorially.

Chapter 1: General Introduction to the Field of Research

1.1. Thesis Overview

A growing body of research has begun to explore the link between future-directed imagery, or *prospection*, and psychological distress (MacLeod, 2016; MacLeod, 2025). From this perspective, it is suggested that the way in which individuals envision their future can contribute to the development and maintenance of mental ill health, and that reversing these biases can facilitate a reduction in distress (Cole & Charura, 2025; Roepke & Seligman, 2016). This rationale has facilitated the development of imagery-based interventions that specifically target biases in future thinking to reduce symptomology (e.g., Hallford et al., 2020a).

For instance, research shows that depression is associated with impairments in the ability to create specific and detailed positive future images (Hallford et al., 2018), which is suggested to maintain symptomology by contributing to a reduced ability to feel pleasure in the moment when thinking about a future event (i.e., anticipatory pleasure) (Hallford et al., 2020b). In response, a recent intervention, future specificity training, was developed to help individuals generate more specific future events (Hallford et al., 2020a). Research shows that this approach can effectively reverse future imagery biases and reduce depressive symptoms (Hallford et al., 2023).

In the context of generalised anxiety disorder (GAD), research has shown that, compared to healthy controls, participants with GAD report more vivid, or *real*, negative future imagery (Di Simplicio et al., 2016; Morina et al., 2011; Tallon et al., 2020). Similar results have been observed in non-clinical samples, showing that individuals with higher generalised anxiety symptomology report more vivid negative future images and less vivid positive future images

(see Du et al., 2022 for a review). It is suggested that the perceived vividness of such thoughts could contribute to the development and maintenance of anxiety. However, despite the considered importance of this dimension of future thinking, questions remain regarding through which mechanism the vividness of negative future imagery could contribute to symptomology.

Understanding how future imagery could contribute to GAD, could help to inform the development of an intervention for individuals who are waiting for psychological treatment, such as cognitive behavioural therapy. GAD is a chronic and often debilitating psychological condition that contributes to substantial economic and personal cost (Moylan et al., 2012; Peng, 2024; Toghanian et al., 2014). It is also increasingly prevalent, with lifetime prevalence rates ranging from 1–7% in Europe and 7.8% in the United States (NICE, 2025). However, despite the prevalence and impact of symptomology, access to therapeutic interventions is limited, with fewer than one third of individuals receiving adequate support (NICE, 2025). Those who do receive psychological treatment, are often faced with long-waiting times due high demand (Lattie et al., 2022; Revicki et al., 2012), which can facilitate prolonged distress and exacerbation of current symptomology (Punton et al., 2022; Reichert & Jacobs, 2018). Furthermore, being placed on a waiting list is also associated with greater drop-out of therapy when an individual does receive treatment, which can lead to symptom deterioration and hospital admission (Carter et al., 2012; De Haan et al., 2013). These challenges underscore the need for accessible, scalable interventions that can provide immediate symptom relief for individuals while they wait for formal counselling services.

Within the framework of the present thesis, it is suggested that the vividness of negative future imagery can contribute to generalised anxiety and that reversing this bias could reduce

symptomology. However, to date, no research has investigated the underlying mechanism through which vividness could contribute to symptomology, and, thus, whether it represents a target for psychological treatment. This serves as the overarching aim of the present thesis. The introductory chapter that follows will review literature relevant to this thesis. This will include a discussion on the ontology of GAD from a cognitive perspective, prospective biases in anxiety, and will review existing intervention techniques that specifically target imagery as imagery has been shown to have powerful effects on emotion (Holmes et al., 2008), therefore it would be reasonable to assume it could impact anxiety.

1.2. What is Anxiety?

Humans can encounter a wide variety of threats throughout their life, from climate change (abiotic threat) to Covid-19 (contaminative threat) (Miloyan et al., 2019). Anxiety is an adaptive response evolved to help manage these threats by detecting danger and promoting protective behaviours such as avoidance. Unlike fear, which arises in response to imminent danger, anxiety focuses on anticipating and mitigating risks that may occur in the future (Miloyan et al., 2019). However, the human threat-detection system is not infallible, and it can produce errors in the form of *false alarms* (perceiving a threat where none exists) and *false negatives* (failing to detect an actual threat) (Miloyan et al., 2019). For example, during the Covid-19 pandemic, some populations failed to detect the threat of the virus despite receiving indicators (e.g., news reports of people dying). These individuals ignored restrictions and continued to socialise despite the risks. This is an example of an anxiety false negative, as people failed to detect the threat of Covid-19 and as a result, these individuals did not engage in protective responses and potentially put themselves in immediate danger (i.e., contracting the virus).

Although false alarms are generally less costly than false negatives (which can lead to harm) they are not without consequence. Rather, repeatedly perceiving threats in the absence of actual danger can result in significant opportunity costs (e.g., missing out on something due to avoidance) and physiological stress. For example, some individuals could avoid social situations due to a perceived risk of embarrassment or judgment. In this example, no actual threat exists, and instead, avoiding the situation can lead to missed opportunities for connection and enjoyment. This pattern is characteristic of individuals with pathological anxiety or an anxiety disorder, who experience mental, behavioural and biological responses to false alarms daily (Beck & Emery, 1985).

1.2.1. Anxiety Disorders

Anxiety disorders are characterised by excessive fear, anxiety and related behavioural disturbances (World Health Organization, 2022). To receive a diagnosis from a qualified clinician, symptoms need to be persistent and severe enough to result in significant distress or impairment (Diagnostic and Statistical Manual of Mental Disorders: DSM-5; APA, 2013). In addition, there should not be an alternative explanation for symptomology including substance abuse, a medical concern, or a different psychological disorder. According to the DSM-5 (APA, 2013) and the International Classification of Diseases (ICD-11; World health Organization, 2022) there are seven recognised anxiety disorders: generalised anxiety disorder, panic disorder, social anxiety disorder, agoraphobia, specific phobias, separation anxiety disorder, and selective mutism. These classifications can be distinguished from one another by the focus of apprehension (i.e., the stimuli or the situations that trigger the fear/anxiety response). For instance, in generalised anxiety disorder the focus of apprehension is generalised to a number of

everyday events, whereas specific phobias focus on a particular stimulus. The present thesis will focus on generalised anxiety disorder and, as such, the section that follows will focus on this condition specifically. However, due to limited research evidence, research on other anxiety disorders will occasionally be drawn upon where relevant.

1.2.2. Generalised Anxiety Disorder

One of the most prevalent anxiety-related disorders is Generalised Anxiety Disorder (Revicki et al., 2012) which is a chronic and often debilitating psychiatric condition that is characterised by persistent, uncontrollable and multifocal worry (e.g., related to school, work, finances, relationships) (APA, 2013; DeMartini et al., 2019; Rowa et al., 2017). Individuals can also experience physiological symptoms including restlessness, reduced concentration, and muscle tension. To receive a diagnosis from a qualified clinician, symptoms must persist over 6 months; however, most individuals struggle for years before receiving a diagnosis (Basile et al., 2024). Individuals with GAD frequently experience comorbid conditions, in particular depression, which affects an estimated 62% of individuals with GAD across their lifetime (NICE, 2025). Individuals with GAD also experience significant personal cost with sufferers more likely to be unemployed, smoke, and have poorer overall well-being (Moylan et al., 2012; Toghanian et al., 2014). In addition to the personal impact of GAD, the condition is associated with increased reliance on healthcare services, contributing to substantial economic costs (Hoffman et al., 2008; Saha et al., 2021; Wittchen, 2002).

1.2.3. What is Worry?

The central feature of GAD is uncontrollable worry (APA, 2013). Worry is characterised by negative verbal thoughts that are typically framed as "what if" questions (e.g., "*what if I am late to my interview?*") (Borkovec, 1985). Although these thoughts are future orientated, they can occasionally be anchored to the past e.g., *"Did I lock my door this morning? What if someone breaks in?".* In this example, the individual is worried about a possible negative *future* consequence which is anchored to a potential past mistake. The content of worrisome thoughts typically centres around an individual's focus of apprehension (i.e., the stimuli or situations that trigger the anxiety response) and can involve a variety of topics including finances, health, relationships, or work/school (Roemer et al., 1997; Sanderson & Barlow, 1990). Importantly, however, individuals without GAD also worry about similar topics as individuals with a diagnosis (Hirsch et al., 2013; Roemer et al., 1997). Instead, healthy worry can be distinguished from pathological worry in how often it occurs, how much control a person feels they have over it, the level of distress it causes, and whether it interferes with daily life (Hirsch et al., 2013; Olatunji et al., 2010; Ruscio & Borkovec, 2004).

The Metacognitive Theory of Emotional Disorders (Wells, 1995; Wells, 2010) offers a framework for understanding how worry becomes pathological in disorders such as GAD. Specifically, this model distinguishes between two types of worry: Type 1 and Type 2 worry. Type 1 worry involves concerns about external events, such as potential threats or everyday problems (e.g., worrying about catching an illness). Type 1 worry is driven by positive beliefs regarding the function of worry, such as helping to anticipate and prepare for threats ("worry helps me prepare") (Wells, 2010). During Type 1 worry, individuals start to generate 'what if?'

scenarios and seek coping strategies to mitigate perceived threats. However, if individuals struggle to find effective solutions, or if they perceive their worry as unmanageable, they can transition into Type 2 worry, or "*meta-worry*". Type 2 worry involves worrying about one's own worrying process and is characterised by negative metacognitive beliefs, including beliefs regarding the controllability or danger of worrying ("My worrying is uncontrollable") (Wells, 2010). This form of worry generates heightened anxiety and leads to the persistence and escalation of pathological worry. Individuals with GAD show pathological worry that is more consistent with Type 2 worry processes (Wells & Carter, 2001). Specifically, sufferers often display maladaptive metacognitive beliefs about the dangers and uncontrollability of their thoughts, which serves to maintain and exacerbate their anxiety.

1.2.2. Measures of Generalised Anxiety Symptomology

Diagnostic manuals such as the DMS-5 (APA, 2013) assume that healthy anxiety is qualitatively distinct from pathological anxiety (i.e., individuals either experience the symptoms or do not). This categorical approach to anxiety is limited, however, due to high overlap between anxiety and other disorders which undermine diagnostic boundaries (Xiao, 2023). For instance, GAD shares common symptomology with other anxiety-related disorders and conditions such as depression which can facilitate misdiagnosis. Also, this categorical distinction forces clinicians to decide whether someone has a disorder or not, which can risk failing to diagnose individuals with subthreshold levels who still experience significant distress and impairment. However, more recent evidence suggests that anxiety exists on a continuum rather than as a categorical distinction (Broman-Fulks et al., 2010; Simonsen, 2010).

From this dimensional perspective, anxiety is not simply present or absent; instead, it varies in severity and frequency (Narrow & Kuhl, 2011). Individuals with low symptomology can be considered to have adaptive, healthy anxiety, which plays a protective role in managing threats (Gladstone & Parker, 2003). At the other end of the continuum, individuals with high symptomology experience severe anxiety that impairs daily functioning. Those with moderate anxiety fall between the two extremes. According to this perspective, the qualitative experience of anxiety is similar across all levels of symptomology, and instead, it is the frequency and impact of symptoms that distinguishes healthy anxiety from pathological. Importantly, this approach suggests that findings from non-clinical populations (e.g., individuals with mild to moderate anxiety) may still be generalisable to clinical groups, as the underlying mechanisms of anxiety remain consistent across the continuum (Robinson et al., 2014).

The severity of anxiety symptoms is typically assessed through self-report psychometric measures that assess an individual's interpretation of their symptoms (Julian, 2011). One such measure is the state-trait anxiety inventory (STAI; Spielberger, 1983) which contains 40 items which assess both temporary feelings of anxiety in response to specific situations (state-based anxiety) and one's tendency to experience anxiety across multiple contexts (trait-based anxiety). State anxiety is considered situational (how do you feel right now) whereas trait anxiety is a dispositional personality characteristic (how do you generally feel). This measure can be useful for determining longevity of an individual's symptomology, specifically whether their anxiety is momentary or a long-term psychological vulnerability.

Although the STAI is useful for differentiating between state and trait anxiety, it is not specifically designed to assess generalised anxiety symptomology specifically. Instead, more

specific tools such as the Generalised Anxiety Disorder-7 questionnaire (GAD-7; Spitzer et al., 2006) can be employed. The GAD-7 consists of seven questions that measure both cognitive (e.g., excessive worry) and somatic symptom severity over the previous two weeks (Spitzer et al., 2006). Scores are then either placed on a continuum from 0-21 with higher scores representing more severe and persistent symptomology or alternatively, cut-off scores can be used to compare individuals with high and low anxiety-levels (e.g., ≥10=high anxiety; Williams, 2014).

The severity of generalised anxiety can also be assessed with measures that assess specific elements of GAD, such as the Penn State Worry questionnaire (Meyer et al., 1990) which measures worry severity. However, measures such as these do not capture the full DSM diagnostic criteria of GAD (e.g., somatic symptoms such as restlessness and muscle tension) (Newman et al., 2002), which is why the present thesis will employ the GAD-7.

1.3. A Summary of Approaches to Anxiety

Although cognitive approaches have become the dominant framework for understanding anxiety (Sarason, 2019), there are other influential theories that propose alternative explanations for the development and maintenance of symptomology. First, psychoanalytic theoretical perspectives distinguish between realistic anxiety, arising from actual external threats, and neurotic anxiety, which originates from internal, unconscious conflicts (De Bianchedi et al., 1988). From this perspective, anxiety disorders are believed to be the result of unresolved and repressed conflict between different aspects of the unconscious (Freud, 1926). Alternatively, behavioural/learning theory suggests that anxiety disorders develop through learning mechanisms (Strongman, 1995). For example, deriving from Pavlov (Clark, 2004), anxiety is

viewed as a conditioned response which forms when a neutral stimulus is paired with a threatening one. In addition, the behavioural theory suggests that anxiety can be learnt by observing others (Bandura, 2021). For example, a child who observes a parent displaying anxiety towards spiders will learn that spiders are threatening. Finally, the physiological theory conceptualises anxiety as the result of biological and neurological processes (Strongman, 1995). This includes genetic vulnerability, imbalances in neurotransmitters, and overactivity in the autonomic nervous system. According to this approach, treatment predominantly involves pharmacological intervention despite being less cost effective and associated with fewer long-term benefits when compared to psychological treatments (Heuzenroeder et al., 2004).

1.3.1. Cognitive Theories of Anxiety

Cognitive theories of anxiety assume that symptoms are driven through the negative interpretation of one's situation, and that treatment involves modifying the maladaptive thoughts and beliefs that underpin such interpretations (Aikins & Craske, 2001; Beck et al., 2005; Eysenck, 2013). The present thesis is positioned and influenced by cognitive perspective epistemologies and the sections that follow will discuss the ontology of GAD within this approach. Specifically, the sections below will include a discussion on the key concepts of the overarching generic cognitive model of anxiety developed by Aaron Beck (Beck, 1976), the looming cognitive model (Riskind, 1997), and the internal threat simulation model (Bulley et al., 2017). In particular, four key components of the cognitive approach will be examined, which are central to the rationale of the present thesis: cognitive vulnerability, self-schema, the proximity of threats, and internally generated thoughts.

1.3.1.1. Becks Cognitive Model of Anxiety

According to Beck's cognitive model, anxiety arises from cognitive vulnerabilities that predispose individuals to overestimate danger and underestimate their ability to cope with adversity (Beck, 1976; Beck & Emery, 1985). These vulnerabilities are rooted in distorted perceptions of events, which operate at three interconnected levels: automatic thoughts, intermediate beliefs, and core beliefs. Automatic thoughts are verbal or imagery-based activity that occurs directly in response to specific triggers. Individuals with elevated anxiety experience negative automatic thoughts often related to mental or physical harm. In addition, these automatic thoughts are elicited frequently and are experienced as particularly *real* and plausible. For instance, after breaking down on the side of the road, an individual with GAD could experience automatic thoughts such as "I'm going to die" and they could imagine being involved in a stationary collision. Automatic thoughts are shaped by intermediate beliefs, which include attitudes and rules (e.g., breaking down is dangerous). These intermediate beliefs, in turn, are rooted in deeper core beliefs that represent rigid, global assumptions about oneself, others, and the world. Core beliefs are organised within schemas, which are cognitive frameworks that influence how individuals interpret their experiences and represent a key target in cognitive behavioural therapy (Koerner et al., 2015; Otte, 2011; Wyatt, 2022). An example of a schema that is significant to understanding anxiety is the self-schema which is discussed in more detail below.

1.3.1.2. The Self-Schema

A key schema in anxiety is the self-schema, which encompasses core beliefs about the self in different aspects of one's life *e.g., school me, work me, friend me* (Cross & Markus, 1994;

Markus, 1977). For instance, a self-schema might include core beliefs such as “I am a good person” or “I am smart.” However, individuals with GAD often display core self-beliefs that emphasise vulnerability and inadequacy, such as “I’ll never pass my exam” or “I will make a fool of myself” (Beck & Emery, 1985). These schemas perpetuate anxiety by reinforcing an exaggerated sense of personal vulnerability and incapacity to manage adversity.

The relationship between GAD and dysfunctional core beliefs about the self is also evident in research showing that individuals with elevated anxiety evaluate themselves negatively in the present (Bandura, 2015; Diener & Diener, 2009; Li et al., 2023; Muris et al., 1998). This is measured with constructs such as self-esteem. Self-esteem, often described as the evaluative component of the self, pertains to individuals’ feelings of self-worth (Kernis, 2013). Individuals with high self-esteem tend to display positive self-perceptions, whereas those with low self-esteem subjectively experience more self-dissatisfaction (Kernis, 2013; Pyszczynski et al., 2004). Research highlights that the relationship between anxiety and self-esteem is reciprocal whereby low self-esteem is both a predictor and a consequence of anxiety symptomology (Li et al., 2023; Sowislo & Orth, 2013).

However, one's sense of self is not constrained to the present, and who one is currently. Instead, the self is a multi-dimensional construct that can be temporally extended in both directions to include information about past and future identities (Kanten & Teigen, 2008; Strahan & Wilson, 2006). As such, individuals with GAD are suggested to selectively attend to self-relevant information in the past (e.g., memories of failure) and the future (e.g., not getting into university) that supports negative self-beliefs and actively avoid any information that contradicts negative schema (e.g., future success) (Borkovec et al., 1986; Sokol et al., 2022).

This is because self-relevant information in the past and future is clustered around periods of identity development (Rathbone et al., 2008; Rathbone et al., 2011). This clustering effect suggests that once a negative self-belief (e.g., "I am a failure") emerges, both memories and future imaginings become organised around this identity, to reinforce its salience (Rathbone & Steel, 2014). Consequently, individuals will retrieve memories of personal failure and also generate future scenarios that continue to reflect and sustain this negative self-concept.

Information about the self in the past derives primarily from autobiographical memory, which refers to memories of personally experienced events that are relevant to an individual's identity (Conway & Pleydell-Pearce, 2000). The accessibility of autobiographical memories is dependent on their consistency with current self-views (Hards et al., 2024). For instance, research shows that memories that do not align with current self-beliefs are often recalled from the observer perspective (viewing the scene through a third person) in order to psychologically distance them from the present self (Libby & Eibach, 2002).

With regards to the future, self-schemas contain information regarding one's future-self or "possible selves" (Markus & Nurius, 1986). Possible selves include the type of person one hopes or fears to be and they play a vital role in motivating behaviour (Frazier et al., 2021; Markus & Nurius, 1986). Possible selves can also provide insight into past and present aspects of the self-schema, as individuals aim for consistency within their self-definitions (Borkovec et al., 1986). Thus, an individual will repeatedly reflect on past experiences that reinforce how they see themselves in the present, e.g., past failure reinforces perceived inadequacy, which in turn shapes how the individual sees themselves in the future. For example, a student once froze during a school presentation and felt humiliated. That experience reinforced the belief that they are unable

to speak in public so now, whenever they imagine a future speaking event, they picture themselves failing again.

Furthermore, altering how one envisions their future self may also reshape how they interpret their past and understand their present identity (Peetz & Wilson, 2008; Strahan & Wilson, 2006). This is because the self is characterised by a bi-directional relationship meaning the past and present can shape one's imagined future, and the future can in turn influence how individuals make sense of their past and present. For instance, imagining a more competent future self could lead individuals to focus more on past instances of success and view past failure as a necessary step in personal development. In addition, imagining a competent and successful future-self could boost feelings of self-worth and self-satisfaction in the present. Within the framework of the present thesis, fostering a more positive future self-concept could therefore reduce anxiety by reducing the influence of negative self-schemas.

1.3.1.3. The Looming Cognitive Model of Anxiety

It is briefly mentioned in Becks cognitive perspective that anxiety is activated when an individual moves closer to a perceived threat, and that mentally imagining or dwelling on a threat can make it appear as though it is moving closer to an individual (Beck & Emery., 1985). The looming cognitive model builds upon this idea and suggests that the '*self*' exists in a world of dynamic threats and some individuals display a bias towards perceiving and mentally imagining threats as rapidly approaching the present self and rising in risk (Riskind et al., 2000). According to this perspective, anxiety does not arise from static threats; rather, it is facilitated through the mental imagining of threats as evolving and approaching in time or space (e.g., a physical danger moving closer in space, or a deadline or feared event becoming more imminent) (Gonzalez-Diez

et al., 2015; Riskind et al., 2000). This cognitive tendency, known as the Looming Cognitive Style (LCS), biases an individual's perception of future danger and plays a key role in anxiety vulnerability (Riskind et al., 2007). Specifically, this tendency could perpetuate anxiety by reinforcing the overestimation of danger in the future.

The looming maladaptive style questionnaire (Riskind et al., 2000) assesses LCS tendencies with six hypothetical scenarios that depict potentially threatening events (Riskind et al., 2000). Participants are instructed to imagine themselves in these situations and answer three Likert-style questions (e.g., In the present, are the chances of this occurring decreasing, or increasing and expanding with each moment?). Research shows that LCS can act as a cognitive vulnerability for anxiety disorders (Adler & Strunk, 2010; Riskind et al., 2007), and it predicts increases in anxiety symptoms over time (Gonzalez-Diez et al., 2015).

1.3.1.4. The Internal Threat Simulation Model

Bulley et al. (2017) proposed a cognitive framework that emphasises the role of internally generated thoughts in the development and maintenance of anxiety. This model argues that anxiety can arise not only from external sensory cues but also from internal cognitive processes organised across two temporal dimensions: prospection (future-orientated thought) and retrospection (past-orientated thought), both of which can occur in episodic (specific scenario-based simulation) or sematic formats (abstract representation of general potential threats, often based on knowledge or learned association). These four interrelated components (episodic prospection, semantic prospection, episodic retrospection, and semantic retrospection) can simulate threat in the absence of any immediate danger, see Table 1.1. For instance, imagine

walking home alone in the dark and hearing footsteps behind you. Although the footsteps act as an external cue, the anxiety response that follows is shaped by internal processes such as remembering hearing about recent robberies on the news or imagining being attacked.

Although these processes have evolved to help survival by facilitating the anticipation and preparation of danger (see Table 1.1 for examples), they can also increase vulnerability to anxiety disorders. Specifically, biases in how individuals simulate the future or recall the past can contribute to the overestimation of threat and a diminished sense of coping capacity, both of which are key mechanisms in anxiety symptomology (Beck & Emery, 1985). For instance, when faced with an upcoming social situation, an individual could focus on past instances where social interactions have gone wrong and imagine that the upcoming event will also result in feeling judged and rejected. These biased thinking processes could lead to the overestimation of social threats and the underestimation of one's ability to cope in social situations. Thus, the cognitive systems that allow us to avoid harm can also give rise to excessive and maladaptive anxiety when paired with a prospective or retrospective thinking bias.

Table 1.1. Taxonomy of Threat-Related Internally Generated Cognition

Component	Definition	Example
Episodic prospection	Mental construction of specific scenario-based simulations of possible future events.	Imagining being attacked on your way home.
Sematic prospection	Abstract representations of general potential threats, which are often based on learned associations or knowledge.	Knowing that walking alone at night increases risk of assault.
Episodic retrospection	Specific, autobiographical threat events from the past.	Remembering being followed home once in the past.
Sematic retrospection	General or abstract knowledge about past threats.	Knowing that your neighbourhood has a history of robberies.

Both Becks cognitive model of anxiety (Beck, 1976) and the Looming cognitive model (Riskind et al., 2000) highlight the importance of prospective cognition in anxiety. Specifically, both theories highlight the importance of the '*self*', and mental representations of future identities in anxiety. More recently, Bulley et al.'s (2017) Internal Threat Simulation Model offered a detailed taxonomy of prospection and retrospection processes that simulate threats internally, even in the absence of external cues. This model highlights how vivid simulations of possible future events (episodic prospection) and abstract verbal representations of potential dangers (semantic prospection) can contribute to heightened and persistent anxiety responses.

Together, these models suggest that anxiety often arises from internally generated simulations about the self in future scenarios. For this reason, the present thesis will focus specifically on prospection related to the future self, as this may play a critical role in how individuals anticipate, interpret, and respond to potential threats. However, due to limited research evidence examining anxiety and the future-self, the sections that follow will discuss research from related fields of study within prospection more broadly.

1.4. Prospection

Prospection is a broad term that is used to describe future-orientated cognition (Gilbert & Wilson, 2007). As discussed in the previous section, it is made up of autobiographical experiences (i.e., episodic information) and general or abstract states of the world (i.e., semantic information) (Tulving, 1984). For example, imagining how the world will look in 50 years (semantic prospection) and predicting what questions you could be asked in an upcoming job interview (episodic prospection). Szpunar et al. (2014) proposed a taxonomical framework of prospection that included: simulations (the construction of a mental representation of a future

event), predictions (estimating the likelihood of a future event), planning (organising the steps required to achieve a goal), and intentions (setting oneself a goal).

E*pisodic future thinking (EFT)* is a type of prospection that involves the simulation of events that could happen in one's future (Atance & O'Neill, 2001; Szpunar, 2010). In these hypothetical mental images, the imaginer plays a central role in the future event and can act out various scenes involving complex interactions with real or imagined counterparts (Henry, 2020). It is suggested that the ultimate goal of EFT is to anticipate future situations that could have various outcomes and steer the events in the present to achieve goals (Oettingen, 2012). However, imagining the future can also have other functional benefits in addition to helping direct behaviour including contributing to one's identity, helping aid emotional regulation, and building social bonds (Duffy & Cole, 2021; Hallford & D'Argembeau, 2022; Schacter et al., 2017).

According to the constructive episodic simulation hypothesis, future-oriented cognition is formulated from the recombination of past events into novel scenarios (Rasmussen & Berntsen, 2013; Schacter & Addis, 2007). Evidence for this can be found in brain imaging research, showing that similar brain regions are activated when people construct both future and past events (Addis et al., 2007; Szpunar et al. 2007). However, although memories provide the building blocks for future cognition, the content of one's future thoughts are shaped by culturally shared expectations (cultural life scripts; Rathbone et al., 2016) and current concerns (Cole & Berntsen, 2016). These factors shape how remembered details are selected and combined. Thus, future events do not merely reflect what has already happened but also what is culturally expected and personally significant.

1.4.1. Possible Selves

As discussed in section 1.3, cognitive theories of anxiety highlight the significance of the self-schema in GAD (Beck, 1976). Possible selves are housed within the self-schema and represent future self-definitions (Markus & Nurius, 1986). These descriptions are sematic in nature because they reflect abstract beliefs or knowledge about the future self, rather than specific future experiences e.g., going to the shop on your way home. Specifically, possible selves disclose a person's fears, i.e., feared possible self, and hopes i.e., hoped-for possible self, for their future identity (Markus & Nurius, 1986; Oyserman & Markus, 1990). It is suggested that possible selves have two main functions 1) to guide and motivate behaviour, and 2) influence the evaluation and interpretation of the current self (Markus & Nurius, 1986). Specifically, possible selves act as '*self-guides*' and provide direction by motivating individuals to either avoid or approach certain behaviours (Oyserman et al., 2004; Henry, 2015). For example, the feared self-motivates individuals to avoid behaviours that could align with undesirable outcomes, whereas the hoped-for self-motivates behaviours towards achieving aspirations. In addition to guiding behaviour, possible selves can also influence how individuals evaluate and interpret their current attributes, abilities, and experiences. For example, after an academic setback, a student could perceive an increased alignment with a feared self (e.g., being a failure) which could facilitate feelings of inadequacy and hopelessness.

1.4.2. Prospection and Psychopathology

Psychopathological research involves the study of mental disorders, including the causes of symptomology and treatment (Hopwood et al., 2023). Dysfunctions in future thinking have been associated to various psychopathology including depression (Roepke, & Seligman, 2016),

anxiety (Macleod, 2025), schizophrenia (Yang et al., 2018), obsessive compulsive disorder (Cole & Tubbs, 2022), and eating disorders (Schuman et al., 2025). To understand how future thinking relates to psychopathological functioning, previous research has examined the characteristics of thoughts by asking participants to rate their descriptions on various subjective dimensions (e.g., valence, controllability, belief in occurrence, vividness) (e.g., Hallford et al., 2018; Nam et al.,2024). Analyses are then conducted to examine differences in how individuals with high and low levels of symptomology think about the future (e.g., Hallford, 2019). The sections that follow will detail some of these findings with a particular focus on anxiety.

1.4.2.1. Future Thinking Valence

When imagining the future, the general population typically generates more positive thoughts compared to negative (Marsh et al., 2019). This positivity bias has been found in laboratory tasks and diary studies (Clark et al, 2013; Ditta & Storm, 2016; Newly-Clark & Ross, 2003) and is suggested to play a key role in emotional regulation and psychological wellbeing (Conversano et al., 2010). Individuals also typically display a positivity bias when reporting possible selves and create more hoped-for identities compared to feared (Markus & Nurius, 1986). According to temporal self-appraisal theory (TSA), people tend to evaluate their lives as an upward, positive trajectory (Wilson & Ross, 2001). As a result, people often view their past through a critical lens, appreciate the present and anticipate further improvements in the future. This self-enhancement bias is suggested to help foster positive self-concepts and promote self-esteem (Mathews et al., 2020).

To evidence TSA theory, research uses the TSA Me/not me task (Sokol and Eisenheim, 2016). During this task, participants are presented with a list of positive and negative adjectives

(e.g., outgoing, nervous) and are asked to rate on a Likert scale the extent that each word can be used to describe them at three different time points: 10 years in the past, currently in the present, and 10 years into the future. Three TSA values are then generated for each participant: TSA past, TSA present, TSA future. Findings show that non-clinical populations typically evaluate their lives in a positive linear trajectory (i.e., they use more positive words to describe themselves in the future) (Grysman et al., 2015; Heller et al., 2011). However, individuals who are experiencing psychological distress often display different trajectory patterns, for instance, individuals with greater anxiety display lower TSA values, at all-time points, when compared to individuals with lower anxiety (Sokol et al., 2022). Thus, although individuals with elevated anxiety still display the typical positive temporal trajectory, they tend to evaluate all time points more negatively overall compared to less anxious individuals.

Similarly, prospection research shows anxious individuals tend to produce more negative future events than non-anxious individuals (MacLeod & Byrne, 1996; MacLeod et al., 1997). MacLeod and colleagues examined the frequency of positive and negative future thinking among individuals with panic disorder, major depressive disorder, and a healthy control group. Participants were asked to generate as many future events as possible across three-time frames: within the next week, within the next year, and within 5-10 years. The results showed that anxious individuals reported significantly more negative future events than both the control and depressed groups. However, unlike the depressed group, the anxious group did not report significantly fewer positive future events compared to the control group. This is consistent with theoretical accounts, such as the Tripartite model, that refer to elevated symptomology as the result of heightened negative affect whereas depression is the result of dampened positive affect (Clark & Watson, 1991).

However, according to Quoidbach et al. (2009), negative future thinking could be a symptom or a side effect of anxiety rather than a causal factor. Quoidbach and colleagues (2009) investigated the role of future thinking in emotional well-being. Participants were randomly assigned to engage in either positive, negative, or neutral future thinking exercises over a 15-day period. The results showed no significant change in anxiety levels after engaging in negative future thinking. Thus, repeated engagement in negative future thinking did not significantly increase anxiety levels. Likewise, other research has shown no association between anxiety and the frequency of negative future thoughts (Duffy et al., 2024; Irvine, 2017; Rubin, 2005) and thus it is unlikely to play a direct causal role in the maintenance of symptomatology.

1.4.2.2. Discrepancy Between Present and Future-Self

The relationship between psychopathology and the dimensions of possible selves has been investigated to a lesser extent when compared to other modes of prospection. However, one dimension that has been examined closely in relation to psychological distress is the perceived discrepancy between the present self and the future possible self (Mason et al., 2019). Specifically, according to self-discrepancy theory (Higgins, 1987), the discrepancy between the present, actual self, and two types of hoped-for possible selves (i.e., the ought self and the ideal self) can engender negative affect. The ought self includes characteristics a person feels they should possess, whereas the ideal self consists of attributes a person aspires to have (Higgins, 1987).

Self-discrepancy theory posits that when an individual perceives a gap between their actual and ideal self (actual-ideal discrepancy), they are likely to experience dejection-related emotions such as sadness and disappointment (Higgins et al., 1985). Whereas a discrepancy

between the actual and ought self (actual-ought discrepancy) leads to agitation-related emotions such as guilt and anxiety (Higgins et al., 1985). As such, it is suggested that different types of self-discrepancies are linked to distinct mental health problems, with actual-ideal discrepancies being associated with depression and actual-ought discrepancies with anxiety (Higgins et al., 1985; Strauman 1989). However, research has largely failed to establish clear, specific associations between particular discrepancies and mental health disorders (Mason et al., 2019). For instance, a recent meta-analysis found that although self-discrepancies are robustly associated with psychopathology overall, the predicted distinctions between actual–ideal discrepancies (linked to depression) and actual–ought discrepancies (linked to anxiety) were not consistently supported (Mason et al., 2019). Instead, more recent studies have explored actual-feared discrepancies as a potential indicator of anxiety, since anxiety could stem from the fear of becoming an undesirable version of oneself (Zeng et al., 2023).

Specifically, Zeng and colleagues explored the relationship between anxiety and three self-discrepancies: actual-ought, actual-ideal, and actual-feared. Perceived self-discrepancies were assessed using the *integrated self-discrepancy index (ISDI)* (Hardin & Lakin, 2009). The ISDI first requires participants to generate a list of adjectives that describe their future-self (categorised as either feared, ideal, or ought) and rate the descriptions on a 5-point scale according to how much they perceive that each description describes them at present. Zeng and colleagues found that alpha adjusted correlations showed no support for the relationship between generalised anxiety symptomology and a specific self-discrepancy and thus is unlikely to be a significant contributor to anxiety. However, more research is required to examine whether the accessibility of possible selves could influence the relationship between anxiety and discrepancy. Specifically, according to self-discrepancy theory, discrepancy has a greater impact on

psychological wellbeing when the possible selves are more accessible within an individual's memory. Thus, the findings reported by Zeng and colleagues may reflect a limitation of the ISDI, which does not account for accessibility.

1.4.2.3. Belief in Future Event Occurrence

As discussed previously, research typically assesses the relationship between psychopathology and the characteristics of future thinking using Likert-type rating scales, where individuals indicate their agreement with various statements. One commonly examined characteristic is *likelihood*, which refers to the subjective probability a person assigns to a future event actually occurring. In the context of anxiety, studies show that individuals with high symptomology tend to assign higher likelihood estimates to negative future events (MacLeod et al., 1996; Wu et al., 2015). However, similar findings have been reported in individuals experiencing depression and suicidality, who also display a tendency to overestimate the likelihood of negative future events (Boland et al., 2018; MacLeod, 2017; MacLeod, 2025). These findings suggest a broader relationship between emotional disturbance and negative future expectancies, rather than a unique contributor to anxiety.

In addition, it is also possible that the relationship between anxiety and belief in future events is influenced by another feature of future thinking, i.e., the clarity or specificity of imagined future scenarios (MacLeod, 2025). In evidence of this, research shows that interventions aimed at increasing the specificity and detail of future simulations have been found to concurrently increase belief in the likelihood of those events (Hallford et al., 2020). This is further supported by experimental findings indicating that imagining future outcomes in vivid detail enhances both the perceived vividness and the subjective likelihood of those events (Szpunar & Schacter, 2013). Thus, rather than acting as a direct contributor to anxiety, belief in

the likelihood of negative events could actually be a biproduct of imagining these events more clearly. Thus, the clearer and more detailed a future event is, the more likely it will seem. Overall, although previous research has attempted to link anxiety to deficits in future thinking, the findings remain inconsistent and are unlikely to play a causal role. Given these inconclusive findings, the present thesis decided to focus research efforts on a different dimension of prospective cognition that is suggested to be anxiety-specific, *clarity*. The section below will discuss this dimension and its relationship to anxiety in more detail.

1.5. Clarity of Future Imagery

Mental images are defined as simulated perceptual experiences that occur in the absence of direct external stimuli (Pearson, 2007). These images can incorporate input from different sensory modalities, including visual, auditory, olfactory, gustatory, and tactile experiences (Andrade et al., 2014; Lacey & Lawson, 2013). Although mental images are experienced internally, in the mind, they can closely imitate actual perception (Pearson et al., 2008; Pylyshyn, 2002). Evidence for this can be found in brain imaging research, showing that mental imagery and actual perception both activate overlapping brain areas (Johnson & Johnson, 2014; Schaefer et al., 2013; Vlek et al., 2011), and can elicit similar emotional responses (Holmes & Mathews, 2010; Ji et al., 2019). The vividness, or clarity, of a mental image, can determine how *real* it feels to the individual (McElwee & Haugh, 2010).

Mental imagery ability varies across individuals (Andrade et al., 2014). Some individuals can produce highly vivid mental images that possess great levels of detail and can experience them as if events are unfolding in real time. This ability to '*pre-live*' mental images can allow individuals to experience what it would be like to be in a future-state which can invoke emotional responses that exert an important influence on how individuals interpret their present

self, such as their sense of self-worth (Strahan & Wilson, 2006). Consequently, the capacity to vividly envision mental images is thought to play a critical role in various conditions, including schizophrenia (Oertel et al. 2009; Sack et al., 2005), Parkinson's disease (Shine et al., 2015), bipolar disorder (di Simplicio et al., 2016) and, relevant to the present thesis, anxiety (Hirsch & Holmes, 2007). Specifically, individuals with elevated anxiety are suggested to envision negative future imagery more clearly when compared to individuals with low anxiety (Du et al., 2022). The following sections will evaluate this research evidence in more detail.

1.5.1. Anxiety and Clarity of Future Thoughts

To our knowledge, only one study has examined the relationship between anxiety and the clarity of future images of the *self* specifically (McElwee and Haugh, 2010). To measure clarity, McElwee and Haugh asked participants to respond to a series of questions such as "*When I picture myself in the future, I see clear and vivid images*". It was found that high anxiety, was associated with reduced clarity of future self-thoughts. However, in this study, the participants had to rely on retrospection to report the clarity of their thoughts, and since thoughts about the future could be forgotten, it is likely that the responses could change when reported in 'real time'. Additionally, McElwee and Haugh did not categorise future self-thoughts into positive or negative subtypes, so it remains unclear whether this finding corresponds to both positive (hoped-for) and negative (feared) future-self thoughts.

Evidence from related fields of research within the prospection literature more broadly, demonstrate that higher anxiety is significantly related to higher clarity of negative images and lower clarity of positive images (Morina et al., 2011; Stöber, 2000). For instance, Liu et al. (2021) investigated the relationship between image clarity and anxiety in a non-clinical sample.

Liu and colleagues collected mental images using the Prospective Imagery Task (Holmes et al., 2008) which assesses imagery clarity for 10 positive and 10 negative standardised future scenarios. It was found that anxiety scores were significantly associated with more vivid negative images and less vivid positive images. Similarly, a recent meta-analysis found that the relationship between anxiety and the vividness of prospective imagery is moderated by cue valence, where events are more vivid if generated with negative cues and less vivid if generated with positive cues (Du et al., 2022).

Similar results have been observed in clinical samples of individuals who have a diagnosis of GAD (Tallon et al., 2020). To assess image clarity, the participants first had to complete the Impact of Future Events Scale (IFES; Deeprose & Holmes, 2010) which requires individuals to create 3 future events that they have been thinking about frequently over the past seven days. Participants then respond to a series of questions that assess the valence, degree of intrusive "pre-experiencing", and the hyperarousal the events produce. In addition to the IFES, the participants also completed a modified version of the Prospective Imagery Task (Holmes et al., 2008) detailed above. Tallon and colleagues found that compared to a healthy control group, individuals with GAD reported more negative events and rated these events as more vivid, intense, and associated to greater pre-experiencing. However, it is important to note that Tallon and colleagues did not directly compare these measures between positive and negative events. As a result, it remains unclear whether individuals with GAD also experience a heightened vividness for positive future events or whether it is specific to negative content.

Research shows that depression is also associated with the vividness of future events, but the pattern is distinct from that observed in anxiety. Specifically, depression is associated with less vivid positive future events but is not associated with the vividness of negative future events

(MacLeod & Byrne, 1996; Morina et al., 2011; Stober, 2000). For instance, Morina and colleagues (2011) compared the future thoughts (collected with the Prospective Imagery Task; Holmes et al., 2008) of individuals with major depressive disorder, anxiety disorders, and healthy controls. It was found that depressed and anxious individuals had less vivid positive imagery, whereas only anxious individuals displayed more vivid negative imagery. To interpret these findings, the researchers relied on the Tripartite model (Clarke & Watson, 1991) which suggests that depression is linked to low positive affect whereas anxiety is linked to heightened negative affect.

Thus, according to the Tripartite model, the relationship between anxiety and the vividness of negative imagery can be understood through the unique association between anxiety and heightened negative affect. Understanding this distinction is especially important because anxiety and depression often co-occur, and share symptoms such as fatigue, difficulty concentrating, and sleep disturbances (Zbozinek et al., 2012) which can complicate diagnosis and treatment. Therefore, it is crucial to identify the underlying factors, such as the vividness of negative imagery, that contribute specifically to anxiety. This focus can help clinicians tailor interventions more effectively, even in the presence of comorbid conditions.

1.5.2. Cognitive Mechanisms Underpinning Clarity and Anxiety

Collectively, evidence suggests that individuals with high anxiety experience greater mental immersion in negative future thoughts. Previous efforts to explain the relationship between anxiety and the clarity of prospective images have predominantly focused on attention-related biases (e.g., Du et al., 2022). For instance, according to Attentional Control Theory (Derakhshan, 2020), individuals with high anxiety are biased to selectively attend to threat-

related imagery. Consequently, anxious individuals spend more time dwelling on threat-related, negative imagery which in turn enhances the clarity of these images. Alternatively, Contrast Avoidance Theory (Newman & Llera, 2011), suggests that individuals with high anxiety tend to maintain a prolonged negative emotional state to avoid abrupt mood shifts, which they perceive as particularly overwhelming. As a result, anxious individuals will spend more time thinking about vivid, negative future events to sustain their current emotional state and prevent the distress that might come from an unexpected shift. However, from these perspectives, clearer negative images are seen as consequences of high anxiety rather than characteristics that can contribute to anxiety symptomology (Du et al., 2022). To our knowledge, no theory has been established to explain a mechanism through which clarity could impact symptomology. Identifying and articulating this change mechanism is a critical step in intervention development, as it provides the necessary foundation for designing and testing effective strategies (Wight et al., 2016).

Thus, before establishing an imagery-based intervention for anxiety, the present thesis needed to establish a mechanism pathway through which clarity could influence symptomology. To do this, the present work will utilise Beck's cognitive framework which proposes that anxiety is maintained through perceived vulnerability where individuals underestimate their own abilities and overestimate the level of future danger (Beck, 1976; Beck & Emery, 1985). Thus, vulnerability could serve as the underlying mechanism through which clarity of negative prospective imagery sustains anxiety, through either contributing to the overestimation of threat or by undermining confidence in one's ability to cope. First, as discussed in section 1.3, anxiety does not arise from static threats; rather, it is facilitated through the mental imagining of threats as evolving and approaching in time or space (e.g., a physical danger moving closer in space, or

a deadline or feared event becoming more imminent) (Gonzalez-Diez et al., 2015; Riskind et al., 2000). This cognitive tendency, known as the Looming Cognitive Style (LCS), biases an individual's perception of future danger and plays a key role in anxiety vulnerability (Riskind et al., 2007). From this perspective, it is the perceived dynamism of threats as rapidly approaching and rising in risk that predisposes anxious individuals to overestimate the level of danger in the future. Furthermore, the clarity of negative prospective imagery could contribute to this looming effect. Specifically, if an individual's mental imagery of threats is highly vivid and detailed, it could emphasise its evolving consequences, making it appear as though it is moving *more* rapidly. Thus, the clarity of negative imagery could contribute to anxiety symptomology through increasing the dynamism of future threats (or increasing looming cognitive style). However, to our knowledge the relationship between anxiety, clarity, and looming cognitive style is yet to be examined.

Alternatively, the clarity of negative prospective imagery could contribute to the underestimation of one's ability to cope with adversity. Specifically, as discussed previously, the clarity of a mental image can determine how *real* it feels to the individual (McElwee & Haugh, 2010). From this perspective, mental images can closely imitate actual perception and real experiences that occur in present reality (Holmes & Mathews, 2010; Ji et al., 2019). The clearer a mental image the more *real* it will feel to an individual. This sense of *pre-living* prospective events can evoke emotional responses and can impact subjective feelings of self-worth similar to events that occur in the present. Since positive accomplishments in the present can enhance self-esteem and negative events can reduce self-esteem, it is plausible that clearly *imagined* mental images can have a similar impact through '*pre-living*' events and their associated emotions (Baumeister et al., 2003; DeHart & Pelham, 2007). Thus, the clarity of negative imagery could

potentially facilitate low self-esteem which is a contributing factor to anxiety symptomology (Li et al., 2023). However, to our knowledge, the relationship between self-esteem, anxiety, and the clarity of future mental images is yet to be explored.

1.6. Interventions

The research findings summarised in the previous sections support the link between anxiety and more vivid negative future events. Although to date, mechanisms that describe this relationship refer to clarity as a symptom of anxiety, it is possible that clarity could also contribute to symptomology. As such, reversing this bias could reduce anxiety. For this reason, the following sections will discuss interventions that target aspects of prospection.

1.6.1. Cognitive Behavioural Therapy

Cognitive Behavioural Therapy (CBT) is widely regarded as the gold-standard psychological treatment for GAD, with robust evidence supporting its efficacy (Olatunji et al., 2010). Meta-analyses and clinical guidelines, such as those from the National Institute for Health and Care Excellence (NICE), recommend CBT as a first-line intervention, demonstrating significant and durable reductions in anxiety symptoms across diverse populations (Hunot et al., 2007; NICE, 2011). Unlike pharmacological treatments, CBT provides individuals with practical skills to manage their symptomology long-term. A key imagery-based technique used during CBT for GAD is the use of structured imaginal simulations, or imaginal exposure (Beck, 2020; Stopa, 2009). This technique involves asking individuals to vividly imagine their most feared outcomes. Thus, rather than avoid their fears, individuals are asked to deliberately confront them in a controlled and systematic way. By mentally rehearsing worst-case scenarios in vivid detail, emotional reactivity decreases over time through a process known as habituation (Newman &

Llera, 2013). Individuals are encouraged to explore and tolerate distressing uncertainty rather than seeking immediate avoidance. In addition, individuals are often supported in imagining the successful management of a feared situation (coping imagery) which can reduce their tendency to underestimate their ability to cope with threats (Wells, 1997). However, the therapeutic voice is important in this context (Wells, 1997), specifically a therapist will instruct the individual in changing the time perspective of the image (e.g., running it forward in time to imagine what happens after a feared event has occurred) or occasionally the therapist will take more of an active role in manipulating the contents of a mental image. Thus, the presence of a therapist is essential for this technique to be effective, which reduces its scalability as an accessible intervention.

1.6.2. Future-Orientated Imagery Rescripting

Imagery rescripting involves reframing negative future mental images into events that lead to positive outcomes (Blackwell, 2021). Traditionally, imagery rescripting is delivered in a therapist-guided three-stage process: first, individuals are asked to think about a distressing image; second, the individual and therapist work together to overcome these images; and third, the therapist facilitates cognitive restructuring by helping individuals reinterpret distressing meanings and reconstruct alternative scenarios (Morina et al., 2017). Overall, imagery rescripting has proved effective as an intervention for various psychological concerns including depression (Ma et al., 2022), post-traumatic stress disorder (Lechner-Meichsner et al., 2022), social anxiety (Landkroon et al., 2022; Lloyd et al., 2022; McCarthy et al., 2022), and GAD (Soleimani et al., 2024). However, as discussed above, the presence of the therapist during the rescripting process reduces the scalability of the technique.

Instead, research has started to explore the benefits of self-directed imagery rescripting, where individuals are instructed to alter distressing future images without the guidance of a therapist (Stavropoulos et al., 2024). Stavropoulos and colleagues compared this approach to an exposure-based control condition. Participants in the rescripting group first imagined a major feared future event and then created either one or three positive alternative outcomes. In contrast, participants in the exposure group repeatedly imagined the negative event without modifying its outcome. Those engaging in self-guided rescripting showed greater immediate reductions in anxiety, worry, and negative appraisals compared to the exposure group. However, these effects diminished after a one-week follow-up. Thus, although this intervention can be adapted into an accessible format, more research is needed to establish the long-term benefits of this intervention before it can be employed to treat GAD.

1.6.3. The Best Possible Self Technique

The Best Possible Self (BPS) technique, a positive psychological intervention developed by King (2001), requires individuals to mentally imagine and describe their ideal future. In the first BPS experiment by King (2001), the effectiveness of the BPS technique was compared against a trauma writing exercise (writing about negative past experiences) and a control condition (writing about daily plans). Compared to the control condition, participants who wrote about their best possible self, once a day over four consecutive days, reported increased subjective well-being at a four-week follow-up. Participants in the trauma writing condition reported similar improvements since such activity can facilitate the organisation of disjointed memories and can promote emotional processing (Smyth et al., 2001). However, the participants rated the trauma writing task as more upsetting (as measured on a scale of 1-5) than the

participants in the BPS condition. As such, the BPS was considered a better choice of intervention for vulnerable participants.

Since the first BPS study, the technique has been used on various populations and has repeatedly delivered positive outcomes such as increased life satisfaction (Boehm et al., 2011), increased positive affect (Sheldon and Lyubomirsky 2006), decreased depressive symptomology (Shapira and Mongrain 2010), and reduced somatic symptoms of anxiety (Booth et al., 2024). The BPS is also flexible in terms of delivery. For instance, the BPS does not have to be completed through writing passages, instead, participants can describe their best-self verbally or even pictorially (Loveday et al., 2018; Owens & Patterson, 2013). In addition, research shows that it can be delivered one-to-one, in small groups, or online using survey software (Carrillo et al., 2019; Layous et al., 2013).

Importantly, since the BPS is a positive prospective imagery technique, it holds promise as a tool for targeting the clarity of mental images. This is because research shows that positive prospective imagery techniques can change the clarity of events (Boland et al., 2018). In this study, Boland and colleagues asked participants to vividly imagine positive future events in response to single cue words (e.g., “achievement”). Following the task, participants reported a significant increase in vividness ratings for positive events, and a significant decrease in vividness for negative events. Thus, directing one's attention toward positive future possibilities can alter the clarity of prospective imagery which could potentially counteract the negativity bias often observed in individuals with high anxiety. Consequently, the BPS technique, which employs a positive imagery task, could be effective as a therapeutic tool for individuals experiencing elevated generalised anxiety.

1.7. Summary of Literature

Evidence from prospection research demonstrates that elevated anxiety, particularly generalised anxiety, is significantly associated with a tendency to envision negative future events with greater clarity than positive events (Du et al., 2022; Tallon et al., 2020). This heightened clarity of negative prospective imagery is thought to contribute to the maintenance and severity of anxiety symptoms. However, the specific cognitive mechanisms underlying this relationship remain unclear. As discussed in section 1.5.2, vulnerability could serve as the underlying mechanism through which clarity of negative prospective imagery sustains anxiety, through either contributing to the overestimation of threat or by undermining confidence in one's ability to cope (Beck & Emery, 1985; Riskind et al., 2000).

If the clarity of prospective imagery does contribute to anxiety through one of these pathways, then an intervention that changes clarity could be effective for reducing symptomology. One such intervention is the best possible self-technique which involves imagining an ideal future self and life. However, the efficacy of this technique on generalised anxiety is yet to be investigated. These gaps form the overarching aim of the present thesis: to explore the cognitive mechanisms that underpin the relationship between image clarity and anxiety, and to assess the efficacy of the best possible self-technique for reducing generalised anxiety.

1.7.1. Aims of the Present Thesis

Table 1.2. details the research questions and contributions of the subsequent chapters. The studies presented within the present thesis explore the role of future event clarity in generalised anxiety. Specifically, the thesis starts by addressing key questions around the relationship between generalised anxiety and the clarity of future self-thoughts (Chapter 2) to inform the rationale of employing an imagery-based intervention in Chapter 4. Chapter 3 attempts to evidence a mechanism that could explain *how* biases could contribute to anxiety using the vulnerability framework discussed above (Beck & Emery, 1985; Riskind et al., 2000).

In summary, the aims of the present thesis are as follows:

1) To explore how generalised anxiety relates to the clarity of future-self-images (Chapter 2- Study 1);

2) To explain how the clarity of future-self thoughts could contribute to symptomology, through exploring the role of self-esteem and looming cognitive style (Chapter 3- Study 2 & 3);

3) To investigate the effectiveness of the best possible self-technique at reducing generalised anxiety (Chapter 4- Study 4 & 5).

Table 1.2: Overview of Thesis Chapters

Chapter title	Main Research Questions	Contributions
Chapter 2: Anxiety and the Future-Self: Examining the Clarity of Hoped-for and Feared Possible Selves	- Is anxiety significantly related to the clarity of possible selves (Study 1).	- Anxiety was significantly associated to more clear feared possible selves and less clear hoped-for possible selves.
Chapter 3: Anxiety and the Clarity of Negative Future-Self Thoughts: Exploration of Mediators	- Does looming cognitive style mediate the relationship between the clarity of feared possible selves and anxiety Study 2). - Can self-esteem mediate the relationship between the clarity of feared possible selves and anxiety (Study 3).	- Looming cognitive style did not mediate the relationship between clarity and anxiety. (Study 2) - Self-esteem fully mediated the relationship between clarity and anxiety. (Study 3)
Chapter 4: Efficacy of the Best Possible Self Intervention for Generalised Anxiety: Exploration of Mediators and Moderators	- Can the Best Possible Self intervention reduce generalised anxiety over 2 weeks (Study 4). - Does Self-Esteem mediate the relationship between the best possible self-intervention and anxiety reduction (Study 4). - Are four sessions of the intervention required to produce a decrease in generalised anxiety symptomology (Study 5). - Is the effectiveness of the intervention moderated by imagery capacity (Study 5).	- The best possible self-intervention significantly reduced anxiety from baseline to follow-up. (Study 4) - Self-esteem partially mediated the relationship between BPS delivery and anxiety reduction. (Study 4) - Anxiety significantly reduced for participants who completed two or more sessions (Conditions 2, 3, and 4). (Study 5) - Imagery capacity was not a significant moderator. (Study 5)
Chapter 5: General Discussion	- The general discussion will summarise the findings from Chapters 2-4. Specifically, the aim of this section is to discuss the efficacy of an intervention for reducing generalised anxiety which will include a summary of the proposed mechanism of change. Finally, this section will comment on the strengths and limitations of the present thesis and will provide directions for future research in the area.	

Chapter 2: Anxiety and the Future-Self: Examining the Clarity of Hoped-for and Feared Possible Selves

2.1. Study 1

The first aim of the present thesis was to explore differences in the clarity of positive and negative future-self thoughts as a function of anxiety severity. As discussed in Chapter 1, clarity is a dimension of future thinking that influences both the quality and vividness of associated mental images. Previous research has found that anxiety was significantly associated to reduced clarity of future self-thoughts (McElwee & Haugh, 2010). However, McElwee and Haugh did not categorise thoughts into positive or negative subtypes, so it is unclear whether these findings apply to both hoped-for and feared descriptions.

Evidence from related fields of research within the prospection literature more broadly, demonstrate that higher anxiety is significantly related to higher clarity of negative images and lower clarity of positive images (Morina et al., 2011; Stöber, 2000). However, this finding needs to be replicated with *self*-related thinking specifically. The self plays a vital role in both the development and maintenance of anxiety symptomatology (Riskind & Calvete, 2020), and it is a central feature in theoretical accounts (Beck, 1976; Beck & Emery, 1985). Therefore, examining how individuals with elevated anxiety imagine their future self may have important implications for understanding and potentially treating anxiety-related distress.

Clarity is typically measured via a Likert rating scale where participants express their agreement with a statement *e.g., images of this thought are hazy, not clear at all.* However, to collect these subjective perceptions of clarity, respondents must first be prompted to consider and record their personal future. Thus, the present study had to employ a future-self thinking task

designed to collect the content of both positive (*hopes*) and negative (*fears*) self-images separately. This approach will allow the present study to explore the relationship between anxiety and clarity while accounting for the effect of valence.

In addition, it was important that the participants generated their own future-self-images. This decision was made because researcher-generated self-descriptions may not be personally relevant and thus unlikely to be related to, or consequential for, anxiety symptomology. As such, closed-ended measures that ask participants to select from a list of pre-defined future-self descriptions were deemed inappropriate. Therefore, it was decided that the present study would employ two closed-formatted prompts that encourage participants to think about positive (*In the future, I hope to be*) and negative (*In the future, I want to avoid being*) future-self-images. Also, it was decided that participants would not be limited in the number of future images they could record. Instead, participants would be allowed to record as many (or as few) possible selves as they wanted.

2.1.1. Aims and Hypotheses

The aim of Study 1 was to examine differences in the clarity of future self-images as a function of anxiety and image valence (hoped-for vs. feared). Specifically, the study aimed to determine whether individuals with high anxiety report different clarity levels for hoped-for and feared future selves compared to individuals with low anxiety. Based on previous research within the prospection literature (Du et al., 2022), it was hypothesised that individuals with high anxiety will report greater clarity for feared possible selves and lower clarity for hoped-for possible selves, relative to those with low anxiety.

2.2. Method

2.2.1. Participants

A target sample size of 102 was determined a priori based on samples used in previous studies with comparable between-subjects designs (Hallford et al., 2024). 216 participants, aged between 18-62 years (165 female, 33 males, 18 non-binary, mean age=22.2, *SD*=8.46*)* were recruited through various methods, including social media, a university research participation scheme, and a mental health forum. The participants who completed the study through the university research participation scheme received points as partial fulfilment to a module requirement. No other form of compensation was offered to the participants who were recruited through other means. All participants provided informed consent.

2.2.2. Design

To assess the effect of valence, the participants completed both a hoped-for and a feared possible selves task. In addition, to assess the interaction between valence and baseline anxiety, the participants were assigned to one of two groups (posthoc) based on *Generalised Anxiety Disorder Questionnaire* scores (probable anxiety versus non-probable anxiety group) thus, group assignment was between-subjects. A cut off of 10 on the Generalised Anxiety Disorder Questionnaire (GAD-7) was employed as recommended by Williams (2014). Thus, participants with a score of ≥10 were placed into a probable anxiety group and participants with a score <10 were placed into a non-probable anxiety group. As such, the present study had a 2 (Possible Selves: Hoped-for vs. Feared) x 2 (Anxiety: High vs. Low) mixed design. In total 105 participants were assigned to the non-probable anxiety group (mean GAD-7 scores =5.5, SD=2.67) and 111 to the probable anxiety group (mean GAD-7 scores =14.51, SD=3.29).

2.2.3. Materials

2.2.3.1. Generalised Anxiety Disorder Questionnaire (GAD-7)

The Generalised Anxiety Disorder Questionnaire (GAD-7) (Spitzer et al., 2006) is a 7-item measure assessing generalised anxiety. However, this measure is suitable for use in heterogeneous samples (Beard & Björgvinsson, 2014). Items are rated on 4-point scales (0 to 3; 0= not at all, 3= nearly every day). Scores range from 0-21. Greater scores indicate greater anxiety symptomology. The GAD-7 demonstrates good reliability and validity (Byrd-Bredbenner et al., 2020).

2.2.3.2. Possible Selves task

The participants completed a hoped-for and a feared possible self-task. The order in which participants completed each task was counterbalanced. First, the participants were introduced to the concept of hoped-for/feared possible selves *("*F*eared/hoped-for possible selves are mental representations of the self in negative/positive future states. In this part of the task, you will be asked to write what you fear/hope to be in the future.")* and were presented with examples (e.g., *homeless/a qualified teacher).* Participants were then asked to record their own possible selves and were asked a question assessing clarity ("*Images of this thought are hazy, not clear at all*") which was measured on a 5-point Likert scale. The participants could record as many possible selves as they could think of, but they had to record a minimum of one to move on.

2.2.4. Procedure

The study was presented on Qualtrics survey presentation software (Qualtrics, Provo, UT) and the participants could complete the study in a place of their choosing. Following the consent procedure, the participants completed demographics and the GAD-7 in randomised order. Finally, the participants completed the hoped for and feared possible selves task. The order the tasks were presented in was counterbalanced. The research project received ethical approval from York St John ethics committee and all participants were fully debriefed.

2.2.5. Data Analysis

Data were analysed using Jamovi version 2.3.28 (2021). Differences in the subjective ratings of clarity were analysed using a linear mixed-effects model with restricted maximum likelihood estimation (REML). The model included random intercepts and random slopes for valence (hoped-for vs. feared possible selves) within participants, allowing for individual variability in how participants responded to thought valence. Group assignment (probable anxiety, non-probable anxiety) and thought valence were included as fixed effects, along with their interaction. The models were specified as follows: outcome ~ 1 + group + valence + (1 + valence | participantID).

2.3. Results

On average participants recorded 2.12 (SD=1.24) hoped-for possible selves and 1.94 (SD= 1.08) feared possible selves. A Wilcoxon test confirmed that participants reported significantly more hoped-for possible selves than feared W=-2.29, p=.022. However, there was no significant difference between individuals with probable and non-probable anxiety in the frequency of reported hoped-for U=5107.5, p=.098, or feared possible selves U=5304, p=.225.

The content of the descriptions was predominantly related to relationships (*n=214*), goals/achievements (*n=253*), stability (*n=136*), health and wellbeing (*n=126*), interpersonal characteristics (*n=78*), controllability (*n=17*), vulnerability (*n=11*), and mental health (*n=45*). Example descriptions are reported in Appendix A.

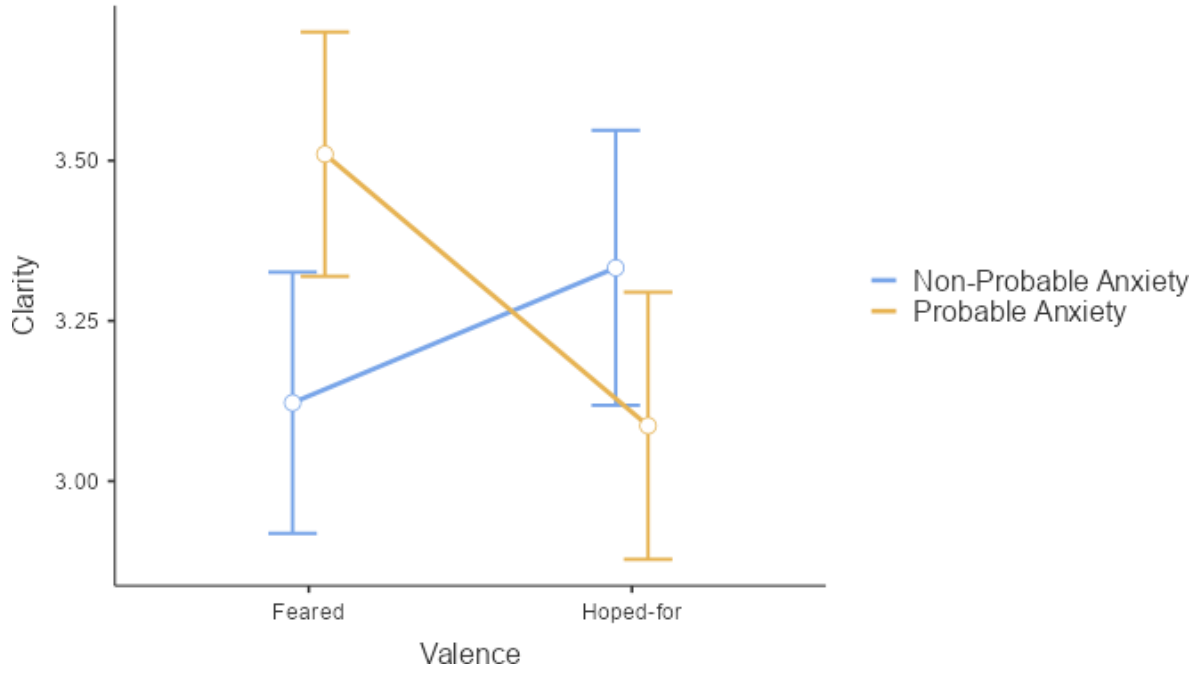
Regarding clarity ratings, on average, individuals with low anxiety reported higher clarity for hoped-for possible selves (M=3.56, SD=1.05) compared to feared possible selves (M=3.12, SD=1.07). Whereas individuals with high anxiety reported higher clarity for feared possible selves (M=3.42, SD=1.06) compared to hoped-for possible selves (M=3.26, SD=1.11). A mixed model was employed to assess differences in the subjective ratings of clarity with group assignment and thought valence included as fixed effects. Model information is presented in Table 2.1.

Table 2.1. Model Information for the Mixed-Effects Analysis

Dependent Variable	Wilkinson-Rogers Formula	Fixed Effect Estimates [95% CI]	Random Effect Variances	Pseudo-R^2
Clarity	Clarity~1+Valence+Group+Valence:Group+(1+Valence|ID)	Valence= -.107[-.32,.107] Group= .071[-.122,.264] Interaction=-.63 [-1.06,-.208]	Intercept=.258 Valence=1.50	.407

The results showed a non-significant main effect of valence $F(1,211)=.959$, $p=.328$ and a non-significant main effect of group assignment $F(1,238)=.516$, $p=.473$. However, there was a significant interaction $F(1,211)=8.5$, $p=.004$. Bonferroni corrected post hoc comparisons showed that participants with probable anxiety rated feared possible selves as significantly clearer compared to participants with non-probable anxiety $p=.041$ and compared to their ratings of hoped-for possible selves $p=.032$, see Figure 2.1.

Figure 2.1. Graph depicting Clarity ratings for Hoped-for and Feared Possible Selves across Anxiety Groups with 95% Confidence Intervals



2.4. Discussion

As hypothesised, it was found that individuals with elevated anxiety imagine feared possible selves significantly more clearly, and hoped-for possible selves significantly less clearly, than individuals with low anxiety. This is consistent with prospective research more broadly (Du et al., 2022) and suggests that individuals with high anxiety experience more mental immersion in feared thoughts about oneself. Under the framework of the present thesis, it is suggested that the way in which individuals envision their future can contribute to the development and maintenance of mental health concerns. Thus, if the clarity of feared possible selves contributes to anxiety, then reversing this bias could reduce symptomology. However,

before an intervention can be implemented, it is first important to establish through what mechanism clarity could contribute to anxiety. Chapter three aimed to explore this question.

One limitation of chapter two is that depressive symptomology was not assessed. As discussed previously, research shows that depression is also associated with the vividness of future events, but the pattern is distinct from that observed in anxiety. Specifically, depression is associated with less vivid positive future events but is not associated with the vividness of negative future events (e.g., MacLeod & Byrne, 1996; Morina et al., 2011; Stober, 2000). Understanding this distinction is important because anxiety and depression often co-occur, and share symptoms (Zbozinek et al., 2012) which can complicate diagnosis and treatment. Therefore, it is crucial to identify the underlying factors, such as the vividness of negative imagery, that contribute specifically to anxiety. This focus can help clinicians tailor interventions more effectively, even in the presence of comorbid conditions. For this reason, it was decided that depression would be assessed in the next study in order to explore whether the clarity of feared possible selves contributes uniquely to anxiety after accounting for depressive symptomatology.

2.4.1. Conclusion

In summary, the present study aimed to investigate whether individuals with high generalised anxiety envision their future-self differently to individuals with low generalised anxiety. The results showed that individuals with high anxiety generated feared possible selves with greater clarity and hoped-for possible selves with less clarity. This pattern aligns with broader research on prospection, suggesting that heightened mental immersion in negative self-relevant thoughts may play a role in the development and maintenance of anxiety. Thus,

interventions aimed at altering this cognitive bias could reduce generalised anxiety symptomology. However, further research is now needed to understand the mechanisms through which clarity contributes to symptomology. Chapter 3 aimed to fulfil this purpose.

Chapter 3: Anxiety and the Clarity of Negative Future-Self Thoughts: Exploration of Mediators

3.1. Study 2

The second aim of the present thesis is to explain *how* the clarity of future-self thoughts could contribute to anxiety symptomology. To do this, the present thesis is utilising Becks cognitive framework which proposes that anxiety is maintained through perceived vulnerability where individuals underestimate their own abilities and overestimate the level of future danger (Beck, 1976; Beck & Emery, 1985). The first study in this chapter focusses on whether the clarity of feared possible selves contributes to anxiety through increasing the overestimation of future danger.

As detailed in the general introduction, looming cognitive style (LCS) is a cognitive bias towards perceiving and mentally imagining potential danger as rapidly approaching and increasing in risk (Riskind, 1997). This pattern of thinking can act as a cognitive vulnerability for anxiety disorders (Adler & Strunk, 2010; Riskind et al., 2007), through contributing to the overestimation of danger. The present study aimed to investigate whether the clarity of negative prospective imagery could contribute to this looming effect. Specifically, imagining a threat could cause minimal anxiety if it is envisioned as a vague, abstract description. However, when a threat is envisioned vividly with great detail, it may appear to be "moving closer" or becoming more urgent. For example, an individual notices a warning light flash on their car dashboard; at first, they dismiss it and plan to deal with it once they get home, but then they start to vividly imagine what might happen if they broke down and were stranded on the side of the road in the dark. They envision having to call roadside assistance, the potential cost of having to do this, and

the emotional stress they feel during the process. These clearly imagined scenarios of what could happen make the threat of breaking down feel like it is approaching and becoming more imminent with every extra mile they drive. Thus, if an individual's mental imagery of threats is highly vivid and detailed, it could emphasise its evolving consequences, making it appear as though it is moving *more* rapidly. Therefore, the clarity of negative imagery could contribute to anxiety symptomology through increasing the dynamism of future threats. However, to our knowledge the relationship between anxiety, clarity, and looming cognitive style is yet to be examined.

In addition, envisioning threats more clearly could also influence how avoidable or controllable threats appear. Specifically, when vividly imagining negative outcomes approaching rapidly, the perceived capacity to prevent or manage those outcomes may diminish. Previous research has shown that when threats are perceived as looming and rapidly approaching, it can contribute to reduced perceived control (Riskind et al., 1992; Riskind & Calvete, 2020). Furthermore, this reduction in perceived control may, in turn, contribute to anxiety symptomology. In evidence of this, research has demonstrated the link between worry frequency and lower perceptions of control over threat-related outcomes (Stapinski et al., 2010). Perceived control could also be linked to depression symptomology since it could foster feelings of hopelessness, a key contributor to depressive symptomology (Choi & Shin, 2023; Kleiman & Riskind, 2012). As discussed in section 2.4, depression will be measured in the present study to determine whether the clarity of feared possible selves contributes uniquely to anxiety after accounting for depressive symptomatology.

LCS is measured with the looming maladaptive style questionnaire (Riskind et al., 2000). It consists of six hypothetical scenarios that depict potentially threatening events. Participants are instructed to imagine themselves in these situations and answer three Likert-style questions that assess perceived dynamism. In contrast, the present study will ask participants to create feared possible selves (Markus & Nurius, 1986) as opposed to imagining hypothetical scenarios. This is because feared possible selves could capture a higher level of specificity since hypothetical scenarios may not be personally relevant and thus, less impactful to anxiety symptomology.

3.1.1. Aims and Hypotheses

The first main aim of Study 2 was to investigate the relationship between anxiety, LCS, and the clarity of feared possible selves. Consistent with Study 1, it was hypothesised that higher anxiety would be significantly associated with clearer feared possible selves after controlling for depression symptomology. Moreover, based on previous research, it was hypothesised that higher anxiety would be significantly associated with higher LCS (e.g., Hong et al., 2017). However, due to limited research evidence no predictions were made regarding the relationship between LCS and the clarity of feared possible selves, instead these analyses were exploratory.

The second aim of the present study was to explore the relationship between LCS, anxiety, depression, and perceived control over evading threats. Consistent with previous research (Riskind et al., 1992; Riskind & Calvete, 2020), it was hypothesised that higher LCS would be significantly associated to lower perceived control. Also, given the relationship between worry frequency and control (Stapinski et al., 2010) it was hypothesised that reduced control would be significantly related to higher anxiety. Finally, given the relationship between

reduced control and increased hopelessness (Choi & Shin, 2023) it was hypothesised that higher depression would be significantly associated with lower control over evading threats.

3.1.2. Method

3.1.2.1 Participants

A minimal sample size of 66 was determined based on a priori power analysis conducted on RStudio with the WebPower package. Power was set at .8 with a medium effect size. Seventy-four participants, aged between 18-61 years (60 female, 9 male, 5 other, mean age = 21.35, SD = 7.03) were recruited through university research participation and received points as partial fulfilment to a module requirement. All participants provided informed consent.

3.1.2.2. Design

A cross-sectional correlational design was employed to assess the relationship between anxiety, clarity and looming cognitive style.

3.1.2.3. Materials

3.1.2.3.1. Generalised Anxiety Disorder Questionnaire (GAD-7)

The Generalised Anxiety Disorder Questionnaire (GAD-7) (Spitzer et al., 2006) is a 7-item measure assessing generalised anxiety (see section 2.2.3.1.).

3.1.2.3.2. Center for Epidemiologic Studies Depression Scale (CES-D)

The Center for Epidemiologic Studies Depression Scale (Eaton et al., 2004) is a 20-item measure assessing the frequency of depressive symptomology. Items are rated on 4-point scales

(0= not at all, 3= nearly every day). Scores range from 0-60. Greater scores indicate greater depressive symptomology. The CES-D demonstrates good reliability and validity (Devins et al., 1988).

3.1.2.3.3. Feared Possible Self Task

Participants were first introduced to the concept of feared possible selves ("Feared possible selves are mental representations of the self in negative future states. In this part of the task, you will be asked to write what you fear to be in the future.") and were presented with examples (i.e., homeless, alone and arrogant). Participants then described what they feared to be ("In the future, I want to avoid being (please provide 1 feared self below)") consistent with previous research (Patrick et al., 2002) and Chapter 2. Next, participants were asked questions addressing control ("I am in control of avoiding this future self.") and clarity ("images of this thought are hazy, not clear at all"). The questions were assessed on a 5-point Likert scale (strongly disagree = 1, strongly agree = 5). The participants could record as many possible selves as they could think of, but they had to record a minimum of one representation.

3.1.2.3.4. The Looming Maladaptive Style Questionnaire (LMSQ)

An adapted version of the Looming Maladaptive Style Questionnaire (Riskind et al., 2000) was used to assess looming cognitive style (see Section 1.3.2. for more information regarding the original format). First, participants created their own future self-threats in the feared possible self-task. Then, the participants responded to three Likert questions per thought. Questions were rated on a 5-point scales ranging from 1 (not at all) to 5 (very much).

The questions were: (1) “In the present are the chances of this occurring decreasing, or increasing and expanding with each moment?” (2) “Is the level of threat that this feared self poses fairly constant, or is it growing rapidly larger with each passing moment?” (3) “How much do you visualise the threat that this poses becoming progressively worse?”. Scores were summed to create a looming maladaptive style score for each thought. Mean looming maladaptive style score was then calculated for each participant. Higher scores indicate greater LCS. The LMSQ demonstrates good psychometric properties (Hong et al., 2017).

3.1.2.4. Procedure

The study was presented on Qualtrics (Qualtrics, Provo, UT), and the participants could complete the study in a place of their choosing. Following the consent procedure, the participants completed a demographics questionnaire, the GAD-7, and the CES-D. The order in which the questionnaires were presented was randomised. The participants then completed the feared possible selves task. After recording each feared possible self, the participants completed the looming maladaptive style questionnaire. The research project received ethical approval from York St John ethics committee and all participants were fully debriefed.

3.1.2.5. Data Analysis

Statistical analyses were performed using Statistical Package for the Social Sciences version 28 (SPSS 28). Spearman’s correlation coefficients were used to examine the relationship between LCS, depression, anxiety, perceived control, and clarity. The mediation model was tested using Hayes’ PROCESS macro with 5000 bootstrap samples. Significance was set at $p < .05$. The indirect effect was considered significant if confidence intervals did not contain zero.

3.1.3. Results

On average participants recorded 1.69 future self-threats (SD = .84, range=1-5). Table 3.1 displays the descriptive statistics and Spearman's rank correlations. First, there was a significant relationship between anxiety and the clarity of threat representations ($r(72) = .32$, $p = .005$) whereby anxiety increased, as the clarity of threat representations increased. However, there was no significant relationship between the clarity of threat representations and LCS ($r(72) = .07$, $p = .570$) or depression ($r(72) = .22$, $p = .06$). Next, in line with predictions, there was a significant relationship between anxiety and LCS ($r(72) = .48$, $p < .001$) whereby anxiety increased as looming cognitive style increased. LCS was also significantly related to depression ($r(72) = .45$, $p < .001$) whereby depression increased as LCS increased. Finally, perceived control was significantly related to depression ($r(72) = -.3$, $p = .011$) and LCS ($r(72) = -.27$, $p = .019$) but was not significantly related to anxiety ($r(72) = -.14$, $p = .223$). Thus, as depression and LCS increased, perceived control over threats decreased.

3.1.3.1. Mediation Analysis

Since there was a significant relationship between LCS, control and depression, a mediation analysis was performed to investigate whether the relationship between depression and LCS is mediated by perceived control over threat representations. The outcome variable in the analysis was depression, the predictor variable was LCS, and the mediator was perceived control. Anxiety was included in the model as a covariate. First, LCS significantly predicted control b=-.1, 95%CI[-.19,-.00], t=-2.02, p=.047. Control significantly predicted depression b=-3.29, 95%CI [-5.6,-.99], t=-2.85,p=.006. LCS did not significantly predict depression (the direct

effect) *b*=.11, 95%CI [-.83, 1.05], *t* = .23, *p*=.815. However, the indirect effect via control was significant *b*=.31, 95% CI [.03,.79].

Table 3.1. Correlational Matrix for Threat Characteristics and Psychometric Scores

	M	SD	1	2	3	4
1. GAD-7	10.36	5.52				
2. CESD	23.92	13.51	.76***			
			[.63, .84]			
3. Clarity	2.58	1.03	-.32**	.22		
			[-.52, -.09]	[-.43, .02]		
4. Control	3.97	.90	-.14	-.3*	-.02	
			[-.37, .1]	[-.5, -.07]	[-.26, .2]	
5. LCS	12.74	2.96	.48***	.43***	-.07	-.27*
			[.27, .64]	[.24, .62]	[-.3, .17]	[-.48, -.04]

Note: *p<.05, **p<.01, ***p<.001, LCS=Looming cognitive style, GAD-7 = Generalised Anxiety Disorder Questionnaire 7, CES-D= Center for Epidemiologic Studies Depression scale

3.1.4. Discussion

The primary aim of the present study was to investigate whether LCS could act as the mechanism through which the clarity of feared possible selves contributes to anxiety symptomology (through contributing to the overestimation of danger in the future). First,

consistent with Study 1, the results showed a significant relationship between anxiety and the clarity of feared possible selves. Whereas the relationship between depression and clarity was not significant, which suggests that the clarity of feared possible selves contributes uniquely to anxiety. However, clarity was not significantly related to LCS thus, the clarity of negative self-imagery does not contribute to the dynamism of future threats.

The second aim of Study 2 was to explore the relationship between LCS, anxiety, depression, and perceived control over evading threats. As hypothesised, higher LCS was significantly related to reduced perceived control. This is consistent with previous research (Riskind et al., 1992; Riskind & Calvete, 2020) and suggests that imagining negative outcomes approaching rapidly, can reduce the perceived capacity to prevent or manage those outcomes. However, perceived control was not significantly related to anxiety. In contrast, previous research has demonstrated the link between worry frequency and lower perceptions of control over threat-related outcomes (Stapinski et al., 2010). However, in this study, to assess control, Stapinski and colleagues asked participants to rate their capacity to cope with one health threat ("How well could you cope with having cancer") which did not assess their ability to specifically *evade* threats in the future. These methodological differences could explain the inconsistent findings; however, future research should explore the link between anxiety and control further.

Although reduced control was not significantly related to anxiety, the results of the present study found that it was significantly related to elevated depression. As discussed in the introduction, perceived control could facilitate depression symptomology because it could foster feelings of hopelessness, a key contributor to symptomology (Choi & Shin, 2023; Kleiman & Riskind, 2012). Exploratory analyses were conducted to investigate whether perceived control

mediated the relationship between LCS and depression. Initial research has suggested that LCS could contribute to comorbid depression when threats are perceived as inescapable (Hong et al., 2017; Tzur-Bitan et al., 2012). For example, Levin et al. (2007) found that LCS for patients with terminal leukaemia predicted anxiety and depression potentially because they felt helpless to evade the threat of illness or death. However, to our knowledge direct evidence of this mechanism is yet to be reported, which is why this exploratory analysis was conducted. The results showed that reduced control mediated the relationship between high LCS and depression. Thus, although LCS can contribute to anxiety, it could also contribute to depression when threats are perceived as inescapable through fostering feelings of hopelessness (Kleiman & Riskind, 2012).

Thus, across two studies, we have reported a significant association between high anxiety and increased clarity of feared possible selves and the results of Study 2 showed that LCS does not mediate this relationship. Instead, as discussed previously, clarity could contribute to the underestimation of one's capabilities in the present. Specifically, the clarity of a mental image can determine how *real* it feels to the individual (McElwee & Haugh, 2010). From this perspective, mental images can closely imitate actual perception and real experiences that occur in present reality (Holmes & Mathews, 2010; Ji et al., 2019). The clearer a mental image the more *real* it will feel to an individual. This sense of *pre-living* prospective events can evoke emotional responses and can impact subjective feelings of self-worth similar to events that occur in the present. Since positive accomplishments in the present can enhance self-esteem and negative events can reduce self-esteem, it is plausible that clearly *imagined* mental images can have a similar impact through '*pre-living*' events and their associated emotions (Baumeister et al., 2003; DeHart & Pelham, 2007). Thus, the clarity of negative imagery could potentially

facilitate low self-esteem which is a contributing factor to anxiety symptomology (Li et al., 2023). However, to our knowledge, the relationship between self-esteem, anxiety, and the clarity of mental images is yet to be explored. The next study in this chapter aimed to fulfil this purpose.

If the clarity of feared possible selves contributes to anxiety symptomology, exploring strategies to reduce the clarity of these representations could provide insights into alleviating symptom distress. As discussed previously, positive imagery techniques can reduce the clarity of negative mental imagery (e.g., Boland et al., 2018). One such task, that targets self-related thinking specifically, is the *best possible self-technique* (King, 2001) which requires participants to elaborate and mentally envision their best future. Specifically, participants are asked to describe a future where everything has worked out the way they wanted it to. To date, the effects of the BPS technique on generalised anxiety have yet to be established. For this reason, the next study also investigated the efficacy of the BPS technique for reducing generalised anxiety symptomology.

3.2. Study 3

3.2.1. Aims and Hypotheses

The primary aim of the present research was to examine whether self-esteem mediated the relationship between the clarity of feared possible selves and anxiety. As discussed previously, clarity could enhance the perceived 'realness' of imagined future-self thoughts which could impact self-esteem; a construct that predicts anxiety symptomology (Li et al., 2023). It was hypothesised that higher anxiety would be associated with clearer feared possible selves,

consistent with the previous chapters. Also, consistent with previous research (e.g., Li et al., 2023), it was hypothesised that higher anxiety would be associated with lower self-esteem.

Due to limited research evidence, no specific hypotheses were generated regarding the relationship between self-esteem and the clarity of feared possible selves, and instead, these analyses were exploratory.

A secondary aim was to explore the impact of the best possible self-technique on anxiety. Although previous research is yet to investigate the effects of the technique on generalised anxiety, research has found that the technique can increase self-esteem (Owens & Patterson, 2013) and reduce somatic symptoms of anxiety (Booth et al., 2024). Therefore, it was hypothesized that the BPS technique would significantly reduce generalised anxiety symptomology.

3.2.2. Methods

3.2.2.1. Participants

A minimal sample size of 66 was determined based on a priori power analysis conducted on *RStudio* with the WebPower package. Power was set at .8 with a medium effect size. In total, 68 participants aged between 18-42 years were recruited (49 women, 14 men, 5 non-binary, mean age= 21.16, *SD*= 5.04) through university research participation: Participants received points as partial fulfillment to a module requirement. Participants were not asked to participate if they were receiving any current psychological or therapeutic intervention, and if English was not their first language. All participants provided informed consent.

3.2.2.2. Design

To assess the primary research question, a cross-sectional, correlational design was employed to assess the relationship between the *clarity of feared possible selves*, *self-esteem*, and *anxiety*.

To assess the secondary aim of this study (examining the effect of the best possible self-technique on anxiety) a repeated measures component was implemented whereby change in anxiety was assessed within-subjects and measured at three time-points: at baseline, after the feared possible self-task, and after the best possible self-technique. Also, to assess the interaction between task-type and baseline anxiety, participants were assigned to one of two groups (posthoc) based on *Generalised Anxiety Disorder Questionnaire* scores (Probable anxiety versus Non-probable anxiety) thus, group assignment was between-subjects. A cut off of 10 on the Generalised Anxiety Disorder Questionnaire was employed as recommended by Williams (2014). Thus, participants with a score of ≥10 were placed into a probable anxiety group and participants with a score <10 were placed into a non-probable anxiety group. In total 32 participants were assigned to the non-probable anxiety group (mean GAD-7 scores =5.28, SD=2.47) and 36 to the probable anxiety group (mean GAD-7 scores =13.75, SD=2.99).

3.2.2.3. Materials

3.2.3.1. Generalised Anxiety Disorder Questionnaire (GAD-7)

The Generalised Anxiety Disorder Questionnaire (*GAD-7*) (Spitzer et al., 2006) is a 7-item measure assessing generalised anxiety *(refer back to section 2.2.3.1.).*

3.2.3.2. Visual Analogue Scale- Anxiety

To avoid repeated use of the Generalised Anxiety Disorder Questionnaire (Spitzer et al., 2006), the present study employed the visual analogue scale-anxiety (VAS-A) to assess change in anxiety. Participants were asked to rate on a slider response bar how anxious they felt in the present moment on a scale of 0-100 (*0= not at all anxious, 100= very anxious*). This measure has been used in previous research and demonstrates good reliability and validity (Abend et al., 2014).

3.2.3.3. The Robson Self-concept Questionnaire (SCQ)

The Robson Self-concept Questionnaire (SCQ; Robson, 1989) is a 30-item measure assessing self-esteem (e.g., "*I can like myself even if others don't*"). Participants were asked to rate their self-esteem over the last two weeks. Items are rated on 8-point scales (0 to 7; 0= completely disagree, 7= completely agree). Greater scores indicate higher self-esteem. The questionnaire demonstrates good reliability and validity (Ghaderi, 2005).

3.2.3.4. Feared Possible Self Clarity

First, the participants were introduced to the concept of feared possible selves and were presented with examples (*homeless, alone, and arrogant).* Participants then described what they feared to be in the future and were asked a question assessing clarity ("*Images of this thought are hazy, not clear at all**") rated on a 5-point Likert scale (1 to 5; 1= completely disagree (*images are very clear*), 5= completely agree (*images are not clear*). The participants could record as many feared possible selves as they could think of, but they had to record a minimum of one to

move on. Clarity was assessed for each feared possible self and average clarity ratings were calculated for each participant.

3.2.3.5. Best Possible Self Technique

In the Best Possible Self (BPS) condition, participants were asked to visualise and describe their best possible *future* self. Specifically, they were presented with the following instructions:

"We would like you to mentally visualise, with as much detail as possible, your best possible self. Focus on your future, and imagine yourself and the qualities, skills, achievements, etc., that would form the best version of yourself and the best way in which your life could develop. Imagine that everything has gone in the way you wanted. Take some time to imagine it. You can guide the construction of your best future self taking into account the following three areas: personal area (for example, feelings, physical abilities, personal achievements…), academic or professional area (professional achievements, goals…), social area (friendships, family relationships…). To build your best possible self use as much sensory information as possible: smells, tastes, sights, sounds, feelings… It will probably help you if you close your eyes and focus on what you visualise in your mind. Write down what you can see."

The participants responded by typing a description into a survey text box. The participants had to write a minimum of 30 words before completing the task.

3.2.2.4. Procedure

The study was presented online, and the participants could complete it in a place of their choosing. Following the consent procedure, the participants completed the GAD-7 and the SCQ.

The order in which these questionnaires were presented was randomised. The participants then completed the feared possible selves task followed by the best possible self-technique. Current anxiety was assessed at three time points 1. at the start of the study (baseline) 2. after the feared possible self-task (T1) 3. after the best possible self-task (T2). The research project received ethical approval from York St John ethics committee and all participants were fully debriefed.

3.2.5. Data Analysis

Data was analysed on RStudio version 4.2.1 and Jamovi version 2.6.13. Correlation analyses were used to assess the relationship between anxiety, clarity, and self-esteem. Mediation analyses were conducted using the *mediation* package in *r* with 5000 bootstrapped confidence intervals. To assess change in anxiety, a mixed methods analysis was employed in Jamovi. Differences in the ratings of VAS-A were analysed using a linear mixed-effects model with restricted maximum likelihood estimation (REML). The model included random intercepts. Group assignment (Probable anxiety, Non-probable anxiety) and time were included as fixed effects, along with their interaction. The models were specified as follows: anxiety ~ 1 + group + time + (1 | participantID).

3.2.6. Results

3.2.6.1. Correlational Analyses and Mediation

On average participants recorded 2.22 feared possible selves (*SD* = 1.20). Spearman's correlations were employed to assess the relationship between anxiety, self-concept, and the clarity of feared possible selves. First, there was a significant relationship between anxiety and the clarity of feared possible selves ($r(66) = .33$, $p=.006$) showing that anxiety increased as clarity increased. Next, there was a significant relationship between anxiety and self-esteem

($r(66) = -.53$, $p < .001$) whereby self-esteem decreased as anxiety increased. Finally, there was a significant relationship between self-esteem and the clarity of feared possible selves ($r(66) = -.39$, $p = .001$) whereby the clarity of feared possible selves decreased as self-esteem increased.

A mediation analysis was performed to investigate whether the relationship between clarity and anxiety was mediated by self-esteem. The outcome variable in the analysis was anxiety, the predictor variable was clarity, and the mediator was self-esteem. First, clarity significantly predicted anxiety (the total effect) $b = 1.57$, 95% CI [.45, 2.70], $p = .008$. Once self-esteem was entered into the model, clarity did not significantly predict anxiety (the direct effect) $b = .77$, 95% CI [-.48, 2.01], $p = .235$. However, the indirect effect via self-esteem was significant $b = .80$, 95% CI [.13, 1.84], $p = .008$. Thus, self-esteem fully mediated the relationship between clarity and anxiety.

3.2.6.2. Change in Anxiety

Estimated marginal means with 95% CI are presented in Table 3.2. Examples of best possible self-descriptions are presented in Appendix B. The results showed a significant main effect of Time (Baseline, T1, T2) $F(2) = 25.22$, $p < .001$ and Group (Probable Anxiety, Non-Probable Anxiety) $F(1) = 26.73$, $p < .001$. There was also a significant *Time X Group* Interaction $F(2) = 5.05$, $p = .008$, see Figure 3.1. Bonferroni corrected post hoc comparisons showed that at baseline the participants in the probable anxiety group reported significantly higher anxiety compared to participants with non-probable anxiety $p = .004$. After the feared possible self-task, the participants in the probable anxiety group reported an increase in anxiety (see Table 3.2.); although this was not significant $p = .067$. The participants in the non-probable anxiety group reported no change in anxiety following the feared possible self-task $p = 1$. After the BPS technique, the participants in the probable anxiety group reported a significant decrease in

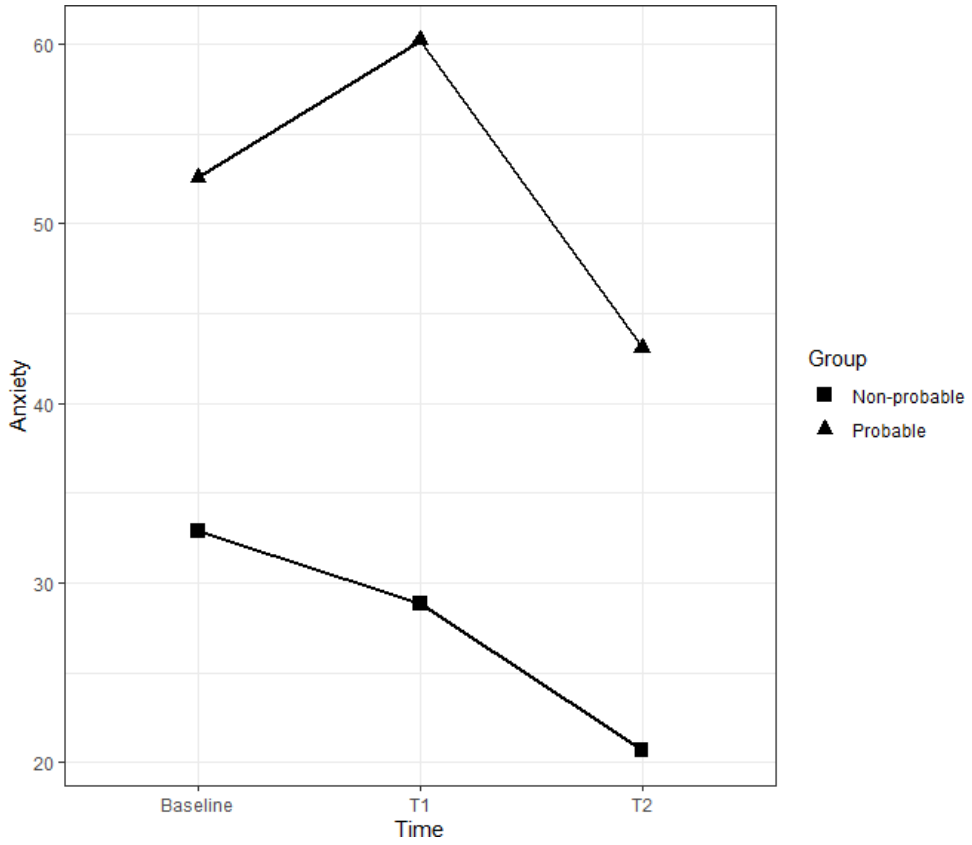
anxiety from baseline p=.007. Likewise, the participants in the non-probable anxiety group also reported a significant decrease in anxiety from baseline to time 2 following the BPS technique p<.001.

Table 3.2. Estimated marginal means with 95% Confidence Intervals

	Probable Anxiety Mean (CI)	Non-probable Anxiety Mean (CI)
Baseline	52.6 (45.4, 59.7)	32.9 (25.4,40.5)
Post-Feared task	60.2 (53.1, 67.3)	28.8 (21.3, 36.4)
Post-BPS task	43.1 (36,50.2)	20.7 (13.1, 28.2)

Note: Feared task= Feared Possible Self Task, BPS task=The Best Possible Self Task

Figure 3.1. Change in VAS-A Scores as a Function of Time and Group



Notes: Probable= Probable anxiety, non-probable= non-probabale anxiety

3.2.7. Discussion

The second aim of the present thesis is to explain *how* the clarity of future-self thoughts could contribute to anxiety symptomology. Chapter 3 aimed to utilise Becks cognitive framework which proposes that anxiety is maintained through perceived vulnerability where individuals underestimate their own abilities, and overestimate the level of future danger (Beck, 1976; Beck & Emery, 1985). The first study in this chapter examined whether the clarity of feared possible selves contributes to anxiety through increasing the overestimation of future danger. To do this, Study 2 examined whether the clarity of feared possible selves was

significantly related to LCS. However, the first study in this chapter failed to find evidence of this. Instead, Study 3 aimed to examine whether clarity can contribute to anxiety through contributing to the underestimation of one's capabilities in the present. Specifically, it was proposed that the clarity of a mental image can determine how *real* it feels to the individual. Furthermore, this sense of *pre-living* prospective events could evoke emotional responses and impact subjective feelings of self-worth similar to events that occur in the present. Since negative events can reduce self-esteem, it was hypothesised that clearly *imagined* mental images can have a similar impact through '*pre-living*' events and their associated emotions (Baumeister et al., 2003; DeHart & Pelham, 2007). However, to our knowledge, the relationship between self-esteem, anxiety, and the clarity of mental images was yet to be explored.

The results found that self-esteem mediated the relationship between the clarity of feared possible selves and anxiety, as hypothesised. This finding highlights a potential mechanism through which the clarity of feared possible selves influences anxiety. Thus, envisioning threats more clearly can contribute to anxiety through reducing self-esteem which could facilitate the underestimation of one's abilities in the present. As such, reversing this bias could reduce symptomology through increasing self-esteem. As explained in the introduction, one way to decrease the clarity of negative imagery is with positive future thinking tasks. The best possible self-task is one such example which requires individuals to imagine and elaborate on an ideal future-self. The secondary aim of Study 3 was to assess the preliminary impact of the best possible self-task on anxiety assessed at three time points: baseline, post feared possible self-task, post best possible self-task.

It was found that the best possible self-task significantly reduced anxiety for both groups. As discussed previously, we hypothesised that the best possible self-task could reduce anxiety through increasing the clarity of hoped-for possible selves which could have boosted self-esteem. However, since change in self-esteem was not assessed in our second research question, further research is necessary to determine the mechanism responsible for these effects. Regardless, these findings have potential implications for therapeutic interventions aimed at reducing anxiety. However, before the BPS technique can be delivered to a clinical group, more research is needed to understand its long-term efficacy, as well as potential moderators to its efficiency.

3.2.7.1. Conclusion

In summary, across three studies the present thesis has found that anxiety is significantly related to the clarity of feared possible selves. The present study showed that this relationship is mediated by self-esteem, thus, clarity can contribute to symptomology through contributing to the underestimation of oneself in the present. Additionally, the present study showed initial evidence regarding the efficacy of the best possible self-task for reducing anxiety. However, more research is needed to understand its long-term efficacy, as well as moderators to its efficiency. Chapter 4 aimed to fulfil this aim.

Chapter 4: Efficacy of the Best Possible Self Intervention for Generalised Anxiety: Exploration of Mediators and Moderators

4.1. Study 4

The previous chapter assessed the immediate post-manipulation effects of the BPS technique and reported significant decreases in generalised anxiety. However, since there was no follow-up assessment, it remains unknown whether the effects of the BPS technique would be present after a delay or if repeated use is required to maintain its benefits. Questions also remain regarding moderating and mediating effects. The present chapter presents two studies that explore these questions.

Although previous research has investigated the factors that could moderate the effectiveness of the BPS technique, relatively little attention has been paid to mediating variables. Thus, questions concerning the underlying mechanisms that explain *why* the BPS technique is effective remain unanswered. As discussed in the previous chapter, the BPS technique could have reduced generalised anxiety through boosting self-esteem. However, evidence was not found for this in the previous study since change in self-esteem was not assessed.

In addition to investigating the mediating effect of self-esteem, the present study also explored the potential benefits of combining past- and future-focused tasks in the BPS technique. A past-self variant of the BPS technique has been employed previously by Carrillo et al. (2021). Carrillo and colleagues explored whether the temporality (past/present/future) of the BPS technique is necessary to produce positive effects or if individuals can experience the same benefits, as experienced when imagining their future-self, envisioning their best past-self or

present-self. They found that regardless of temporality, envisioning oneself in a positive way was enough to produce positive effects (Carrillo et al., 2021). However, when envisioning the past, individuals are constrained by what has already occurred. Thus, if individuals have experienced significant trauma, they could find it difficult to generate positive past/present themes, therefore, the present study decided to focus on the future temporality. However, we did want to explore whether combining the past with the future could produce stronger effects than the standalone future intervention because previous research has demonstrated that imagining past success can boost self-efficacy (i.e. belief in one's abilities) and reduce psychological distress (Paersch et al., 2022). Moreover, higher self-efficacy is linked to stronger belief in the likelihood of positive future events (Brown et al., 2016). Thus, incorporating a best past self-task, before the future best possible self-task, could serve to boost self-efficacy in the present, in turn making positive future outcomes feel more credible. For example, an individual might visualise a best future self-involving graduating from university and landing their dream job. While this imagined scenario might have positive effects, the individual may doubt its likelihood. However, if the individual is instructed to reflect on their best past self, such as completing school with good grades and being accepted into university, it could make their envisioned future feel more achievable through boosting self-efficacy in the present. However, to our knowledge, the effect of combining the past and the future in the BPS technique are yet to be established.

4.1.1. Aims and Hypotheses

The primary aim of the present study was to compare the effectiveness of the BPS technique for reducing generalised anxiety over two weeks in comparison to an activity writing and a passive control group. The passive control group was included in the present study in

addition to the activity writing task because research suggests that writing about daily activities could also be beneficial for well-being; thus, it might not be an adequate control group (Carrillo et al., 2021). Alongside investigating the lasting effects of the BPS technique, Study 4 also aimed to fulfil two additional aims. First, to compare the effectiveness of the BPS technique to a condition that combined imagining their best past self with imagining their best future self (Best possible past-future self (BPP-FS), to investigate if envisioning the past can boost the effects of the future-based task. The second additional aim was to assess the mediating role of self-esteem. It was hypothesised that the BPS would significantly reduce anxiety over two weeks, consistent with cross sectional research (presented in the Chapter 3, Study 3), but the participants in the control conditions would experience no significant change in symptomology. It was also hypothesised that the BPP-FS condition would reduce anxiety significantly more than the standalone BPS. This hypothesis was made because the past can facilitate belief in one's capabilities which could make the future feel more possible (Paersch et al., 2022). Finally, it was hypothesised that the participants in the BPS and BPP-FS conditions would report a significant increase in self-esteem consistent with previous research (Owens & Patterson, 2013), and this change in self-esteem would significantly predict change in anxiety, since self-esteem is considered to be a contributor to symptomology (Li et al., 2023).

4.1.2. Method

4.1.2.1. Participants

A minimal sample size of 84 was determined based on a priori power analysis conducted on G*Power. Power was set at .8 with a large effect size. A large effect size was used in the power analysis because previous research examining the effect of the BPS on self-esteem yielded

a large effect ($\eta^2 = .12$; Owens & Patterson, 2013). The inclusion criteria that were adopted for this study were as follows: 1) Aged over 18 (2) Fluent in English (3) UK resident (4) Not currently receiving psychological or pharmaceutical intervention. At baseline, 124 participants were randomly assigned to one of four groups: Best Possible Self [BPS], Activity Writing, Passive Control, Best Possible Past and Future Self [BPP-FS]. 27 participants were excluded from the analysis for not completing all elements of the study (n=23) or for not following task instructions (n=4). A Chi-Square analysis showed the difference in retention rates across the conditions was not significant $\chi^2(3)=2.12, p=.569$, $\varphi=.12$. In addition, there was no significant difference between participants who dropped out and participants who completed the study on baseline anxiety scores $Z=-.49$, $p=.622$, and self-esteem $t(152)=1.54$, $p=.063$. In total 97 participants completed the study (85 female, 10 males, 2 non-binary, mean age= 20.92, SD= 7.22). Participants were distributed across conditions as follows: Best Possible Self (n = 24), Activity Writing (n = 24), Passive Control (n = 25), and Best Possible Past and Future Self (n = 24). There were no significant differences between groups in terms of self-esteem $F(3,93)=1.18, p=.323$, baseline anxiety ($H(3)=.46, p=.928$), or age ($H(3)=2.36, p=.501$). All participants provided informed consent.

4.1.2.2. Design

A randomised control trial was employed with group assignment (BPS, BPP-FS, Activity Writing, Passive Control) representing the independent variable and anxiety scores (baseline vs follow-up) representing the dependent variable. Participants were recruited through an online research participation programme and social media. The participants who completed the study through the online research participation programme received points as partial fulfillment to a module requirement. All other participants received a £20 voucher for completing the study. All

participants provided informed consent and ethics approval was granted from a university Ethics Committee.

4.1.2.3. Materials

All participants were informed that the study aimed to investigate individual differences in mood changes over two weeks. Participants in the control conditions received the same information, and as such had the same expectations regarding study outcomes.

4.1.2.3.1. Generalised Anxiety Disorder Questionnaire (GAD-7)

The Generalised Anxiety Disorder Questionnaire (*GAD-7*) (Spitzer et al., 2006) is a 7-item measure assessing generalised anxiety *(see section 2.2.3.1.)*.

4.1.2.3.2. The Robson Self-concept Questionnaire (SCQ)

The Robson Self-concept Questionnaire (SCQ; Robson, 1989) is a 30-item measure assessing self-esteem *(see section 3.2.3.3.)*.

4.1.2.3.3. Imagery Training

Before completing their assigned tasks, all participants listened to an audio description of an imagery training exercise. The imagery training was adapted from previous research (Carrillo et al., 2021; Holmes et al., 2008) and involves participants imagining cutting into a lemon. Following this, participants received specific instructions for their respective condition.

4.1.2.3.4. Best Possible Self (BPS)

In the Best Possible Self (BPS) condition, participants were asked to visualise and describe their best possible *future* self (see section 3.2.3.5).

4.1.2.3.5. Best Possible Past and Future Self (BPP-FS)

In the BPP-FS condition, participants were asked to visualise and describe their best possible past-self before completing the BPS technique. Specifically, they were presented with the following instructions:

"We would like you to mentally visualise, with as much detail as possible, your best past self. In order to do this, focus on your past and visualise yourself in the best time or moment where you consider that the best version of yourself appeared. Take some time to imagine it. You can guide the construction of your best past-self taking into account the following three areas: personal area (for example, feelings, physical abilities, personal achievements…), academic or professional area (professional achievements, goals…), social area (friendships, family relationships…). To build your best past-self use as much sensory information as possible: smells, tastes, sights, sounds, feelings… It will probably help you if you close your eyes and focus on what you visualise in your mind. Write down what you can see."

The participants responded by typing a description into a survey text box. After completing the past task, participants were presented with the BPS instructions as described above. The participants had to write a minimum of 30 words in both the past and future variant of the task.

4.1.2.3.6. Activity Writing

In the Activity Writing condition, participants were instructed to describe the activities they had engaged in earlier that day. Specifically, they were presented with the following instructions:

"We would like you to visualise in your mind, with as much detail as possible, the activities you have done today. To do this, focus on the activities of your daily life that normally go unnoticed, such as meetings, classes, conversations, etc. This exercise consists of remembering them and visualising them in your mind as vividly as possible. To help you determine and guide what to focus on, think about an agenda of the last 24 h and review it slowly. Think about each activity you have done, when and where it took place and with whom. It will probably help you if you close your eyes and focus on what you visualise in your mind. Write down what you can see."

The participants responded by typing a description into a survey text box. The participants had to write a minimum of 30 words before completing the task.

4.1.2.3.7. Passive Control

The participants in the passive control group did not receive any task-related instructions. Instead, the participants assigned to this condition completed the study after listening to the imagery training audio.

4.1.2.4. Procedure

Following the consent procedure, at baseline participants completed the GAD-7 and the SCQ questionnaires in a randomised order. Following this, they completed the imagery training

exercise. The video had to be played in full before they could proceed. Participants were then randomly assigned to one of four groups (Best Possible Self [BPS], Activity Writing, Best Possible Past and Future Self [BPP-FS], Passive Control) and completed their assigned task. Participants in the passive control group did not complete a task. Over the next three consecutive days, participants received another administration of their assigned task (once per day). The passive control group did not complete any tasks during this period. Two weeks post-baseline, participants completed the GAD-7 and SCQ for a second time, in a randomised order. The research project received ethical approval from York St John ethics committee and all participants were fully debriefed.

4.1.2.5. Data Analysis

The data was analysed using SPSS version 29. The differences in the ratings of anxiety symptomology were analysed using a 2 (Baseline vs Follow-up) x 4 (BPS vs Activity Writing vs BPP-FS vs Passive Control) mixed ANOVA. To assess the mediating role of self-esteem, Hayes' PROCESS macro with 5000 bootstrap samples was used. Significance was set at $p < .05$. The indirect effect was considered significant if confidence intervals did not contain zero.

4.1.3. Results

4.1.3.1. Change in Anxiety Symptomology

Table 4.1 displays the Mean (and SD) for Anxiety Scores at Baseline and Follow-up, across conditions. Figure 4.1 illustrates the change in anxiety scores across conditions. A 2 (Time: Baseline vs Follow-up) x 4 (Condition: BPS vs BPP-FS vs Activity Writing vs Passive Control) mixed ANOVA showed a non-significant main effect of Time F (1,93) = .78, p=*.379*, η^2= .008, and a non-significant main effect of Condition F (3,93) = .466, p =.707, η^2= .015.

However, there was a significant Condition x Time interaction F (3,93) = 4.21, p =.008, η^2= .119. Bonferroni comparisons revealed participants in the BPS condition reported significantly higher anxiety at baseline compared to follow-up (p=.009), whereas participants in the passive control condition reported lower anxiety at baseline compared to follow-up (p=.025). There was no significant difference in anxiety symptomology for the participants in the activity writing or the BPP-FS condition (p=.642 and p=.388 respectively).

Mediating Role of Self-Esteem

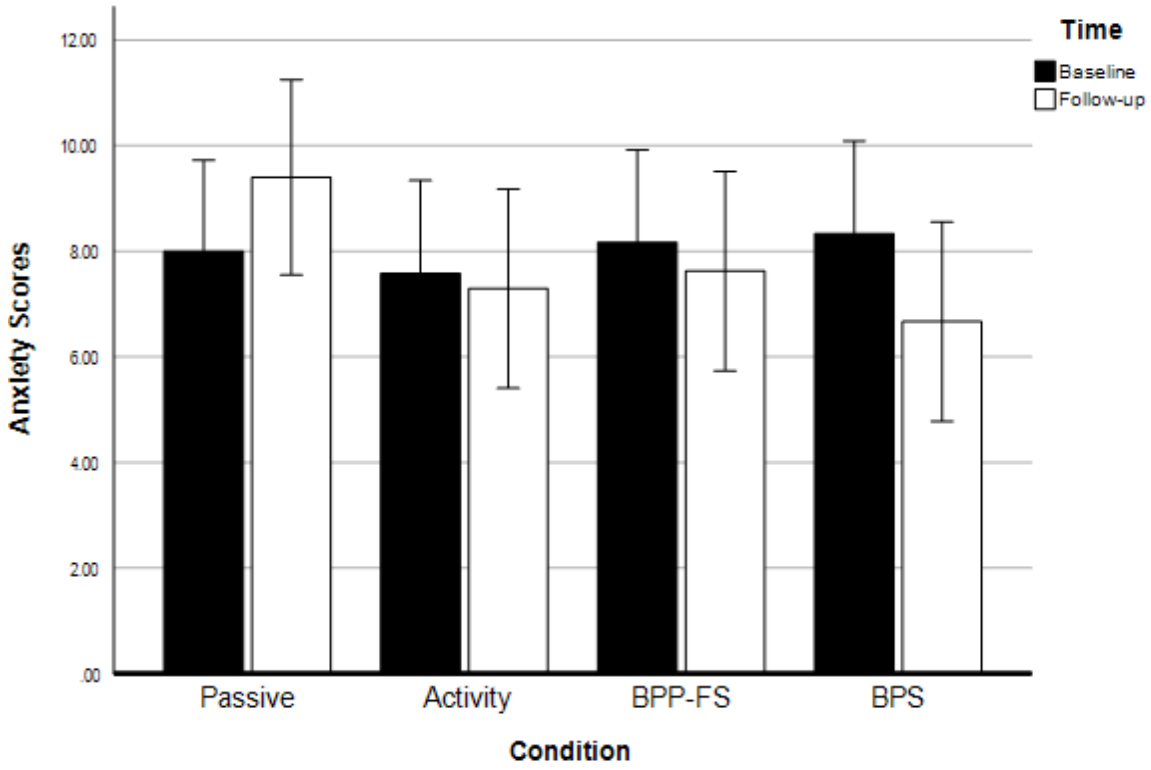
Table 4.1 displays the Mean (and SD) for Self-Esteem Scores at Baseline and Follow-up, across conditions. The descriptive statistics showed that the BPP-FS condition reported a decrease in self-esteem, and thus, this group was removed from the mediation analyses. Instead, the predictor variable in the analysis was whether participants were in the standalone BPS condition or not. The mediator variable was change in self-esteem, and the outcome variable was change in anxiety scores. Baseline self-esteem was entered as a covariate. Results showed that the BPS technique significantly predicted change in self-esteem b= 7.14, 95 %CI[.25, 14.03], t= 2.06, p=.043 and change in self-esteem significantly predicted change in anxiety b= -.08, 95 %CI[-.11, -.03], t= -3.54, p=.001. The direct effect of the BPS technique on anxiety change was significant b= -1.58, 95 %CI[-2.97, -.18], t= -2.24, p=.027. However, the indirect effect via self-esteem was also significant b=-.52, 95 % CI [-1.31,-.01] indicating a partial mediation.

Table 4.1. Mean (and SD) Anxiety, and Self-Esteem Scores at Baseline and Follow-up, across conditions

	BPS (N=		BPP-FS		Activity Writing		Passive Control	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Anxiety								
Baseline	8.33	4.85	8.17	4.21	7.58	3.93	8	4.28
Follow-up	6.67	4.29	7.63	4.43	7.29	4.16	9.4	5.56
Change score	-1.67	3.21	-.54	3.39	-.29	2.39	1.4	3.16
Self-Esteem								
Baseline	120.88	31.37	117.25	24.17	110.21	20.51	107.36	34.72
Follow-up	124.75	25.48	114.75	22.48	109.42	21.93	108	31.4
Change score	3.88	16.8	-2.5	13.33	-.79	16.75	.64	18.14

Note: BPS=Best possible self-condition, BPPS= Best possible past self-condition

Figure 4.1. Change in anxiety scores across conditions. Error bars represent 95% Confidence Intervals



4.1.4. Discussion

The primary aim of the present study was to examine the efficacy of the BPS technique for reducing generalised anxiety across two weeks. In addition, it also aimed to examine whether combining the standalone BPS procedure with envisioning one's best past self could enhance its effects. The results showed that the BPS technique significantly reduced anxiety from baseline to follow-up consistent with cross-sectional findings reported in the previous chapter. This supports the potential of the BPS as an effective intervention, potentially for individuals who are unable to access immediate therapeutic support. In comparison, the participants in the activity writing control condition experienced no significant change in anxiety across the two weeks. Notably, participants in the passive control condition experienced a significant increase in anxiety, suggesting that engagement in one of the tasks employed in the study could help prevent symptom escalation even if they do not significantly reduce symptomology.

Contrary to the hypothesis, the participants in the combined past and future best self-condition showed no significant change in anxiety and reported a decrease in self-esteem. As discussed in the introduction, it was hypothesised that incorporating a best past self-task, before the future best possible self-task, could serve to boost self-efficacy in the present, in turn making positive future outcomes feel more credible (Paersch et al., 2022), which could make their ideal future feel more possible. However, in the present study, the inclusion of the past task appeared to inhibit the effects (as observed in the standalone BPS condition) of the BPS technique. One potential explanation for this is that reflecting on a positive ideal past could highlight one's own inadequacies in the present, which could explain the observed decrease in self-esteem. This contrast could lead individuals to feel disconnected from their past achievements and reduce

belief in their capabilities. As a result, when they imagine the future, the sense of decline they envisioned from the past to the present could result in feelings of helplessness going forward. To address this, future research should try and modify the instructions for the best past self-technique. For example, reframing the instructions to focus on specific instances of past success (e.g., describe a time when you succeeded in an area of importance) rather than a best version of themself that exists no more.

The present study also aimed to investigate whether self-esteem mediates the effects of the BPS technique on anxiety. As mentioned in the introduction, the BPS technique could reduce anxiety by enabling individuals to pre-live future events and experience how it would feel to inhabit that future state (Erikson, 2007). This immersive process can elicit emotional responses and can impact subjective feelings of self-worth (i.e., self-esteem) in the same way actual experiences can (Duffy et al., 2024a). In addition, since low self-esteem can contribute to high anxiety, the present study proposed that self-esteem could mediate the effects of the BPS task. Consistent with this proposed theory, the results from the present study revealed a partial mediation. As such, the BPS technique boosts self-esteem, which can reduce anxiety indirectly, since self-esteem contributes to symptomology. However, since the mediation was partial, other mechanisms may also explain the effects of the BPS technique on anxiety. Future research could examine alternative mediators, such as self-efficacy (belief in one's capabilities) which can also contribute to anxiety (Bandura, 2015).

Overall, the results highlighted the efficacy of the BPS technique for reducing anxiety over two weeks. However, questions still remain regarding the frequency that is required to produce positive effects. Specifically, do individuals need to complete the BPS technique on four

occasions to experience a significant reduction in symptomology (as employed in the original BPS experiments (King, 2001) and in Study 4, or is one session enough to produce positive effects. In addition, Study 4 did not assess the impact of mental imagery ability. Mental imagery refers to the internal simulation or re-experiencing of perceptual events, which can engage multiple sensory modalities, such as visual (sight) and olfactory (smell) domains (Kosslyn et al., 2001). Since the BPS technique requires individuals to visualise their best future in as much detail as possible, individual differences in imagery capacity could moderate the effectiveness of the task, something which Study 4 did not examine. In addition, a related concern involves the necessity of imagery training and whether it is required to produce significant reductions in anxiety or not. Study 5 aimed to answer these questions.

4.2. Study 5

Extensive research has already investigated under what conditions the BPS technique is most effective (see Loveday et al., 2018 for a discussion). As a whole, the BPS technique is flexible in terms of delivery. For instance, the BPS does not have to be completed through writing passages, instead, participants can describe their best-self verbally or even pictorially (Loveday et al., 2018; Owens & Patterson, 2013). In addition, research shows that it can be delivered one-to-one, in small groups, or online using survey software (Carrillo et al., 2013; Layous et al., 2013). However, several factors related to the task and participants characteristics could influence the effectiveness of the BPS technique in reducing anxiety. These could include the frequency of task completion and individual differences in imagery capacity. The following sections will discuss each of these factors in detail.

First, it is important to explore *how often* the BPS should be delivered (i.e., task frequency). In the first BPS experiment, the participants completed the technique once a day across four consecutive days (King, 2001), whereas Maddalena et al., (2014) found positive effects from completing just one session. Thus, more research is necessary to understand the optimal frequency, as there is a risk for both over and under prescribing psychological interventions. For instance, Lyubomirsky et al. (2005) found that a positive psychological intervention involving counting one's blessings was less effective when delivered three times a week compared to once a week. Thus, the BPS could be just as effective (or more effective) when delivered once a week as opposed to four times a week (as examined in Study 4). However, insufficient delivery of an intervention could result in a "watering down" effect, reducing its overall impact. (Loveday et al., 2018).

In addition, since the BPS is primarily a mental visualisation exercise (i.e., participants are instructed to use as much sensory information as possible (e.g., visual, auditory, tactile) to form a clear image of their future-self) it is important to explore the role of mental imagery capacity. Mental imagery capacity refers to an individual's ability to form mental images which varies across individuals (Andrade et al., 2014). To our knowledge, only one study has examined the moderating impact of imagery capacity on the effectiveness of the BPS task (Odou & Vella-Brodrick, 2013). Odou & Vella-Brodrick found that the BPS technique was beneficial for individuals regardless of their imagery capabilities (Odou & Vella-Brodrick, 2013). However, the study did have key limitations, including low statistical power, and the use of an outdated measure of imagery capacity that lacks construct validity (Andrade et al., 2014). In addition, they did not categorise imagery capacity according to specific sensory modalities. This could be an important consideration because research shows that visual imagery produces stronger emotional

effects than verbal processes (e.g., seeing the crowd laughing at your presentation skills as opposed to hearing them) (Holmes et al., 2008). Thus, individuals with higher visual capacity could experience stronger emotional responses to the BPS technique compared to individuals with higher capacity in other sensory modalities. In addition, it is also important to investigate whether imagery training is necessary for the BPS technique to reduce anxiety. Research suggests that individuals spend a significant amount of time envisioning their future; thus, the BPS task instructions should not feel entirely unfamiliar. However, since mental imagery capacity can vary across populations (Andrade et al., 2014), providing individuals with imagery training could be an important task requirement, particularly for those participants with low capability. Previous research has reported positive effects of the BPS regardless of whether they have imagery training or not (Loveday et al., 2018); however, Study 5 will explore the benefits of the BPS technique without imagery training to try and replicate these findings when anxiety is the outcome measure.

4.2.1. Aims and Hypotheses

The primary aim of Study 5 was to assess the impact of varying frequencies of the BPS technique. To investigate this, Study 5 compared the effectiveness of four-sessions of the technique (used in Study 4) against three other frequencies (1 session, 2 sessions, 3 sessions) and a passive control condition. Based on the results from Study 4, it was hypothesised that regardless of frequency, all participants would experience a significant decrease in anxiety following the BPS technique, whereas participants in the passive control condition would experience no such change. However, since research examining the impact of varying sessions is

limited, no hypotheses were made regarding frequency effect, and instead these analyses were exploratory.

In addition, Study 5 also aimed to explore the moderating effects of imagery capacity. As discussed in the introduction, previous research has reported no significant effects of imagery capacity on the effectiveness of the BPS (Odou & Vella-Brodrick, 2013). However, Odou and Vella-Brodrick employed an outdated measure of imagery capacity and never assessed the moderating effects of *visual* imagery capacity specifically. Since visual imagery can produce stronger emotional effects to verbal processes (Holmes et al., 2008), it was hypothesised that visual imagery ability would moderate the effectiveness of the BPS for reducing anxiety. However, it was hypothesised that imagery capacity as a whole (across all sensory modalities) would not significantly moderate the effectiveness of the BPS (consistent with Odou & Vella-Brodrick, 2013).

4.2.2. Method

4.2.2.1. Participants

The inclusion criteria that were adopted for this study were as follows: (1) Aged over 18 (2) Fluent in English (3) UK resident (4) Not currently receiving psychological or pharmaceutical intervention. A minimal sample size of 95 was determined based on a priori power analysis conducted on G*Power. Power was set at .8 with a large effect size. A total of 165 participants were initially enrolled in the study. However, 47 participants were excluded from the analysis due to incomplete data resulting in 118 participants completing the study (92 female, 19 males, 7 non-binary, mean age= 19.63, *SD*= 2.26). No significant differences were observed between participants who dropped out and those who completed the study in terms of

baseline anxiety scores (Z = -0.51, p = .613) or imagery capacity (t(163) = 0.52, p = .302). All participants provided informed consent.

4.2.2.2. Study Design

A randomised control trial was employed with condition assignment (Passive Control vs 1 session vs 2 sessions vs 3 sessions vs 4 sessions) representing the independent variable and anxiety scores (baseline vs follow-up) representing the dependent variable. Participants were recruited through an online research participation program and social media. The participants who completed the study through the online research participation program received points as partial fulfillment to a module requirement. All other participants received a £10 voucher for completing the study. All participants provided informed consent and ethics approval was granted from a university Ethics Committee. Participants were distributed across conditions as follows: passive control (n=22), 1 session (n = 26), 2 sessions (n = 26), 3 sessions (n = 22), and 4 sessions (n = 22). At baseline, there were no significant differences between the five groups in terms of generalised anxiety (H(4) = 7.69, p = .104) or imagery capacity (F(4, 160) = 0.47, p = .757).

4.2.2.3. Materials

4.2.2.3.1. Generalised Anxiety Disorder Questionnaire (GAD-7)

The Generalised Anxiety Disorder Questionnaire (*GAD-7*) (Spitzer et al., 2006) is a 7-item measure assessing generalised anxiety (see section 2.2.3.1.)

4.2.2.3.2. Plymouth Sensory Imagery Questionnaire

The Plymouth Sensory Imagery Questionnaire (Psi-Q; Andrade et al., 2014) assesses seven domains of mental imagery capacity: visual (e.g., *"Imagine the appearance of a sunset"*), auditory (e.g., *"Imagine the sound of an ambulance siren"*), olfactory (e.g., *"Imagine the smell of a stuffy room"*), gustatory (e.g., *"Imagine the taste of lemon"*), tactile (e.g., *"Imagine touching fur"*), bodily sensation (e.g., *"Imagine the bodily sensation of threading a needle"*) and, feeling (e.g., *"Imagine feeling excited"*). Participants are asked to rate items on a scale of 0 (*"No image at all"*) to 10 (*"Image as clear and vivid as real life"*). Total imagery score is calculated by averaging across domains. Visual imagery capacity score was calculated by averaging the items for that domain. Scores range from 0-10. Higher scores indicate higher imagery capacity. The questionnaire has good reliability and validity (Andrade et al., 2014).

4.2.2.3.3. Best Possible Self (BPS)

Consistent with Study 4, participants were informed that the study aimed to investigate individual differences in mood changes over two weeks. No imagery exercise was used in this study, in order to investigate if imagery training is necessary to produce a significant reduction in anxiety. The participants in one of the four BPS conditions completed the same task presented in Study 4. Also, consistent with Study 4, the participants had to type a minimum of 30 words before completing the task. Depending on what condition the participants were in, they were exposed to varying frequencies of the BPS technique.

One Session: Participants who completed one session of the BPS, completed the task at baseline, and then only completed the GAD-7 after 2-weeks.

Two Sessions: Participants who completed two sessions, completed one task at baseline, followed by a second task the following day. They then completed the GAD-7 after two weeks.

Three Sessions: Participants who completed three sessions, completed one task at baseline, and two additional tasks over the next two days, followed by final assessments after two weeks.

Four Sessions: Participants who completed four sessions, completed one task at baseline, and an additional task each day for the next four days. The GAD-7 was then completed after two-weeks.

Passive Control: The participants in the passive control condition, did not complete any task. Instead, the participants in this condition only completed the GAD-7 and the Psi-Q at baseline and the GAD-7 at follow-up.

4.2.2.4. Procedure

Following the consent procedure, participants were randomly assigned to one of five groups: Passive Control, One Session, Two Sessions, Three Sessions, Four Sessions. All participants completed the GAD-7 and Psi-Q at baseline. Participants in the passive control group completed only the baseline and follow-up assessments. In the intervention groups, participants completed varying numbers of BPS sessions: one session at baseline (1 Session), two sessions over two days (2 Sessions), three sessions over three days (3 Sessions), or four sessions over four days (4 Sessions). All participants completed the GAD-7 two weeks after completing baseline measures. The research project received ethical approval from York St John ethics committee, and all participants were fully debriefed.

4.2.2.5. Analysis Plan

Data were analysed using SPSS version 29. To assess differences across conditions over two weeks, a 2 (Baseline vs Follow-up) x 5 (Condition: Passive Control vs 1 session, vs 2 sessions, vs 3 sessions, vs 4 sessions) mixed ANOVA was conducted. Potential moderating effects of imagery capacity were indicated by a significant three-way interaction between the moderator, group assignment, and time.

4.2.3. Results

4.2.3.1. Change in Anxiety Symptomology

Table 4.2 displays the Mean (and SD) for Anxiety Scores at Baseline and Follow-up, across conditions. Figure 4.2. illustrates the change in anxiety scores across conditions. A 2 (Time: Baseline vs Follow-up) x 5 (Condition: Passive Control vs 1 Session vs 2 Sessions vs 3 Sessions vs 4 Sessions) mixed ANOVA showed a non-significant main effect of Condition F (4,113) = 1.7, p=*.156*, η^2= .057, and a non-significant Condition x Time interaction F (4,113) = .88, p =.479, η^2= .03. However, there a significant main effect of Time F (1,113) = 15.96, p <.001, η^2= .124. Bonferroni comparisons revealed that participants who received 2, 3 and 4 sessions of the BPS technique reported significantly higher anxiety at baseline compared to follow-up (p=.008, p=.045, and p=.017 respectively). Participants in the Passive Control condition or who received 1 session reported a non-significant change in anxiety from baseline to follow-up (p=.794 and p=.120 respectively).

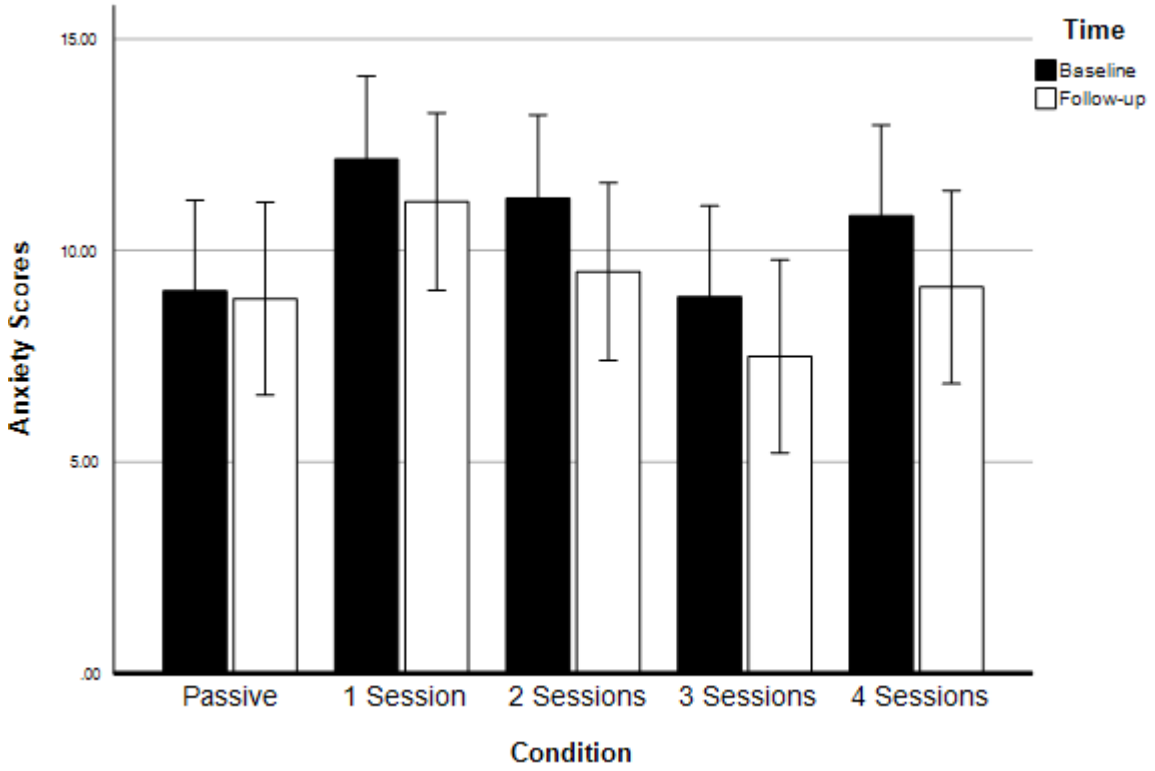
4.2.3.2. Moderating effects of Imagery Capacity

On average participants scored 6.42 (*SD*=1.63) on the imagery capacity scale and 7.52 (*SD*=1.87) on the visual imagery subscale. When imagery capacity was entered into the ANOVA, there was a non-significant three-way interaction between Condition x Time x Imagery Capacity F (5,112) = .87, p =.507, η^2= .037. Likewise, when the visual imagery subscale was entered into the ANOVA, there was a non-significant three-way interaction, F (5,112) = 1.66, p =.15, η^2= .069. These results indicate that total imagery capacity, and the visual imagery subscale were non-significant moderators.

Table 4.2. Mean (and SD) Anxiety Scores at Baseline and Follow-up, across conditions

	Baseline M(SD)	Follow-up	Change score
Passive Control	9.05 (4.9)	8.86(4.8)	-.18(2.4)
1 Session	12.15(4.68)	11.15(5.88)	-1(3.86)
2 Sessions	11.23(4.93)	9.5(5.23)	-1.73(3.44)
3 Sessions	8.91(5.94)	7.5(5.42)	-1.41(2.38)
4 Sessions	10.82(4.96)	9.14(5.54)	-1.68(3.71)

Figure 4.2. Change in Anxiety Scores Across Conditions. Error bars represent 95% Confidence Intervals



4.2.4. Discussion

The aim of the present study was to examine the impact of varying sessions of the BPS technique for reducing generalised anxiety. It was hypothesised that the participants in the BPS conditions would experience a significant reduction in anxiety over two weeks (consistent with study 4). The results showed that anxiety significantly reduced for participants who completed two or more sessions over four days (Conditions 2, 3, and 4). This result is consistent with Study 4 and with cross-sectional findings reported in chapter 3 (Study 3, Section 3.2.), highlighting the potential benefits of the BPS as an intervention for reducing generalised anxiety. Notably, Study 5 omitted the imagery training exercise used in Study 4, and the BPS technique still produced

significant

reductions in anxiety. This supports prior findings that imagery training may not be essential for the task to produce positive effects (Loveday et al., 2018). Participants who only completed one session of the technique reported a decrease in anxiety over time, however, contrary to the hypotheses, this change was not significant. Similarly, participants in the passive control condition did not show any significant change in anxiety. These findings suggest that more than one session over two weeks is necessary to produce a significant reduction in generalised anxiety. However, these results also raise important questions for future research, for instance, offering a different frequency of sessions per week may well give rise to different findings. In addition, further research is needed to assess the longevity of the intervention's effects, including when the benefits begin to diminish and when subsequent sessions may be required to sustain improvements in anxiety.

Study 5 also aimed to investigate whether imagery capacity moderates the effectiveness of the BPS technique. In the present study, imagery capacity scores were consistent with the typical average imagery scores represented in the general population (e.g., 7.05; Andrade et al., 2014). Consistent with previous research (Odou & Vella-Brodrick, 2013), imagery capacity across all sensory modalities did not moderate the intervention's effects. This suggests that the BPS technique can be effective regardless of participants' imagery ability, even in the absence of imagery training. Contrary to the hypothesis, the visual imagery sub-scale also did not moderate the effectiveness of the BPS task. As discussed in the introduction (Chapter 1) it was hypothesised that visual imagery would play a key role, as it has been shown to produce stronger emotional responses than imagery relying on other sensory modalities (Holmes et al., 2008). Thus, it was expected that participants with higher visual imagery capacity would experience

greater reductions in anxiety. However, the findings suggest that the task's effectiveness is not dependent on the ability to generate vivid visual imagery. This reinforces the accessibility of the BPS technique, as individuals with lower visual imagery capacity can still benefit from the intervention. However, it is still unclear what participants are thinking, and whether they use mental imagery when completing the BPS technique. To address this, future research could ask participants the extent that they used imagery when completing the task and what type of imagery they used. This could help to establish if participants who use more mental imagery during the task, experience larger decreases in anxiety, rather than assessing mental imagery ability in general.

In summary, Chapter 4 presented two studies that highlighted the efficacy of the BPS technique for reducing generalised anxiety over two weeks. Study 4 examined the mediating role of self-esteem and found that self-esteem partially mediated the effects of the BPS on anxiety. This suggests that changes in self-esteem could help explain how the BPS intervention reduces anxiety. Specifically, it is possible that by envisioning a positive, ideal future, individuals may "*pre-live*" the emotions associated with that future, which can positively impact their sense of self-worth. These findings support the proposed mechanism of the BPS technique discussed in the introduction (Section 4.1.) and emphasise the emotional benefits (in the present) of imagining an ideal future. Future research should aim to replicate these findings and explore this and other potential mechanisms that may contribute to the BPS's effects on anxiety.

Study 5 demonstrated that the effects of the BPS technique on anxiety persisted regardless of whether imagery training was delivered or not. In addition, the outcomes of the BPS were not moderated by individual differences in mental imagery capacity (across all modalities and for visual imagery specifically). These findings highlight the accessibility of the

BPS technique, as individuals with lower visual imagery capacity can still benefit from the intervention. The results from Study 5 demonstrated that multiple sessions of the BPS technique (two or more sessions over four days) are required to result in significant reductions in anxiety. Notably, participants who completed only one session did not report significant reductions, emphasising the importance of multiple sessions for achieving significant improvements in anxiety.

Furthermore, since the BPS task was delivered entirely online using survey software, it offers a convenient and cost-effective solution for intervention delivery (Muñoz et al., 2018). As highlighted in the introduction, generalised anxiety is highly prevalent in the general population, yet access to therapeutic support is often limited due to high demand (Lattie et al., 2022; Revicki et al., 2012). This creates a need for accessible interventions that can alleviate symptoms of anxiety for individuals who are waiting for more formal treatments, such as cognitive behavioral therapy (Muñoz et al., 2018). The findings of this study provide initial support for offering the BPS technique to individuals on waiting lists. In addition, given that the BPS also benefited individuals who scored below the cutoff for probable generalised anxiety, the BPS technique may be useful as an early intervention to prevent the escalation of anxiety symptoms.

Chapter 5: General Discussion and Summary of Contributions

The research presented within the present thesis has demonstrated the importance of prospective self-related cognition for the maintenance and treatment of generalised anxiety. Specifically, it was the clarity of negative imagery that was examined as a potential unique contributor to anxiety. The potential mechanism through which clarity could contribute to anxiety was also established using Becks cognitive framework, which posits that anxiety arises from 1. Underestimating one's ability cope with adversity and 2. Overestimating the level of danger a threat poses. Once a mechanism was established, the present thesis examined the benefits of a positive imagery task, *the best possible self-technique* (BPS). Previous research showed that positive imagery can reduce the clarity of negative imagery, so it was proposed that the BPS technique could reduce anxiety through reversing the prospective bias of imagining negative events more clearly. Moderators of the BPS efficiency were also examined through exploring the role of imagery capacity, imagery training, and the frequency of task administration.

5.1. Overview of Thesis

The studies presented within the present thesis were designed to fulfil three overarching aims. The first aim was to explore how generalised anxiety relates to the clarity of future self-images (Chapter 2). Previous research within the prospection literature demonstrated that higher anxiety was significantly related to higher clarity of negative images and lower clarity of positive images (Morina et al., 2011; Stöber, 2000). However, this finding needed to be replicated with *self*-related thinking specifically. To measure this, a possible self-task was employed which was used across three studies (Chapters 2 & 3). The task included two closed-formatted prompts that

encouraged participants to think about and describe positive (*In the future, I hope to be*) and negative (*In the future, I want to avoid being*) future-self-images. Participants were then asked to subjectively rate the clarity of their images on a 5-point Likert scale ("*Images of this thought are hazy, not clear at all").*

The results from the first study showed that individuals with elevated anxiety imagine feared possible selves significantly more clearly, and hoped-for possible selves significantly less clearly, than individuals with low anxiety. It was suggested that the clarity of these images could contribute to anxiety and that reversing this bias using a positive imagery technique could reduce symptomology. However, before an intervention could be implemented, it was first important to establish through what mechanism clarity could contribute to anxiety. In addition, one limitation of Study 1 was that depressive symptomology was not assessed. Understanding the distinction between anxiety and depression is important because they often co-occur, and share symptoms (Zbozinek et al., 2012) which can complicate diagnosis and treatment. Therefore, it is crucial to identify the underlying factors, such as the vividness of negative imagery, that contribute specifically to anxiety. For this reason, it was decided that depression will be measured in Study 2 to determine whether the clarity of feared possible selves contributes uniquely to anxiety after accounting for depressive symptomatology.

The second aim of the present thesis was to explain *how* the clarity of future self-thoughts could contribute to anxiety symptomology. To do this, the present thesis utilised Beck's cognitive framework which proposes that anxiety is maintained through perceived vulnerability where individuals underestimate their own abilities and overestimate the level of future danger (Beck, 1976; Beck & Emery, 1985). The first study in Chapter 3 investigated whether the clarity of

feared possible selves contributes to anxiety through increasing the overestimation of future danger (or through increasing looming cognitive style (LCS)). Specifically, if an individual's mental imagery of threats is highly vivid and detailed, it could emphasise its evolving consequences, making it appear as though it is moving *more* rapidly. The results showed that LCS was not significantly related to the clarity of feared possible selves; thus, the clarity of negative self-imagery does not contribute to the dynamism of future threats.

The secondary aim of Study 2 was to explore the relationship between LCS, anxiety, depression, and perceived control over evading threats. Consistent with previous research (Riskind et al., 1992; Riskind & Calvete, 2020), it was found that higher LCS was significantly related to reduced perceived control. Thus, imagining negative outcomes approaching rapidly, can reduce the perceived capacity to prevent or manage those outcomes. In addition, although reduced control was not significantly related to anxiety, it was found to be significantly related to elevated depression. For this reason, exploratory analyses were conducted to investigate whether perceived control mediated the relationship between LCS and depression. Although initial research has suggested that LCS could contribute to comorbid depression when threats are perceived as inescapable (Hong et al., 2017; Tzur-Bitan et al., 2012), to our knowledge, no direct evidence of this mechanism has been published. The results showed that reduced control mediated the relationship between high LCS and depression. These results suggest that although LCS can contribute to anxiety, it could also contribute to depression when threats are perceived as inescapable or uncontrollable through fostering feelings of hopelessness (Kleiman & Riskind, 2012).

Therefore, the first study in Chapter 3 (Study 2) suggested that clarity did not contribute to anxiety through increasing LCS. Instead, the next study in Chapter 3 (Study 3) aimed to investigate whether clarity could contribute to the underestimation of one's capabilities in the present by investigating whether self-esteem mediated the relationship between the clarity of feared possible selves and anxiety. Specifically, it was hypothesised that clarity could enhance the perceived realness of imagined future-self thoughts which could impact self-esteem, a construct that predicts anxiety symptomology (Li et al., 2023). The secondary aim of Study 3 was to explore the impact of the best possible self-technique on anxiety using a repeated measures design.

The results showed that self-esteem mediated the relationship between the clarity of feared possible selves and anxiety. This finding highlighted a potential mechanism through which the clarity of feared possible selves influences anxiety. Also, it was found that the best possible self-task significantly reduced anxiety, potentially through boosting self-esteem. However, since change in self-esteem was not assessed in our second research question, further research was necessary to determine the mechanism responsible for these effects. In addition, more research was needed to understand the long-term efficacy of the BPS technique for reducing anxiety, as well as potential moderators to its efficiency.

Chapter 4 presented two studies that explored the efficacy of the BPS technique for reducing generalised anxiety over 2 weeks. In the first study in this chapter (Study 4), the BPS technique was compared against an activity writing and a passive control group. The benefits of a fourth condition were also assessed which included a task that combined imagining the best past self with imagining the best future self (Best possible past-future self (BPP-FS)), to

investigate if envisioning the past can boost the effects of the future-based task. This study also assessed the mediating effect of self-esteem.

The results showed that the BPS technique significantly reduced anxiety from baseline to follow-up consistent with cross-sectional findings reported in Chapter 3 (Study 3). This was also found to be partially mediated by self-esteem. In comparison, the participants in the activity writing control condition experienced no significant change in anxiety across the two weeks. Notably, participants in the passive control condition experienced a significant increase in anxiety, suggesting that engagement in one of the tasks employed in the study could help prevent symptom escalation even if they do not significantly reduce symptomology. Also, the participants in the combined past and future best self-condition showed no significant change in anxiety and reported a decrease in self-esteem. As discussed previously, a potential explanation for this is that reflecting on a positive ideal past could highlight one's own inadequacies in the present, which could explain the observed decrease in self-esteem. This contrast could lead individuals to feel disconnected from their past achievements and reduce belief in their abilities. As a result, when they imagine the future, the sense of decline they envisioned from the past to the present could result in feelings of helplessness going forward.

Overall, the results from Study 4 highlighted the efficacy of the BPS technique for reducing anxiety over two weeks. However, questions still remained regarding the frequency that is required to produce positive effects. Specifically, do individuals need to complete the BPS technique on four occasions to experience a significant reduction in symptomology (as employed in the original BPS experiments (King, 2001) and in Study 4), or is one session enough to produce positive effects. In addition, Study 4 did not assess the impact of mental imagery ability

or whether the imagery training exercise used in Study 4 was necessary to produce significant effects. Therefore, Study 5 investigated these questions.

The aim of the final study (Study 5) within the thesis was to assess the impact of varying frequencies of the BPS technique by comparing the effectiveness of four-sessions of the technique (used in Study 1) against three other frequencies (1 session, 2 sessions, 3 sessions) and a passive control condition. In addition, a secondary aim was to assess the moderating role of imagery capacity. The imagery training exercise was not employed in this study to investigate whether the BPS technique was still effective at reducing generalised anxiety without it.

The results showed that anxiety significantly reduced for participants who completed two or more sessions over four days (Conditions 2, 3, and 4). This result is consistent with Study 4 and with cross-sectional findings reported in Chapter 3 (Study 3) highlighting the potential benefits of the BPS as an intervention for reducing generalised anxiety. These findings suggest that more than one session over two weeks is necessary to produce a significant reduction in generalised anxiety.

However, this also raises important questions for future research, for instance, it remains unclear whether the two sessions need to be administered on consecutive days or whether one session per week would be equally effective. Additionally, further research is needed to assess the longevity of the intervention effects, including when the benefits begin to diminish and when subsequent sessions may be required to sustain improvements in anxiety. Notably, these effects were also present without imagery training. Additionally, imagery capacity across all sensory modalities did not moderate the intervention effects. This suggests that the BPS technique can be effective regardless of participants' imagery ability and in the absence of imagery training.

5.2. Implications of Findings

5.2.1. Anxiety and the Clarity of Future Thoughts

As discussed in the general introduction (Chapter 1), dysfunctions in future thinking have been associated with various psychopathology (Section 1.4.2). Previous research has examined this by measuring the characteristics of thoughts by asking participants to rate their descriptions of future events on various subjective dimensions (e.g., valence, controllability, belief in occurrence, vividness) (e.g., Hallford et al., 2018; Nam et al., 2024). Regarding generalised anxiety, research within the field of prospection has shown that compared to healthy controls, participants with elevated symptomology report more vivid, or *real*, negative future imagery (Di Simplicio et al., 2016; Morina et al., 2011; Tallon et al., 2020). However, to our knowledge this has yet to be replicated with self-related thinking specifically, an important gap that Study 1 addressed. More importantly, the findings in Chapter 3 represent the first attempt to establish a mechanism through which clarity contributes to anxiety. Understanding this mechanism is a crucial step in the development of more precise and effective interventions (Wight et al., 2016). Specifically, Study 3 demonstrated that clarity may act as a contributor to anxiety maintenance, by reducing present self-esteem. These results suggest that therapeutic strategies aimed at reducing the clarity of feared possible selves could be efficacious in reducing anxiety symptoms.

5.2.2. Anxiety and Depression Comorbidity

As discussed in Chapter 1, since anxiety and depression often co-occur and share symptoms, it is crucial to identify the underlying factors that contribute specifically to anxiety. This focus can help clinicians tailor interventions more effectively, even in the presence of comorbid conditions. Within the present thesis, Study 2 addressed this issue by exploring

whether the clarity of feared possible selves was also associated with depressive symptoms. It was found that depression was not significantly associated to the clarity of feared possible selves and hence the clarity of negative imagery could be a unique contributor to anxiety. This was consistent with prospection research more broadly and the Tripartite Model (Clark & Watson, 1991) which suggests anxiety is associated to heightened negative affect whereas depression is associated to diminished positive affect.

However, including depression in Study 2, also allowed the present thesis to establish a mechanism for understanding anxiety-depression comorbidity. As discussed previously, initial research has suggested that LCS could contribute to comorbid depression when threats are perceived as inescapable (Hong et al., 2017; Tzur-Bitan et al., 2012). To our knowledge, the results of Study 2 represent the first evidence of this mechanism. Specifically, the results showed that reduced control mediated the relationship between high LCS and depression. Thus, although LCS can contribute to anxiety, it could also contribute to depression when threats are perceived as inescapable through fostering feelings of hopelessness (Kleiman & Riskind, 2012). These insights have important implications for psychological interventions aimed at preventing comorbidity. For instance, could interventions designed to increase perceived control be effective at preventing depression in populations with high LCS. As discussed in Chapter 1, comorbidity between anxiety and depression is extremely common, with depression affecting an estimated 62% of individuals diagnosed with GAD across their lifetime (NICE, 2025). The concurrent presence of depression can complicate both the diagnosis and treatment of GAD (Zhiguo & Yiru, 2014) and is associated with increased suicide attempts, greater impairment and an increased reliance on mental health services (Birmaher et al., 1996; Ezpeleta, Domenech, & Angold, 2006). Thus, finding evidence of this comorbidity mechanism is important for

understanding under what conditions anxiety and depression can co-occur. However, since investigating the conditions of comorbidity was not one of the main aims of the present thesis, further research should build upon these initial findings.

5.2.3. Efficacy of the BPS Technique for Reducing Generalised Anxiety

The findings presented in the present thesis provide initial support for the BPS technique as a brief, accessible and scalable intervention for reducing generalised anxiety. Specifically, since the BPS was effective when delivered entirely online using survey software, it offers potential for wide-scale implementation, particularly in contexts where mental health services are overburdened and inaccessible. This is particularly relevant for generalised anxiety which, despite being highly prevalent, is often paired with limited or inadequate support (Lattie et al., 2022; Revicki et al., 2012). The results from Chapter 4 in particular suggest that the BPS technique could provide immediate, low-cost support for individuals who are unable to access formal psychological treatments such as cognitive behavioral therapy. In addition, the findings presented in Study 4 offer important implications for understanding *how* the BPS technique reduced generalised anxiety. Specifically, the technique altered current perceptions of self-worth through immersing individuals in vivid, fulfilling representations of a positive future self.

These findings also provide evidence for the bi-directional relationship between present-self and future thinking. As discussed in Chapter 1, the way in which individuals envision the future is influenced by their current self-perceptions (Markus & Nurius, 1986; Strahan & Wilson, 2006). Specifically, it is suggested that self-relevant information from the past and the future tend to cluster around periods of identity development (Rathbone et al., 2008; Rathbone et al., 2011). Thus, once a negative self-belief emerges (e.g., “I am a failure”), both autobiographical

memories and future imaginings become organised around this identity, reinforcing its salience (Rathbone & Steel, 2014). Consequently, individuals are more likely to retrieve past failures and generate future scenarios that sustain this negative self-concept. However, the results in the present thesis show that the reverse of this is also possible since modifying how individuals imagine the future can directly influence how they feel about themselves in the present. This has both theoretical and clinical significance. Specifically, it suggests that prospective interventions like the BPS technique are not limited to enhancing mood because they can also change core aspects of identity and self-perception. From an identity-based perspective, this may work by shifting the autobiographical "clustering" of self-relevant information. For instance, the BPS could facilitate a competing, positive self-perception that draws on more positive autobiographical memories and aids in the development of a positive, present self-belief.

The results in Study 5 also challenge the assumption that the BPS technique is predominantly a mental visualisation exercise. This is because no evidence was found for the moderating effects of imagery capacity which means that even individuals who struggle to create images in their minds can experience the beneficial effects of the BPS technique. This increases the accessibility of the BPS technique since individuals do not necessarily need strong mental imagery abilities to engage with the task. However, based on these findings it is now unclear whether mental imagery is used during the BPS technique, which raises important questions for future research (see Section 5.3). The present thesis also offers valuable guidance for the implementation of the BPS technique. Specifically, the results from Study 5 suggest that participants have to engage in a minimum of two sessions to experience a significant reduction in anxiety. This has potential implications for future research incorporating the BPS technique. It also shows that, to keep costs down and attrition higher, a minimum of two sessions a fortnight

could be employed in future to help to reduce generalised anxiety. However, these results also raise important questions for future research, for instance, it remains unclear whether the two sessions need to be administered on consecutive days and when the benefits of the two sessions begin to diminish (see Section 5.4).

5.3. Limitations and Future Directions

The present thesis has highlighted the role of prospective cognition for the maintenance and treatment of generalised anxiety. Despite the potential implications of these findings, there are important limitations that should be acknowledged. These limitations and potential solutions alongside suggestions for future research are detailed below.

First, the studies presented within the present thesis consisted of non-clinical populations (i.e., individuals without a diagnosis of generalised anxiety disorder). As discussed in the general introduction (Section 1.2.2.), according to the dimensional perspective of anxiety, symptomology sits on a continuum and varies in severity and frequency (Narrow & Kuhl, 2011). As a result, findings from non-clinical populations may still be generalisable to clinical groups, as the underlying mechanisms of anxiety remain consistent across the continuum (Robinson et al., 2014). Regardless, however, it is still important to consider the representativeness of the sample when interpreting the results particularly since the samples also largely consisted of university students who were female. It is important for future research to replicate the results from the present thesis with a more representative clinical sample.

Furthermore, since the present thesis collected limited demographic information, other potentially important characteristics, such as ethnicity, nationality, and socioeconomic background were not assessed. As such, it is unknown whether the findings could vary across different demographic groups. Additionally, across all studies the participants were

predominantly university students, which limits the applicability of the findings particularly regarding the benefits of the BPS technique. For example, university students could find it easier to construct future goals related to their career path compared to other demographic groups (e.g., individuals facing socioeconomic disadvantages who perceive more barriers). As such, the effectiveness of the BPS technique may not operate similarly across demographic groups, and further research is required to examine its impact in more diverse populations.

Although power analyses were conducted throughout, recruitment occasionally exceeded the minimum sample sizes necessary. This is an important consideration because although larger samples increase statistical power, they also increase the probability that small effects reach statistical significance. As such, interpretation of the findings should not rely solely on *p*-values but must also consider the magnitude of the observed effect sizes. Importantly, the effects observed across the intervention studies were large in magnitude (η^2= .119-.124), suggesting that the BPS intervention produced meaningful changes in the outcomes assessed.

The standardised questionnaires that were used in the present thesis to measure anxiety were selected due to their established psychometric properties and clinical cut-offs. However, relying on standardised measures can reduce the complexity of anxiety to a single score and are susceptible to bias. It is also important to acknowledge the limitations associated with the use of cut-off scores to categorise participants into probable and non-probable anxiety groups. Although the selected cut-off score is empirically supported, the individuals who scored just below the cut-off for probable anxiety could still experience clinically meaningful levels of distress since anxiety symptoms exist on a continuum (Narrow & Kuhl, 2011). Future research should employ multimethod assessments to provide a more comprehensive understanding of anxiety and the impact of the BPS technique. For example, future research could combine self-report questionnaires with structured clinical interviews or behavioural measures of anxiety.

The results presented in Chapter 4 demonstrate that the BPS technique can reduce generalised anxiety over a two-week period. However, participants needed to complete a minimum of two sessions to experience a significant reduction in symptomatology. Establishing the minimal requirements for an effective mental simulation intervention is important because it can enhance the cost effectiveness of the technique (Cole et al., 2021). In addition, research shows that the frequency and spacing of simulation techniques can influence their effectiveness, and it is suggested that sessions should be short and spaced apart to counteract the diminishing returns (Driskell et al., 1994). Thus, this finding has important practical implications for the deployment of the BPS technique as a scalable intervention. Regardless however, key questions remain about how best to structure these two sessions. For instance, it is still unclear whether they need to be delivered on consecutive days, or whether they can be spread evenly across a week or spaced further apart. These variations in session frequency and spacing could have substantial implications for the feasibility and effectiveness of the BPS technique if implemented in real-world contexts, such as on digital self-help platforms. Additional research is therefore needed to test different delivery schedules in order to determine the most efficient and sustainable format for symptom reduction.

In addition, the current findings do not provide evidence regarding the durability of the BPS technique i.e., when do the effects start to diminish. Specifically, understanding how long the benefits of the BPS last is important for informing recommendations around when additional sessions or extra support is needed. Without this knowledge it is difficult to know how to maintain symptom reduction over time. Future research should include additional follow-up assessments beyond two weeks when examining the efficacy of the BPS technique.

In addition, since the BPS task was delivered entirely online using basic survey software, the present thesis highlights its potential as a convenient, low-cost, and scalable intervention for

reducing generalised anxiety. This mode of delivery could be particularly useful for reaching individuals who experience barriers to accessing traditional therapy, such as long waiting lists.

However, despite these advantages, further research is required to determine the optimal delivery format for maximising the intervention's efficacy. For instance, although online delivery offers flexibility and broad accessibility (Rodgers et al., 2017), it is unclear whether completing the BPS task in more structured environments (such as a laboratory setting or with therapeutic support) might enhance engagement and emotional impact. Similarly, combining the BPS with existing treatments (e.g., cognitive behavioural therapy) could potentially produce additional therapeutic benefits. However, to our knowledge the effect of combining the BPS with existing treatments is yet to be established. It is also important to recognise that online interventions may not be appropriate for all users. For example, individuals with limited digital access or lower digital literacy could find it difficult to complete online interventions. For these individuals, the BPS technique could be adapted into alternative formats such as paper-based exercises.

Another important question relates to how individuals engage with the BPS task. Currently, the task is typically completed through written responses, but some individuals may benefit more from alternative formats, such as drawing, voice recordings, or visual storytelling. This is an important consideration for future investigation, since research shows that providing individuals with a choice on how an intervention is delivered can enhance its effects (Clark et al., 2008). Thus, offering individuals the choice in how to complete the BPS technique could be important for optimising its effectiveness and ensuring that it is engaging and accessible across different populations.

In addition, it is not clear whether the BPS technique would be effective for individuals

who are unable to generate mental images (i.e., those with aphantasia). Research shows that individuals with aphantasia experience mental ill-health in the absence of symptoms linked to mental imagery (Mawtus et al., 2024). Therefore, the BPS could be ineffective for this group since the proposed mechanism by which the technique exerts its effects is not relevant (i.e., reducing the clarity of negative self-images). However, the findings in Study 5 showed that mental imagery capacity did not moderate the effectiveness of the BPS technique. Thus, it remains unclear which cognitive processes participants were actually engaging in during the BPS technique if it is not generating vivid visual images. For instance, some individuals could have relied on more abstract or verbal thinking styles instead of mental imagery. Specifically, thinking deeply in words about what their ideal future could look like could have prompted individuals to reinterpret their current circumstances with a more positive outlook (Bartoszewicz, 2023). Therefore, rather than assess participants' ability to create mental images, future research should investigate the type of mental processes participants engage in during the task.

In addition, it is possible that the measure of imagery ability employed in the present thesis did not capture the type of imagery required for the BPS task. Specifically, the Plymouth Sensory Imagery questionnaire assesses an individual's ability to generate mental images of familiar, previously experienced events (e.g., hearing the sound of ambulance sirens), whereas the BPS task requires participants to construct hypothetical future scenarios. As such, the measure may not have assessed the type of future-oriented imagery that was relevant to engaging in the BPS technique. Thus, future research should assess the moderating effect of hypothetical imagery ability on the effectiveness of the BPS technique. Also, it is important to understand how the BPS technique impacts existing future thinking deficits. In the present thesis, it was proposed that the BPS could reduce the clarity of feared possible selves and increase self-esteem. Although Study 4 found evidence for the mediating effects of self-esteem, the change in the

clarity of feared possible selves over time was not assessed. This is a significant limitation in the present thesis and one that requires attention in future research.

Similarly, related to the previous point, it is a limitation of the present thesis that the potential role of language ability in moderating the effects of the BPS technique was not investigated. The BPS task relies on participants ability to describe a vivid narrative about their ideal future. Individuals with more developed verbal skills or a richer vocabulary may be better able to construct these narratives, which could, in turn, enhance the impact of the intervention. Previous research has suggested that although emotional responses to mental imagery tend to be more intense than those evoked by verbal representations (Holmes et al., 2006; 2008), language nonetheless could play a significant role in emotional processing. For example, literary works (e.g., books or poems) can produce powerful emotional responses by constructing narratives that engage memory, empathy, and perspective-taking (Bohn-Gettler & Rapp, 2014; Power & Dalgleish, 1999). Therefore, language ability could impact how effectively individuals can engage with the BPS technique and how they emotionally respond to it. Future research should investigate the moderating effects of language ability to better understand under what conditions the BPS technique is most effective.

5.4. Conclusion

The studies presented within the present thesis have demonstrated that individuals with elevated generalised anxiety envision their feared future self with greater clarity. Importantly, this research extended existing prospection literature by focusing specifically on self-related imagery and found evidence for a potential mechanism through which clarity could influence symptomology, namely through reducing self-esteem. The findings also provided evidence for the efficacy of the Best Possible Self (BPS) technique in reducing generalised anxiety symptoms

over two weeks. These improvements appear to be partially mediated by increases in self-esteem and are not moderated by imagery ability. Although the present thesis is not without its limitations, and further research is required to optimise task delivery and clarify underlying mechanisms, the findings contribute novel evidence to the field of imagery-based interventions and could carry important clinical implications for the treatment of GAD. Specifically, modifying how individuals imagine their future selves in terms of clarity and emotional immersion could be effective for reducing generalised anxiety.

Appendix A

Examples of Hoped-for Possible Selves

Financially independent, Successful, More confident

Examples of Feared Possible Selves

Alone, Selfish, Worried

Appendix B

Examples of Feared Possible Selves

Example 1: “Avoid being bad at social interactions”

Example 2: “Someone who hasn’t reached their full potential”

Example 3: “Being left with no family”

Examples of Best Possible Selves

Example 1: “I graduated university with a good grade and I’m on the path to having a job in mental health/counselling. I am still with my boyfriend, and I am still close with my best friends I have now. I could still live in [hometown] but I’m also happy to move somewhere else. I spend my time going to gigs and travelling with my boyfriend/my friends as well as visiting home.”

Example 2: “I would have a slow-paced life, where i can take my time to rise in the morning, feel well rested and not feel rushed throughout the day. I would work at my yoga studio and hold spaces for people such as in women circles and meditation classes. I would still be writing poetry and making art, but for the purpose of my soul expression rather than for others to like it. I would love myself so unconditionally that i don’t rely on the love of others in order to feel good enough about myself. I have the time to nourish my body with whole foods and continue my daily meditation and yoga classes. Spending time in nature and in solitude is a big priority for me and i make time for this regularly. I don’t need to earn a lot of money, just enough to live comfortably and have a good work/ life balance. I will have a little home of my own that feels like a sanctuary. i feel safe and comfortable there. I am surrounded by people who love and care for me. People who support my growth and healing and I’m able to lean into support from these people whilst also putting boundaries in place with those who don’t support my growth and

healing. I have the time and space in my life to be able to travel but also always have a home to come back to and feel grounded again."

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