The University of Liverpool

Doctorate in Clinical Psychology

Predictors of Worry and Generalised Anxiety Disorder

The Role of Intolerance of Uncertainty, Negative Metacognitive Beliefs, and Experiential Avoidance

Natalie Whittaker Bork

June 2013

Supervised by:

Dr Peter Fisher & Dr Pierce O'Carroll

Submitted in Partial Fulfilment of the Degree of Doctorate in Clinical Psychology at the Division of Clinical Psychology, University of Liverpool

Acknowledgements

There are many people I would like to thank for their support and help in completing this project. Firstly, I would like to thank all the participants who gave up their time to take part in this study, as this work would clearly not have been possible without their time. Positive feedback and encouragement received from a number of participants was greatly received and helped to remind me of why I chose to be a psychologist. Particular thanks also go to the staff members who helped advertise the project to all the students across the university, which helped improve recruitment rates.

Secondly, I am also very grateful to all the people who provided advice, and support during this steep learning curve, and sometimes frustrating and painful process. Special thanks go to both of my supervisors, Dr. Peter Fisher and Dr. Pierce O'Carroll, for their incredibly swift and helpful feedback, and helping me through my confusion of this massive project. I would also like to thank the research department for providing extra teaching sessions to try to ease all of our anxieties regarding the new thesis format.

Finally, a very special, thank you goes to my family and friends for their kind words of encouragement when it became too much. They have given so much and asked for so little in return, it has been really appreciated! This has been especially true of my husband Daniel, who has lived through the rollercoaster journey over the past three years and definitely made the hard times easier. The support and encouragement he has provided, not only for this project, but also in planning our wedding, (whilst I have had my head in the books), has made it all seem possible. I could not have done it without you!

Contents

List of Tables

List of Figures

List of Appendices

Chapter 1: General Introduction

1.1 General Overview

The overarching aim of this thesis was to gain an increased understanding of the psychological processes related to generalised anxiety disorder (GAD) and how they contribute to the development and maintenance of the disorder. Changes in the diagnostic criteria of GAD over the years, have led to increased identification of specific psychological processes that may be responsible for the disorder, all of which offer a plausible explanation. However, limited empirical research exists exploring the relative merits, or have made direct comparisons of each. Therefore, this thesis attempts to answer the following questions: Which psychological factors contribute to the severity of worry? and do the identified psychological factors explain the development of GAD? Delineation of these psychological processes may hold the key to increased efficacy of treatments, as outcomes are currently poor, which lead to increased health care utilisation and high economic costs to the public health service. Improving treatments is clearly an important factor for GAD sufferers who often experience significant impairment in overall functioning and quality of life.

Chapter 2 presents an overview of the relevant literature, which provides a point of orientation for the research section that follows. This will initially offer a historical context, followed by an overview of GAD, the role of negative life events, and finally considers the implications for psychopharmacological and psychological treatments. The evolution of the development of psychological models of anxiety is outlined, which provided the foundation for the development of some of the current leading psychological models of GAD within this field. These have led to the identification of key processes that offer a clear hypothesis and explanation of the phenomena seen in worry and GAD; the most recent models included within this review are the Intolerance of Uncertainty (IU) model (Dugas, Gagnon, Ladouceur, & Freeston, 1998), the Metacognitive model (Wells, 1995, 1999), and finally the Acceptance-

Based model (Roemer, Salters, Raffa, & Orsillo, 2005). This leads into the final section of Chapter 2, which is a systematic review of the key processes to be explored within this thesis, the processes of interest are IU, negative metacognitive beliefs about worry, and finally experiential avoidance.

Chapter 3 leads into the empirical paper, which provides a detailed account of the research and the outcomes. This research attempted to address some of the gaps in the literature by being the first to explore all three of these constructs in one study. The aim of which was to understand more about what factors are related to the prediction of worry severity and GAD status in a non-clinical sample. Additionally, this study attempted to address some of the limitations of previous literature by using a prospective design, which allowed inferences on causality to be made. Students were recruited and completed the study via a web-based design, completing measures at two time points. The findings of this research are presented with an overall discussion of how this relates to previous research. These are discussed in the context of several limitations.

In the final chapter, the implications of the research are outlined, with reference to the theoretical and clinical relevance. In addition, methodological considerations are highlighted, including the relative strengths and limitations of the research. As the dissemination of research findings is an important process for any research, the next section is an article prepared for those participants who took. The final section relates to how future studies can continue to bridge the gaps within the literature, this is outlined in the form of a research proposal. Further empirical research is required within this field, specifically; replication of the current study within clinical samples would further and extend the findings presented in Chapter 3. The thesis then closes with an overall conclusion.

References

Dugas, M., J., Gagnon, F., Ladouceur, R., & Freeston, M., H. (1998). Generalized anxiety disorder: a preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*(2), 215-226.

Roemer, L., Salters, K., Raffa, S., & Orsillo, S. M. (2005). Fear and avoidance of internal experiences in GAD: Preliminary tests of a conceptual model. *Cognitive Therapy and Research, 29*(1), 71-88.

Wells, A. (1995). Meta-cognition and worry: A cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy, 23*(03), 301-320.

Wells, A. (1999). A cognitive model of generalized anxiety disorder. *Behavior Modification, 23*(4), 526-555.

Chapter 2: Literature Review

2.1 Introduction

Several psychological processes may be responsible for the development and maintenance of worry and GAD. Testing competing theories often offers new insights into which psychological processes are fundamental to the disorder and in turn can lead to improved treatment efficacy. This review begins with a discussion of the historical overview of the phenomenology of worry and taxonomic development of GAD, before discussing treatment implications. An outline of the leading cognitive models of GAD is then provided.

This review examines the evolution of models of GAD that fall under the rubric of Cognitive Behaviour Therapy (CBT). First, two generic models of anxiety are presented; Beck's Model of Anxiety (Beck, Emery, & Greenberg, 1985), and Barlow's model of Anxious Apprehension (Barlow, 2000). These generic models of anxiety led to the development of specific models of GAD. An early example of a specific model is the Cognitive Avoidance model (Borkovec, 1994; Borkovec, Alcaine, & Behar, 2004), which is described briefly as this provided the foundation to the development of the current leading psychological models of GAD.

A more detailed account of three recent models of GAD then follows with a brief summary of their general empirical support. These models include (1) the Intolerance of Uncertainty (IU) model (Dugas, Gagnon, Ladouceur, & Freeston, 1998) (2) the Metacognitive model (Wells, 1995, 1999b) and (3) the Acceptance-Based model (Roemer, Salters, Raffa, & Orsillo, 2005). These have been chosen as considerable empirical evaluation of each of these three models has been conducted using operationalised measures of the putative mechanisms. Therefore, the literature review concludes with a systematic review examining the central predictions made by the IU, Metacognitive, and the Acceptance-Based models,

specifically the association and relative merits of IU, negative metacognitive beliefs, and experiential avoidance.

2.2 Overview of Generalised Anxiety Disorder

GAD is a common disorder characterised by persistent worry, the key diagnostic feature for this disorder. '*Anxiety neurosis*' was used by Freud to refer to symptoms of what would now be diagnosed as GAD and panic disorder (Sigmund, Strachey, & Richards, 1976). In the original Diagnostic Statistical Manual (DSM) (APA, 1952) there was also no distinction made between GAD and panic disorder (Barlow & Wincze, 1998). GAD was eventually differentiated from panic disorder when outcome studies showed that imipramine was effective at treating panic but not generalised anxiety (Klein, 1964). GAD was then introduced as a unique diagnosis in DSM-III (APA, 1980). However, it remained a residual category and could be diagnosed only in the absence of other disorders (Barlow, Rapee, & Brown, 1992).

The duration criterion of one month increased the chances of GAD, rather than an adjustment disorder being diagnosed (Barlow & Wincze, 1998). Accordingly, GAD has undergone many diagnostic changes to improve the reliability and validity of the diagnosis, with the most significant change highlighting that GAD could coexist with other disorders. In addition, phenomenological accounts of worry helped to differentiate specific worries as in social anxiety, from multiple worries observed in GAD (Barlow, Blanchard, Vermilyea, Vermilyea, & DiNardo, 1986). Worry became the cardinal feature of GAD and was recognised as a disorder in its own right (Mennin, Fresco, & Heimberg, 2004).

In the DSM-IV (APA, 2000), GAD is defined by excessive worry perceived as difficult to control, occurring more days than not for 6 months, about a number of activities or events. Other associated symptoms required for a diagnosis include three of the

following; restlessness or feeling keyed up or on edge, fatigue, poor concentration, or mind going blank, irritability, muscle tension and sleep disturbance. The level of worry and associated symptoms must cause the individual clinically significant distress and/or functional impairment for a diagnosis to be made (APA, 2000).

2.2.1 Prevalence and Course

GAD has a chronic course, high rates of co-morbidity (Kessler, Chiu, Demler, Merikangas, & Walters, 2005) and significant levels of psychosocial impairment (Tyrer & Baldwin, 2006; Wittchen & Hoyer, 2001). Changing definitions of GAD have made it difficult to collect long-term data on the prevalence and course of the disorder. Nevertheless, GAD has an estimated 12-month prevalence rate of 3.1% and a lifetime prevalence rate of 5.7% (Kessler et al., 2005). Higher rates of GAD have been found in primary care settings (7.9% to 14.8%) (Barrett, Barrett, Oxman, & Gerber, 1988; Maier et al., 2000; Olfson et al., 2000; Roy-Byrne, 1996) making GAD the second most frequent mental health disorder after depression (Wittchen & Hoyer, 2001). It is twice as prevalent in women, in lower socioeconomic groups, unmarried people, and ethnic minority groups (Kessler, Walters, & Wittchen H, 2004). However, these factors do not appear to predict the course of GAD (Yonkers, Dyck, Warshaw, & Keller, 2000).

The average age of onset is in the late teens to late 20s (Rogers et al., 1999; Yonkers, Warshaw, Massion, & Keller, 1996), and the average length of disorder is 20 years (Yonkers et al., 1996). Other anxiety disorders are often established by the age of 20 (Wittchen & Hoyer, 2001), but prevalence rates for GAD are often lower in younger people and increases sequentially with age (Carter, Wittchen, Pfister, & Kessler, 2001; Kessler et al., 2004). The disorder has a waxing and waning course, and most people with GAD do not recover spontaneously (Wittchen, Zhao, Kessler,

& Eaton, 1994), thereby causing significant impairments in their quality of life (Henning, Turk, Mennin, Fresco, & Heimberg, 2007) and economic costs due to increased health care utilisation (Bereza, Machado, & Einarson, 2009).

2.2.2 Comorbidity

GAD is frequently comorbid with other disorders (Rodriguez, Bruce, Pagano, & Keller, 2005; Yonkers et al., 2000), with individuals often also presenting with panic disorder, social phobia, and major depression (Yonkers et al., 1996). GAD is also frequently observed as a comorbid disorder in individuals with personality disorder with estimates up to 49% (Sanderson, Wetzler, Beck, & Betz, 1994). High levels of co-morbidity may lead to under recognition and diagnosis of GAD, leading to inappropriate treatment being provided, especially when GAD is comorbid with depression (Barlow & Wincze, 1998; Wittchen, Carter, Pfister, Montgomery, & Kessler, 2000).

2.2.3 Phenomenology of Worry

'Worry is a chain of thoughts and images, negatively affect-laden and relatively uncontrollable. The worry process represents an attempt to engage in mental problem solving on an issue whose outcome is uncertain but contains the possibility of one or more negative outcomes. Consequently, worry relates closely to the fear process' (Borkovec, Robinson, Pruzinsky, & DePree, 1983, pp. 10). Individuals with GAD report worry is a distressing experience, they find difficult to control. The typical worrier with GAD, worries that something bad could happen at any time and this is usually expressed in terms of '*what if...*' statements, with worry spiralling from one worry to the next (Borkovec et al., 1983).

Worry is ubiquitous for humans, as we are able to create mental representations of the past, and anticipate a future event, which helps to plan and problem-solve. This can often cause anxiety even in the absence of threat. The content of worry topics in GAD is the same as in non-anxious worriers; though the frequency of worry is much higher in GAD, with more worry topics, and less realistic and less controllable worries (Rapee, 1991; Roemer, Molina, & Borkovec, 1997; Vasey & Borkovec, 1992). Borkovec and Inz (1990) reported that worry involved primarily verbal linguistic activity rather than imagery, and observed GAD sufferer's as reporting more worrying thoughts and fewer images in comparison to a control group, who reported a greater percentage of imagery. They hypothesised that worrying may serve to avoid distressing imagery (Borkovec & Inz, 1990), which was later supported by further research (Freeston & Dugas, 1996).

2.2.4 Life Events

Frequently, individuals describe the onset of problematic anxiety in the context of difficult and often stressful life events. Although minimal research is available, increased frequency of life events experienced has been found to be positively correlated with an increased risk of developing GAD (Blazer, Hughes, & George, 1987). Recent research exploring the risk of relapse in individuals with GAD, implicated the frequency of stressful life events in the previous four-week period to increased risk, which is thought to be due to stressful life events increasing the experience of severe worry to help the individuals cope, as the 'unlikely' event has occurred (Francis, Moitra, Dyck, & Keller, 2012). Additionally, research has shown the development of depression to be experienced when the individual has experienced loss, and severe danger with the onset of anxiety, with those experiencing both loss and severe danger more likely to report comorbid anxiety and depression (Finlay-Jones & Brown, 1981). Daily hassles have also been

related to the onset of GAD, linked by attentional and appraisal processes, e.g. anxious individuals pay attention to threat-relevant information and interpret events as threatening (Russell & Davey, 1993).

2.2.5 Treatments for Generalised Anxiety Disorder

A stepped care approach is advocated for the treatment of GAD (NICE, 2011). Initial steps include education, self-help, active monitoring, and for those with increasing levels of functional impairment, psychological intervention, usually CBT or applied relaxation (AR), and/or drug therapy, usually a selective serotonin reuptake inhibitor (SSRI). Combination treatments are recommended for those with complex presentations or at high risk of self-harm. SSRI are efficacious as an acute treatment (Baldwin, Woods, Lawson, & Taylor, 2011; Baldwin & Polkinghorn, 2005), and have been shown to help prevent relapse (Rocco Donovan, Glue, Kolluri, & Emir, 2010). A recent meta-analysis supported the use of SSRI, specifically fluoxetine, as a first-line treatment for its response and remission benefits and sertraline for its tolerability (Baldwin et al., 2011). However, the reality in clinical practice is that only 50% of individuals report being symptom free (Buoli, Caldiroli, Caletti, Paoli, & Altamura, 2013). The use of antipsychotic medication may be beneficial (Lalonde & Van Lieshout, 2011), along with polypharmacy, but both options remain controversial (Buoli et al., 2013; Lalonde & Van Lieshout, 2011). Accurate diagnosis is essential for effective treatment by medication, but GAD continues to be misdiagnosed due to high rates of comorbidity (Cassano, Rossi, & Pini, 2002).

Studies exploring the efficacy of psychological treatments have highlighted the benefits of CBT, AR and additionally cognitive therapy (CT), in the treatment of individuals with GAD (Borkovec & Ruscio, 2001; Gale & Oakley-Browne, 2000).

However, these benefits appear to depend on early intervention and the age of the individuals, with younger adults responding more favourably (Covin, Ouimet, Seeds, & Dozois, 2008). Like psychopharmacological treatments, approximately only 50% of individuals achieve recovery following psychological treatment (Fisher & Durham, 1999). However, in a more recent review of psychological treatments of GAD, exploring two recent treatment innovations based on Metacognitive and IU models of GAD, along with CT, CBT, and AR, have reported benefits of metacognitive therapy. Metacognitive therapy displayed superior recovery rates of 80%, in comparison to other psychological treatment, with IU therapy obtaining similar recovery rates to CBT (50%), AR and CT obtained the lowest recovery rates (34-36%) (Fisher, 2006), thus highlighting potentially promising results for GAD sufferers.

2.3 Psychological Models of Generalised Anxiety Disorder

Two generic psychological theories of anxiety that have influenced the theory and treatment of GAD are described below:

Generic Models

2.3.1 Beck's Generic Cognitive Model of Anxiety

The cognitive Model of Anxiety hypothesises that an individual's emotional reactions are primarily influenced by their perceptions of events, and emphasise how an event is appraised being an important factor and not the event itself. There are three central components of Becks Cognitive Model of Anxiety; schemas, negative automatic thoughts (NATs), and cognitive biases. A schema or core belief is thought to be a set of rules, beliefs, or assumptions that the individual holds about themselves, the world, and the future. In anxiety, the stored information reflects a

perceived vulnerability and, once these schemas have been activated, individuals are more likely to interpret situations as threatening and experience NATs such as '*the world is a dangerous place'*. NATs are perceived as facts or statements of truth (Beck, 1976).

The model highlights that individuals will selectively pay attention to information due to cognitive biases or thinking errors that may indicate that they are in imminent danger, while disregarding information that suggests they are safe. Individuals may over-generalise and become preoccupied by their feelings. Within the cognitive model, the key to understanding anxiety is to understand the individual's frame of reference and their cognitive distortions (Beck et al., 1985).

2.3.2 Barlow's Model of Anxious Apprehension

Barlow's (2000) generic model of anxiety, suggests three vulnerability factors that increase the risk of the development of anxiety disorders; these include biological, environmental, and psychological factors. In this model, GAD is conceptualised as Anxious Apprehension and constitutes the 'basic' anxiety disorder. Similar to Beck, Barlow reports anxiety disorders to manifest themselves, due to perceived deficiencies in the individual's ability to cope with unpredictable, uncontrollable, negative events. Anxiety is triggered by cues, which may not be within the individual's conscious awareness, (*e.g. an internal somatic cue*) and their attention may become focused on sources of threat or danger, leading to distortions in information processing. The consequences of these lead to avoidance of cues and negative affect that lead to apprehension of anxiety (Barlow, 2000).

When these specific vulnerabilities are triggered, the individual is likely to experience negative affect characterised by a sense of uncontrollability,

physiological response, and activation of specific brain circuits (*e.g., the behavioural inhibition system*). Consequently, the individual become self-focused on their physiological arousal and hyper-vigilant for threat, which produces attempts to cope with the experienced anxiety. The predominant coping strategies proposed in this model are behavioural avoidance and worry in an attempt to problem-solve and reduce negative affect (Barlow, 2000).

Specific Models of GAD

Following these generic models of anxiety, the early 1990's saw the development of specific psychological models of GAD. One of the earliest models was the Cognitive Avoidance model (Borkovec, 1994; Borkovec et al., 2004) which drew upon, the Two-Stage Theory of Fear (Mowrer, 1947), and the Emotional Processing of Fear theories (Foa & Kozak, 1986). The model is also underpinned by the basic principles of the generic models, but additionally posits '*classically conditioned acquisition of fear is followed by operantly conditioned avoidance of fear cues, resulting in fear maintenance due to lack of unreinforced exposure to those conditioned stimuli'* (Borkovec et al., 2004, pp. 78).

The model therefore highlights that the actual threat is imagined (*e.g. thoughts and images about what the future has in store for them*), with escape from these imagined threats not being physically possible, therefore worry enables the individual to try to avoid the perceived catastrophic events from occurring (Borkovec, 1994). Avoidance of mental imagery, somatic and emotional experiences work in the short-term to alleviate distress, but prevents the emotional processing of fear required for the successful habituation and extinction of fears, thus maintaining anxiety and worry (Foa & Kozak, 1986).

There was early empirical support for the Cognitive Avoidance model, but now more recent conceptualisations of GAD exist. The advent of recent specific psychological models provided a clear outline of conceptual accounts of the psychological mechanism to explain worry and GAD. Recent models include IU, Metacognitive, and Acceptance-based models, which have developed operationalised measures of the specific mechanisms. These three models are described with a brief description of the empirical support in the following section.

2.3.3 The Intolerance of Uncertainty Model

The IU model is a schema-based model (Dugas et al., 1998) with four main components: IU, positive beliefs about worry, negative problem orientation and cognitive avoidance. However, IU is thought to be a fundamental construct to the development and maintenance of worry and GAD (Dugas et al., 1998; Dugas, Buhr, & Ladouceur, 2004; Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994). Individuals with GAD are thought to experience high levels of IU, and find uncertain or ambiguous situations overwhelming and distressing, and thus experience persistent worry (Dugas et al., 1998).

The content of cognitions in individuals, who are unable to tolerate uncertain situations, is reflected by catastrophic thoughts and the perceived inability to cope. Uncertain situations may trigger a felt sense, and this '*feeling*' may confirm beliefs about the certainty of worry, (i.*e. 'I just always feel worried even though I know nothing is going to happen, I am just a worrier and always have been'*). Therefore, IU is viewed as a personality trait derived from core beliefs and schemas, that future uncertain and unpredictable events are unacceptable, which results in the individuals being more likely to react negatively on an emotional, cognitive, and behavioural level to uncertain situations and events. Worriers tend to find it hard to

live with remaining doubts; efforts to remove them are reflected in assumptions and principles that, overall, increase hypervigilance and rigidity *(i.e. 'if I keep a look-out I will be prepared')* (Dugas, Buhr, et al., 2004). The model and its components are presented in Figure 1.

This text box is where the unabridged thesis included the following third party copyrighted material:

Dugas, M., J., Gagnon, F., Ladouceur, R., & Freeston, M., H. (1998). Generalized anxiety disorder: a preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*(2), 215-226.

Figure 1: Intolerance of Uncertainty Model of GAD (Dugas et al., 1998)

The IU model includes positive beliefs about worry, which are beliefs that worrying will enable coping and prevent the occurrence of unwanted events (Borkovec & Roemer, 1995; Davey, Tallis, & Capuzzo, 1996; Dugas et al., 1998; Freeston et al., 1994). Worrying is also coupled with negative problem orientation, where problems are perceived as threats (Dugas, Buhr, et al., 2004). Individuals are thought to lack the confidence to solve problems and therefore do not attempt to implement problem solving approached/strategies. Research has shown that individuals with GAD do not have problem-solving deficits, but rather they have negative problem orientation (Dugas & Letarte, 1995; Dugas, Buhr, et al., 2004). For example, research has shown that individuals are often unable to solve relatively simple

problems, even once a solution has been identified, as they would not implement the solution for fear of not achieving the desired outcome, which results from seeking the 'perfect solution' that inevitably does not exist (Dugas, Buhr, et al., 2004).

Additionally, the final construct of the IU models is a coping strategy that is the consequence of IU, is known as cognitive avoidance. Cognitive avoidance highlights that distressing thoughts and images are avoided by using strategies such as thought suppression, distraction and behavioural avoidance (Dugas, Buhr, et al., 2004). These strategies maintain distress as avoidance of uncertainty is not possible. Overall, clinically the research highlights that individuals with GAD often report a preference for a negative outcome rather than an uncertain one (Dugas, Buhr et al., 2004).

2.3.3.1 Empirical Support for the Intolerance of Uncertainty Model

Non-clinical and clinical studies have provided empirical support for the IU model. Empirically, studies have found that high levels of IU are positively correlated with severity of worry (Buhr & Dugas, 2006) and is higher in individuals with GAD when compared to a control group (Dugas et al., 1998). In a series of experimental studies, manipulations of IU using gambling tasks, led to higher levels of worry (Ladouceur, Gosselin, & Dugas, 2000). However, IU has been shown to be activated only by worrisome thoughts or situations (de Bruin, Rassin, & Muris, 2006), thus providing support for it being a schema model, which is activated only by NATs.

Research into the four components of this model has highlighted their importance in the ability to distinguish GAD sufferers from healthy controls. However, Dugas et al

(2007), found IU and negative problem orientation to be the specific process predictive of GAD. In addition, specificity of IU construct has been demonstrated in a number of studies that have supported IU to be closely related with GAD in comparison to any other anxiety disorder (Dugas, Gosselin, & Landouceur, 2001; Dugas, Schwartz, & Francis, 2004), with two studies in particular reporting IU to be the main construct to distinguish GAD sufferers (Dugas, Marchand, & Ladouceur, 2005b; Ladouceur et al., 1999).

Cognitive psychology paradigms have been used to examine whether people with high levels of IU demonstrate information-processing biases. In a series of interlinked studies, IU was related to the biased recall of words denoting uncertainty and participants scoring highly on IU, who were also more likely to report ambiguous information as more threatening (Dugas, Hedayati, et al., 2005). Furthermore, studies have also found individuals with high IU to report ambiguous situations more disconcerting relative to those with low IU (Koerner & Dugas, 2008; Ladouceur, Talbot, & Dugas, 1997). Although this model has a vast amount of empirical support, specific limitations includes the lack of prospective studies, which means inferences on causality are not able to be made, and further prospective studies are required.

2.3.4 The Metacognitive Model

The ability to reflect on and evaluate our knowledge and cognition about cognitive phenomena or '*thinking about thinking*' is termed metacognitions (Flavell, 1979). However, metacognitive beliefs and processes were associated with the development and maintenance of psychological disorders until the introduction of the Self-regulatory Executive Function model (S-REF) (Wells, 2000; Wells & Matthews, 1994, 1996; Wells & Morrison, 1994; Wells & Papageorgiou, 1995).

Metacognitions refers to a range of interrelated concepts that can be separated into knowledge, experiences and strategies (Wells, 2000). Metacognitive knowledge refers to specific theories or beliefs that people hold about their thinking, (*e.g., my thoughts are harmful*). Metacognitive experiences refer to the situational interpretations that individuals have regarding their own mental process (*e.g. worry about worry*). Finally, metacognitive strategies are attempts to control and/or change thinking processes. It is the amalgamation of these interrelated concepts that is thought to lead to unhelpful thinking styles that add to psychological distress, as the strategies that individuals adopt, are largely ineffective and serve to maintain and enhance their distress (Wells, 2009).

Within this model, psychological disturbance is thought to be maintained by a particular style called the Cognitive Attentional Syndrome (CAS). This consists of worry and rumination and is linked to metacognitive beliefs about the uncontrollability and danger of thoughts. CAS may lead to psychological disorder as individuals may select inappropriate coping strategies to cope with their distressing thoughts or thinking (*e.g. thought suppression, cognitive avoidance, and depressive rumination*), all of which fail to reduce anxiety or threat (Wells, 2009). The Metacognitive model of GAD is outlined in Figure 2.

This text box is where the unabridged thesis included the following third party copyrighted material:

Wells, A. (1995). Meta-cognition and worry: A cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy, 23*(03), 301-320.

Wells, A. (1999a). A cognitive model of generalized anxiety disorder. *Behavior Modification, 23*(4), 526-555.

Figure 2: The Metacognitive Model of GAD, reproduced from (Wells, 1995, 1999a).

Within this model, there are thought to be two types of worry; type 1 and type 2. Type 1 worry, also known as a positive beliefs about worry, concerns external events and non-cognitive internal events that occur following an anxiety-provoking intrusive thought, this can be an image or a verbal '*what if....*' worry. This refers to the typical worry that most people experience (Wells, 1999a). However, type 1 worry can become the basis of negative appraisals in individuals with GAD. If the problem that activated type 1 worry is not resolved, type 2 worry is activated. Type 2 worry is focused on the activity of worry itself, i.e. '*Worry about worry'*. The appraisals about the activity of worry are linked to negative metacognitive beliefs about the perceived uncontrollability and danger of worry (*i.e. 'worrying will make me go crazy'*) (Wells, 1999a). Consequently, individuals attempt to control or

suppress the activity of worry, which invariably fails thereby reinforcing the belief that worry is an uncontrollable process.

2.3.4.1 Empirical Support for the Metacognitive Model

Numerous studies using both non-clinical and clinical samples support the central components of the Metacognitive model of GAD. The model specifies that negative metacognitive beliefs about the uncontrollability and the danger of worry are the proximal cause of worry and GAD (Wells, 1995). Several lines of evidence support this contention. Ruscio and Borckovec (2004) found negative beliefs about the uncontrollability and the danger of worry differentiated GAD patients from people with high levels of worry (Ruscio & Borkovec, 2004). Additionally, Wells and Carter (1999) demonstrated negative metacognitive beliefs about worry to be the strongest predictor of worry in comparison to positive beliefs about worry, specifically negative metacognitive beliefs have been able to distinguish GAD from other anxiety disorders (Wells & Carter, 2001). Similar findings have been reported by several other studies (Cartwright-Hatton & Wells, 1997; Davis & Valentiner, 2000; Wells, 2005).

Limitations of the Metacognitive model have focused on the circularity of the relationship between negative metacognitive beliefs and the principal diagnostic feature of GAD, namely that worry is uncontrollable. This limitation has specifically focused on measures of negative metacognitive beliefs (metacognitions questionnaire; MCQ (Cartwright-Hatton & Wells, 1997; Wells & Cartwright-Hatton, 2004), (Behar, DiMarco, Hekler, Mohlman, & Staples, 2009), and measures of metaworry (Anxious Thoughts Inventory; AnTI (Wells, 1994; 2005) that focus predominantly on the sense of uncontrollability associated with thinking. This is the main feature of the diagnosis of GAD, thus not highlighting anything unique, with

only one study to date exploring the danger of worry in isolation to uncontrollability (Ruscio & Borkovec, 2004). This potentially highlights a limitation of the findings of previous research. Wells has attempted to address some of these issues with the development of the Metaworry Questionnaire (MWQ), which has removed the uncontrollability aspect of the metaworry construct to enable the construct of danger to be assessed in isolation. Using a cross-sectional evaluation in a non-clinical sample, the MWQ was able to distinguish GAD groups from non-GAD groups, which was specifically related to the frequency of danger beliefs (Wells, 2005).

Finally, most studies providing support for the model have been cross-sectional and used non-clinical samples, which limits inferences of causality. However, one prospective study has been conducted exploring the prospective role of negative metacognitive beliefs in predicting anxiety and depression (Yilmaz et al (2011). After controlling for the impact of life events, negative metacognitive beliefs, predicted residual change in both anxiety and depression (Yilmaz, Gençöz, & Wells, 2011). Specific prospective studies examining the Metacognitive model of worry and GAD are required to understand this further.

2.3.5 The Acceptance-Based Model

The Acceptance-Based model of mental distress stipulates the activation of a rigid, inflexible response to inner aversive experiences, termed experiential avoidance, to be a key component in maintaining anxiety disorders. The model stems from Hayes' model of experiential avoidance (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996) and Borkovec's Cognitive Avoidance model (Borkovec, 1994; Borkovec et al., 2004). The focus of this model is not on what is wrong with what people think, but on the aversive states that accompany thoughts (Hayes, Strosahl, & Wilson, 1999). Friman and Colleagues (1998) offered an example of this concept and suggested

that when someone has agoraphobia they are not avoiding open spaces as such, but the thoughts, images and body sensations that have become associated with the panic that may be experienced when in that situation (Friman, Hayes, & Wilson, 1998). People avoid the negative experiences that become associated with the fear experience, therefore it is the '*fear of the fear*' as described in an early paper (Chambless & Gracely, 1989) or a fear of negative affect (Eifert & Forsyth, 2005) that is thought to drive worry and GAD.

With experiential avoidance, a person is unwilling to experience certain private experiences (*e.g. body sensations, emotions, thoughts, memories, behavioural predispositions)* and finds strategies to either avoid or reduce the frequency of these experiences (Hayes et al., 1996). Increased worry is caused by failed attempts to control or avoid unpleasant experiences through the ineffective strategy of experiential avoidance and as a result, behaviours that the individual engages in are narrowed for fear of engaging with the avoided experiences (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Individuals start to '*live in their heads*' reducing their flexibility for engaging in unpleasant experiences by engaging in experiential avoidance. Thus, this impacts on the individual's quality of life as their long-terms hopes, desires and goals (*e.g. values*) become less of a priority as feeling good becomes more of a priority and they lose contact with what was previously important in their lives (Hayes et al., 2006).

The Acceptance-Based model has been used to explain the development and maintenance of GAD (Roemer et al., 2005). Roemer et al., 2005, suggest that GAD may be maintained by the individual's attempts to avoid internal experiences. Moreover, those individuals develop positive beliefs about the usefulness of experiential avoidance as a coping strategy. Individuals are more likely to worry about less distressing events, serving a function of avoiding experiences that are

more distressing (Roemer et al., 2005). The main focus of this model is the lack of tolerance or non-acceptance of anxiety (Hayes et al., 1996). Although the authors have not developed a diagrammatic version of the model, Behar and colleagues depicted a model in their review (Behar et al., 2009), which has been adapted for this literature review, demonstrated in Figure 3.

This text box is where the unabridged thesis included the following third party copyrighted material:

Roemer, L., Salters, K., Raffa, S., & Orsillo, S. M. (2005). Fear and avoidance of internal experiences in GAD: Preliminary tests of a conceptual model. *Cognitive Therapy and Research, 29*(1), 71-88.

Diagram is from:

Behar, E., DiMarco, I. D., Hekler, E. B., Mohlman, J., & Staples, A. M. (2009). Current theoretical models of generalized anxiety disorder (GAD): Conceptual review and treatment implications. *Journal of Anxiety Disorders, 23*(8), 1011-1023.

Figure 3: An Acceptance-Based Model of GAD (Roemer et al., 2005) depicted by Behar et al (2009).

2.3.5.1 Empirical Support for the Acceptance-Based Model

Although in its infancy, recent studies have tested the central construct of experiential avoidance, as it has been considered a risk factor in the development of mental distress. Specifically, it has been found to mediate the effects of passive coping on both increased anxiety and depression, but more generally demonstrating a reduction in emotional and psychological well-being (Fledderus, Bohimeijer, &

Pieterse, 2010). Experiential avoidance is thought to be a common experience in those experiencing mental distress, but some report it is not specific to GAD (Buhr & Dugas, 2012). In support of this idea, Hayes and colleagues report experiential avoidance to be a general psychological vulnerability, a common construct underlying many disorders (Hayes et al., 1996).

However, several studies indicate experiential avoidance is involved in the development and maintenance of GAD. First, a direct relationship in the role of experiential avoidance and a fear of emotions has been observed in worry in a non-clinical sample and GAD severity in a clinical sample, suggesting those with high levels of worry and those with GAD share a common experience of experiential avoidance. Although the authors also suggested experiential avoidance may not be unique to GAD and may be present in other anxiety disorders (Roemer et al., 2005).

Also in support of an Acceptance-Based model of GAD, Lee et al (2010) used a clinical sample to explore the role of experiential avoidance and IU, compared to a control group. Findings suggest that those with GAD report significantly higher levels of experiential avoidance and distress about their emotions. Experiential avoidance was found to share a unique variance in IU, thus suggesting, situations that elicit uncertainty may lead to individuals avoiding internal experiences, which leads to increased experiential avoidance. This study provides additional support for the role of fear of emotions, specifically experiential avoidance in understanding worry and GAD in a clinical sample (Lee, Orsillo, Roemer, & Allen, 2010). In addition, individuals experiencing GAD have been found to live a life with significantly less valued actions and an overall diminished quality of life, which is thought to be the result of experiential avoidance from individuals seeking to avoid their internal experiences (Michelson, Lee, Orsillo, & Roemer, 2011).

As this model is still in its developmental phase, most of the research has been focused on this construct being a general vulnerability for psychopathology and not specific to GAD. There are methodological limitations of the current studies; small clinical samples, cross-sectional designs (Roemer et al., 2005) and heterogeneous clinical samples (Lee et al., 2010). In addition, there has also been no longitudinal research looking at causality, therefore further studies with more rigorous methodology are required to understand the role of experiential avoidance in the development and maintenance of worry and GAD.

2.4 Summary

The literature thus far has highlighted the complexities associated with persistent worry and GAD, with several theories offering different conceptualisations. Early generic models offered the foundation to the three specific models described, but offered little in the way of describing the specific components responsible for the persistence of worry associated with GAD. The specific models reviewed have some overlap, but also propose distinct mechanisms underlying worry and GAD.

Common to the three specific models, is the identification of avoidance as a coping strategy. For example, the IU model suggests worry is a strategy to avoid uncertainty whereas, the Metacognitive model, avoidance is used as a strategy to avoid worrying about worry due to the perceived danger, and finally, the Acceptance-Based model highlights experiential avoidance to avoid internal experiences. For each of these models, worry is highlighted as serving a function of a maladaptive coping strategy, which is largely ineffective and only prevents appropriate emotional processing, which leads to further distress and increased negative affect. Each of the models highlights worry about the future, with the generation of possible scenarios for every eventuality, and solutions generally in the

form of problem-solving, and in addition highlighting the role of positive beliefs about worry, thus increasing the frequency of utilising worry as a strategy due to its perceived usefulness.

The main differences offered by each model are evident when each of the three models are grouped to into two distinct categories, such as cognitive models, which include the IU and Metacognitive models, and emotional and behavioural models, which include the Acceptance-Based model. Cognitive models hold the view that specific cognitive processes maintain the persistence of worry. For example, the IU model focuses specifically on intolerance to uncertain or ambiguous events, which leads to cognitive bias and interpreting uncertain situations as problematic, with a specific focus on the dangerousness of uncertain or ambiguous situations, whereas the Metacognitive model highlights the function of conflicting positive and negative metacognitive beliefs that cause difficulties in the regulation of worry. Although one of these models is schema focused and the other is metacognitive, the main focal point of treatment for both is on a primary cognition, so the, IU model would focus on increasing tolerance to uncertain or ambiguous situations, whereas in the Metacognitive model, the primary focus would be on reducing negative metacognitive beliefs.

In contrast, the emotional and behavioural models, such as the Acceptance-Based model, have a specific focus on emotions and not cognitions, with an emphasis on how emotions trigger avoidance of internal experiences. The focus of treatment is an increased tolerance of private experiences associated with emotions, thus increasing psychological flexibility, leading to a reduction of GAD symptoms and an increase in value-based behaviours.

Although support for the models has been highlighted within this review, the remainder of this chapter presents a systematic search of the literature to uncover the empirical evidence related to the three key components that are to be explored within this research in Chapter 3. The outcome of this systematic search should lead to a clearer understanding of the role of IU, negative metacognitive beliefs, and experiential avoidance in terms of their associations with or prediction of worry and GAD.

2.5 Systematic Literature Review

This systematic review will search for studies that have researched the associations and predictive value of psychological processes associated with worry and GAD, specifically related to IU, negative metacognitive beliefs, and experiential avoidance. One specific question provides a framework for the review:

1) 'How are IU, *negative metacognitive beliefs, and experiential avoidance associated with or make predictions of worry and GAD in clinical and non-clinical adult populations?*'

The main objective of this review is to identify all relevant studies related to the research question above. The inclusion criteria, search strategy, data extraction, and results are outlined below.

2.6 Method

2.6.1 Procedure and Inclusion Criteria

Studies were identified by searching four databases, DISCOVER, PsychInfo, Psycharticles, and Medline, from 1995-2013. Key words used were '*intolerance of uncertainty', 'negative metacog**, and '*experiential avoidance'*, to ensure mainly

relevant articles were identified, key words were specifically paired with '*worry'* AND '*generalised anxiety disorder*'. To be included, studies needed to meet the following inclusion criteria:

1) 18-65 years of age.

2) Cross-sectional, prospective and between-groups designs. This review aimed to explore studies that have looked at the three components of interest; this was so they could inform the design and focus of the empirical study set out in chapter 3.

3) There is a broad literature on experimental studies looking at processes related to IU, negative metacognitive beliefs and experiential avoidance (e.g. Hirsch & Mathews, 2012), much of which is lab-based reaction time studies. Their findings inform the theoretical models underpinnings of IU, negative metacognitive beliefs and experiential avoidance. However, as the current review is primarily aimed at informing a correlational and prospective design, this body of experimental research is not to be reviewed in this review.

4) English language.

5) Include at least one of the following: a measure of IU (Intolerance of Uncertainty scale; IUS) (Buhr & Dugas, 2002), negative metacognitive beliefs (Metacognitive Questionnaire; MCQ or MCQ-30) (Cartwright-Hatton & Wells, 1997; Wells & Cartwright-Hatton, 2004), or experiential avoidance (Acceptance and Action Questionnaire; AAQ or AAQ-II) (Bond et al., 2011; Hayes et al., 2004).

6) Include either a sample of GAD participants and/or have a measurement of worry, (Penn State Worry Questionnaire; PSWQ) (Meyer, Miller, Metzger, & Borkovec, 1990) or measures of GAD (Worry & Anxiety Questionnaire; WAQ) (Dugas, Freeston, et al., 2001a, 2001b) (Generalised Anxiety Disorder

Questionnaire; GAD-Q or GAD-Q-IV) (Newman et al., 2002; Roemer, Borkovec, Posa, & Borkovec, 1995).

2.7 Results

Figure 4 shows 362 articles were initially identified from the searches once duplicates were removed. A visual inspection of titles resulted in 317 articles being excluded, as they did not meet the inclusion criteria, (e.g. n=22 not in English Language, n=193 not relevant, n=38 studies on children and adolescents or older adults, n=52 papers on treatments, n=12 review articles). This narrowed the search to 45 articles; the abstracts of these articles were explored further.

On exploration of the abstracts a further 17 articles were removed (n=9 not relevant, n=8 experimental design), leaving 28 articles for review. The remaining 28 articles were obtained and the reference list searched for further relevant articles. This process yielded a further six articles, with a total of 34 articles. All 34 articles were read to ensure their relevance to the literature research question. A further nine articles were removed (n=9 not relevant). Therefore, 26 articles were related to the research question, and were included in this review.
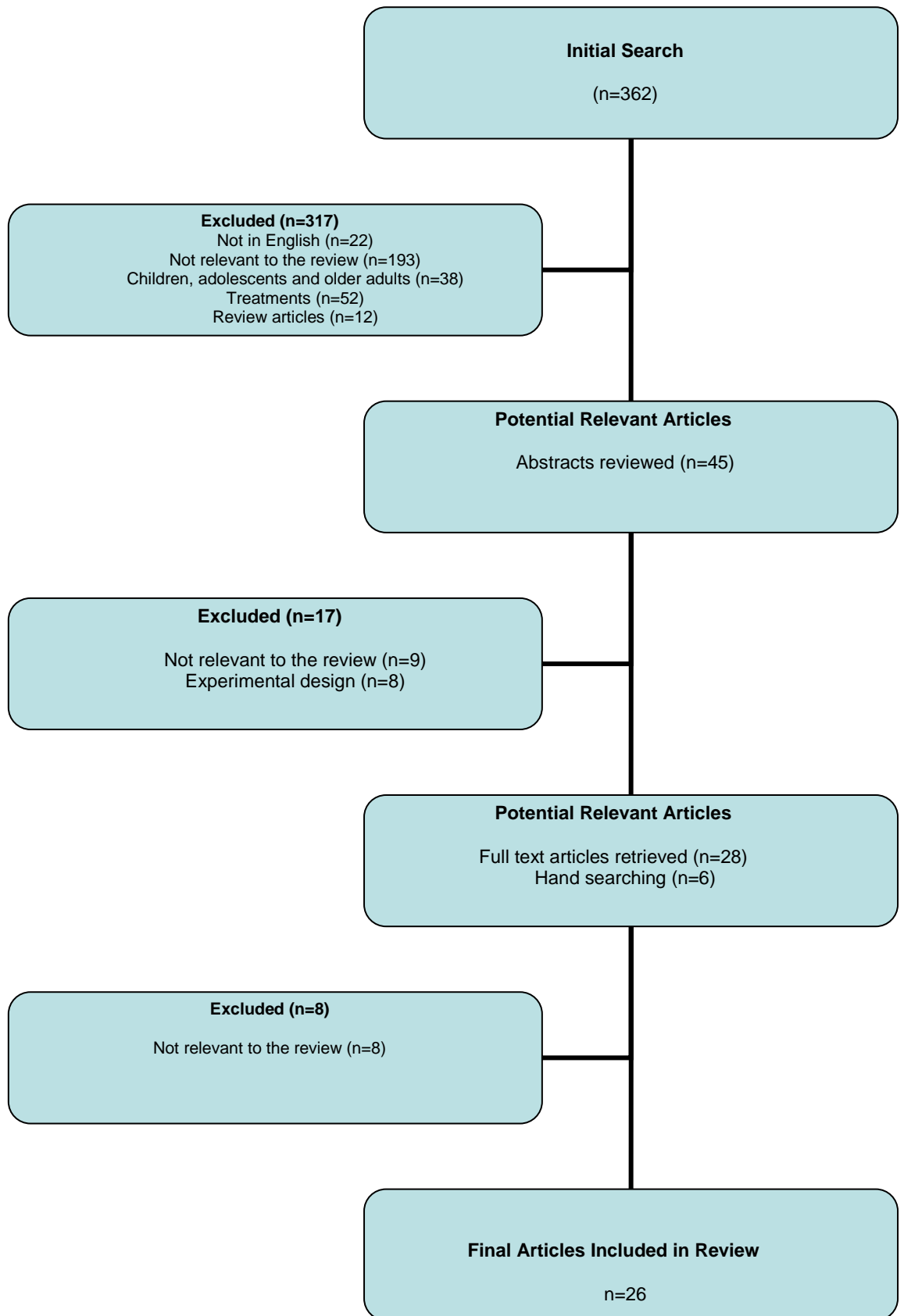
Figure 4: Flow Chart of Selection Process

2.7.1 Summary of Studies

All the studies were reviewed and the following data was extracted: number of participants, sample type (clinical, non-clinical), design (cross-sectional, prospective, & between-groups), which of the three key explanatory constructs were assessed (measure used), any additional variables used in study, methods for assessing worry and/or GAD or clinical diagnosis, and finally a summary of the relevant key findings. This process is summarised in Table 1.

Table 1: Summary of Study Characteristics for Non-clinical and Clinical Studies with Key Findings.

Study	Design	N	Model Variables	Other Variables	Measure of Worry	Measure of GAD	Diagnosis	Key Findings
Non-clinical studies								
Buhr & Dugas, 2006	Cross-Sectional	197	**IUS**	Sense of Control, Perfectionism, Intolerance of Ambiguity	**PSWQ**		N/A	IU was a stronger predictor of worry above other measures.
de Bruin, Rassin, & Muris, 2007	Cross-Sectional	105	**IUS**	Anxious Thoughts, & Neuroticism	**PSWQ**		N/A	IU and metaworry beliefs made unique and independent contributions to the prediction of worry, but neuroticism was the strongest predictor of worry. IU and metaworry partial mediated neuroticism and worry.
Dugas, Freeston, & Ladouceur, 1997	Cross-Sectional	285	**IUS**	Social Problem Solving	**PSWQ**		N/A	IU and negative problem orientation predicted worry.
Dugas, Gosselin, et al., 2001	Cross-Sectional	347	**IUS**	Responsibility, Anxiety Sensitivity, & Body Sensations	**PSWQ**		N/A	IU significantly predicted worry over symptoms of OCD and panic.
Dugas, Schwartz, et al., 2004	Cross-Sectional	240	**IUS**	Dysfunctional Attitudes	**PSWQ**		N/A	Worry predicted IU (but not significantly) over symptoms of depression. IU significantly predicted worry over dysfunctional attitudes.

Fergus & Wu, 2010	Cross-Sectional	414	**IUS**	Negative Problem Orientation, Responsibly and Threat Estimation, Perfectionism, & Importance and Control of Thoughts	**PSWQ**		N/A	IU significantly predicted both OCD and GAD, but was more related to OCD.
Chen & Hong, 2010	Prospective	130	**IUS**	Daily Hassles	**PSWQ**		N/A	IU moderated the relationship between daily hassles and anxiety symptoms over a month but not worry.
Holaway, Heimberg, & Coles, 2006	Between-Groups	560	**IUS**		**PSWQ**	**GAD-Q-IV**	N/A	IU predicted worry, GAD and OCD symptoms, no differences were found between GAD or OCD.
Khawaja & McMahon, 2011	Between-Groups	253	**IUS**	Anxious Thoughts	**PSWQ**	**WAQ**	N/A	Metaworry was related to GAD, OCD social phobia and depression. IU was not related to depressive symptoms. Metaworry was the strongest predictor of worry, GAD and OCD, IU was strongest predictor of social phobia.
Davis & Valentiner, 2000	Cross-Sectional	175	**MCQ** (MCQ-Negative Beliefs)	Positive Beliefs, Cognitive Confidence, Superstitions/ Punishment/Responsibility & Cognitive Self-consciousness.	**PSWQ**	**GAD-Q**	N/A	Negative metacognitive beliefs distinguished GAD cases from non GAD-cases and were a significant predictor of worry above other MCQ subscales.

Penney, Mazmanian, & Rudanycz, 2012	Cross-Sectional	230	**MCQ-30** (MCQ-Negative Beliefs)	Positive Beliefs about Worry	**PSWQ**	**WAQ**	N/A	Negative metacognitive beliefs were the strongest predictor of GAD when controlling for trait worry. Negative metacognitive beliefs mediated the relationships between trait worry and GAD symptoms.
Roemer et al., 2005 **Study 1**	Cross-Sectional	240	**AAQ**	Fear of Emotions	**PSWQ**	**GAD-Q-IV**	N/A	Experiential avoidance was associated with worry severity and predicted GAD severity over other measures.
Buhr & Dugas, 2012	Cross-Sectional	251	**IUS & AAQ**	Fear of Anxiety	**PSWQ**	**WAQ**	N/A	IU was the strongest predictor of worry. IU, fear of emotions and experiential avoidance were significantly higher in GAD group in comparison to non-GAD groups.
Khawaja & Chapman, 2007	Cross-Sectional	96	**IUS & MCQ** (MCQ-Positive Beliefs)	Negative Thinking, Positive Beliefs about Worry	**PSWQ**		N/A	IU was the strongest predictor of worry.
Tan, Moulding, Nedeljkovic, & Kyrios, 2010	Cross-Sectional	119	**MCQ-30 & IUS** (MCQ-Negative Beliefs)	Perception of Adult Attachment		**GAD-Q-IV**	N/A	Negative metacognitive beliefs were found to be the strongest predictor of GAD symptoms *however,* this was not found to be statistically significant after controlling for depression.

Clinical Studies									
Dugas et al., 1998	Cross-Sectional	44	**IUS**	Positive beliefs about Worry, Poor Problem Orientation, Cognitive Avoidance	**PSWQ**	**WAQ**	**GAD Vs Control**	IU distinguished GAD from control over other measures.
Khawaja, McMahon, & Strodl, 2011	Cross-Sectional	198	**IUS**	Anxious Thoughts		**WAQ**	**GAD vs Control**	Significant differences were found on IU and low non-clinical groups and clinical GAD, but no significant differences found between high non-clinical GAD and clinical GAD. Metaworry was able to distinguish between all three groups.
(Dugas et al., 2007)	Cross-Sectional	84	**IUS**	Positive Beliefs about Worry, Poor Problem Orientation & Cognitive Avoidance	**PSWQ**	**WAQ**	**GAD**	IU distinguished high GAD severity groups and the mild groups, but no moderate and severe, over other measures.
Dupuy & Ladouceur, 2008	Between-Groups	32	**IUS**	Positive Beliefs about Worry, Poor Problem Orientation & Cognitive Avoidance		**WAQ**	**GAD** **GAD & Depression**	IU was highest in groups with both GAD and depression, in comparison to GAD groups, over other measures.
Dugas, Marchand, & Ladouceur,	Between-Groups	45	**IUS**	Positive Beliefs about Worry, Negative Problem	**PSWQ**	**WAQ**	**GAD** **Panic**	IU distinguished GAD from panic, over other measures.

2005				Orientation & Cognitive Avoidance				
Ladouceur et al., 1999	Between-Groups	106	**IUS**	Positive Beliefs about Worry, Poor Problem Orientation & Cognitive Avoidance	**PSWQ**	**GAD-Q**	**Primary &Secondary GAD** **Other Anxiety Disorder**	IU and problem orientation distinguished GAD from other anxiety disorders. IU was not able to distinguish from primary or secondary GAD.
Barahmand, 2009	Between-Groups	180	**MCQ**	Anxious Thoughts & Thought Control			**GAD** **OCD** **Depression** **Control**	Negative metacognitive beliefs were highest in GAD groups in comparison to OCD, depression and control.
Wells & Carter, 2001	Between-Groups	120	**MCQ**	Anxious Thoughts			**GAD** **Social phobia** **Panic**	GAD patients had significantly higher negative metacognitive beliefs in comparison to social phobia and panic.
Roemer et al., 2005 **Study 2**	Cross-Sectional	19	**AAQ**	Fear of Emotions	**PSWQ**		**GAD**	GAD reported higher experiential avoidance, which was significantly associated with reports of stress and worry.

Ruggiero, Stapinski, Caselli, Fiore, & Gallucci, 2012	Cross-Sectional	138	**MCQ-30 & IUS**	Anxiety Control	**PSWQ**		**GAD vs Control**	Negative metacognitive beliefs and anxiety control interacted to strengthen the effect of IU on worry severity.
Stapinski, Abbott, & Rapee, 2010	Cross-Sectional	126	**MCQ-30 & IUS** (Total Subscale)	Anxiety Control & Affect Control	**PSWQ**		**GAD vs Control**	IU was a significant predictor of GAD but not worry severity. Metacognitions (total subscale) were significant predictors of worry but not GAD.
Lee et al., 2010	Cross-Sectional	90	**IUS & AAQ**	Fear of Emotions	**PSWQ**		**GAD vs Control**	Experiential avoidance and fear about emotions was higher in the GAD groups in comparison to controls.

Note: *AAQ=Acceptance and Action Questionnaire, GAD-Q=Generalised Anxiety Disorder Questionnaire, GAD-Q-IV=Generalised Anxiety Disorder Questionnaire-Revised, IUS=IU Scale, MCQ=Metacognitions Questionnaire, MCQ-30=Metacognitions Questionnaire (30-items), PSWQ=Penn State Worry Questionnaire, WAQ=Worry and Anxiety Questionnaire.*

2.7.1.1 Summary of Sample, Constructs Measured and Design

Out of the 26 studies, seventeen studies explored the role of IU. Seven used clinical samples, three of which used a mixed clinical sample (Dugas, Marchand, et al., 2005a; Dupuy & Ladouceur, 2008; Ladouceur et al., 1999), and four used a sample of GAD participants only (Dugas et al., 1998; Dugas et al., 2007; Khawaja et al., 2011; Stapinski et al., 2010); the remaining ten studies used non-clinical samples (Buhr & Dugas, 2006; Chen & Hong, 2010; de Bruin et al., 2007; Dugas et al., 1997; Dugas, Gosselin, et al., 2001; Dugas, Schwartz, et al., 2004; Fergus & Wu, 2010; Holaway et al., 2006; Khawaja & Chapman, 2007; Khawaja & McMahon, 2011). Four explored the role of negative metacognitive beliefs. Two used a mixed clinical sample (Barahmand, 2009; Wells & Carter, 2001), and two used non-clinical samples (Davis & Valentiner, 2000; Penney et al., 2012). One study explored the role of experiential avoidance, but reported two studies in the paper, the first using a non-clinical sample and the second using a clinical sample of GAD participants (Roemer et al., 2005).

Four studies looked at a combination of these constructs, with two studies looking at the role of negative metacognitive beliefs and IU and the final two papers explored the role of IU, and experiential avoidance. Of the two studies looking at the role of negative metacognitive beliefs and IU, one used a clinical sample of GAD participants (Ruggiero, Stapinski, Caselli, Fiore, Gallucci, et al., 2012) and the other study used a non-clinical sample (Tan et al., 2010). Of the two papers that explored the relationships between IU and experiential avoidance, Buhr and Dugas (2012) used a non-clinical sample, and Lee and colleagues (2010), used a clinical sample compared to a matched control group. None of the papers found looked at the role of negative metacognitive beliefs and experiential avoidance, or all three constructs in combination.

One study used a prospective design (Chen & Hong, 2010); seven studies used a between-groups design (Barahmand, 2009; Dugas, Marchand, et al., 2005; Dupuy & Ladouceur, 2008; Holaway et al., 2006; Khawaja & Chapman, 2007; Ladouceur et al., 1999; Wells & Carter, 2001) with the remaining eighteen studies using a cross-sectional design (Buhr & Dugas, 2006; Buhr & Dugas, 2012; Davis & Valentiner, 2000; de Bruin et al., 2007; Dugas et al., 1997; Dugas et al., 1998; Dugas, Gosselin, et al., 2001; Dugas et al., 2007; Dugas, Schwartz, et al., 2004; Fergus & Wu, 2010; Khawaja & McMahon, 2011; Khawaja et al., 2011; Lee et al., 2010; Penney et al., 2012; Roemer et al., 2005; Ruggiero, Stapinski, Caselli, Fiore, Gallucci, et al., 2012; Stapinski et al., 2010; Tan et al., 2010). All the studies relied on self-report measures and all the non-clinical studies were recruited from non-clinical university student populations. The following section offers a synthesis of the findings of these studies, which provides an account of statistically significant results, in addition to an illustration of the magnitude of the effect where data was available[1].

2.7.1.2 Intolerance of Uncertainty

Studies exploring IU yielded the greatest number of studies (17) with mixed findings. In support of the construct, non-clinical studies have tested IU (IUS; Freeston et al., 1994) in the context of negative problem orientation and problem-solving skills subscales (Social Problem-Solving Inventory-Abridged; Dugas, Freeston & Ladouceur, 1996) (Dugas et al., 1997), perceived control (Sense of Control Scale; Lachman & Weaver, 1998), and perfectionism (Multidimensional Perfectionism Scale; Hewitt & Flett, 1991) (Buhr & Dugas, 2006), and poor problem solving-confidence (Problem Solving Inventory;

---

[1] Effect size reference: Correlation effect sizes 'r' small= 0.10; medium= 0.30 and large = 0.50. Difference effect sizes: Cohen's d small = 0.20; medium = 0.50 and large =0 .80. Regression effect size: % = R^2 change; Odds Ratios (OR) effect size: Small -1.1-1.5; medium=1.6-3.0 and large = >3.0.

Heppner & Petersen, 1982), positive beliefs about worry (Positive beliefs subscale of the Metacognitions Questionnaire; Cartwright-Hatton & Wells, 1997), negative thinking (Anxious Thoughts and Tendencies Scale; Uhlenhuth et al, 1999) (Khawaja & Chapman, 2007) and severity of worry. Correlational analysis from these suggested all these constructs to have positive relationships with worry severity with IU having the largest positive correlation. These three studies reported ranges between r=0.70, r=0.63, and r=0.74 respectively, with a mean of r=0.69.

Further hierarchical regression analysis in Dugas and colleagues (1997) study, with their final model including IU, negative problem orientation and problem solving skills, indicated these variables to offer 21.7% to the overall variance in the prediction of worry severity, however, only IU and negative problem orientation were independent predictors. In support of these findings, Buhr and Dugas, (2006) indicated a single significant predictor of IU to offer 13% in their final model in the prediction of worry severity. The final study by Khawaja and Chapman (2007) indicated IU, problem solving confidence, anxious thoughts, and positive beliefs about worry, to contribute 13% to their final model in predicting worry severity, however, only IU and anxious thoughts made independent contributions. Thus, these three studies overall offer support for IU being a unique construct in the prediction of worry.

In addition to these non-clinical studies, two studies using clinical GAD participants have reported evidence to support IU and its relationship with worry. In a sample of GAD participants and a control group, Dugas et al., (1998) using Discriminant function, found IU (IUS; Freeston et al., 1994), poor problem orientation (Social Problem-Solving Inventory-Abridged; Dugas, Freeston & Ladouceur, 1996), and cognitive avoidance (White Bear Suppression Inventory;

Wegner & Zanakos, 1994) to be highly related in GAD participants with the final model correctly classifying 82%. Further examination of the standardised canonical coefficients (0.91) revealed IU being the largest predictor in distinguishing GAD participants from the control group.

Further to this, Dugas and colleagues (2007) recruited a sample of GAD participants who were separated into mild, moderate, and severe groups based on the severity of GAD. Their findings indicated IU (IUS; Freeston et al., 1994), positive beliefs about worry (Why Worry-II; Gosselin et al., 2003); negative problem orientation (Social Problem Solving Inventory Revised; D'Zurilla et al., 1998), and cognitive avoidance (Cognitive Avoidance Questionnaire; Gosselin et al., 2002) to be positively correlated to worry severity. The strongest correlation being offered by IU and worry (r=0.38). When comparing the three distinct groups, only IU and negative problem orientation revealed distinct groups differences, but only between mild and severe GAD groups, (M [SD] for IUS, mild GAD; 56.75 [12.44], severe GAD; 88.19 [19.33], d=1.25) (Dugas et al., 2007). These results demonstrate the IUS offering the largest difference in mean scores and effect size between these groups, therefore suggesting IU can offer specificity to distinguish GAD participants.

Initial conclusions from these clinical and non-clinical studies suggest that IU may play a unique role in predicting worry and GAD. However, four studies found contradictory results to these presented. In the first study comparing GAD participants with control groups, Stapinski and colleagues (2010) explored the role of fear of emotions (Affect Control Scale; Williams, Chamblass, & Ahrens, 1997), metacognitions (total subscale) (MCQ-30; Cartwright-Hatton & Wells, 1997), and IU (IUS; Freeston et al., 1994) in a clinical sample of GAD participants. Results from logistic regression reported fear of emotions

(OR=0.82) as playing an important role in the prediction of GAD status and this was the largest predictor of GAD status, with IU being the second largest predictor (OR=1.06) (Stapinski et al., 2010). However, this study used the total subscale for the MCQ and not just the negative metacognitive beliefs subscale, therefore this study design was flawed, and replication is required to distinguish fully the variables with the largest predictive power for GAD status.

In addition to this study, de Bruin and colleagues (2007) explored metaworry (Anxious Thought Inventory; Wells 1994), IU (IUS; Freeston et al., 1994) and neuroticism (Eysenck Personality Questionnaire; Eysenck, Eysenck, & Barrett, 1985) in predicting worry in a non-clinical sample. Entering all these variables in their final model it contributed 6% to the overall prediction of worry, although, they found neuroticism to be the only significant predictor (de Bruin et al., 2007). However, this variance remained small, and there may be other predictors of worry that were not measured in this study for example, age, gender, and depression that may be more significant. In addition, there may be an overlap f variance with the neuroticism measure, therefore may not be measuring unique constructs, highlighting potential circularity of the measured constructs.

In contrast, Khawaja and McMahon (2011) separated their non-clinical sample into GAD, OCD, social phobia, and depression. Findings indicated metaworry subscale (Anxious Thought Inventory; Wells 1994) and IU (IUS; Freeston et al.,1994) both significantly predicted GAD, OCD and social phobia symptoms, but had the strongest relationship with GAD symptoms, with metaworry (10.82%) being more significant than IU (9.36%). However, this difference in the variance offered by metaworry and IU is so small in terms of the magnitude of effect; clinically this would be unlikely to have any practical relevance.

The final study (Khawaja, McMahon & Strodl, 2011) had a clinical GAD sample and control group, separated into high and low GAD severity. Results demonstrated a specificity of IU (IUS; Freeston et al.,1994) in distinguishing between low non-clinical GAD and GAD participants, but it was unable to distinguish between GAD and high non-clinical GAD (M [SD], low GAD; 40.09 [11.03], high GAD; and GAD; 86.59 [20.23], d=2.59). Whereas the metaworry subscale (Anxious Thought Inventory; Wells 1994) was able to distinguish between all three groups, (M [SD], low GAD; 8.42 [8.42], high GAD; 17.70 [4.63] and GAD; 20.08 [4.20], d = 2.02, between low GAD and clinical GAD). These results suggest metaworry may be a more sensitive measure of GAD as the variation in the scores between the low and high GAD groups was much greater in the metaworry measure (Khawaja et al., 2011).

The specificity of IU construct has been further explored in both non-clinical and clinical samples, with conflicting results. Three non-clinical studies have explored specific relationships with GAD, OCD, and worry symptoms. Dugas, Gosselin, and Ladouceur (2001) explored IU (IUS; Freeston, et al., 1994), anxiety sensitivity (Anxiety Sensitivity Index; Reiss, Peterson, Gursky, & McNally, 1986), obsessions, and compulsions (Paudua Inventory: Sanavio, 1988; R-Scale; Salkovskis, 1992) in a non-clinical sample. Results revealed that IU had the largest correlation (r=0.70) with worry severity, moderately correlated (r=0.48) with obsessions and compulsive symptoms and showed only a small relationship (r=0.23) with anxiety sensitivity symptoms. However, regression analysis with IU in the final model, revealed IU as having the largest variance in the prediction of worry severity (42%); suggesting IU was more related to worry then to OCD.

The final two non-clinical studies obtained results that were less supportive of the role of IU. Fergus and Wu (2010) explored a combination of constructs, including IU (IUS; Freeston et al., 1994), negative problem orientation (Negative Problem Orientation Questionnaire; Robichaud & Dugas, 2005), responsibilities and threat estimations, perfection, and certainty and importance of control of thoughts (Obsessive Beliefs Questionnaire-44; Obsessive Cognitions Working Group, 2005) (Fergus & Wu, 2010). Whereas Holaway et al. (2006) explored only the IU (IUS; Freeston et al., 1994) construct. Both studies reported GAD groups to score significantly higher on worry. However, Holaway and colleagues reported IUS means not to be significantly different in GAD and OCD groups (M [SD] GAD; 66.30 [20.39], OCD; 59.81 [16.59], d=0.35), therefore these results suggest IU may be a common construct in both GAD and OCD (Holaway et al., 2006).

Of the studies, using mixed clinical samples and between-groups designs to assess the specificity of IU to worry and GAD, two studies have explored IU in relation to other anxiety disorders. Ladouceur and colleagues (1999) explored the role of IU (IUS; Freeston et a.l, 1994), positive beliefs about worry (Why Worry; Freeston et al, 1994), cognitive avoidance (White Bear Suppression Inventory, Wegner & Zanakos, 1994), and poor problem orientation (Problem Solving Inventory; Heppner & Peterson, 1982). Looking at clinical samples with a primary diagnosis of GAD, secondary diagnosis of GAD and anxiety disorder groups without GAD, results indicated GAD symptoms to be able to distinguish between the two GAD groups in comparison to other anxiety disorder groups, suggesting GAD to be a distinct disorder. However, it was unable to distinguish between primary and secondary diagnosis of GAD, this highlights the difficulties individuals with co-morbid disorders have in obtaining an accurate diagnosis of GAD in clinical practice, which would lead to appropriate treatment being offered.

IU was found to be higher in those with GAD in comparison to other anxiety disorders (M [SD], GAD group; 81.3 [24.5] and other anxiety disorder; 65.6 [20.3], d= 0.73), but it was unable to distinguish between primary and secondary GAD groups (M [SD], primary GAD; 81.3 [24.5]; secondary GAD; 82.0 [22.1], d= -0.03) (Ladouceur et al., 1999).

Further to this study, Dugas and colleagues (2005) explored the same constructs with participants with GAD, and panic disorder. They found when comparing IU in these group, IU (IUS; Freeston et al., 1994) was highest in GAD (M [SD], GAD group; 75.59 [17.20], and panic disorder group; 63.21 [20.34] d=0.64). When participant groups were collapsed together, all four components of the IU model; IU, (IUS; Freeston et al., 1994), cognitive avoidance (White Bear Suppression Inventory, Wegner & Zanakos, 1994), poor problem orientation (Problem Solving Inventory; Heppner & Peterson, 1982) and positive belief about worry (Why Worry; Freeston et al., 1994) were related to severity of worry, but not to symptoms of panic (Dugas, Marchand, et al., 2005).

In addition to these studies, IU has been explored in clinical and non-clinical participants with GAD and depression symptoms. Dugas and colleagues (2004) explored the strength of the relationships between IU (IUS; Freeston, et al., 1994), worry (PSWQ; Meyer et al 1990), and dysfunctional attitudes (Dysfunctional Attitudes Scale; Weissman, 1980) about depression. Worry was more related to the variance of IU (14.1%) than depression (6.3%), indicating IU to be significant in both disorders, but offering a higher variance and specificity in the prediction of worry severity (Dugas, Schwartz, et al., 2004).

Dupuy and Ladouceur (2008) used a clinical sample of participants with GAD and a sample with GAD and comorbid depression to explore how cognitive

variables manifest themselves when GAD and depression are comorbid. The variables of interest included IU, (IUS; Freeston, et al., 1994); poor problem orientation, (Negative Problem Orientation Questionnaire; Gosselin et al., 2005); cognitive avoidance, (Cognitive Avoidance Questionnaire; Gosselin et al., 2002); positive beliefs about worry; (Why Worry II; Gosselin et al., 2003). Results demonstrated those with comorbid GAD and depression to be more intolerant of uncertainty than those with a primary diagnosis of GAD (M [SD], GAD and depression group; 97.87 [13.10], and GAD group; 70.76 [17.82], d=1.72) (Dupuy & Ladouceur, 2008), thus suggesting IU is common in both GAD and depression. Overall, the results from these studies provide an inconsistent picture of specificity of IU with GAD and worry, and suggest IU may also be present in other disorders.

Chen and Hong (2010) were the only authors to offer a prospective study with a non-clinical sample exploring the role of daily hassles (Inventory of College Students' Recent Life Events; Kohn, Lafreniere & Gurevich, 1990) in the context of IU (IUS; Freeston et al., 1994) and prediction of worry (PSWQ; Meyer et al 1990) and anxiety (Beck Anxiety Inventory, Beck, Epstein, Brown and Streer, 1988) (Chen & Hong, 2010). The non-clinical sample completed assessments one month apart, and in the final regression model the variables worry, IU, daily hassles and interaction of IU and daily hassles were entered, which offered 0% to the overall prediction of worry severity at time 2. Results indicated that IU does not interact with daily hassles to predict a residual change in worry. However, IU moderated the relationship between daily hassles and anxiety symptoms particularly for those highly intolerant of uncertainty (simple slop analysis for those who are more intolerant of uncertainty = 0.48, p<.01), therefore indicating that those who are highly intolerant of uncertainty, each additional daily hassles score predicts 0.48 higher score on anxiety symptoms.

Chen and Hong suggest these finding indicates that those with high IU may be more likely to perceive increased threats and probability of negative outcomes. This coupled with information-processing biases towards uncertainty is likely to inflate threat and therefore raise anxiety levels. As IU did not predict a change in worry, they suggest daily hassles may not be a prerequisite for the development of worry to occur (Chen & Hong, 2010). These results also suggest that IU does not play a causal role in worry or GAD, however, had there been a longer time period between follow up assessments, this may have allowed sufficient time for a residual change in symptoms to be observed, therefore these findings may need to be replicated with a longer follow up period.

2.7.1.3 Negative Metacognitive Beliefs

Of the two studies to explore the role of negative metacognitive beliefs; Davis and Valentiner (2000) found negative metacognitive beliefs (MCQ; Cartwright-Hatton & Wells 1997) to be a significant predictor of GAD status as measured by the GAD-Q. Additionally, Penney and colleagues (2012) explored the role of positive beliefs about worry (Why Worry-II; Holowka et al, 2000), and negative metacognitive beliefs (MCQ-30; Wells & Cartwright-Hatton, 2004) in relation to GAD symptom severity as measured by the WAQ. In their final model, which included, worry, positive beliefs about worry and negative metacognitive beliefs, results indicated these variables to offer 81% in the prediction of GAD symptom's, however positive beliefs about worry did not make a unique contribution, when controlling for trait worry. Negative metacognitive beliefs were also a significant mediator between worry and GAD, therefore those with strong beliefs about the uncontrollability and dangerousness of worry were more likely to experience GAD symptoms (Penney et al., 2012).

In studies using between-groups design assessing the specificity of the negative metacognitive beliefs, Wells and Carter (2001) examined metacognitive beliefs (MCQ; Cartwright-Hatton & Wells, 1997) and metaworry (Anxious Thoughts Inventory; Wells, 1994) in participants with GAD, depression, social phobia, panic and a non-clinical control group. They found negative metacognitive beliefs to be significantly elevated in the GAD sample in comparison to other participant groups (M [SD], GAD; 50.4 [9.0], panic; 40.2 [10.9], social phobia; 38.8 [9.3], depression; 45.4 [9.3] and control group; 31.4 [8.6], d=2.15 between GAD and control group). In addition, metaworry was elevated in all groups, but no significant differences were found between GAD and panic disorder suggesting metaworry is common to both disorders (M [SD], GAD; 19.7 [3.9] and panic; 15.7 [4.6], d =0.93).

Barahmand (2009) supported these findings, examining the level of metacognitive beliefs (MCQ; Cartwright-Hatton & Wells, 1997) in participants with GAD, OCD, depression, and a non-clinical control group, and supported the findings by Wells and Carter (2001). They found negative metacognitive beliefs distinguished GAD participants in their sample from other disorders and the control group, but suggest negative metacognitive beliefs to be present on a continuum of severity for different anxiety disorders, with higher levels observed in GAD samples. Overall, both these studies suggest a specificity of negative metacognitive beliefs construct in clinical samples of GAD.

2.7.1.4 Experiential Avoidance

Roemer and colleagues were the only authors to explore the role of fear of emotions (Affective Control Scale; Williams et al., 1997) and experiential avoidance (AAQ-II: Bond et al., 2011). In their non-clinical and clinical samples, results indicated positive correlations of experiential avoidance with worry (r=0.43) and GAD severity

symptoms (r=0.46) as measured by the GAD-Q-IV. Regression analysis from their non-clinical sample indicated that experiential avoidance offered a small unique contribution (2%) to the prediction of GAD severity. The authors suggest experiential avoidance may not be unique to GAD, or may not be able to distinguish GAD from other disorders, but could be a significant element when it comes to treatment (Roemer et al., 2005). Therefore, this study offers some support for an association and unique contributor between experiential avoidance, worry, and GAD, although further empirical evidence may be required to understand this more, as a limited number of empirical studies are currently available.

2.7.1.5 Negative Metacognitive Beliefs and Intolerance of Uncertainty

Of the initial studies obtained, only two explored the role of IU and negative metacognitive beliefs in combination. Ruggiero et al., (2012) explored the interactional effects of IU and negative metacognitive beliefs (MCQ-30; Wells & Cartwright-Hatton) and perceived control (Anxiety Control Questionnaire; Rapee et al., 1996) in a sample of participants with GAD and a control group. Results indicated the relevance of IU and negative metacognitive beliefs, with negative metacognitive beliefs and anxiety control independently adding to the effect of IU on worry severity. They suggest that IU is the initial trigger, while negative metacognitive beliefs and perceived control are secondary appraisals of worry that increase the effects of IU on worry (Ruggiero, Stapinski, Caselli, Fiore, Gallucci, et al., 2012). In the second study, Tan et al., (2010) explored the role of IU (IUS; Freeston et al., 1994), negative metacognitive beliefs (MCQ-30; Wells & Cartwright-Hatton, 2004), and developmental factors, and their ability to predict GAD symptoms. IU and negative metacognitive beliefs were both found to be strong predictors of GAD, together offering 20% variance to the prediction GAD symptoms (developmental factors did not contribute). However, after controlling for

depression, this did not reach statistical significance (Tan et al., 2010). Further studies are required to understand this relationship more.

2.7.1.6 Intolerance of Uncertainty and Experiential Avoidance

Two studies have explored the combination of IU and experiential avoidance. Lee and colleagues (2010) explored the role of IU (IUS; Freeston et al., 1994) and experiential avoidance (AAQ; Hayes et al, 2004) in a clinical sample versus a control group. Initial findings looking at correlations between severity of symptoms, indicate positive correlations between IU and experiential avoidance and measures of worry (r=0.86 & r=0.87). In addition, when comparing differences between groups, higher levels of experiential avoidance were found in those with GAD in comparison to the control groups (M [SD], GAD group; 76.51 [10.62], non-GAD; 45.67 [8.44], d = 3.21) (Lee et al., 2010). The authors suggest that those with high IU may engage in avoidance to cope with their distress to low tolerance of uncertainty.

Further to this study, Buhr and Dugas (2012) explored the role of fear of emotions (Affective Control Scale; Williams et al., 1997), experiential avoidance (AAQ; Hayes et al 2002), and IU (IUS; Freeston et al., 1994) in excessive worry and GAD. Results indicated from the final model, which included IU, fear of emotions, and experiential avoidance, to offer 47% to the prediction of worry severity, however only IU and fear of anxiety made an independent contribution. Furthermore, after grouping participants into those who met the GAD criteria and non-clinical participants (as measured by the WAQ), the groups differed significantly on IU and, on all four subscales of the fear of emotions and experiential avoidance. Overall, Buhr and Dugas (2012) suggest IU, fear of emotions and experiential avoidance are all related to worry; however, experiential avoidance offered only a small

contribution, which suggests it is not specific to GAD, but is a general psychological vulnerability.

2.8 Discussion and Conclusion

Sections 2.3.3.1, 2.3.4.1, and 2.3.5.1 of the literature review provided empirical support for the IU, Metacognitive, and the Acceptance-Based models of GAD. Each model stipulates a clear conceptualisation of the psychological mechanisms underlying worry and GAD. This systematic review has provided a synthesis of the findings of these psychological mechanisms, in an attempt to explain how IU, negative metacognitive beliefs, and experiential avoidance are associated with or contribute to the prediction of worry and GAD in clinical and non-clinical adult populations.

The majority of the studies from this review have been for the IU construct, which have thus far provided conflicting results. Five clinical and non-clinical studies provided initial support for the IU construct (Buhr & Dugas, 2006; Dugas et al., 1997; Dugas et al., 1998; Dugas et al., 2007; Khawaja & Chapman, 2007). Additionally, two further studies exploring a combination of IU and experiential avoidance also offered support for the IU construct and its relationship with worry and GAD, (Buhr & Dugas, 2012; Lee et al., 2010), although Stapinski and colleagues (2010) reported fear of emotions to be a stronger predictor of worry over IU. When IU was explored with metaworry, the results in these studies were contrasting. One of the studies reported both IU and metaworry made independent and unique contributions to the prediction of worry, but neuroticism offered the largest variance, suggesting the personality construct was a stronger predictor than the two psychological mechanisms (de Bruin et al., 2007).

The final two studies exploring only metaworry and IU, both found metaworry to offer specificity of GAD in a non-clinical sample of GAD, OCD, social phobia and depression (Khawaja & McMahon, 2011), which also highlighted metaworry as being able to distinguish between GAD and non-clinical GAD and low non-clinical GAD participants (Khawaja et al., 2011). Despite these results, a limitation of metaworry measure, AnTI has been noted previously within this review, due to its predominant focus on the uncontrollable nature of worry and not danger (Wells, 2005). This issue of circularity with the diagnostic category is likely to inflate associations between metaworry and GAD, therefore these results needs to be considered within the context of this limitation for the metaworry measure.

Further results on the specificity of IU to worry and GAD have offered conflicting results. Out of three non-clinical studies, exploring IU in the context of OCD and GAD, only one was in support of IU being more prominent in GAD than in OCD (Dugas, Gosselin, et al., 2001). Two studies disputed this finding, with one study reporting IU to be higher in OCD (Fergus & Wu, 2010) and the other reporting it to be equally present in GAD and OCD (Holaway et al., 2006). Additionally, in clinical samples, IU was reported as not to be able to distinguish between primary GAD and secondary GAD, but was able to distinguish between other anxiety disorders, with findings from another study supporting this, as IU was able to distinguish between GAD and panic disorder (Dugas, Marchand, et al., 2005). In contrast to this finding, one study reported IU to be more prominent in social phobia (Khawaja & Chapman, 2007), thus highlighting further inconsistencies in the literature.

Further to these studies, IU has been explored in relation to GAD and depression, with one study supporting IU as being more prominent in GAD than in depression (Dugas, Schwartz, et al., 2004), which was supported by Khawaja et al., (2011). However, Dupuy and colleagues (2008) offered conflicting results as they reported

increased levels of IU in a sample of comorbid GAD and depression. Therefore, the results for IU and its specific role in worry and GAD are less clear as it appears to be a construct not specific to worry and GAD. IU also does not appear to offer a causal role in the development of worry, as demonstrated by findings from Chen and Hong's (2010) prospective study.

Secondly, findings from this review have thus far highlighted negative metacognitive beliefs as playing an important role in worry and GAD, with four non-clinical and clinical studies consistently providing support for this notion. Results from the two clinical studies suggest negative metacognitive beliefs appearing to offer specificity between GAD and other disorders (Barahmand, 2009; Wells & Carter, 2001). Additionally, of the two studies that explored the role of negative metacognitive beliefs and IU, Tan et al., (2010), in a non-clinical sample reported negative metacognitive beliefs as offering the largest variance in the prediction of GAD as measured by GAD-Q-IV, above IU, although this was not significant after controlling for depression. The final study offered evidence of an interactional relationship between negative metacognitive beliefs and IU, which suggests negative metacognitive beliefs increased the effect of IU on the severity of worry (Ruggiero, Stapinski, Caselli, Fiore, Gallucci, et al., 2012). Although limited studies have been presented within this review for the role of negative metacognitive beliefs, the results from these initial studies offer promising results in support of negative metacognitive beliefs and their role in worry and GAD. Although further empirical support is required to confirm these conclusions.

Lastly, this review offered minimal evidence for the role of experiential avoidance as an important construct in the development and maintenance of worry and GAD. The findings from these two studies appear to offer little evidence of an independent contribution of experiential avoidance in the development and maintenance of worry

and GAD (Roemer et al., 2005). This was also highlighted in the two studies that explored the role of experiential avoidance and IU (Buhr & Dugas, 2012; Lee et al., 2010). However, the findings from these studies offer some evidence to suggest an association between experiential avoidance, worry, and GAD, which may suggest experiential avoidance is a general vulnerability factor common to all mental health problems as highlighted in section 2.3.5.1.

2.8.1 Limitations of the Published Literature

The findings from this review have provided some interesting results and offered some insights into the specific role each of the three constructs has with worry and GAD. However, they need to be taken in context with some specific limitations of the studies. First, the majority of the studies obtained utilised non-clinical samples; often university students which may limit the generalisability of the findings obtained to a clinical population. Second, all but one study (Chen & Hong, 2010) used cross-sectional and between-groups designs, which does not allow for inferences on causality to be drawn from the studies presented within this review. Third, clinical samples were often small (Dugas, Marchand, et al., 2005; Dupuy & Ladouceur, 2008; Ladouceur et al., 1999; Roemer et al., 2005; Wells & Carter, 2001) and as a consequence of studies being underpowered, results may not be accurate and may inflate false positive results within the findings.

Fourth, two of the studies reported findings from samples with co-morbid diagnoses (Dugas et al., 2007; Lee et al., 2010), which suggests results obtained may not be specific to GAD, and may be attributable to other co-morbid disorders present within the sample, thus again potentially devaluing the results obtained. Fifth, not all the studies controlled for the effects of demographic factors (*i.e. age and gender*) (Roemer et al., 2005; Stapinski et al., 2010; Tan et al., 2010), the overlap of

depressive symptoms (Buhr & Dugas, 2006; Buhr & Dugas, 2012) or demographics and the overlap of depressive symptoms (Chen & Hong, 2010; Davis & Valentiner, 2000; de Bruin et al., 2007; Fergus & Wu, 2010; Holaway et al., 2006; Khawaja & Chapman, 2007; Khawaja & McMahon, 2011; Penney et al., 2012). The additional variance from these factors may have contributed to the results and may have resulted in them demonstrating significant findings in support of specific constructs, whereas, if these factors had been controlled for, the results might not have been significant. Lastly, Chen and Hong (2010) provided some interesting results but did not find a significant interactional effect of daily hassles. However, they conducted the follow-up to their study only one month later, and this may not have been long enough to observe a change in symptoms, which suggests that further studies may need to offer a longer time before conducting follow-up assessments.

In conclusion, this review provides some insights into the association and the unique and relative contributions in the variants attributable to worry and GAD of each of these model constructs in clinical and non-clinical samples. Thus far, negative metacognitive beliefs appear to offer the most plausible explanation for the factors responsible for persistent worry and GAD. Despite this, further studies are required to replicate the findings and add to the existing body of literature to try to find a consistent and coherent picture of the factors that are directly attributable to the development and maintenance of persistent worry and GAD.

After reviewing, the methodological limitations from the current review, further research may want to (1) explore further the relative merits of IU, negative metacognitive beliefs, and experiential avoidance, and their unique and relative contribution to the prediction of worry and GAD. Specifically, due to reported problems with the construct measuring negative metacognitive beliefs, highlighted in section 2.3.4.1 studies should consider using only the items that relate to assessing

the danger of worry to ensure that this issue is addressed. (2) Additional studies should use prospective designs to offer insights into casualty. (3) Large clinical and non-clinical samples of participants should be recruited to ensure the statistical robustness of the findings. (4) Studies should also control for other factors that may contribute to the variance observed in worry and GAD, such as daily hassles, age, gender, and depression, to allow firmer conclusions to be drawn from the findings. These recommendations were taken into consideration when designing the current study, which is presented in the following chapter.

References

American Psychiatric Association (APA). (1952). *Diagnostic and statistical manual of mental disorders (1st ed).* Washington, DC.

American Psychiatric Association (APA. (1980). *Diagnostic and statistical manual of mental disorders (3rd ed).* Washington, DC.

American Psychiatric Association (APA). (2000). *Diagnostic and statistical manual of mental disorder (4th ed)*: Washington DC.

Baldwin, D., Woods, R., Lawson, R., & Taylor, D. (2011). Efficacy of drug treatments for generalised anxiety disorder: Systematic review and meta-analysis. *BMJ: British Medical Journal, 342*(7798).

Baldwin, D. S., & Polkinghorn, C. (2005). Evidence-based pharmacotherapy of generalized anxiety disorder. *International Journal of Neuropsychopharmacology, 8*(2), 293-302. doi: 10.1017/s1461145704004870

Barahmand, U. (2009). Meta-cognitive profiles in anxiety disorders. *Psychiatry Research, 169*(3), 240-243.

Barlow, D., H. (2000). Unraveling the mysteries of anxiety and its disorders from the perspective of emotion theory. *American Psychologist, 55*(11), 1247-1263. doi: 10.1037/0003-066x.55.11.1247

Barlow, D., H., Rapee, R., M., & Brown, T., A. (1992). Behavioral treatment of generalized anxiety disorder. *Behavior Therapy, 23*(4), 551-570. doi: 10.1016/s0005-7894(05)80221-7

Barlow, D. H., Blanchard, E. B., Vermilyea, J. A., Vermilyea, B. B., & DiNardo, P. A. (1986). Generalized anxiety and generalized anxiety disorder: Description and reconceptualization. *The American Journal of Psychiatry, 143*(1), 40-44.

Barlow, D. H., & Wincze, J. (1998). DSM-IV and beyond: what is generalized anxiety disorder? *Acta Psychiatrica Scandinavica, 98 (suppl.393)*, 23-29.

Barrett, J., Barrett, J. A., Oxman, T. E., & Gerber, P. D. (1988). The prevalence of psychiatric disorders in a primary care practice. *Archives of General Psychiatry, 45*(12), 1100-1106. doi: 10.1001/archpsyc.1988.01800360048007

Beck, A., T, Emery, G., & Greenberg, R. L. (1985). *Anxiety disorders and phobias : A cognitive perspective*: Cambridge, MA : Basic Books, 2005

Beck, A. T., Epstein, N., Brown, G., & Steer, R. (1988). An inventory for measuring clinical anxiety: Psychometric properties. Journal of Consulting and Clinical Psychology, 56, 893–897.

Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. New York: Penguin.

Behar, E., DiMarco, I. D., Hekler, E. B., Mohlman, J., & Staples, A. M. (2009). Current theoretical models of generalized anxiety disorder (GAD): Conceptual review and treatment implications. *Journal of Anxiety Disorders, 23*(8), 1011-1023.

Bereza, B. G., Machado, M., & Einarson, T. R. (2009). Systematic review and quality assessment of economic evaluations and quality-of-life studies related to generalized anxiety disorder. *Clinical Therapeutics, 31*(6), 1279-1308. doi: http://dx.doi.org/10.1016/j.clinthera.2009.06.004

Blazer, D., Hughes, D., & George, L. K. (1987). Stressful life events and the onset of a generalized anxiety syndrome. *The American Journal of Psychiatry, 144*(9), 1178-1183.

Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., . . . Zettle, R. D. (2011). Preliminary psychometric properties of the acceptance and action questionnaire–II: a revised measure of psychological inflexibility and experiential avoidance. *Behavior Therapy, 42*(4), 676-688.

Borkovec, T. D. (1994). The nature, functions, and origins of worry. In G. C. L. Davey & F. Tallis (Eds.), *Worrying: perspectives on theory, assessment and treatment*: Chichester: Wiley, 1994.

Borkovec, T. D., Alcaine, O., & Behar, E. (2004). Avoidance theory of worry and generalized anxiety disorder. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized anxiety disorder : advances in research and practice*: New York ; Guilford Press, 2004.

Borkovec, T. D., & Inz, J. (1990). The nature of worry in generalized anxiety disorder: A predominance of thought activity. *Behaviour Research and Therapy, 28*(2), 153-158.

Borkovec, T. D., Robinson, E., Pruzinsky, T., & DePree, J. A. (1983). Preliminary exploration of worry: Some characteristics and processes. *Behaviour Research and Therapy, 21*(1), 9-16.

Borkovec, T. D., & Roemer, L. (1995). Perceived functions of worry among generalized anxiety disorder subjects: Distraction from more emotionally distressing topics? *Journal of Behavior Therapy and Experimental Psychiatry, 26*(1), 25-30. doi: 10.1016/0005-7916(94)00064-s

Borkovec, T. D., & Ruscio, A. M. (2001). Psychotherapy for generalized anxiety disorder. *Journal of Clinical Psychiatry, 62*(Suppl11), 37-42.

Buhr, K., & Dugas, M. (2006). Investigating the construct validity of intolerance of uncertainty and its unique relationship with worry. *Journal of Anxiety Disorders, 20*(2), 222-236.

Buhr, K., & Dugas, M. J. (2002). The intolerance of uncertainty scale: psychometric properties of the English version. *Behaviour Research and Therapy, 40*(8), 931-945.

Buhr, K., & Dugas, M. J. (2012). Fear of emotions, experiential avoidance, and intolerance of uncertainty in worry and generalized anxiety disorder. *International Journal of Cognitive Therapy, 5*(1), 1-17.

Buoli, M., Caldiroli, A., Caletti, E., Paoli, R. A., & Altamura, A. C. (2013). New approaches to the pharmacological management of generalized anxiety disorder (English). *Expert opinion on pharmacotherapy, 14*(2), 175-184.

Carter, R. M., Wittchen, H.-U., Pfister, H., & Kessler, R. C. (2001). One-year prevalence of subthreshold and threshold DSM-IV generalized anxiety disorder in a nationally representative sample. *Depression & Anxiety (1091-4269), 13*(2), 78-88.

Cartwright-Hatton, S., & Wells, A. (1997). Beliefs about worry and intrusions: The meta-cognitions questionnaire and its correlates. *Journal of Anxiety Disorders, 11*(3), 279-296.

Cassano, G. B., Rossi, N. B., & Pini, S. (2002). Psychopharmacology of anxiety disorders. *Dialogues In Clinical Neuroscience, 4*(3), 271-285.

Chambless, D., & Gracely, E. (1989). Fear of fear and the anxiety disorders. *Cognitive Therapy and Research, 13*(1), 9-20.

Chen, C. Y., & Hong, R. Y. (2010). Intolerance of uncertainty moderates the relation between negative life events and anxiety. *Personality and Individual Differences, 49*(1), 49-53.

Covin, R., Ouimet, A. J., Seeds, P. M., & Dozois, D. (2008). A meta-analysis of CBT for pathological worry among clients with GAD. *Journal of Anxiety Disorders, 22*, 108-116. doi: 10.1016/j.janxdis.2007.01.002

Davey, G. C. L., Tallis, F., & Capuzzo, N. (1996). Beliefs about the Consequences of Worrying. *Cognitive Therapy and Research, 20*(5), 499-520.

Davis, R. N., & Valentiner, D. P. (2000). Does meta-cognitive theory enhance our understanding of pathological worry and anxiety? *Personality and Individual Differences, 29*(3), 513-526.

de Bruin, G., Rassin, E., & Muris, P. (2007). The Prediction of Worry in Non-Clinical Individuals: The Role of Intolerance of Uncertainty, Meta-Worry, and Neuroticism. *Journal of Psychopathology and Behavioral Assessment, 29*(2), 93-100.

de Bruin, G. O., Rassin, E., & Muris, P. (2006). Worrying in the lab: Does intolerance of uncertainty have predictive value? *Behaviour Change, 23*(2), 138-147.

Dugas, M., Freeston, M., H, Provencher, M., D, Lachance, S., Ladouceur, R., & Gosselin, P. (2001a). The worry and anxiety questionnaire: English translation.http://www.psychology.concordia.ca/fac/dugas/downloads/en/WAQ.pdf

Dugas, M., Freeston, M., H, Provencher, M., D, Lachance, S., Ladouceur, R., & Gosselin, P. (2001b). The worry and anxiety questionnaire: Validation in non-clinical and clinical samples (French). *Journal de Therapie Comportementale et Cognitive, 11*(31-36).

Dugas, M., Hedayati, M., Karavidas, A., Buhr, K., Francis, K., & Phillips, N. (2005). Intolerance of uncertainty and information processing: Evidence of biased recall and interpretations. *Cognitive Therapy and Research, 29*(1), 57-70.

Dugas, M., J., Freeston, M., H., & Ladouceur, R. (1997). Intolerance of Uncertainty and Problem Orientation in Worry. *Cognitive Therapy and Research, 21*(6), 593-606.

Dugas, M. J., Ladouceur, R., & Freeston, M. H. (1996). Version abr~g~e del'Inventaire de r+solution de probl6mes sociaux (Abbreviated version of the Social Problem Solving Inventory). *Journal de* ThOrapie Comportementale et Cognitive, 6, 59-62.

Dugas, M., J., Gagnon, F., Ladouceur, R., & Freeston, M., H. (1998). Generalized anxiety disorder: a preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*(2), 215-226.

Dugas, M., J., Gosselin, P., & Landouceur, R. (2001). Intolerance of uncertainty and worry: Investigating specificity in a non-clinical sample. [Article]. *Cognitive Therapy & Research, 25*(5), 551-558.

Dugas, M., J., & Letarte, H. (1995). Worry and problem solving: Evidence of a specific relationship. *Cognitive Therapy & Research, 19*(1), 109-120.

Dugas, M., J., Savard, P., Gaudet, A., Turcotte, J., Laugesen, N., Robichaud, M., . . . Koerner, N. (2007). Can the components of a cognitive model predict the severity of generalized anxiety disorder? *Behavior Therapy, 38*(2), 169-178.

Dugas, M., J., Schwartz, A., & Francis, K. (2004). Brief Report: Intolerance of Uncertainty, Worry, and Depression (Vol. 28, pp. 835-842): Springer Science & Business Media B.V.

Dugas, M., Marchand, A., & Ladouceur, R. (2005). Further validation of a cognitive-behavioural model of generalized anxiety disorder diagnostic and symptom specificity. *Journal of Anxiety Disorders, 19*, 329-343.

Dugas, M. J., Buhr, K., & Ladouceur, R. (2004). The Role of Intolerance of Uncertainty in Etiology and Maintenance. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized Anxiety Disorder: Advances in Research and Practice*. New York: The Guilford Press.

Dupuy, J.-B., & Ladouceur, R. (2008). Cognitive processes of generalized anxiety disorder in comorbid generalized anxiety disorder and major depressive disorder. *Journal of Anxiety Disorders, 22*(3), 505-514. doi: http://dx.doi.org/10.1016/j.janxdis.2007.05.010

D'Zurilla TJ, Nezu AM, Maydeu-Olivares A. Manual for the Social Problem-Solving Inventory–Revised. North Tonawanda, NY: Multi-Health Systems; 1998.

Eifert, G. H., & Forsyth, J. P. (2005). *Acceptance & commitment therapy for anxiety disorders: A practitioner's treatment guide to using mindfulness, acceptance, and values-based behavior change strategies*. Oakland, CA: New Harbinger Publications, Inc

Eysenck, H. J., Eysenck, M.W., & Barrett, P. (1985). A revised version of the psychoticism scale. *Personality and Individual Differences*, *6,* 21–29.

Fergus, T. A., & Wu, K. D. (2010). Do symptoms of generalized anxiety and obsessive-compulsive disorder share cognitive processes? (English). *Cognitive Therapy and Research, 34*(2), 168-176.

Finlay-Jones, R., & Brown, G. W. (1981). Types of stressful life event and the onset of anxiety and depressive disorders. *Psychological Medicine, 11*(4), 803-815.

Fisher, P. L. (2006). The efficacy of psychological treatments for generalised anxiety disorder? *Worry and its psychological disorders: theory, assessment and treatment.* West Sussex: John Wiley & Sons.

Fisher, P. L., & Durham, R. C. (1999). Recovery rates in generalized anxiety disorder following psychological therapy: An analysis of clinically significant change in the STAI-T across outcome studies since 1990. . *Psychological Medicine, 29*, 1425–1434.

Flavell, J. (1979). Metacognition and cognitive monitoring: A new area of cognitive–developmental inquiry. *American Psychologist, 34*(10), 906-911.

Fledderus, M., Bohimeijer, E. T., & Pieterse, M. E. (2010). Does experiential avoidance mediate the effects of maladaptive coping styles on psychopathology and mental health? (English). *Behavior Modification, 34*(6), 503-519.

Foa, E. B., & Kozak, M. J. (1986). Emotional processing of fear: Exposure to corrective information. *Psychological Bulletin, 99*(1), 20-35. doi: 10.1037/0033-2909.99.1.20

Francis, J. L., Moitra, E., Dyck, I., & Keller, M. B. (2012). The Impact of stressful life events on relapse of generalized anxiety disorder. [Article]. *Depression & Anxiety (1091-4269), 29*(5), 386-391. doi: 10.1002/da.20919

Freeston, M. H., & Dugas, M. J. (1996). Thoughts, images, worry, and anxiety. [Article]. *Cognitive Therapy & Research, 20*(3), 265-273.

Freeston, M. H., Rhéaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17*(6), 791-802.

Friman, P., C, Hayes, S. C., & Wilson, K. G. (1998). Why behavior analysts should study emotion: The example of anxiety. *Journal of Applied Behavior Analysis, 31*, 137-156.

Gale, C., & Oakley-Browne, M. (2000). Anxiety disorder. *British Medical Journal 321*(7270), 1204-1207.

Gosselin P, Langlois F, Freeston MH, Ladouceur R, Dugas MJ, Pelletier O. Le The Cognitive Avoidance Questionnaire: Development and validation in adult and adolescent samples Journal de Thérapie Comportementale et Cognitive. 2002;12:24–37.

Gosselin P, Ladouceur R, Langlois F, Freeston MH, Dugas MJ, Bertrand J. Development and validation of a new measure of erroneous beliefs about worry. Revue Européenne de Psychologie Appliquée. 2003;53:199–211.

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behaviour Research and Therapy, 44*(1), 1-25.

Hayes, S. C., Strosahl, K., & Wilson, K. G. (1999). *Acceptance and commitment therapy: An experiential approach to behaviour change.* New York: The Guilford Press.

Hayes, S. C., Strosahl, K., Wilson, K. G., Bissett, R. T., Pistorello, J., Toarmino, D., . . . McCurry, S. M. (2004). Measuring experiential avoidance: A preliminary test of a working model. *Psychological Record, 54*(4), 553-578.

Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Experiential avoidance and behavioral disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology, 64*(6), 1152-1168.

Henning, E. R., Turk, C. L., Mennin, D. S., Fresco, D. M., & Heimberg, R. G. (2007). Impairment and quality of life in individuals with generalized anxiety disorder. *Depression and Anxiety, 24*(5), 342-349.

Heppner, P. P., & Petersen, C. H. (1982). The development and implications of a personal problem-solving inventory. Journal of Counseling Psychology, 29, 66 – 75.

Hewitt, P. L., & Flett, G. L. (1991). Perfectionism in the self and social contexts: conceptualization,assessment, and association with psychopathology. Journal of Personality and Social Psychology, 60, 456–470.

Hirsch, C. R. Mathews, A. (2012). A cognitive model of pathological worry. *Behaviour Research and Therapy, 50*, 636-646.

Holaway, R. M., Heimberg, R. G., & Coles, M. E. (2006). A comparison of intolerance of uncertainty in analogue obsessive-compulsive disorder and generalized anxiety disorder. *Journal of Anxiety Disorders, 20*(2), 158-174.

Holowka, D. W., Dugas, M. J., Francis, K., & Laugesen, N. (2000, November). *Measuring beliefs about worry: A psychometric evaluation of the Why Worry-II Questionnaire.* Poster presented at the Association for Advancement of Behavior Therapy's 34th Annual Convention, New Orleans, USA.

Kessler, R. C., Chiu, W. T., Demler, O., Merikangas, K. R., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12 month DSM-IV disorders in the National comorbidity survey. *Archives of General Psychiatry, 62*, 617-627.

Kessler, R. C., Walters, E. E., & Wittchen H. (2004). Epidemiology. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized anxiety disorder: advances in research and practice*. New York: The Guilford Press.

Khawaja, N. G., & Chapman, D. (2007). Cognitive predictors of worry in a non-clinical population. *Clinical Psychologist, 11*(1), 24 - 32.

Khawaja, N. G., & McMahon, J. (2011). The relationship of meta-worry and intolerance of uncertainty with pathological worry, anxiety, and depression. *Behaviour Change, 28*(4), 165-180.

Khawaja, N. G., McMahon, J., & Strodl, E. (2011). Intolerance of uncertainty and meta-worry: relative importance in discriminating GAD. *Behaviour Change, 28*(4), 181-194. doi: 10.1375/bech.28.4.181

Klein, D. (1964). Delineation of two drug-responsive anxiety syndromes. *Psychopharmacologia, 5*(6), 397-408. doi: 10.1007/bf02193476

Koerner, N., & Dugas, M. (2008). An investigation of appraisals in individuals vulnerable to excessive worry: the role of intolerance of uncertainty. *Cognitive Therapy and Research, 32*(5), 619-638. doi: 10.1007/s10608-007-9125-2

Kohn, P. M., Lafreniere, K., & Gurevich, M. (1990). The inventory of college students' recent life experiences: A decontaminated hassles scale for a special population. Journal of Behavioral Medicine, 13, 619–630.

Lachman, M. E., & Weaver, S. L. (1998). The sense of control as a moderator of social differences in health and well-being. Journal of Personality and Social Psychology, 74, 763–775.

Ladouceur, R., Dugas, M. J., Freeston, M. H., Rhéaume, J., Blais, F., Boisvert, J.-M., . . . Thibodeau, N. (1999). Specificity of generalized anxiety disorder symptoms and processes. *Behavior Therapy, 30*(2), 191-207.

Ladouceur, R., Gosselin, P., & Dugas, M. J. (2000). Experimental manipulation of intolerance of uncertainty: a study of a theoretical model of worry. *Behaviour Research and Therapy, 38*(9), 933-941.

Ladouceur, R., Talbot, F., & Dugas, M. J. (1997). Behavioral expressions of intolerance of uncertainty in worry. *Behavior Modification, 21*(3), 355-371.

Lalonde, C. D., & Van Lieshout, R. J. (2011). Treating generalized anxiety disorder with second generation antipsychotics: A systematic review and meta-analysis. *Journal of Clinical Psychopharmacology, 31*(3), 326-333. doi: 10.1097/JCP.0b013e31821b2b3f

Lee, J. K., Orsillo, S. M., Roemer, L., & Allen, L. B. (2010). Distress and avoidance in generalized anxiety disorder: Exploring the relationships with intolerance of uncertainty and worry. *Cognitive Behaviour Therapy, 39*(2), 126 - 136.

Maier, W., Gänsicke, M., Freyberger, H. J., Linz, M., Heun, R., & Lecrubier, Y. (2000). Generalized anxiety disorder (ICD-10) in primary care from a

cross- cultural perspective: A valid diagnostic entity? *Acta Psychiatrica Scandinavica, 101*(1), 29-36.

Mennin, D. S., Fresco, D. M., & Heimberg, R. G. (2004). Clinical presentation and diagnostic features. In D. E. M. D. tucker & D. S. Mennin (Eds.), *Generalized Anxiety Disorder: Advances in Research and Practice* (pp. 3-28). New York: Guilford Press.

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the penn state worry questionnaire. *Behaviour Research and Therapy, 28*(6), 487-495.

Michelson, S. E., Lee, J. K., Orsillo, S. M., & Roemer, L. (2011). The role of values-consistent behavior in generalized anxiety disorder. [Article]. *Depression & Anxiety (1091-4269), 28*(5), 358-366. doi: 10.1002/da.20793

Mowrer, O. H. (1947). On the dual nature of learning—a re-interpretation of "conditioning" and "problem-solving.". *Harvard Educational Review, 17*, 102-148.

Newman, M. G., Zuellig, A. R., Kachin, K. E., Constantino, M. J., Przeworski, A., Erickson, T., & Cashman-McGrath, L. (2002). Preliminary reliability and validity of the generalized anxiety disorder questionnaire-IV: A revised self-report diagnostic measure of generalized anxiety disorder. *Behavior Therapy, 33*(2), 215-233.

National Institue of Clinical Excellence (NICE). (2011). *Generalized anxiety disorder and panic (with and without agoraphobia) in adults.* London: Department of Health.

Obsessive Compulsive Cognitions Working Group. (2005). Psychometricvalidation of the Obsessive Belief Questionnaire and interpretation of intrusions inventory - Part 2: Factor analyses and testing of a brief version. Behaviour Research and Therapy, 43, 1527–1542. doi:10.1016/j.brat.2004.07.010.

Olfson, M., Shea, S., Feder, A., Fuentes, M., Nomura, Y., & Gameroff, M. (2000). Prevalence of anxiety, depression and substance use disorders in an urban general medical practice. *Archives of Family Medicine, 9*, 876-883.

Penney, A. M., Mazmanian, D., & Rudanycz, C. (2012). Comparing positive and negative beliefs about worry in predicting generalized anxiety disorder. *Canadian Journal of Behavioural Science.* doi: 10.1037/a0027623

Rapee, R. M. (1991). Generalized anxiety disorder: A review of clinical features and theoretical concepts. *Clinical Psychology Review, 11*(4), 419-440. doi: 10.1016/0272-7358(91)90116-

Rapee, R. M. Craske, M. G. Brown, T. A. & Barlow, D. H. (1996) Measurement of perceived control over anxiety-related events. *Behavior Therapy*, 27, 279-293.

Reiss, S., Peterson, R. S., Gursky, D. M., & McNally, R. J. (1986). Anxiety sensitivity, anxiety, frequency and the prediction of fearfulness. *Behaviour Research and Therapy*, *24,* 1–8.

Robichaud, M., & Dugas, M. J. (2005). Negative problem orientation (part I): Psychometric properties of a new measure.Behaviour Research and Therapy, 43, 391–401. doi:10.1016/ j.brat.2004.02.007.

Rocco Donovan, M., Glue, P., Kolluri, S., & Emir, B. (2010). Comparative efficacy of antidepressants in preventing relapse in anxiety disorders — A meta-analysis (English). *Journal of affective disorders, 123*(1-3), 9-16.

Rodriguez, B. F., Bruce, S. E., Pagano, M. E., & Keller, M. B. (2005). Relationships among psychosocial functioning, diagnostic comorbidity, and the recurrence of generalized anxiety disorder, panic disorder, and major depression. *Journal of Anxiety Disorders, 19*(7), 752-766. doi: http://dx.doi.org/10.1016/j.janxdis.2004.10.002

Roemer, L., Borkovec, M., Posa, S., & Borkovec, T. D. (1995). A self-report measure of generalised anxiety disorder. *Journal of Behavior Therapy and Experimental Psychiatry, 26*, 345-350.

Roemer, L., Molina, S., & Borkovec, T. D. (1997). An investigation of worry content among generally anxious individuals. *Journal of Nervous and Mental Disease, 185*(5), 314-319. doi: 10.1097/00005053-199705000-00005

Roemer, L., Salters, K., Raffa, S., & Orsillo, S. M. (2005). Fear and avoidance of internal experiences in GAD: Preliminary tests of a conceptual model. *Cognitive Therapy and Research, 29*(1), 71-88.

Rogers, M. P., Warshaw, M. G., Goisman, R. M., Goldenberg, I., Rodriguez-Villa, F., Mallya, G., . . . Keller, M. B. (1999). Comparing primary and secondary generalized anxiety disorder in a long-term naturalistic study of anxiety disorders. *Depression And Anxiety, 10*(1), 1-7.

Roy-Byrne, P. P. (1996). Generalized anxiety and mixed anxiety-depression: association with disability and health care utilization. *J Clin Psychiatry, 7*, 86-91.

Ruggiero, G. M., Stapinski, L., Caselli, G., Fiore, F., Gallucci, M., Sassaroli, S., & Rapee, R. M. (2012). Beliefs over control and meta-worry interact with the effect of intolerance of uncertainty on worry. *Personality and Individual Differences, 53*(3), 224-230. doi: 10.1016/j.paid.2012.03.016

Ruggiero, G. M., Stapinski, L. A., Caselli, G., Fiore, F., & Gallucci, M. (2012). Beliefs over control and meta-worry interact with the effect of intolerance of uncertainty on worry *Journal of Personality and Individual Differnces, 53*, 224-230.

Ruscio, A. M., & Borkovec, T. D. (2004). Experience and appraisal of worry among high worriers with and without generalized anxiety disorder. [Article]. *Behaviour Research and Therapy, 42*, 1469-1482. doi: 10.1016/j.brat.2003.10.007

Russell, M., & Davey, G. C. L. (1993). The relationship between life event measures and anxiety and its cognitive correlates. *Personality and Individual Differences, 14*(2), 317-322.

Sanavio, E. (1988). Obsessions and compulsions: The Padua Inventory. *Behaviour Research and Therapy*, *26,* 169–177.

Salkovskis, P. M. (1992, June). *Cognitive models of therapy of obsessive-compulsive disorder.* Paperpresented at the World Congress of Cognitive Therapy, Toronto, Ontario, Canada.

Sanderson, W. C., Wetzler, S., Beck, A. T., & Betz, F. (1994). Prevalence of personality disorders among patients with anxiety disorders. *Psychiatry Research, 51*(2), 167-174. doi: http://dx.doi.org/10.1016/0165-1781(94)90036-1

Sigmund, F., Strachey, J., & Richards, A. (1976). *Introductory lectures on psychoanalysis*: Harmondsworth: Penguin, 1976.

Stapinski, L. A., Abbott, M. J., & Rapee, R. M. (2010). Fear and perceived uncontrollability of emotion: Evaluating the unique contribution of emotion appraisal variables to prediction of worry and generalised anxiety disorder. *Behaviour Research and Therapy, 48*(11), 1097-1104.

Tan, S., Moulding, R., Nedeljkovic, M., & Kyrios, M. (2010). Metacognitive, cognitive and developmental predictors of generalised anxiety disorder symptoms. *Clinical Psychologist, 14*(3), 84-89.

Tyrer, P., & Baldwin, D. (2006). Generalised anxiety disorder. *The Lancet, 368*(9553), 2156-2166.

Uhlenhuth, E. H., McCarty, T., Paine, S. & Warner, T. (1999).The revised Anxious Thoughts and Tendencies (ATT) scale:A general measure of anxiety-prone cognitive style. Journal of Affective Disorders, 52, 51 – 58.

Vasey, M. W., & Borkovec, T. D. (1992). A catastrophizing assessment of worrisome thoughts. *Cognitive Therapy and Research, 16*(5), 505-520. doi: 10.1007/bf01175138

Weissman, A. N. (1980). *Assessing depressogenic attitudes: A validation study.* Poster session presented at the annual meeting of the Eastern Psychological Association, Hartford, Connecticut.

Wells, A. (1994). A multi-dimensional measure of worry: Development and preliminary validation of the Anxious Thoughts Inventory. *Anxiety, Stress & Coping: An International Journal, 6*(4), 289-299. doi: 10.1080/10615809408248803

Wells, A. (1995). Meta-cognition and worry: A cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy, 23*(03), 301-320.

Wells, A. (1999a). A cognitive model of generalized anxiety disorder. *Behavior Modification, 23*(4), 526-555.

Wells, A. (1999b). A metacognitive model and therapy for generalized anxiety disorder. *Clinical Psychology and Psychotherapy, 6*, 86-95.

Wells, A. (2000). *Emotional disorders and metacognition: Innovative cognitive therapy.* New York, NY US: John Wiley & Sons Ltd.

Wells, A. (2005). The metacognitive model of GAD: Assessment of meta-worry and relationship with DSM-IV; generalized anxiety disorder. *Cognitive Therapy and Research, 29*(1), 107-121.

Wells, A. (2009). *Metacognitive therapy for anxiety and depression.* London: Guilford Press.

Wells, A., & Carter, K. (2001). Further tests of a cognitive model of generalized anxiety disorder: Metacognitions and worry in GAD, panic disorder, social phobia, depression, and nonpatients. *Behavior Therapy, 32*(1), 85-102.

Wells, A., & Cartwright-Hatton, S. (2004). A short form of the metacognitions questionnaire: properties of the MCQ-30. *Behaviour Research and Therapy, 42*(4), 385-396.

Wells, A., & Matthews, G. (1994). *Attention and emotion: a clinical perspective*: Hove: Erlbaum, 1994.

Wells, A., & Matthews, G. (1996). Modelling cognition in emotional disorder: The S-REF model. *Behaviour Research and Therapy, 34*(11-12), 881-888.

Wells, A., & Morrison, A. (1994). Qualitative dimensions of normal worry and normal obsessions: A comparative study. *Behaviour Research and Therapy, 32*(8), 867-870.

Wells, A., & Papageorgiou, C. (1995). Worry and the incubation of intrusive images following stress. *Behaviour Research and Therapy, 33*(5), 579-583.

Wegner, D. M., & Zanakos, S. (1994). Chronic though suppression. *Journal of Personality, 62,* 615-640.

Williams, K. E., Chambless, D. L., & Ahrens, A. (1997). Are emotions frightening? Anextension of the fear of fear construct. Behaviour Research and Therapy, 35, 239-248

Wittchen, H., Zhao, S., Kessler, R. C., & Eaton, W. W. (1994). DSM-III-R generalized anxiety disorder in the national comorbidity survey. *Archives of General Psychiatry, 51*(5), 355-364. doi: 10.1001/archpsyc.1994.03950050015002

Wittchen, H. U., Carter, R. M., Pfister, H., Montgomery, S. A., & Kessler, R. C. (2000). Disabilities and quality of life in pure and comorbid generalized anxiety disorder and major depression in a national survey. *International Clinical Psychopharmacology, 15*(6), 319-328.

Wittchen, H. U., & Hoyer, J. (2001). Generalized anxiety disorder: Nature and course. *Journal of Clinical Psychiatry, 62 (suppl 11)*, 15-19.

Yilmaz, A. E., Gençöz, T., & Wells, A. (2011). The temporal precedence of metacognition in the development of anxiety and depression symptoms in the context of life-stress: A prospective study. *Journal of Anxiety Disorders, 25*(3), 389-396.

Yonkers, K. A., Dyck, I., R., Warshaw, M., & Keller, M., B. (2000). Factors predicting the clinical course of generalised anxiety disorder. *The British Journal of Psychiatry, 176*, 544-549. doi: 10.1192/bjp.176.6.544

Yonkers, K. A., Warshaw, M. G., Massion, A. O., & Keller, M. B. (1996). Phenomenology and course of generalised anxiety disorder. *The British Journal of Psychiatry, 168*(3), 308-313. doi: 10.1192/bjp.168.3.308

Chapter 3: Empirical Paper

Intolerance of Uncertainty, Negative Metacognitive Beliefs and Experiential Avoidance in predicting Worry and Generalised Anxiety Disorder[2]

Whittaker Bork, N, O'Carroll, P, & Fisher, P

Department of Clinical Psychology, University of Liverpool, Liverpool

3.1 Abstract

The Intolerance of Uncertainty, Metacognitive, and Acceptance-Based models of generalised anxiety disorder (GAD) stipulate three vulnerability mechanisms for understanding the development and maintenance of persistent worry and GAD. These vulnerability factors include intolerance of uncertainty, negative metacognitive beliefs, and experiential avoidance. Cross-sectional studies have supported the unique constructs for each model and their relationships with worry and GAD; however, there are few prospective studies and none has included an assessment of all three models. The current study aimed to extend previous research by examining relative and unique contributions of each of these models in their prediction of worry and GAD over time in a non-clinical sample.

A non-clinical sample completed a battery of self-report questionnaires (N=586) and again 6 months later (N=323). Logistic and hierarchical regression analysis showed that from the three psychological models tested only negative metacognitive beliefs about the danger of worry significantly predicted worry and GAD status, in addition to other known predictors. Thus, suggesting that metacognitive theory can enhance our knowledge of the factors responsible for the persistence of worry and GAD.

Key Words: generalised anxiety disorder, worry, intolerance of uncertainty, negative metacognitive beliefs, and experiential avoidance.

---

[2] This paper is to be submitted to the Journal of Anxiety Disorders for publication, please see Appendix A for author guidelines.

3.2 Introduction

Generalised anxiety disorder (GAD) is a common mental health problem that is characterised by persistent and uncontrollable worry (APA, 2000). It has a chronic course and is associated with high levels of co-morbidity (Rodriguez, Bruce, Pagano, & Keller, 2005; Yonkers, Dyck, Warshaw, & Keller, 2000), with a lifetime prevalence rate of 5.7% (Kessler, Walters, & Wittchen H, 2004). Increased prevalence rates are observed for women (2:1) (Maier et al., 2000; Olfson et al., 2000), in unmarried individuals, and those from low socioeconomic and ethnic minority groups (Kessler et al., 2004). It represents a considerable public health concern because of its chronic course (Wittchen, Zhao, Kessler, & Eaton, 1994), coupled with high rates of GAD presenting in primary care settings, it has led to high costs to the public health service and the economy (Barrett, Barrett, Oxman, & Gerber, 1988; Maier et al., 2000; Olfson et al., 2000; Roy-Byrne, 1996). Health care costs of anxiety disorders alone, in 2007 were an estimated £1.2 billion for the UK, and with the addition of loss of employment, the total cost was £8.9 billion (DoH, 2011; McCrone, Dhanasiri, Patel, et al., 2008).

Theoretical advances in understanding the development and maintenance of worry and GAD have led to several competing theoretical models and treatments. Most of these models fall under the rubric of Cognitive Behavioural Therapy (CBT). Early generic models of anxiety such as Beck's models of Anxiety (Beck, Emery, & Greenberg, 1985) and Barlow's model of Anxious Apprehension (Barlow, 2000) provided the foundation of the development of specific models of GAD. Borkovec and colleagues (Borkovec et al., 2004) provided the advent of specific models, which saw the development of the Cognitive Avoidance model, which highlighted the specific role of avoidance of unwanted images, somatic and emotional experiences. Worry therefore serves the purpose of helping the individuals to avoid perceived catastrophic events of occurring (Borkovec, 1994).

Four further recent models with growing empirical support include the Intolerance of Uncertainty (IU) model of GAD, which focuses on the construct of IU (Dugas, Gagnon, Ladouceur, & Freeston, 1998) the Metacognitive model of GAD, which stipulates a specific role for negative metacognitive beliefs (Wells, 1995, 1999), an Acceptance-Based model of GAD, which has the process of experiential avoidance as its unique construct (Roemer, Salters, Raffa, & Orsillo, 2005). Finally a Cognitive Model of Pathological Worry (Hirsch & Mathews, 2012) this model suggests worry arises from an interaction between involuntary (bottom up) process, habitual biases in attention, and biases interpretation of threatening stimuli and voluntary (top down) process (Hirsch & Mathews, 2013). All these various processes have been observed to distinguish normal worriers from those experiencing GAD.

Of main interest in this research were three leading models, which included the IU model, the Metacognitive Model and finally the Acceptance based model. The IU model (Dugas et al., 1998) is a schema-based model that highlights individuals with GAD are more likely to react negatively on an emotional, cognitive, and behavioural level to situations that are uncertain, and this notion is thought to be the key component related to the development and maintenance of worry and GAD. The model suggests that individuals with IU use worry as a coping strategy, as they believe their worry will serve a purpose to help them cope with threatening situations or actually prevent them from happening, (Dugas et al., 1998; Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994).

Worrying leads to negative problem orientation, where problems are perceived as threats leading to avoidance of situations where problems may arise. In addition, IU leads to cognitive avoidance, a strategy used by the individual to help them cope, but in the long-term is largely ineffective as it serves to maintain beliefs about the danger of ambiguous or uncertain situations and individuals are unable to avoid

uncertainty altogether, thus increasing their worry (Dugas et al., 1998). Empirically, high levels of IU have been associated with an increased severity of worry (Ladouceur, Gosselin, & Dugas, 2000), and have been found to be higher in those experiencing GAD in comparison to other anxiety disorders (Dugas, Gosselin, & Landouceur, 2001; Dugas, Schwartz, & Francis, 2004; Dugas, Marchand, & Ladouceur, 2005; Ladouceur et al., 1999).

One element of the Metacognitive model of GAD (Wells, 1995, 1999) proposes that individuals hold positive metacognitive beliefs about worry. Positive metacognitive beliefs relate to the usefulness of worry, that it is a helpful activity; that worrying enables individuals to anticipate future problems, and to consider strategies to help them cope. All individuals will hold positive beliefs about worrying at times, but the Metacognitive model states that this is not the distinctive or proximal feature of GAD. Wells and colleagues suggest that for individuals with GAD, the activity of worry can also become the source of negative appraisals if worry persists.

These appraisals fall into two distinct categories; that worry is perceived to be *dangerous* and that worry is perceived to be *uncontrollable* (Wells, 1999). As worry escalates, the individual attempts to control or suppress their worry, which is largely an ineffective mental control strategy that serves only to maintain worry. This reinforces negative metacognitive beliefs that worry is uncontrollable. Research to support this model, has highlighted that those with more severe worry have stronger negative beliefs about the harmfulness and uncontrollability of worry (Ruscio & Borkovec, 2004; Wells & Carter, 1999). In addition, negative metacognitive beliefs about worry have been found to distinguish GAD sufferers from non-clinical worriers (Cartwright-Hatton & Wells, 1997; Davis & Valentiner, 2000; Wells, 2005).

Other models propose that fear of emotions has a key role in the development of worry and GAD, which formed the basis of early psychological models of GAD such as the Cognitive Avoidance model of GAD (Borkovec, Alcaine, & Behar, 2004). These models stipulates that fear of emotions causes individuals with GAD to avoid mental imagery, somatic and emotional experiences and, despite providing alleviation from distress in the short-term, in the long-term this prevents emotional processing that is required for the extinction of fears (Borkovec et al., 2004).

An additional, more recent, conceptualisation of fear of emotions, based on this concept, is that of experiential avoidance, which refers to the unwillingness to remain in contact with difficult thoughts, emotions, and other private experiences. It is not focused on the interpretation of events or surroundings, but rather on how individuals tolerate an anxious affect in the presence of fear cues such as body sensations, emotions and thoughts (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Experiential avoidance is the key unique construct of the Acceptance-Based model of GAD developed by Roemer et al (2005).

This model suggests persistent worry is maintained by psychological inflexibility due to experiential avoidance, with worry serving a function of avoiding experiences that are distressing. Although in its infancy, some empirical support exists for this model, showing an association of experiential avoidance with GAD (Roemer et al., 2005). Roemer et al., (2005) reported that experiential avoidance contributed a unique variance in a cross-sectional study of non-clinical participants reporting GAD symptoms. In addition, Lee et al. (2010) reported high levels of experiential avoidance in a treatment-seeking sample of GAD participants (Lee, Orsillo, Roemer, & Allen, 2010).

There has been little research exploring the relative and unique contribution to worry and GAD comparing two or more of these processes. Two studies to date have explored the role of IU and experiential avoidance (Buhr & Dugas, 2012; Lee et al., 2010). Lee et al. (2010) reported both IU and experiential avoidance to be associated with GAD, however only Buhr and Dugas (2012) explored the relative contribution of experiential avoidance, and reported that although it offered some variance in the prediction of GAD, it made only a small contribution, with IU being a stronger predictor of GAD. The overall findings from these two studies appear to demonstrate an association of experiential avoidance with GAD, but offer little evidence of it offering a unique continuation to the development and maintenance of GAD.

Two studies have explored metacognitions and IU, and both found IU to be the strongest predictor of worry (Khawaja & Chapman, 2007; Stapinski, Abbott, & Rapee, 2010). However, neither of these studies explored the specific role of negative metacognitive beliefs alone, with one study exploring positive metacognitive beliefs (Khawaja & Chapman, 2007) and the other study not separating the individual Metacognitive model constructs (i.e. positive and negative beliefs about worry) (Stapinski et al., 2010). Finally, one study has explored the role of IU and negative metacognitive beliefs and their findings suggested there was an interaction between IU and negative metacognitive beliefs, suggesting negative metacognitive beliefs strengthened the link to IU, thus increasing worry and GAD symptoms (Ruggiero et al., 2012).

In summary, most studies to date have been cross-sectional, with no previous studies using a prospective design to examine the independent contributions made by IU, negative metacognitive beliefs, and experiential avoidance in predicting worry and GAD over a 6-month period. As indicated above, the construct of positive

beliefs about worry is common to all three models, therefore, in this study, positive beliefs about worry will be entered as a covariate. In addition, other covariates will include mood, demographics and daily hassles, as previous studies have omitted to control for these factors. Earlier criticisms have been made about the use of the negative metacognitive beliefs sub-scale of the MCQ because it includes items related to both dangerousness and uncontrollability (Behar, DiMarco, Hekler, Mohlman, & Staples, 2009; Wells, 2005). As uncontrollability is a diagnostic criterion for GAD, it is likely to inflate associations between the general negative metacognitive beliefs and GAD. Therefore, this study will focus on negative metacognitive beliefs about the dangerousness of worry.

Comparing these psychological processes, and controlling for these other key factors, will allow a clear delineation of the key mechanism(s) involved in worry and GAD. Therefore, this study will test whether IU, negative metacognitive beliefs about danger and experiential avoidance prospectively predict worry severity and GAD status. In addition, it will explore whether these three constructs are able to contribute to the variance over and above factors previously implicated in worry severity, including demographic factors, positive beliefs about worry and daily hassles. Specific hypotheses with respect for the aim of the current study were as follows:

1. *'IU, negative metacognitive beliefs, and experiential avoidance as measured at time 1 (T1) will prospectively predict residual change in worry at time 2 (T2), when demographic variables, worry T1, positive beliefs about worry T1, depression T1, and daily hassles T2 are controlled'.*

2. *'IU, negative metacognitive beliefs, and experiential avoidance as measured at T1 will prospectively predict GAD status T2 when demographic variables,*

GAD status T1, positive beliefs about worry T1, depression T1 and daily hassles T2 are controlled'.

3.3 Method

3.3.1. Participants

Five hundred and eighty six (n=586) undergraduate and postgraduate students participated in the study at T1. Three hundred and twenty three students (55% retention rate) participated at T2, approximately 6-months later (See Appendix B for recruitment procedure). Of the 323 who completed on both occasions, 248 (76.8%) were female and 75 (23.2%) were male. The age range was 18-64 years with a mean age of 22.99 years. The majority of the sample identified themselves as White British 262 (81.1%), Irish 12 (3.7%), other white background 22 (6.8%), Asian background six (1.8%), Black background three (0.9%), Chinese two (0.6%), and 16 (4.9%) identified themselves as having mixed ethnicity.

3.3.2 Measures

Dependent Variables

Penn State Worry Questionnaire (PSWQ): (Meyer, Miller, Metzger, & Borkovec, 1990). The PSWQ is a 16-item self-report measure of trait worry, assessing the tendency to engage in excessive and uncontrollable worry. Participants rate the extent to which the items are typical of themselves on a Likert scale ranging from 1 (*Not typical at all*) to 6 (*Very typical of me).* Higher scores indicate more severe worry. The PSWQ has demonstrated convergent and divergent validity, internal consistency (α=.93) and test-retest reliability (Meyer et al., 1990).

Generalised Anxiety Disorder Questionnaire-IV (GAD-Q-IV): (Newman et al., 2002). A 9-item self-report measure that assesses the severity of GAD and its constituent components was based on the DSM-IV diagnostic criteria (APA, 2000). The recommended cut-off score for individuals meeting the diagnostic criteria is 5.7, which demonstrates test-retest reliability, convergent and discriminate validity, and kappa agreement of .67 with a structured interview. Using this cut-off leads to sensitivity of 83% and specificity of 89% (Newman et al., 2002). This measure was used to screen participants meeting the criteria for GAD.

Predictor Variables

Intolerance of Uncertainty Scale (IUS): (Freeston et al., 1994). This 27-item measure assesses uncertainty, emotional and behavioural reactions to ambiguous situations, implications of being uncertain, and attempts to control the future. Items are rated on a 5-point Likert scale, with higher scores on this measure indicating greater IU. The IUS has shown good internal consistency and test-retest reliability (Buhr & Dugas, 2002).

Metacognitions Questionnaire (MCQ-30): (Wells & Cartwright-Hatton, 2004). This is a 30-item self-report measure, measuring a range of metacognitive beliefs relevant to the vulnerability and to the maintenance of emotional disorders. It has five subscales that assess '*positive beliefs about worry*', '*negative beliefs about the danger and uncontrollability of worry*', 'cognitive *confidence*', *'need for control'* and '*cognitive self-consciousness'*. Items are scored on a four-point scale, yielding a total score for each subscale ranging from 6-24. High scores indicate that more positive and negative beliefs about worry, reduced cognitive confidence in memory, greater belief in the need to control thoughts and an increased tendency towards self-focused attention. This measure has demonstrated reliability, validity, and moderate test-retest reliability (Wells & Cartwright-Hatton, 2004). For this study, the

whole measure was administered with only positive and negative beliefs about worry (only 3 items relating to the danger of worry) subscales being used for the analysis.

Acceptance and Action Questionnaire (AAQ-II): *(Bond et al., 2011).* This is a 10-item measure of experiential avoidance and psychological flexibility. These are rated on a 7-point Likert scale, ranging from 1 (*never true)* to 7 (*always true).* Higher scores indicate greater psychological flexibility (i.e. less experiential avoidance). This measure has good internal consistency, good test-retest reliability and validity (Bond et al., 2011).

Covariate Variables

Depression Anxiety Stress Scale (DASS-21): (Lovibond & Lovibond, 1995). A 21-item self-report measure of negative emotional states, including depression, anxiety, and stress. Items are rated on a 4-point Likert scale ranging from 0 (*does not apply to me*) to 3 (*applied to me very much*). Higher scores indicate a greater severity of depression, anxiety, and stress. It has adequate construct validity and reliability (Henry & Crawford, 2005). In the current study, only the depression subscale was used.

Inventory of College Students' Recent Life Events (ICSRLE): (Kohn, Lafreniere, & Gurevich, 1990). This is as well validated 49-item self-report measure, designed to assess students' levels of daily hassles without the contamination of general psychological symptoms, measured on a 4-point Likert scale, 1 (*not at all part of my life) to 4 (very much a part of my life*). Higher scores indicate higher levels of daily hassles. It has acceptable test-retest reliability (Sarason, Johnson, & Siegel, 1978).

3.3.3 Procedure

Ethical permission was sought and obtained prior to commencing this research, with all participants consenting for their data to be used for research purposes. Participants were provided with a web-based study and were greeted by an information page (*Appendix C*), a consent page (*Appendix D)* and then completed the set of questionnaires at T1, and were contacted by email, 6 months later to complete the same questionnaires (*Appendix E*). All participants were entered into a prize draw for gift vouchers upon completion of the second set of questionnaires.

3.3.4 Overview of Data Analytic Strategy

The data was analysed using the Statistical Package for Social Sciences (SPSS, v.20). As not all scales were normally distributed, this study used nonparametric statistics to ensure findings were robust. Nonparametric statistics (Mann-Whitney U) were used to compare completers and non-completers and T1 outcomes, and changes in worry (Wilcoxon signed ranks) and GAD status (McNemar) over time. Gender differences were explored across worry severity T1 and T2, depression T1, positive beliefs about worry T1, daily hassles T2, IU, negative metacognitive beliefs about the danger of worry, and experiential avoidance (Mann-Whitney U) and GAD status (Fisher's exact test, one-tailed). Where significant differences were found these variables were entered as control variables in the subsequent regression analyses; however, other variables were also entered to partial out variance.

Preliminary correlation analyses (Spearman Rho) examined the correlation of T1 and T2 worry, depression, positive metacognitive beliefs, IU, negative metacognitive beliefs about danger, and experiential avoidance. To test the prediction that IU, negative metacognitive beliefs about danger, and experiential avoidance as assessed at T1 would prospectively predict worry 6 months later (T2), hierarchical regression analysis was employed. Step one controlled for age, gender, and step

two controlling for worry T1, depression T1, positive beliefs about worry T1 and daily hassles T2 as these are previously know predictors of worry. With the addition of IU at step three, experiential avoidance at step four, and finally negative metacognitive beliefs about danger in step five. The order of the last three steps in the hierarchical regression was determined by entering the last three variables in different orders. As negative metacognitive beliefs were the only significant predictor of the three constructs regardless of order enters, it was entered last as any variance that was attributable to IU and experiential avoidance could be partialled out.

The final analysis involved a test of the prediction that IU negative metacognitive beliefs about danger, and experiential avoidance as assessed at T1 would prospectively predict GAD status 6 months later (T2). Logistic regression analysis was employed, with step one controlling for age, gender, and step two controlling for GAD status T1, depression T1, positive beliefs about worry T1 and daily hassles T2, with the addition of IU step three, experiential avoidance at step four, and finally negative metacognitive beliefs in step five. The rational for the order of steps in the logistic regression, was the same as that employed for the hierarchical regression analysis.

3.4 Results

3.4.1. Data Screening

Univariate analysis for each variable was assessed for normality, homogeneity of variance, and the presence of outliers (*Appendix F*); there were no missing values by virtue of the inclusion criteria. According to the Kolmogorov-Smirnov statistic assumptions of normality were violated (DASS-D, PSWQ, MCQ-POS, MCQ-Neg-D, IUS, AAQ-II, ICSRLE T2), however several variables visibly approximated normal distributions with acceptable levels of skew and kurtosis. Nevertheless, non-

parametric tests were used to assess bivariate correlations and to test for differences amongst these variables. Analyses for multivariate outliers were identified for seven cases. Due to the sensitivity of regression analysis to outlying data points, all these cases were removed from the analysis (Tabachnick & Fidell, 2007) leaving a final sample of 316. The assumptions of linearity, homoscedasticity, and normally distributed errors were all met (*Appendix F*). Tolerance values ranged from 0.34 to 0.98, indicating no problems with multicollinearity as values were above 0.1 (Tabachnick & Fidell, 2007).

3.4.2 Descriptive, Preliminary and Correlational Analysis

3.4.2.1 Completers versus Non-Completers

Comparisons of participants who completed the study at both times and those who completed only at T1 differed only in age, with those completing the study both times being significantly older than those who completed only at baseline [(*Mdn*=306.67, completed follow-up) (*Mdn*=278.71, did not complete), U=38626, *z*=-2.008, p<.05].

3.4.2.2 Changes in GAD Status and Worry over Time

No significant differences were observed between worry scores T1 and T2, however there was a significant difference between those who met GAD criteria at T1 and T2 (Table 2).

Table 2: Differences in Measures of Worry and GAD Status over Time.

	Time 1 (n=316)	Time 2 (n=316)	*P*
PSWQ			
Mean (SD)	52.93 (13.37)	52.58 (13.38)	Z=-.850, p=.395
Median (IQR)	53.50 (20)	53.00 (20)	
GAD-Q-IV			
N	138	119	p<.05
%	(43.7%)	(37.7%)	

Note: PSWQ=Penn State Worry Questionnaire, GAD-Q-IV=Generalised Anxiety Disorder Questionnaire.

3.4.2.3 Gender Differences

Women reported significantly higher levels of worry at T1 and T2, however there was no significant difference between the gender observed and those who met GAD criteria (cut off 5.7) at T1. Significant differences were observed at T2 with more women meeting the criteria for GAD status at T2 (Table 3). Gender was therefore entered as a covariate in subsequent analyses.

Table 3: Gender Differences in Worry and GAD Status T1 and T2

	Male (n=69)	Female (n=246)	*p*
PSWQ T1			
Mean (SD)	48.48 (13.67)	54.14 (13.05)	p<.01
Median (IQR)	48 (21)	54 (19)	
PSWQ T2			
Mean (SD)	48.43 (13.68)	53.74 (13.10)	p<.01
Median (IQR)	46 (19)	54 (19)	
GAD-Q-IV T1			
N	24	114	P=.60
%	7.6%	36.1%	
GAD-Q-IV T2			
N	16	103	p<.01
%	5.1%	32.6%	

Note: *PSWQ=Penn State Worry Questionnaire, GAD-Q-IV=Generalized Anxiety Disorder Questionnaire*

3.4.2.4 Correlations

Intercorrelations of outcome and predictor variables are presented in Table 4. These indicated the univariate associations between each outcome and the predictor variable, (worry- PSWQ).

Table 4: Spearman's Rho Correlation Coefficients between Symptom Predictor and Covariate Variable.

Variable	1	2	3	4	5	6	7	8	Median (IQR)
1. PSWQ T1	-	.846***	.493***	.289***	.679***	.703***	-.655***	.476***	53.50 (20)
2. PSWQ T2		-	.451***	.315***	.642***	.649***	-.594***	.578***	53 (20)
3. DASS-D			-	.075	.536***	.523***	-.587***	.501***	4 (5)
4. MCQ-POS				-	.126*	.324***	-.134*	.202***	10 (5)
5. MCQ-NEG-D					-	.608***	-.679***	.505***	6 (4)
6. IUS						-	-.715***	.536***	59.50 (104)
7. AAQ-II							-	-.515***	47 (19)
8. ICSRLE T2								-	91 (30)

Note: PSWQ=Penn State Worry Questionnaire, T1 & T2, DASS-D=Depression, MCQ-POS=Positive Beliefs about Worry; MCQ-NEG-D=Negative beliefs about worry danger subscale; IUS=Intolerance of Uncertainty Scale; AAQ-II=Acceptance and Action Questionnaire; ICSRLE=Inventory of College Students' Recent Life Events, Time 2.
* p<.5, *** p<.001, (1-talied).

3.4.3 Prediction of Worry

The hierarchical multiple regression analysis was conducted to identify predictors of change in worry symptoms prospectively over 6 months; Table 5 displays results of this analysis. In step one, age and gender accounted for 2.7% of the variance in worry, T2 (PSWQ, T2) [F (2, 313) = 4.36, p<.05]. At step two, positive metacognitive beliefs (MCQ-POS), depression (DASS-D) and daily hassles, T2 (ICSRLE, T2) and worry, T1 (PSWQ, T1), were entered and accounted for an additional 47.9% of the variance in the model [F (6, 309) = 153.72, p<.001]. Step three included the addition of IU (IUS) which accounted for an additional 0.1% of the variance [F (7, 308) = 131.86, p <.001]. In step four, the addition of experiential avoidance (AAQ-II) accounted for no additional variance in worry [F (8, 307) = 115.19, p <.001], and the final step, included negative metacognitive beliefs about

danger (MCQ-NEG-D), which accounted for an additional 0.4% of the variance [$F_{(9, 306)} = 104.06$, $p < .001$]. The final model accounted for 75.4%. Beta coefficients revealed only worry T1 (PSWQ, T1), daily hassles T2 (ICSRLE, T2), positive beliefs about worry (MCQ-POS) and negative metacognitive beliefs about the danger of worry (MCQ-NEG-D) to be significant predictors of worry T2 (PSWQ, T2).

The reversal of predictor variables in steps, three, four and five, demonstrated experiential avoidance (AAQ-II) and IU (IUS) to offer 0.1% of the variance when entered in step three, but added no additional variance when entered in steps four and five. Neither of these measures produced a significant unique contribution to the model. When negative metacognitive beliefs about danger (MCQ-NEG-D) were entered at step three, it offered 0.5% and 0.4% respectively when entered in steps four and five. It was the only variable to offer a significant unique contribution to the overall model, regardless of the order entered.

Table 5: Hierarchical Multiple Regression Analysis Predicting T2 Worry after Controlling for (1) Age and Gender, (2) Age, Gender, Depression T1, Positive Beliefs about Worry T2, Daily Hassles T2 and Worry T1.

Variables	ΔR^2	ΔF	B	B (SE)	β	t
					Final Model	
Step 1	.027	4.36*				
Age			.025	.078	.010	.326
Gender			.616	.940	.019	.655
Step 2	.722	222.23***				
DASS-D			-.229	.128	-.070	-1.787
MCQ-POS			.252	.120	.067	2.108*
ICSRLE T2			.113	.022	.186	5.181***
PSWQ T1			.695	.045	.694	15.296***
Step 3	.001	.932				
IUS			.012	.029	.021	.432
Step 4	.000	.3.76				
AAQ-II			.-001	.054	-.001	-.011
Step 5	.004	4.49*				
MCQ-NEG-D			.441	.208	.094	2.119*

*Note: DASS-D=Depression, MCQ-POS=Positive Metacognitive beliefs subscale MCQ-NEG-D=Negative metacognitive beliefs about the danger of worry subscale; IUS=Intolerance of Uncertainty Scale; AAQ-II=Acceptance and Action Questionnaire; ICSRLE=Inventory of College Students' Recent Life Events; PSWQ=Penn State Worry Questionnaire. * p<.05, *** p<.001*

3.4.4 Prediction of GAD

Logistic regression analysis was conducted to ascertain whether the three constructs offered prediction of GAD status at T2, and participants were grouped according to their scores on the GAD-Q-IV. Those scoring 5.7 or above were categorised as experiencing GAD (GAD group, n=138) and those scoring below 5.7 were categorised as non-clinical (non-GAD, n=178) (Newman et al., 2002). A hierarchical logistic regression analysis evaluated the unique contribution of IUS,

AAQ-II and MCQ-NEG-D in predicting GAD status (GAD versus non-GAD), results of which are presented in Table 6.

A good-fit model was observed on the first step, [χ^2 (2, 313) = 8.32, p <.05], a correct classification rate of 62.3% was observed indicating age and gender reliability contributed to the prediction of GAD T2. On the second step, a good-fit model was also observed [χ^2 (6,310) = 153.55, p <.001], with an improved correct classification rate of 80.7% indicating depression (DASS-D), positive beliefs about worry (MCQ-POS), daily hassles T2 (ICSRLE, T2), and GAD status T1 (GAD-Q-IV, T1), all contributed to the prediction of GAD. The addition of predictor variables also found a good-fit model. Step three had the addition of IU (IUS), [χ^2 (7, 309) = 155.62, p <.001] however, correct classification of the model reduced to 80.1%. The further addition of experiential avoidance (AAQ-II) [χ^2 (8, 308) = 160.90, p<.001] offered a slight improvement of the correct classification of the model to 80.3%. The final addition of negative metacognitive beliefs about danger (MCQ-NEG-D) [χ^2 (9, 307) = 176.14, p <.001] improved the model classification again to 80.7%. Examination of the relative contribution of each variable, revealed only gender, daily hassles T2 (ICSRLE, T2), GAD status T1 (GAD-Q-IV, T1) and negative beliefs about danger (MCQ-NEG-D) significantly contributing to the classification of GAD status within the full model.

The reversal of predictor variables in steps three, four, and five found a good-fit model for all variations regardless of the order entered. In addition, there were no major differences in the overall correct classification of each of the models. In evaluation of the relative and unique contribution of each variable, the results obtained demonstrated negative metacognitive beliefs about danger (MCQ-NEG-D)

to be the only variable to contribute significantly to the correct classification of the model, regardless of the order entered.

Table 6: Logistic Regression for Full Model Predicting GAD Status T2, Controlling for (1) Age and Gender, (2) Age, Gender, Depression T1, Positive Beliefs about Worry T1, Daily Hassles T2, and GAD Status T1.

Variables	B	B (SE)	Wald	df	Odd Ratio	Odds Ratio 95% C.I	
						Lower	Upper
Step 1: 62.3%							
Age	.029	.033	.734	1	1.30	.964	1.099
Gender	-1.107	.434	6.50*	1	.330	.141	.774
Step 2: 80.7%							
DASS-D	.000	.052	.000	1	1.00	.904	1.117
MCQ-POS	.074	.050	2.20	1	1.08	.976	1.187
ICSRLE T2	.045	.010	23.28***	1	1.05	1.027	1.066
GAD status T1	-1.348	.374	12.33***	1	.27	.129	.560
Step 3: 80.1%							
IUS	-.004	.011	.137	1	.97	.975	1.018
Step 4: 81.3%							
AAQ-II	-.017	.022	.646	1	.98	.942	1.025
Step 5: 80.7%							
MCQ-NEG-D	.299	.075	14.55***	1	1.35	1.157	1.573

Note: DASS-D=Depression, MCQ-POS=Positive Metacognitive beliefs subscale; MCQ-NEG-D=Negative metacognitive beliefs about the danger of worry subscale IUS=Intolerance of Uncertainty Scale; AAQ-II=Acceptance and Action Questionnaire; ICSRLE T2=Inventory of College Students' Recent Life Events, T2; GAD Status=Generalized Anxiety Disorder Questionnaire (GAD-Q-IV). * $p<.05$, ***$p<.001$

3.5 Discussion

This research was the first prospective study to examine relative contributions of three leading constructs purported to have a significant role in the development and maintenance of worry and GAD. Initial correlational analysis revealed positive correlations with depression T1, positive metacognitive beliefs T1, daily hassles T2, IU and negative metacognitive beliefs about danger, and worry at T1 and T2. A negative relationship was found between experiential avoidance and worry T1 and T2. Correlations between IU, negative metacognitive beliefs about danger and experiential avoidance and worry are consistent with previous research (Dugas et al., 1998; Roemer et al., 2005; Wells, 2005).

In the prospective analyses, the results of the hierarchical regression analysis predicting worry, after controlling for the influence of demographic factors, depression T1, and positive metacognitive beliefs T1, daily hassles T2 revealed only negative metacognitive beliefs about danger to predict worry over time. IU and experiential avoidance failed to contribute to the unique variance in the change observed in worry severity. In addition to the three constructs of interest, daily hassles T2 and positive metacognitive beliefs about worry were also significant predictors of worry prospectively.

Additional logistic regression analysis in the prediction of GAD status demonstrated similar results after controlling for the influence of demographic factors; depression T1, daily hassles T2, and positive metacognitive beliefs T1. Only negative metacognitive beliefs about danger were a significant predictor of GAD status prospectively. IU and experiential avoidance failed to contribute to the prospective prediction of GAD. Additionally, gender and daily hassles T2 were identified as unique predictors of GAD.

Overall, the results from this study suggest a possible causal role of negative metacognitive beliefs about danger, which is not attributable to the effects of other known predictors, to the change in residual symptoms of worry and GAD status over time. In addition, findings are suggestive of negative metacognitive beliefs about danger being one of the central features that distinguish low worries from those with more severe worry and those with GAD in a non-clinical sample. Daily hassles emerged as a significant predictor for worry and GAD, highlighting the specific possible causal role of daily hassles in worry and GAD status.

Given the higher prevalence rates of GAD in females, it is unsurprising that gender contributed to the prediction of GAD, with females being more likely to meet the GAD criteria and predict GAD status prospectively. Additionally, positive metacognitive beliefs remained a significant predictor of worry, and, although this has not been identified as a proximal feature for the development and maintenance of worry, it is consistent with IU, Metacognitive and Acceptance-based models of GAD, which suggests individuals will hold positive about worry. Thus, individuals increase the selection of worry as a coping strategy. Specific to the Metacognitive model, these positive beliefs leads to increased distress when the individual has negative appraisals about their worry as being dangerous (Wells, 1995, 1999).

Only one previous experimental study has used only the items relating negative metacognitive beliefs of the danger of worry and not uncontrollability, as measured by the MCQ in isolation (Ruscio & Borkovec, 2004). This study found negative metacognitive beliefs about danger to differ significantly in individuals with GAD and non-GAD high worriers, thus suggesting this was the main construct to distinguish the difference between high worriers, with GAD reporting significantly higher levels of impairment than worriers without GAD. This is also consistent with other studies that did not distinguish between uncontrollability and danger, which found negative

metacognitive beliefs to be predictive of worry and GAD (Barahmand, 2009; Davis & Valentiner, 2000; Wells & Carter, 2001). Yet these studies were cross-sectional and do not offer any information on the temporal relationship of negative metacognitive beliefs. One study that has explored the temporal relationship is Yilmaz et al (2011), although not directly related to worry or GAD, they found negative beliefs about worry to be a significant predicator of anxiety prospectively, after also controlling for the effect of daily hassles (Yilmaz, Gençöz, & Wells, 2011). Therefore, the current study provides further support for the role of negative metacognitive beliefs about the danger of worry in predicting severity of worry and GAD status.

In contrast to previous findings, these results do not support the role of IU or experiential avoidance and their relative contribution to the prediction of worry and GAD. Cross-sectional studies have previously found IU to be the strongest predictor of worry (Buhr & Dugas, 2006; Dugas, Freeston, & Ladouceur, 1997; Dugas et al., 2007; Dugas, Marchand, & Ladouceur, 2005). Additional research by Stapinski et al (2010) reported IU to be the strongest predictor of worry and metacognitive beliefs to be the strongest predictor of GAD. However, they did not explore the metacognitive constructs in isolation (i.e. separate positive and negative beliefs) (Stapinski et al., 2010). In contrast to these findings, Tan et al. (2010) reported both IU and negative metacognitive beliefs to be predictive of worry, however, negative metacognitive beliefs offered the largest unique variance (Tan, Moulding, Nedeljkovic, & Kyrios, 2010). The findings of the current study are suggestive of IU not playing a causal role in the development of worry and GAD, but possibly still having an important role in understanding the factors that are associated with worry and GAD in terms of a general vulnerability factor that is also associated with other disorders.

Buhr and Dugas (2012) have previously found IU to be a stronger predictor of worry than experiential avoidance with the authors suggesting experiential avoidance was more of a general vulnerability to mental distress and not directly related to GAD (Buhr & Dugas, 2012). In support of this hypothesis, Hayes et al. (1996) report experiential avoidance as playing a non-specific role in the development of disorders (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Roemer et al. (2005) also suggested this, and despite finding a unique relationship of experiential avoidance in the prediction of worry in their non-clinical sample, the variance was only minimal. They also suggested that experiential avoidance may not be specific to GAD, but there may still be a role for acceptance-based therapies (Roemer et al., 2005). Therefore, consistent with the findings from the current study, experiential avoidance may just be a by-product that is associated with mental distress and a coping strategy utilised to manage distressing symptoms that is common to all disorders.

Although the findings from this study have been interesting in advancing our knowledge and understanding of worry and GAD, this study is not without several methodological limitations. Firstly, this study relied on the use of self-report measures and did not account for response bias, as self-report methodology can be considered valid only to the extent that individuals can accurately assess each domain to which they are responding. In addition, the majority of sample were female and, even though gender was statistically controlled for this may have impacted the results and needs to be considered when interpreting the findings, as women tend to report higher levels of worry then men (Meyer et al., 1990).

An additional limitation includes the sample of non-clinical, majority white-British students, thus potentially limiting the generalisabilty of the findings to other population groups. Future studies should strive to include a sample that incorporates an equal distribution of males and females, in a more culturally

representative sample, in addition to between-groups designs, in treatment-seeking participants. Finally, although prospective designs allow us to control for antecedence for the predictor variables and to assess correlation (two necessary criteria to for causality), it cannot rule out the possibility of spuriousness for these observed associations. Even though the study controlled for a number of potential factors that may both predict negative metacognitive negative beliefs about worry and worry or GAD these may have an on influence on the results. More specific experimental studies varying the 'dose' of negative metacognitive beliefs and its relation to worry or GAD would need to be conducted in order to provide a more robust test of the causal role of negative metacognitive beliefs about worry underlying the onset and maintenance of worry and or GAD.

Despite these limitations, in summary, the present study attempted to address some of the current gaps in the literature by using a prospective design in the first study to explore the relative and unique contributions of IU, negative metacognitive beliefs about danger and experiential avoidance, in combination, in the prediction of worry and GAD status. In addition, it has addressed some of the limitations from previous studies by using a more stringent test of the three individual constructs by controlling for previously known predictors. Although other significant predictors were found in this research, in addition to the variance offered by negative metacognitive beliefs about the danger of worry being modest, the findings from this study offer tentative conclusions that negative metacognitive beliefs about danger were the only significant predicator of worry and GAD status prospectively, in comparison to IU and experiential avoidance. Further studies including those of experimental design may offer further insights into the role of negative metacognitive beliefs in the development and maintenance of worry and GAD.

References

American Psychiatric Association (APA). (2000). *Diagnostic and statistical manual of mental disorder (4th ed)*: Washington DC.

Barahmand, U. (2009). Meta-cognitive profiles in anxiety disorders. *Psychiatry Research, 169*(3), 240-243.

Barlow, D., H. (2000). Unraveling the mysteries of anxiety and its disorders from the perspective of emotion theory. *American Psychologist, 55*(11), 1247-1263. doi: 10.1037/0003-066x.55.11.1247

Beck, A., T, Emery, G., & Greenberg, R. L. (1985). *Anxiety disorders and phobias : A cognitive perspective*: Cambridge, MA : Basic Books, 2005

Barrett, J., Barrett, J. A., Oxman, T. E., & Gerber, P. D. (1988). The prevalence of psychiatric disorders in a primary care practice. *Archives of General Psychiatry, 45*(12), 1100-1106. doi: 10.1001/archpsyc.1988.01800360048007

Behar, E., DiMarco, I. D., Hekler, E. B., Mohlman, J., & Staples, A. M. (2009). Current theoretical models of generalized anxiety disorder (GAD): Conceptual review and treatment implications. *Journal of Anxiety Disorders, 23*(8), 1011-1023.

Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., . . . Zettle, R. D. (2011). Preliminary psychometric properties of the acceptance and action questionnaire–II: a revised measure of psychological inflexibility and experiential avoidance. *Behavior Therapy, 42*(4), 676-688.

Borkovec, T. D., Alcaine, O., & Behar, E. (2004). Avoidance theory of worry and generalized anxiety disorder. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized anxiety disorder : advances in research and practice*: New York ; Guilford Press, 2004.

Borkovec, T. D. (1994). The nature, functions, and origins of worry. In G. C. L. Davey & F. Tallis (Eds.), *Worrying: perspectives on theory, assessment and treatment*: Chichester: Wiley, 1994.

Buhr, K., & Dugas, M. (2006). Investigating the construct validity of intolerance of uncertainty and its unique relationship with worry. *Journal of Anxiety Disorders, 20*(2), 222-236.

Buhr, K., & Dugas, M. J. (2002). The intolerance of uncertainty scale: psychometric properties of the English version. *Behaviour Research and Therapy, 40*(8), 931-945.

Buhr, K., & Dugas, M. J. (2012). Fear of emotions, experiential avoidance, and intolerance of uncertainty in worry and generalized anxiety disorder. *International Journal of Cognitive Therapy, 5*(1), 1-17.

Cartwright-Hatton, S., & Wells, A. (1997). Beliefs about worry and intrusions: The meta-cognitions questionnaire and its correlates. *Journal of Anxiety Disorders, 11*(3), 279-296.

Davis, R. N., & Valentiner, D. P. (2000). Does meta-cognitive theory enhance our understanding of pathological worry and anxiety? *Personality and Individual Differences, 29*(3), 513-526.

Deperment of Health (2011). No health without mental health: A cross governerment mental health outcomes strategy for people of all ages. Department of health. London.

Dugas, M., J., Freeston, M., H., & Ladouceur, R. (1997). Intolerance of Uncertainty and Problem Orientation in Worry. *Cognitive Therapy and Research, 21*(6), 593-606.

Dugas, M., J., Gagnon, F., Ladouceur, R., & Freeston, M., H. (1998). Generalized anxiety disorder: a preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*(2), 215-226.

Dugas, M., J., Gosselin, P., & Landouceur, R. (2001). Intolerance of uncertainty and worry: Investigating specificity in a non-clinical sample. *Cognitive Therapy & Research, 25*(5), 551-558.

Dugas, M., J., Savard, P., Gaudet, A., Turcotte, J., Laugesen, N., Robichaud, M., . . . Koerner, N. (2007). Can the components of a cognitive model predict the severity of generalized anxiety disorder? *Behavior Therapy, 38*(2), 169-178.

Dugas, M., J., Schwartz, A., & Francis, K. (2004). Brief Report: Intolerance of Uncertainty, Worry, and Depression (Vol. 28, pp. 835-842): Springer Science & Business Media B.V.

Dugas, M., Marchand, A., & Ladouceur, R. (2005). Further validation of a cognitive-behavioural model of generalized anxiety disorder diagnostic and symptom specificity. *Journal of Anxiety Disorders, 19*, 329-343.

Freeston, M. H., Rhéaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17*(6), 791-802.

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behaviour Research and Therapy, 44*(1), 1-25.

Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Experiential avoidance and behavioral disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology, 64*(6), 1152-1168.

Henry, J. D., & Crawford, J. R. (2005). The 21-Item version of the Depression Anxiety Stress Scale (DASS-21): Normative data and psychometric evaluation in a large non-clinical sample. *British Journal of Clinical Psychology, 44*, 227-239.

Kessler, R. C., Walters, E. E., & Wittchen H. (2004). Epidemiology. In R. G. Heimberg, C. L. Turk & D. S. Mennin (Eds.), *Generalized anxiety disorder: advances in research and practice*. New York: The Guilford Press.

Hirsch, C. R. Mathews, A. (2012). A cognitive model of pathological worry. *Behaviour Research and Therapy, 50*, 636-646.

Hirsch, C, R. Mathews, A. (2013). Charaterisitcs of worry in generalized anxiety disorder. *Journa lof Behavior Therapy and Experimental Psychaitry, 44*, 388-395.

Khawaja, N. G., & Chapman, D. (2007). Cognitive predictors of worry in a non-clinical population. *Clinical Psychologist, 11*(1), 24 - 32.

Kohn, P. M., Lafreniere, K., & Gurevich, M. (1990). The inventory of college students' recent life experiences: a decontaminated hassles scale for a special population. *Journal of Behavioral Medicine, 13*(6), 619-630.

Ladouceur, R., Dugas, M. J., Freeston, M. H., Rhéaume, J., Blais, F., Boisvert, J.-M., . . . Thibodeau, N. (1999). Specificity of generalized anxiety disorder symptoms and processes. *Behavior Therapy, 30*(2), 191-207.

Ladouceur, R., Gosselin, P., & Dugas, M. J. (2000). Experimental manipulation of intolerance of uncertainty: a study of a theoretical model of worry. *Behaviour Research and Therapy, 38*(9), 933-941.

Lee, J. K., Orsillo, S. M., Roemer, L., & Allen, L. B. (2010). Distress and avoidance in generalized anxiety disorder: Exploring the relationships with intolerance of uncertainty and worry. *Cognitive Behaviour Therapy, 39*(2), 126 - 136.

Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the depression anxiety stress scales (2nd. Ed.)*. Sydney: Psychological Foundation

Maier, W., Gänsicke, M., Freyberger, H. J., Linz, M., Heun, R., & Lecrubier, Y. (2000). Generalized anxiety disorder (ICD-10) in primary care from a cross- cultural perspective: A valid diagnostic entity? *Acta Psychiatrica Scandinavica, 101*(1), 29-36.

McCrone, P, Dhansiri, S, Patel, A, Knapp, M, Lawton-Smith, S. (2008) Paying the price: The cost of mental health care in England in 2026. London: King's Fund.

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the penn state worry questionnaire. *Behaviour Research and Therapy, 28*(6), 487-495.

Newman, M. G., Zuellig, A. R., Kachin, K. E., Constantino, M. J., Przeworski, A., Erickson, T., & Cashman-McGrath, L. (2002). Preliminary reliability and validity of the generalized anxiety disorder questionnaire-IV: A revised self-report diagnostic measure of generalized anxiety disorder. *Behavior Therapy, 33*(2), 215-233.

Olfson, M., Shea, S., Feder, A., Fuentes, M., Nomura, Y., & Gameroff, M. (2000). Prevalence of anxiety, depression and substance use disorders in an urban general medical practice. *Archives of Family Medicine, 9*, 876-883.

Rodriguez, B. F., Bruce, S. E., Pagano, M. E., & Keller, M. B. (2005). Relationships among psychosocial functioning, diagnostic comorbidity, and the recurrence of generalized anxiety disorder, panic disorder, and

major depression. *Journal of Anxiety Disorders, 19*(7), 752-766. doi: http://dx.doi.org/10.1016/j.janxdis.2004.10.002

Roemer, L., Salters, K., Raffa, S., & Orsillo, S. M. (2005). Fear and avoidance of internal experiences in GAD: Preliminary tests of a conceptual model. *Cognitive Therapy and Research, 29*(1), 71-88.

Roy-Byrne, P. P. (1996). Generalized anxiety and mixed anxiety-depression: association with disability and health care utilization. *J Clin Psychiatry, 7*, 86-91.

Ruggiero, G. M., Stapinski, L., Caselli, G., Fiore, F., Gallucci, M., Sassaroli, S., & Rapee, R. M. (2012). Beliefs over control and meta-worry interact with the effect of intolerance of uncertainty on worry. *Personality and Individual Differences, 53*(3), 224-230. doi: 10.1016/j.paid.2012.03.016

Ruscio, A. M., & Borkovec, T. D. (2004). Experience and appraisal of worry among high worriers with and without generalized anxiety disorder. *Behaviour Research and Therapy, 42*, 1469-1482. doi: 10.1016/j.brat.2003.10.007

Sarason, I. G., Johnson, J. H., & Siegel, J. M. (1978). Assessing the impact of life changes: Development of the Life Experiences Survey. *Journal of Consulting and Clinical Psychology, 46*(5), 932-946.

Stapinski, L. A., Abbott, M. J., & Rapee, R. M. (2010). Fear and perceived uncontrollability of emotion: Evaluating the unique contribution of emotion

appraisal variables to prediction of worry and generalised anxiety disorder. *Behaviour Research and Therapy, 48*(11), 1097-1104.

Tabachnick, B., & Fidell, L. (2007). *Using multivariate statistics*. Boston: Pearson Education, Inc.

Tan, S., Moulding, R., Nedeljkovic, M., & Kyrios, M. (2010). Metacognitive, cognitive and developmental predictors of generalised anxiety disorder symptoms. *Clinical Psychologist, 14*(3), 84-89.

Wells, A. (1995). Meta-cognition and worry: A cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy, 23*(03), 301-320.

Wells, A. (1999). A cognitive model of generalized anxiety disorder. *Behavior Modification, 23*(4), 526-555.

Wells, A. (2005). The metacognitive model of GAD: Assessment of meta-worry and relationship with DSM-IV; generalized anxiety disorder. *Cognitive Therapy and Research, 29*(1), 107-121.

Wells, A., & Carter, K. (1999). Preliminary tests of a cognitive model of generalized anxiety disorder. *Behaviour Research and Therapy, 37*(6), 585-594. doi: 10.1016/s0005-7967(98)00156-9

Wells, A., & Carter, K. (2001). Further tests of a cognitive model of generalized anxiety disorder: Metacognitions and worry in GAD, panic disorder, social phobia, depression, and nonpatients. *Behavior Therapy, 32*(1), 85-102.

Wells, A., & Cartwright-Hatton, S. (2004). A short form of the metacognitions questionnaire: properties of the MCQ-30. *Behaviour Research and Therapy, 42*(4), 385-396.

Wittchen, H., Zhao, S., Kessler, R. C., & Eaton, W. W. (1994). DSM-III-R generalized anxiety disorder in the national comorbidity survey. *Archives of General Psychiatry, 51*(5), 355-364. doi: 10.1001/archpsyc.1994.03950050015002

Yilmaz, A. E., Gençöz, T., & Wells, A. (2011). The temporal precedence of metacognition in the development of anxiety and depression symptoms in the context of life-stress: A prospective study. *Journal of Anxiety Disorders, 25*(3), 389-396.

Yonkers, K. A., Dyck, I., R., Warshaw, M., & Keller, M., B. (2000). Factors predicting the clinical course of generalised anxiety disorder. *The British Journal of Psychiatry, 176*, 544-549. doi: 10.1192/bjp.176.6.544

Chapter 4: Concluding Section

4.1 General Overview

The overarching aim of the thesis was to test three models of GAD, namely, the IU model (Dugas, Gagnon, Ladouceur, & Freeston, 1998), the Metacognitive model (Wells, 1995, 1999a), and the Acceptance-Based model (Roemer, Salters, Raffa, & Orsillo, 2005). It was not possible to compare the complete models, but rather the central components of each model, which included IU, negative metacognitive beliefs about danger, and experiential avoidance. A non-clinical sample of students was recruited via a web-based study to complete assessments at T1 and at T2. This concluding section provides an overview in relation to previous literature, theoretical and clinical implications, methodological considerations, a section on participant feedback, a proposal for further research and finishes with a general conclusion.

4.2 Summary of Results in Relation to Previous Literature

4.2.1 Participants

The current study recruited participants from a non-clinical sample of university students, which is a common method of recruitment in similar non-clinical studies. Participants were predominantly female (76.8%), with a mean age of 22.99 years. All these factors were comparable to other non-clinical studies (Buhr & Dugas, 2006; Buhr & Dugas, 2012; Chen & Hong, 2010; Davis & Valentiner, 2000; de Bruin, Rassin, & Muris, 2007; Dugas, Freeston, & Ladouceur, 1997; Khawaja & Chapman, 2007; Khawaja & McMahon, 2011; Penney, Mazmanian, & Rudanycz, 2012; Tan, Moulding, Nedeljkovic, & Kyrios, 2010; Yilmaz, Gençöz, & Wells, 2011). The use of non-clinical samples in these types of research has been supported by taxometric research, which indicates worry to exist on a continuum rather than clinical worry being distinct from non-clinical worry (Olatunji, Broman-Fulks, Bergman, Green, &

Zlomke, 2010; Ruscio, Borkovec, & Ruscio, 2001). Although findings from this research suggest distinct processes are present between GAD sufferers and non-clinical worriers, research has shown severe worriers who fail to meet the GAD diagnostic criteria as reporting many of the same symptoms as those with GAD (Ruscio, 2002). Therefore, the findings from this research may be relevant to those who experience high worry, but do not meet the criteria for GAD.

The baseline sample consisted of 586 participants, much larger in comparison to similar non-clinical studies, with other studies reporting samples ranging from 96 participants (Khawaja & Chapman, 2007) to 285 participants (Dugas et al., 1997). The follow-up sample was 323, also a much larger sample than two previous prospective studies, one reporting a sample of 162 participants (Yilmaz et al., 2011), and the other 110 participants (Chen & Hong, 2010). The larger sample size allowed for a more robust test of the models by accounting for the influence of demographic variables, depression, positive beliefs about worry, and daily hassles.

4.2.2 Study-Dependent Variables

In the final sample, the mean level of worry measured by the PSWQ (Meyer, Miller, Metzger, & Borkovec, 1990) was 52.93 (13.37), which is comparable to other non-clinical studies (Buhr & Dugas, 2006; Buhr & Dugas, 2012; Chen & Hong, 2010; de Bruin et al., 2007; Penney et al., 2012; Roemer et al., 2005). Mean worry scores for those who met the GAD status was 62.57 (9.2), which is comparable to worry scores in a clinical sample of GAD participants reported in a recent study comparing benefits of medication and CBT (Crits-Christoph et al., 2011). This, therefore, increases the validity of the results obtained and may be comparable to clinical samples.

Additionally, 43.3% of the sample met the criteria for GAD as measured by the GAD-Q-IV. This result is higher than another study using the same measure, which found 31.7% of their sample to meet the GAD criteria (Roemer et al., 2005). Other studies using different measures to distinguish GAD status found much lower rates within their samples. One study reported 9%, using the generalised anxiety disorder questionnaire (GAD-Q) (Davis & Valentiner, 2000), another study using the PSWQ, reported 17% (Penney et al., 2012), and finally, one study using the worry and anxiety questionnaire (WAQ), reported 19% of their sample as meeting GAD criteria (Buhr & Dugas, 2012).

Differences in GAD rates in non-clinical studies may be due to differences reflected in the measures used to assess GAD status, as sensitivity and specificity of the measures vary in correctly identifying GAD sufferers. The measure used in the current study (GAD-Q-IV) has reported a correct response rate of 83% (Newman et al., 2002), this is higher than the other measures used in similar studies with the GAD-Q reporting 80% (Roemer, Borkovec, Posa, & Borkovec, 1995), WAQ reporting 78.9% (Dugas, Freeston, et al., 2001) and finally the PSWQ (using a cut-off at 65), has reported 67.86% (Fresco, Mennin, Heimberg, & Turk, 2003). This potentially highlights that the current study, used a measure, which was more likely to correctly identify GAD sufferers, therefore increasing the validity of the findings as more GAD sufferers were potentially correctly identified from the non-clinical sample.

4.2.3 Preliminary Findings - Exploring Gender Differences

Exploration of gender differences in levels of worry found women to report higher levels of worry than men, with observed mean scores of 48.48 (13.67) for males and 54.17 (13.01) for females. These findings are comparable with two previous studies

(Meyer et al., 1990; Zlomke & Hahn, 2010). Preliminary investigations of gender differences in GAD status did not find significant differences in gender and GAD status T1, but significant differences were found at T2, with more women meeting GAD status than men at T2. This finding is consistent with one previous study that found gender differences in a non-clinical sample with GAD participants identified using the WAQ (Buhr & Dugas, 2012). Finally, gender differences were also found in reports of daily hassles with females reporting significantly more daily hassles than men, which is consistent with previous research that reported a mean scores of 97.15 for females and 90.64 for males (Kohn, Lafreniere, & Gurevich, 1990). The current study found mean scores slightly lower in comparison to this study (93.53, females; 87.52, males).

4.2.4 Main Findings

4.2.4.1 Correlation Analysis

The current study undertook correlation analysis on outcome measures to explore their relationships with worry (T1 & T2) and, as expected, all study variables were correlated. Positive medium correlations were found between depression and worry (T1 & T2), which was consistent with three previous studies that used the same measures as the current study. The strengths of the correlations were comparable (Khawaja & McMahon, 2011; Roemer et al., 2005; Stapinski, Abbott, & Rapee, 2010). In addition, one further study found positive correlations with worry (Dugas et al., 2007) although different measures of depression were used, which precludes direct comparisons. High levels of worry appear to be associated with the severity of depression, and the results from the current study add to the growing body of literature.

Positive correlations were found on daily hassles and worry, which is consistent with previous research that has suggested levels of daily hassles to have an interactive effect with mental health symptomology (Russell & Davey, 1993). One other study using the same measures as this study also reported significant correlations with worry and daily hassles, (Chen & Hong, 2010) and reported medium-strength correlations, thus suggesting daily hassles are significantly associated with the severity of worry.

Studies consistently demonstrate that positive beliefs about worry are positively correlated with worry severity, which is congruent with the findings from this study, which found medium correlations. Consistent with these findings, Davis and Valentiner (2000) reported large correlations, and Khawaja, and Chapman (2007) reported medium correlations in their studies. The results therefore support the existing literature and the specific models described within this research, which suggest positive beliefs about worry to be a common construct associated with worry severity.

This study has offered a unique finding by being the first study to look at correlations of worry and negative metacognitive beliefs about danger. Although direct comparisons cannot be made, significant associations have been previously found with two other studies looking at negative metacognitive beliefs about danger and uncontrollability of worry, with the strength of the correlations being large (Davis & Valentiner, 2000; Penney et al., 2012). This study therefore expands on the existing literature by being the first to demonstrate positive correlations with worry and negative metacognitive beliefs about danger.

IU has been found by numerous studies to have a significantly positive relationship with worry, and results have ranged from medium to large correlations (Buhr &

Dugas, 2006; Buhr & Dugas, 2012; Chen & Hong, 2010; de Bruin et al., 2007; Dugas et al., 1997; Dugas, Gosselin, & Landouceur, 2001; Dugas et al., 2007; Dugas, Marchand, & Ladouceur, 2005; Khawaja & Chapman, 2007; Khawaja & McMahon, 2011; Lee, Orsillo, Roemer, & Allen, 2010; Stapinski et al., 2010). These results are consistent with the findings from the current research, which found large correlations, therefore demonstrating high levels of worry to be associated with high levels of IU.

Finally, three studies that have explored the associations of worry and experiential avoidance, using the earlier version of AAQ-II (Bond et al., 2011) (AAQ; (Hayes et al., 2004) found significant positive associations with worry with medium to large correlations. Earlier versions of this scale had a variation in the scoring criteria in comparison to the AAQ-II, with the AAQ using higher scores to indicate experiential avoidance, and AAQ-II using lower scores to indicate experiential avoidance (Buhr & Dugas, 2012; Lee et al., 2010; Roemer et al., 2005). Generally, results suggest a greater severity of worry to be associative with higher levels of experiential avoidance, with medium correlations, which is consistent with previous studies.

4.2.4.2 Predicting Worry

When assessing the prediction of worry using a hierarchical multiple regression, after controlling for gender, age, positive beliefs about worry, daily hassles T2, depression T1, and worry T1, measures assessing IU and negative metacognitive beliefs about danger improved the classification of the model, whereas experiential avoidance did not offer any additional variance. Within the final model, only negative metacognitive beliefs about danger, worry T1, and daily hassles T2 offered a significant unique contribution to the prediction of worry T2. Although cross-sectional studies have offered support for IU and experiential avoidance in the

prediction of worry, the current study tentatively suggests they do not offer a causal role, which highlights other mechanisms specifically, negative metacognitive beliefs about danger, to be fundamental to the persistence of worry. Results from one prospective study have also supported these results and also suggested IU not to have a causal role in the prediction of worry (Chen & Hong, 2010).

This study is the first to explore the prospective prediction of worry using these three constructs and offers the first valuable insights into the causal role that negative beliefs about the danger of worry have in worry severity, with the results lending support to the Metacognitive model of GAD. In a similar prospective study, negative metacognitive beliefs about worry were identified as a significant predictor of anxiety symptoms independently of daily hassles (Yilmaz et al., 2011), and findings from the current study add to these results, by assessing specifically the relationships with worry symptoms, suggesting the importance of negative metacognitive beliefs about worry in the prediction of worry severity over time.

In a previous prospective study (Chen & Hong, 2010), that explored worry, IU and daily hassles, daily hassles T1 and worry T1 were found to offer significant unique variance in the prediction of worry T2. Although the current study explored daily hassles T2 these results are consistent with the current study, thus suggesting the occurrence of daily hassles as contributing to and having a causal role in the prediction of worry, which adds to the current literature.

4.2.4.3 Predicting GAD

Further logistic regression analysis allowed exploration of IU, negative metacognitive beliefs about danger and experiential avoidance, and the prediction of GAD status T2. The results from this analysis were similar to the results obtained in

the prediction of worry. After controlling for gender, age, positive beliefs about worry T1, daily hassles T2, depression T1, and GAD status T1, measures assessing IU and negative metacognitive beliefs about danger and experiential avoidance accounted for 80.7% correct prediction of GAD status. However, within the final model, only negative metacognitive beliefs about danger, gender, GAD status T1, and daily hassles T2 were significant predictors of change in GAD status over time.

No prospective studies have previously explored the unique contributions of IU, negative metacognitive beliefs about the danger of worry, and experiential avoidance in the prediction of GAD status. Therefore, this study adds to and extends the current literature. Results from one cross-sectional study by Davis and Valentiner (2000) exploring the role of negative metacognitive beliefs in the prediction of GAD status using a non-clinical sample, found negative metacognitive beliefs about worry were the only significant predictor of GAD status when compared with other metacognitions (i.e. cognitive confidence and positive beliefs about worry). Therefore, these results expand on this and offer further information on the causal role of negative metacognitive beliefs.

In addition to this study, one previous cross-sectional study explored the unique contribution of metacognitions and IU in the prediction of GAD status using a mixed sample of clinical and non-clinical participants, and found only IU to offer unique variance in the prediction of GAD and not metacognitions. However, the authors of this study misused the MCQ measure, as they did not isolate the individual subscales, thus invalidating their results (Stapinski et al., 2010). Therefore, this study offers replication of this study in a prospective or experimental design, with a more robust use of the measures for testing prediction of GAD status adding to and extending previous research.

The findings that gender and daily hassles are predictive of GAD status prospectively has not previously been explored, therefore the results from the current study offer the first insights into these factors being predictive of GAD and extend previous research. This, coupled with the finding of daily hassles being predictive of worry suggests that actively tackling perceived stressors related to daily living may help to reduce levels of persistent worry.

4.2.4.4 Overall Summary

Overall, the findings from the correlation analysis seem largely consistent with the previous literature, and suggest relationships exist between worry, IU, negative metacognitive beliefs about danger, and experiential avoidance, broadly offering support for the three models of GAD explored in this research. However, when using analyses that partials out shared and examines unique variance associated with predictor variables the findings show that negative metacognitive beliefs about danger continues to make a unique contribution in predicting both worry severity and GAD, whereas IU and experiential avoidance did not.

It might be noted that the most significant predictor of worry and GAD status, was in fact worry at T1 and GAD status at T1, however, this is not surprising and provides no information as to why this might be the case except to indicate that worry and GAD might be stable over this time period. Thus suggesting that those individuals with higher levels of worry and those who meet GAD criteria, are unlikely to demonstrate spontaneous symptom reduction over the period of 6 months, which has direct clinical implications for those who suffer with the disorder (this will be discussed further in section 4.3.2). To say that worry at T1 'causes' worry at T2 could be misleading and the factors that were important from a theoretical point of view were whether IU, negative metacognitive beliefs, or

experiential avoidance could also account for worry or GAD status at T2, whilst controlling for the levels of worry and GAD at T1.

The literature thus far has demonstrated limited previous findings regarding the role of negative metacognitive beliefs about danger, without the items relating to the uncontrollability of worry, with only one previous study exploring the items relating to danger on the MCQ (Ruscio & Borkovec, 2004). In their experimental study, they observed GAD sufferers to be reporting significantly higher levels of metacognitive beliefs relating to the danger of worry, in comparison to non-GAD high worriers. This study therefore expands on these findings and opens up avenues for further research, as research is currently sparse in this clinical area, and highlights the need for replication in clinical samples using between and within subjects designs, to expand on the results from the current study.

Although IU has not been indicated within this thesis to have a causal role in the development of worry and GAD, cross-sectional studies have emphasised the role of IU as an important construct in worry and GAD (Buhr & Dugas, 2006; Buhr & Dugas, 2012; de Bruin et al., 2007; Dugas, Gosselin, et al., 2001; Dugas et al., 2007; Dugas, Schwartz, & Francis, 2004; Dugas et al., 2005; Ladouceur et al., 1999; Ladouceur, Gosselin, & Dugas, 2000). However, a recent review article highlighted criticisms of the IU not being specific to worry or GAD, suggesting it was a transdiagnostic construct observed in other disorders (Carleton, 2012).

A recent meta-analysis examining the cross-sectional associations of IU and symptoms of GAD, depression, and OCD provided additional support for this view, claiming IU not to narrow specificity to any one syndrome (Gentes & Ruscio, 2011). The authors suggest the IUS (Buhr & Dugas, 2002) is more related to GAD than other disorders and offers specificity, however, they imply that a mechanism in

which IU may contribute to emotional disorders may be through a common experience of all three disorders, that of intrusive or repetitive thoughts (Gentes & Ruscio, 2011). Freeston et al. (1994) supported this notion and also suggested IU to increase levels of worry in an attempt to feel more in control about the uncertainty of the future (Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994), therefore this same process may apply for depression and OCD. Carleton (2012) suggests IU to be a transdiagnostic dispositional risk factor in the development of all anxiety disorders (Carleton, 2012), which supports the outcomes in this study. Recent research has supported the transdiagnostic value of IU in anxiety and depressive disorders (Carleton et al., 2012; Mahoney & McEvoy, 2012; McEvoy & Mahoney, 2012).

As previously discussed within this thesis (sections 2.3.5.1 & 3.5), it is not surprising that experiential avoidance appears not to be a construct relevant to our understanding of worry and GAD, but more of a general vulnerability factor seen in all mental distressing disorders, and Hayes et al. (1996) support this notion and suggest it is a general vulnerability factor. Additional support for this idea comes from research by Kashdan et al. (2006) who also explored the role of experiential avoidance as a toxic process that contributes to overall the vulnerability of anxiety related symptoms, which results in a reduction of function, quality of life and a meaningful life (Kashdan, Barrios, Forsyth, & Steger, 2006).

4.3 Implications of Findings

4.3.1 Theoretical

The theoretical implications of the findings from this research lend support to metacognitive theory of GAD, which has increased our understanding of the factors responsible for the persistence of worry and GAD. As highlighted in section 2.3.4,

the S-REF model of emotional disorders appears to offer a plausible explanation of the factors pertinent in the development and maintenance of GAD. The model suggests that without continual cognitive processing by CAS, (the process by which the S-REF suggests worry is maintained), worry would not become persistent or distressing.

Specific to GAD, the importance of positive and negative metacognitive beliefs about worry have been highlighted, indicating that the oscillation between positive and negative beliefs and the unhelpful strategies utilised by the individual, causes GAD to develop, but also maintains it. Theoretically, this study and the previous literature suggest that the construct of IU and experiential avoidance are factors that are correlated to worry and GAD. However, they may be seen to be more like general risk factors associated with the development of mental disorders. This calls for more research to explore these factors as transdiagnostic constructs.

4.3.2   Clinical

Increased awareness of factors that contribute to anxiety, and worry, including the impact these have on overall mental well-being, has been one of the direct clinical implications of this research. Specifically, positive feedback was received from a small sample of participants who reported the benefits of reflecting on their experiences of worry and anxiety, particularly in relation to an increased understanding of worry and anxiety-related symptoms. This highlights the need for overall awareness of the impact of worry on mental well-being, which in the long-term may help facilitate self-help amongst individuals who experience high levels of worry.

In clinical practice, the implications of this research highlights that the main significant and robust predictor of worry and GAD status are symptom levels at T1. This poses many challenges for the field, to understand further, why some people are more vulnerable to high levels of worry than others, and what factors are responsible for its persistence. From this longitudinal study, it was clear that those with high levels of worry and those who met GAD status, do not appear to reduce spontaneously over time suggesting that if left untreated, symptoms may increase over longer period of time. Thus highlighting the importance of identifying this disorder in its early stages due to its persistence, and offering treatment to try to prevent the disabling effects it can have for those who suffer from it.

This study aimed to understand more about what those processes where that underlie this persistence of worry and GAD, beyond previously known predictors, which clearly has a clinical significance for those who experiences the disabling effects of persistent worry and GAD. The findings do suggest that screening for negative metacognitive beliefs about danger, in individuals presenting to services, may lead to early detection of persistent high levels of non-specific worry, and/or increased identification of GAD. Early detection of these key processes may lead to improved treatment outcomes, with individuals receiving support and treatment early to try to prevent the disabling effects of this disorder and retain previous levels of functioning. Early intervention has been previously implicated for improved treatment outcomes (Covin, Ouimet, Seeds, & Dozois, 2008)

Clinically, formulation-driven approaches may offer a way forward to disentangle the complexities with which individuals with GAD can often present. Identifying negative and positive metacognitive beliefs about worry could lead to therapies such as Metacognitive Therapy (MCT) being offered as a psychological treatment option (Wells, 1999b), the outcomes of which have already been highlighted within this

review in section 2.2.5. MCT typically offers 14 sessions where strategies are used to help modify positive and negative metacognitive beliefs about worry, introducing cognitive dissonance to enhance motivation for change, while teaching therapeutic techniques such as detached mindfulness and worry postponement to help facilitate change process within therapy (Wells, 1997, 2009).

MCT has demonstrated effective therapeutic outcomes within a number of trials. In a small-scale study, 10 participants were offered between 3 and 12 sessions of MCT. Large-effect sizes were observed, with outcome measures reporting 80% improvement in overall symptoms, with benefits being retained at the 12-month follow-up (Wells & King, 2006). In addition, when comparing MCT with other therapies, MCT has also demonstrated superior treatment outcomes in comparison to applied relaxation (AR), with large-effect sizes. Results indicated again 80% recovery on measures of worry and trait anxiety for MCT, in comparison to 20% observed with AR, with benefits retained 12 months post-therapy (Wells et al., 2010). Finally, in a recent randomised control trial (RCT) of MCT and IU therapy (IUT), compared to a control group, IUT and MCT were both found to have improved outcomes, however MCT was found to offer superior outcomes to IUT (van der Heiden, Muris, & van der Molen, 2012).

Consequently, in an NHS where short-term cost-effective therapy is of extreme value (DoH, 2007), the literature has highlighted the appealing nature of MCT for worry and GAD. Indeed, more studies are required, with larger samples to fully establish MCT benefits, yet to date these promising results suggest MCT may help produce lasting treatment benefits and reduce service demands from individuals with persistent worry and GAD.

4.4 Methodological Considerations

4.4.1 Strengths

This study aimed to draw on previous research and address some of the methodological limitations and gaps in the literature. First, this study employed a web-based design, which allowed for easy access of a large sample in a short period. Computer-based methods of data collection are becoming increasingly popular due to the ease of data collection, reduction in financial costs due to immediate data entry, and elimination of errors (Schmitz, Hartkamp, Brinschwitz, Michalek, & Tress, 2000). Consequently, this study had a large sample, with 582 completing the study at T1 and 323 at T2, which may not have been achievable with a paper-based study in the same time.

Second, this study had an attrition rate of 45%. Attrition rates are generally poor for web-based studies (Nulty, 2008), therefore follow-up rates were improved by sending reminder emails to participants for completion of the study at T2, as this method has been shown to improve follow-up rates (Cottler, Compton, Ben-Abdallah, Horne, & Claverie, 1996; Nulty, 2008). Consequently, using a rule of thumb guide for a medium effect size, the minimum sample required to reach adequate power was approximately 150 (T2) (Cohen, 1992), therefore indicating the power calculation was reached, which indicates statistical robustness of the findings.

Third, this study aimed to explore IU, negative metacognitive beliefs about danger, and experiential avoidance in a design that addressed some of the methodological limitations of previous studies. Therefore, this study controlled for factors that may contribute to the unique variance in the prediction of GAD and worry. As highlighted in Chapter 2 (section 2.4), positive beliefs about worry are common to all three models of GAD explored in this research, therefore eliminating the overlap of

positive beliefs enabled the unique constructs of each of the models to be explored in isolation. In addition, this study controlled for the overlap of demographic factors (age and gender), depressive symptoms, and finally the potential influence of daily hassles, which may have had an impact on the residual change in symptoms of worry and GAD status over time. Therefore, this study offered an increased stringent test of the three unique constructs; this allows firmer conclusions to be drawn from the results obtained.

As previously highlighted within this thesis (section 2.3.4.1), there have been earlier reports of a potential limitation with the measure used to assess negative metacognitive beliefs, with specific reference to the circulatory of the uncontrollability construct of the MCQ (Behar, DiMarco, Hekler, Mohlman, & Staples, 2009). To attempt to address this issue, this study separated the negative metacognitive beliefs subscale and used only the items relating to the dangerousness of worry. Therefore, this research has addressed some of the methodological limitations of previous research exploring negative metacognitive beliefs.

Lastly, the majority of research in this area has used cross-sectional design and, although these studies provide valuable information regarding specific processes that are relevant to worry and GAD, they tell us little about the temporal relationships. Therefore, one of the main strengths of this study is its prospective design, as this allows inferences to be drawn about causality. This study specifically provides direct evidence that negative metacognitive beliefs about the dangerousness of worry have a causal role in the persistence of worry and GAD.

4.4.2   Limitations

Although the use of a web-based design had its advantages including the successful recruitment of a large sample in a relatively short time, it is not without its limitations. One limitation is the lack of control for response quality and the individual motivations of the type of participant who takes part in online research.   Some findings have indicated online studies having problems with obtaining sample diversity and representativeness (Brüggen, Wetzels, de Ruyter, & Schillewaert, 2011), thus potentially limiting the generalisabilty of the findings. Despite this limitation, efforts were made to limit some of the drawbacks, which included offering guidance on whom to contact if individuals felt distressed, in addition to contact details of the researchers for questions or comments regarding the research.   The study was also widely advertised across the university to try to obtain a diverse sample.   This was deemed the most appropriate and cost-effective method of recruiting such a large sample, therefore the potential beliefs were thought to outweigh the limitations.

Second, those who did not complete the online questionnaires in full were not included in the sample.   This may have introduced a bias, in terms of those who were more likely to persevere with the questionnaires and those who stopped part way through.   This seemed the most appropriate way of dealing with the data, as many respondents stopped after the consent page and did not complete any further questionnaires.   This meant multiple items or whole questionnaires were missing, this method has been supported elsewhere as an appropriate way to deal with large amounts of missing data (Penny & Atkinson, 2012).

In addition, as previously discussed in section 3.5, there is a potential limitation of the generalisabilty of the findings, as the use of a non-clinical sample may not be applicable to treatment-seeking clinical samples.   However, despite these

limitations, the use of non-clinical populations to research disorders such as GAD is common, with this study specifically reporting worry scores comparable to clinical samples in those who met GAD status, therefore highlighting the potential validity of the findings.

The majority of the sample who took part in this study was female and of white British origin, therefore findings may not be relevant to males and individuals from other cultures. Although limited research exists on specific gender differences in worry and GAD, a study using an adolescent sample, demonstrated girls as being more likely to hold positive beliefs about worry, and boys, increased IU and negative problem orientation (Barahmand, 2008). Further to this, in an adult population, women were also found to report more worry and thought suppression and more negative problem orientation, which is in contrast to the finding in the adolescent study (Robichaud, Dugas, & Conway, 2003). Although these studies were specific to the IU model of GAD, it may suggest overall gender differences in the constructs explored in this thesis and findings may need to be replicated with an even mix sample.

Research has reported variations in the most frequently reported symptoms across cultures, with non-western cultures more frequently reporting somatic rather than psychological symptoms of worry and GAD (Hoge et al., 2006; Marques, Robinaugh, LeBlanc, & Hinton, 2011). Although this may be due to fears of being perceived as weak, or the effects of black magic and stigma of having a mental health problem, this could also mean that culture causes differences in beliefs, which could alter specific beliefs about IU, metacognitions, and experiential avoidance. Despite some of these differences, Scott and colleagues found no ethnic differences on measures of worry (PSWQ) or on the GAD-Q-IV, therefore indicating the measures may be culturally specific (Scott, Eng, & Heimberg, 2002).

Notwithstanding, there may be implications for further cross-cultural studies to explore the role of IU, negative metacognitive beliefs about the danger of worry, and experiential avoidance, as they may operate differently across cultures.

Finally, this study employed a prospective design, which controlled for the influence of demographic and psychological processes at T1 and examined the role of three theoretical processes/mechanisms in predicting worry and GAD at 6 months (T2). Although this allows conclusions to be drawn about the associations and the antecedent role of IU, negative metacognitive beliefs about the danger of worry and experiential avoidance in predicting worry and GAD, it does not rule out the possibility of spuriousness for these associations. For an accurate estimate of the causal role of these variables in worry and GAD, further carefully designed experimental studies may offer further insights, as the particular variables of interest could be manipulated, which would allow firmer conclusions to be drawn about the role of these three constructs in the development and maintenance of worry and GAD. For example, an experiment manipulating different levels or 'doses' of negative metacognitive beliefs about the danger of worry would provide a more valid test for the role of this variable in its effects on worry and GAD.

4.5 Participants' Feedback Information

Exploring the Role of Thoughts and Beliefs in Anxiety

Thank you for your support and participation in this study looking at experiences of worry. Worry is a distinctive type of thinking, usually related to future events about things that may be uncertain or a perceived threat (e.g., '*what if X happens*?'). In extreme circumstances, worry can be experienced as persistent and difficult to control. When worries are pervasive and persistent they can lead to the onset of generalised anxiety disorder (GAD). Therefore, although worry is a normal activity, it can be experienced at very high levels, which can cause significant distress and interfere with day-to-day living. This study set out to explore and test three explanations for the persistence of worry, which may also help to explain why some people develop GAD.

4.5.1   What Drives Anxiety- Three Explanations to Be Tested

Several theories exist that try to explain why worry is a problem for some individuals and not others. We looked at three current explanations for the development of persistent worry and its relationship to GAD. These three explanations were:

1) 'Beliefs about Worry',

2) '*I Can't Stand Uncertainty*'

3) '*I Can't Stand Emotional Distress*'.

A common aspect of all these theories is that people tend to believe worry helps. However, these three explanations also have some unique processes that are thought to be specific to problematic worry; these processes were of key interest in this study.

The '*Beliefs About Worry'* explanation suggests that people begin to develop beliefs about worry itself, that is beliefs that worry is difficult to control and beliefs that prolonged worry is harmful. Worry is thought to persist as people try to suppress their worrying because it is perceived to be harmful, but this suppression is not effective, and tends to strengthen the belief that worry is uncontrollable.

The '*I Can't Stand Uncertainty'* explanation suggests that some people have a tendency to respond with excessive worry when faced with uncertain threat situations. Worry persists as it is seen as a way for achieving certainty. However, because certainty is not possible, worry persists.

The final theory, 'I *can't stand emotional distress'* explanation suggests that some people have a strong tendency to avoid inner distressing experiences. Counter intuitively, it suggests that worry is a way to avoid or reduce the distress associated with imagined future threat. Worry acts as a kind of distraction. However, worry persists because the activity of worry has the effect of reducing the overall level of distress, it tends to be strengthened.

4.5.2 How Was This Research Done?

- Students from the University of Liverpool were invited to take part.
- We used three questionnaires to measure the central elements of explanations above.
- 1081 students expressed an interest in the study by looking at the research website, with a final number of 582 consenting.
- 323 completed the second part of the study 6 months later.

4.5.3 What We Tested?

- Although these processes have been associated with the persistence of worry and GAD, little was known about how they can cause them to occur. Therefore, the main aim of this research was to examine how well each explanation accounted for the levels of worry and GAD reported in the study.

- These tests were carried out in two ways:

    1) First we tested to see how strongly each explanation alone, ignoring the influence of the other two explanations, was related to worry and GAD.

    2) Second, we tested to see how strongly each explanation, while taking account of the influence of the other explanations, predicted worry and GAD at six months from the time of the original assessment.

4.5.4 What We Found.

- When each explanation was looked at alone, each was found to be related to worry and GAD. So each explanation was supported in this simple test.

- However, when they were looked at together, only one explanation had an influence, namely the '*Beliefs about Worry'* explanation.

- This means that beliefs about how dangerous and uncontrollable worry is, were found to be the main factor that caused worry to be persistent.

- The influences of the other two explanations were found to be not significant.

4.5.5 *Why Are These Findings Important?*

- These findings have important implications for sufferers of persistent worry and those diagnosed with GAD.

- This increased understanding of the role of negative beliefs about worry can enable researchers and clinicians to improve treatment interventions for people who are seen in mental health services.

4.5.6 Further Information on Findings

If you have, any further questions or comments you would like to make regarding the research or the findings within this article, please do not hesitate to send them to the following email address: nbork@liverpool.ac.uk

Thank you again for your participation

4.6 Proposed Future Research

4.6.1 Introduction

Empirical evidence for the role of negative metacognitive beliefs about the danger and uncontrollability of worry continues to grow. In two non-clinical studies, one experimental study (Ruscio & Borkovec, 2004) and findings from the current prospective study (Chapter 3), the danger component (3 items) from the danger and uncontrollability subscale of MCQ-30 has been shown to a) differentiate GAD from non-GAD individual and high levels of worry, and b) to prospectively predict GAD status and worry levels in a student sample. The current findings from this prospective study are limited by virtue of using only a non-clinical sample and require replication in a clinical sample. The specificity of negative metacognitive beliefs about the danger of worry in GAD compared to other clinical populations is required.

4.6.2 Aims

The aims of a follow-on study would be to explore prospectively the temporal relationships of IU, negative metacognitive beliefs, and experiential avoidance in clinical samples, including GAD, OCD and depression, and their prediction of worry severity and GAD.

4.6.3 Design

Between and within group design would allow comparisons to be made between each of the disorder groups, on measures of worry, IU, negative metacognitive beliefs, and experiential avoidance and additionally, within subjects, will allow inferences on causality to be made on residual change observed on measure of worry.

4.6.4 Research Hypotheses

Specific research hypotheses would be:

1) Worry severity will be highest in individuals with GAD.

2) Negative metacognitive beliefs about danger will distinguish GAD group, over OCD and depression, whereas IU and experiential avoidance will be present in all three groups, but will not be able to distinguish groups.

3) Controlling for demographic variables, depression T1, and positive beliefs about worry and daily hassles T2, negative metacognitive beliefs about danger will make a unique and only significant contribution to the prospective prediction of worry. IU will have a unique variance but this will not be significant, whereas experiential avoidance will not offer a unique variance.

4) Controlling for demographic variables, depression, and positive beliefs about worry and daily hassles T2, negative metacognitive beliefs about

danger will make a unique and the largest and only significant contribution to the prospective prediction of GAD status. IU will have a unique variance but this will not be significant whereas experiential avoidance will not offer a unique variance.

4.7 Summary and Conclusions

Overall, this research has succeeded in completing the aim of exploring the roles of thoughts and beliefs in the development and the maintenance of worry and GAD. Specifically, an increased understanding was obtained on the specific constructs of IU, negative metacognitive beliefs about danger, and experiential avoidance. While acknowledging the specific limitations of this research, in addition, the need for further exploration with clinical, cross-cultural and cross-gender samples, tentative conclusions can be made of the causal role of negative metacognitive beliefs about danger, and their unique and relative contribution to the prediction of worry and GAD status over time. This highlights the potential benefits of this understanding for GAD sufferers, including targeting specific cognitions with the clinical application of MCT, for negative metacognitive beliefs about danger for those suffering GAD, to hopefully improve the efficacy of treatment outcomes for GAD.

References

Barahmand, U. (2008). Age and gender differences in adolescent worry. *Personality and Individual Differences, 45*(8), 778-783. doi: http://dx.doi.org/10.1016/j.paid.2008.08.006

Behar, E., DiMarco, I. D., Hekler, E. B., Mohlman, J., & Staples, A. M. (2009). Current theoretical models of generalized anxiety disorder (GAD): Conceptual review and treatment implications. *Journal of Anxiety Disorders, 23*(8), 1011-1023.

Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., . . . Zettle, R. D. (2011). Preliminary psychometric properties of the acceptance and action questionnaire–II: a revised measure of psychological inflexibility and experiential avoidance. *Behavior Therapy, 42*(4), 676-688.

Brüggen, E., Wetzels, M., de Ruyter, K., & Schillewaert, N. (2011). Individual differences in motivation to participate in online panels. *International Journal of Market Research, 53*(3), 369-390. doi: 10.2501/ijmr-53-3-369-390

Buhr, K., & Dugas, M. (2006). Investigating the construct validity of intolerance of uncertainty and its unique relationship with worry. *Journal of Anxiety Disorders, 20*(2), 222-236.

Buhr, K., & Dugas, M. J. (2002). The intolerance of uncertainty scale: psychometric properties of the English version. *Behaviour Research and Therapy, 40*(8), 931-945.

Buhr, K., & Dugas, M. J. (2012). Fear of emotions, experiential avoidance, and intolerance of uncertainty in worry and generalized anxiety disorder. *International Journal of Cognitive Therapy, 5*(1), 1-17.

Carleton, R. N. (2012). The intolerance of uncertainty construct in the context of anxiety disorders: Theoretical and practical perspectives. *Expert Review of Neurotherapeutics, 12*(8), 937-947. doi: 10.1586/ern.12.82

Carleton, R. N., Myriah, K. M., Michel, A. T., Randi, E. M., Martin, M. A., & Gordon, J. G. A. (2012). Increasingly certain about uncertainty: Intolerance of uncertainty across anxiety and depression. *Journal of Anxiety Disorders, 26*, 468-479. doi: 10.1016/j.janxdis.2012.01.011

Chen, C. Y., & Hong, R. Y. (2010). Intolerance of uncertainty moderates the relation between negative life events and anxiety. *Personality and Individual Differences, 49*(1), 49-53.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155-159. doi: 10.1037/0033-2909.112.1.155

Cottler, L. B., Compton, W. M., Ben-Abdallah, A., Horne, M., & Claverie, D. (1996). Achieving a 96.6 percent follow-up rate in a longitudinal study of drug abusers. *Drug and Alcohol Dependence, 41*(3), 209-217. doi: 10.1016/0376-8716(96)01254-9

Covin, R., Ouimet, A. J., Seeds, P. M., & Dozois, D. (2008). A meta-analysis of CBT for pathological worry among clients with GAD. *Journal of Anxiety Disorders, 22*, 108-116. doi: 10.1016/j.janxdis.2007.01.002

Crits-Christoph, P., Newman, M. G., Rickels, K., Gallop, R., Gibbons, M. B. C., Hamilton, J. L., . . . Pastva, A. M. (2011). Combined medication and cognitive therapy for generalized anxiety disorder. *Journal of Anxiety Disorders, 25*(8), 1087-1094. doi: http://dx.doi.org/10.1016/j.janxdis.2011.07.007

Davis, R. N., & Valentiner, D. P. (2000). Does meta-cognitive theory enhance our understanding of pathological worry and anxiety? *Personality and Individual Differences, 29*(3), 513-526.

de Bruin, G., Rassin, E., & Muris, P. (2007). The Prediction of Worry in Non-Clinical Individuals: The Role of Intolerance of Uncertainty, Meta-Worry, and Neuroticism. *Journal of Psychopathology and Behavioral Assessment, 29*(2), 93-100.

Deparment of Health (DoH). (2007). *Report of the high level group on clinical effectiveness* London: Department of Health

Dugas, M., Freeston, M., H., Provencher, M., D, Lachance, S., Ladouceur, R., & Gosselin, P. (2001). The worry and anxiety questionnaire: Validation in non-clinical and clinical samples (French). *Journal de Therapie Comportementale et Cognitive, 11*(31-36).

Dugas, M., J., Freeston, M., H., & Ladouceur, R. (1997). Intolerance of Uncertainty and Problem Orientation in Worry. *Cognitive Therapy and Research, 21*(6), 593-606.

Dugas, M., J., Gagnon, F., Ladouceur, R., & Freeston, M., H. (1998). Generalized anxiety disorder: a preliminary test of a conceptual model. *Behaviour Research and Therapy, 36*(2), 215-226.

Dugas, M., J., Gosselin, P., & Landouceur, R. (2001). Intolerance of uncertainty and worry: Investigating specificity in a non-clinical sample. *Cognitive Therapy & Research, 25*(5), 551-558.

Dugas, M., J., Savard, P., Gaudet, A., Turcotte, J., Laugesen, N., Robichaud, M., . . . Koerner, N. (2007). Can the components of a cognitive model predict the severity of generalized anxiety disorder? *Behavior Therapy, 38*(2), 169-178.

Dugas, M., J., Schwartz, A., & Francis, K. (2004). Brief Report: Intolerance of Uncertainty, Worry, and Depression (Vol. 28, pp. 835-842): Springer Science & Business Media B.V.

Dugas, M., Marchand, A., & Ladouceur, R. (2005). Further validation of a cognitive-behavioural model of generalized anxiety disorder diagnostic and symptom specificity. *Journal of Anxiety Disorders, 19*, 329-343.

Freeston, M. H., Rhéaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? *Personality and Individual Differences, 17*(6), 791-802.

Fresco, D. M., Mennin, D. S., Heimberg, R. G., & Turk, C. L. (2003). Using the penn state worry questionnaire to identify individuals with generalized

anxiety disorder: a receiver operating characteristic analysis. *Journal of Behavior Therapy and Experimental Psychiatry, 34*(3–4), 283-291.

Gentes, E. L., & Ruscio, A. M. (2011). A meta-analysis of the relation of intolerance of uncertainty to symptoms of generalized anxiety disorder, major depressive disorder, and obsessive-compulsive disorder. *Clinical Psychology Review, 31*, 923-933.

Hayes, S. C., Strosahl, K., Wilson, K. G., Bissett, R. T., Pistorello, J., Toarmino, D., . . . McCurry, S. M. (2004). Measuring experiential avoidance: A preliminary test of a working model. *Psychological Record, 54*(4), 553-578.

Hoge, E. A., Tamrakar, S. M., Christian, K. M., Mahara, N., Nepal, M. K., Pollack, M. H., & Simon, N. M. (2006). Cross-cultural differences in somatic presentation in patients with generalized anxiety disorder (English). *The Journal of nervous and mental disease, 194*(12), 962-966.

Kashdan, T. B., Barrios, V., Forsyth, J. P., & Steger, M. F. (2006). Experiential avoidance as a generalized psychological vulnerability: Comparisons with coping and emotion regulation strategies. *Behaviour Research and Therapy, 44*(9), 1301-1320.

Khawaja, N. G., & Chapman, D. (2007). Cognitive predictors of worry in a non-clinical population. *Clinical Psychologist, 11*(1), 24 - 32.

Khawaja, N. G., & McMahon, J. (2011). The relationship of meta-worry and intolerance of uncertainty with pathological worry, anxiety, and depression. *Behaviour Change, 28*(4), 165-180.

Kohn, P. M., Lafreniere, K., & Gurevich, M. (1990). The Inventory of College Students' Recent Life Experiences: A decontaminated hassles scale for a special population. *Journal of Behavioral Medicine, 13*(6), 619-630.

Ladouceur, R., Dugas, M. J., Freeston, M. H., Rhéaume, J., Blais, F., Boisvert, J.-M., . . . Thibodeau, N. (1999). Specificity of generalized anxiety disorder symptoms and processes. *Behavior Therapy, 30*(2), 191-207.

Ladouceur, R., Gosselin, P., & Dugas, M. J. (2000). Experimental manipulation of intolerance of uncertainty: a study of a theoretical model of worry. *Behaviour Research and Therapy, 38*(9), 933-941.

Lee, J. K., Orsillo, S. M., Roemer, L., & Allen, L. B. (2010). Distress and avoidance in generalized anxiety disorder: Exploring the relationships with intolerance of uncertainty and worry. *Cognitive Behaviour Therapy, 39*(2), 126 - 136.

Mahoney, A. E. J., & McEvoy, P. M. (2012). A transdiagnostic examination of intolerance of uncertainty across anxiety and depressive disorders. *Cognitive Behaviour Therapy, 41*.

Marques, L., Robinaugh, D. J., LeBlanc, N. J., & Hinton, D. (2011). Cross-cultural variations in the prevalence and presentation of anxiety

disorders. *Expert Review of Neurotherapeutics, 11*(2), 313-322. doi: 10.1586/ern.10.122

McEvoy, P. M., & Mahoney, A. E. J. (2012). To be sure, to be sure: Intolerance of uncertainty mediates symptoms of various anxiety disorders and depression. *Behavior Therapy, 43*(3), 533-545. doi: http://dx.doi.org/10.1016/j.beth.2011.02.007

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the penn state worry questionnaire. *Behaviour Research and Therapy, 28*(6), 487-495.

Newman, M. G., Zuellig, A. R., Kachin, K. E., Constantino, M. J., Przeworski, A., Erickson, T., & Cashman-McGrath, L. (2002). Preliminary reliability and validity of the generalized anxiety disorder questionnaire-IV: A revised self-report diagnostic measure of generalized anxiety disorder. *Behavior Therapy, 33*(2), 215-233.

Nulty, D. D. (2008). The adequacy of response rates to online and paper surveys: What can be done? *Assessment & Evaluation in Higher Education, 33*(3), 301-314.

Olatunji, B. O., Broman-Fulks, J. J., Bergman, S. M., Green, B. A., & Zlomke, K. R. (2010). A taxometric investigation of the latent structure of worry: Dimensionality and associations with depression, anxiety, and stress. *Behavior Therapy, 41*(2), 212-228.

Penney, A. M., Mazmanian, D., & Rudanycz, C. (2012). Comparing positive and negative beliefs about worry in predicting generalized anxiety disorder. *Canadian Journal of Behavioural Science*. doi: 10.1037/a0027623

Penny, K. I., & Atkinson, I. (2012). Approaches for dealing with missing data in health care studies. *Journal of Clinical Nursing, 21*(19/20), 2722-2729. doi: 10.1111/j.1365-2702.2011.03854.x

Robichaud, M., Dugas, M., & Conway, M. (2003). Gender differences in worry and associated cognitive-behavioural variables. *Anxiety Disorders, 17*, 501-516.

Roemer, L., Borkovec, M., Posa, S., & Borkovec, T. D. (1995). A self-report measure of generalised anxiety disorder. *Journal of Behavior Therapy and Experimental Psychiatry, 26*, 345-350.

Roemer, L., Salters, K., Raffa, S., & Orsillo, S. M. (2005). Fear and avoidance of internal experiences in GAD: Preliminary tests of a conceptual model. *Cognitive Therapy and Research, 29*(1), 71-88.

Ruscio, A. M. (2002). Delimiting the boundaries of generalized anxiety disorder: differentiating high worriers with and without GAD. *Journal of Anxiety Disorders, 16*(4), 377-400.

Ruscio, A. M., & Borkovec, T. D. (2004). Experience and appraisal of worry among high worriers with and without generalized anxiety disorder. *Behaviour Research and Therapy, 42*, 1469-1482. doi: 10.1016/j.brat.2003.10.007

Ruscio, A. M., Borkovec, T. D., & Ruscio, J. (2001). A taxometric investigation of the latent structure of worry. *Journal of Abnormal Psychology, 110*(3), 413-422.

Russell, M., & Davey, G. C. L. (1993). The relationship between life event measures and anxiety and its cognitive correlates. *Personality and Individual Differences, 14*(2), 317-322.

Schmitz, N., Hartkamp, N., Brinschwitz, C., Michalek, S., & Tress, W. (2000). Comparison of the standard and the computerized versions of the Symptom Check List (SCL-90-R): A randomized trial. *Acta Psychiatrica Scandinavica, 102*(2), 147-152.

Scott, E. L., Eng, W., & Heimberg, R. G. (2002). Ethnic differences in worry in a nonclinical population. *Depression And Anxiety, 15*(2), 79-82.

Stapinski, L. A., Abbott, M. J., & Rapee, R. M. (2010). Fear and perceived uncontrollability of emotion: Evaluating the unique contribution of emotion appraisal variables to prediction of worry and generalised anxiety disorder. *Behaviour Research and Therapy, 48*(11), 1097-1104.

Tan, S., Moulding, R., Nedeljkovic, M., & Kyrios, M. (2010). Metacognitive, cognitive and developmental predictors of generalised anxiety disorder symptoms. *Clinical Psychologist, 14*(3), 84-89.

van der Heiden, C., Muris, P., & van der Molen, H., T. (2012). Randomized controlled trial on the effectiveness of metacognitive therapy and intolerance-of-uncertainty therapy for generalized anxiety disorder.

[Article]. *Behaviour Research and Therapy, 50*, 100-109. doi: 10.1016/j.brat.2011.12.005

Wells, A. (1995). Meta-cognition and worry: A cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy, 23*(03), 301-320.

Wells, A. (1997). *Cognitive therapy of anxiety disorders: A practice manual and conceptual guide.* Chichester, UK: Wiley.

Wells, A. (1999a). A cognitive model of generalized anxiety disorder. *Behavior Modification, 23*(4), 526-555.

Wells, A. (1999b). A metacognitive model and therapy for generalized anxiety disorder. *Clinical Psychology and Psychotherapy, 6*, 86-95.

Wells, A. (2009). *Metacognitive therapy for anxiety and depression*. London: Guilford Press.

Wells, A., & King, P. (2006). Metacognitive therapy for generalized anxiety disorder: An open trial. *Journal of Behavior Therapy and Experimental Psychiatry, 37*(3), 206-212. doi: http://dx.doi.org/10.1016/j.jbtep.2005.07.002

Wells, A., Welford, M., King, P., Papageorgiou, C., Wisely, J., & Mendel, E. (2010). A pilot randomized trial of metacognitive therapy vs applied relaxation in the treatment of adults with generalized anxiety disorder (English). *Behaviour Research and Therapy, 48*(5), 429-434.

Yilmaz, A. E., Gençöz, T., & Wells, A. (2011). The temporal precedence of metacognition in the development of anxiety and depression symptoms in the context of life-stress: A prospective study. *Journal of Anxiety Disorders, 25*(3), 389-396.

Zlomke, K. R., & Hahn, K. S. (2010). Cognitive emotion regulation strategies: Gender differences and associations to worry. *Personality and Individual Differences, 48*(4), 408-413. doi: http://dx.doi.org/10.1016/j.paid.2009.11.007

Appendix A
Author Guidelines

This text box is where the unabridged thesis included the following third party copyrighted

material:

http://www.elsevier.com/journals/journal-of-anxiety-disorders/0887-6185/guide-for-authors#5000

This text box is where the unabridged thesis included the following third party copyrighted

material:

http://www.elsevier.com/journals/journal-of-anxiety-disorders/0887-6185/guide-for-authors#5000

This text box is where the unabridged thesis included the following third party copyrighted

material:

http://www.elsevier.com/journals/journal-of-anxiety-disorders/0887-6185/guide-for-authors#5000

This text box is where the unabridged thesis included the following third party copyrighted material:

http://www.elsevier.com/journals/journal-of-anxiety-disorders/0887-6185/guide-for-authors#5000

This text box is where the unabridged thesis included the following third party copyrighted material:

http://www.elsevier.com/journals/journal-of-anxiety-disorders/0887-6185/guide-for-authors#5000

This text box is where the unabridged thesis included the following third party copyrighted

material:

http://www.elsevier.com/journals/journal-of-anxiety-disorders/0887-6185/guide-for-authors#5000

This text box is where the unabridged thesis included the following third party copyrighted material:

http://www.elsevier.com/journals/journal-of-anxiety-disorders/0887-6185/guide-for-authors#5000

This text box is where the unabridged thesis included the following third party copyrighted

material:

http://www.elsevier.com/journals/journal-of-anxiety-disorders/0887-6185/guide-for-authors#5000

Appendix B

Recruitment Strategy
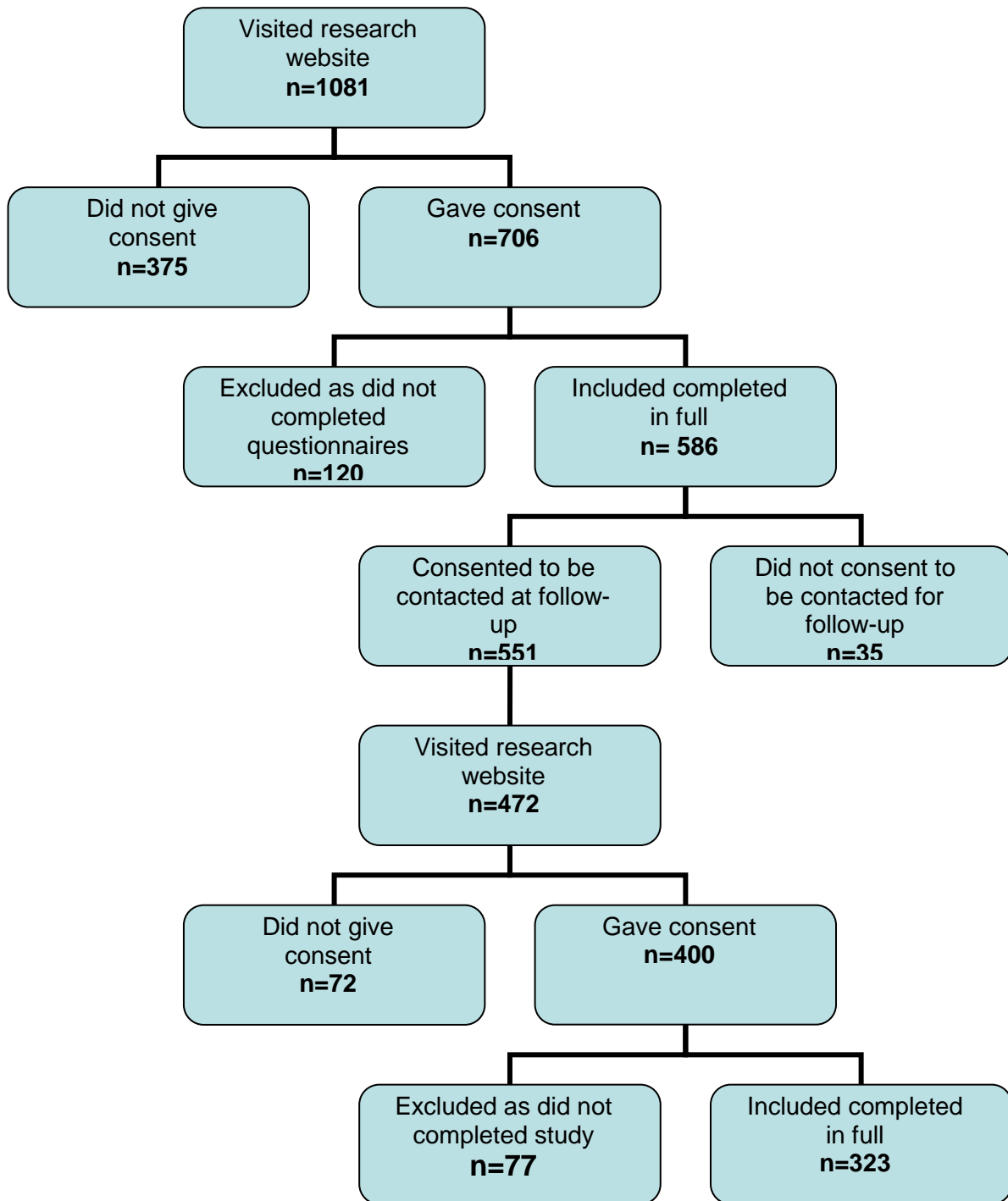
Figure 5: Points of Attrition for the Study

Appendix C

Participant Information Sheet

Participant Information Sheet

Exploring the Role of Thoughts and Beliefs in Anxiety

1. Introduction

Thank you for your interest in taking part in this research study. This information sheet will explain why the research is being done and what it will involve. Please take time to read this information carefully and discuss it with others, such as your family.

2. What is the purpose of the study?

We are exploring how people think about anxiety and worry and hope to find about 300 participants. The study is split into two parts and you can complete the first part only or both parts if you wish.

3. Why have I been chosen?

We are inviting everyone who is currently studying at the University of Liverpool to take part in this study.

4. Do I have to take part?

No. Participation in this study is voluntary and you are free to withdraw at anytime without explanation or disadvantage. Results up to the period of withdrawal may be used, if you are happy for this to be done. Otherwise, you may request that they are destroyed and no further use will be made of them.

5. What does taking part involve?

If you agree to take part in the study you will be asked to indicate your consent on the next page, we will then ask you to complete some questionnaires online. This will involve answering some questions about your emotions, beliefs about emotions and life events, and should take about 20-30 minutes to complete. As an incentive to take part we are offering all participants who complete the study at both time points the opportunity to be entered for a prize draw to win Amazon gift vouchers, prizes include £100, £35 and £15, winners will be contacted by email.

6. Are there any risks in taking part?

Taking part involves thinking about your thoughts and emotions, which could be mildly distressing. If you experience any discomfort or distress you can stop at any stage, and we encourage you to inform the researcher (Natalie Bork) or one of the supervisors (Dr P Fisher or Dr P O'Carroll) as soon as possible. If you are distressed you may wish to contact the university counselling service (www.liv.ac.uk/counserv, 14 Oxford Street, Liverpool, L69 7WX, 0151 794 3304), which is a service free of charge to all students studying at the University of Liverpool who may be experiencing problems such as anxiety. You can also seek advice from www.nhsdirect.nhs.uk or 0845 46 47, or from your G.P.

7. Are there any benefits in taking part?

Taking part in the research may not benefit you personally but you may find it rewarding and interesting, it may offer you the chance to reflect on common experiences of anxiety. We do hope that the information gained will enable us to have a better understanding of the factors that cause individuals to experience anxiety and worry.

8. What if I am unhappy or if there is a problem?

If you are unhappy, or if there is a problem, please feel free to let us know by contacting the researcher or one of the supervisors. If you remain unhappy or have a complaint, which you feel you cannot come to us with then you should contact the Research Governance Officer on 0151 794 8290 (ethics@liv.ac.uk). When contacting the Research Governance Officer, please provide details of the name or description of the study (so that it can be identified), the researcher and or supervisors involved, and the details of the complaint you wish to make.

9. Will my participation be kept confidential?

Yes. Your information will only be accessible to the researchers

10. How will my information be stored?

Your information will be transferred automatically to a secure database to enable it to be analysed with data from other participants. Your name and contact details will not appear on any of the data collected and an ID code will be used to identify your anonymous data. That way, we will not identify you when we analyse the data or write reports about the study. Email addresses will be used solely to contact you 6 months after baseline data to see if you wish to take part in the second part of the study, and to contact winners from the prize draw. Email addresses will be destroyed when they are no longer needed. The data will be stored for five years after the study, and then it will be destroyed safely via the University Data Management Services.

11. Will my taking part be covered by an insurance scheme?

Participants taking part in this study will be covered by the University's insurance.

12. What will happen to the results of the study?

The results of this study will contribute to a Doctorate in Clinical Psychology thesis that is being undertaken by the researcher (Natalie Bork), and may be published in psychological journals and presented at research conferences. You will be able to get copies of the published results from the address below, if and when that happens.

13. Who can I contact if I have further questions?

If you have any concerns or questions about the study and wish to contact someone, please call the researcher or a supervisor.

Dr Peter Fisher (Supervisor)   plfisher@liverpool.ac.uk

Dr Pierce O'Carroll (Supervisor)   ocarroll@liverpool.ac.uk

Natalie Bork (Researcher)   nbork@liverpool.ac.uk

University of Liverpool,

Department of Clinical Psychology,

Ground Floor, The Whelan Building,

The Quadrangle,

Brownlow Hill,

Liverpool,

L69 3BG

0151 794 5334,

Thank you for taking the time to read this information leaflet

Appendix D

Online Consent Form

UNIVERSITY OF
LIVERPOOL

ONLINE CONSENT FORM

Title of Research Project: Exploring the Role of Thoughts and Beliefs in Anxiety

Researcher(s): Dr Peter Fisher, Dr Pierce O'Carroll & Natalie Bork

Before you take part in this study, please select your answer to the questions below and press. If all your answers are Yes, press Submit to begin

Please select answers

I confirm that I have read and have understood the information sheet dated November 2011 for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

YES/NO

I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my rights being affected.

YES/NO

I understand that, under the Data Protection Act, I can at any time ask for access to the information I provide and I can also request the destruction of that information if I wish.

YES/NO

I agree to take part in the above study.

YES/NO

By pressing this button I confirm that I consent to taking part in the study [SUBMIT]

The contact details of lead Researcher (Principal Investigator) are:
Dr Peter Fisher
Division of Clinical Psychology
Whelan Building
University of Liverpool
L69 3GB
0151 794 5279
plfisher@liverpool.ac.uk

Appendix E

Measures

Demographic Data for Web-Based Study

Gender

Please select

1. Male

2. Female

Age

Ethnicity

Please select

1. White British

2. White Irish

3. Other White background- Please Specify_____

4. Asian- Indian

5. Asian- Pakistani

6. Asian-Bangladeshi

7. Other Asian Background- Please specify_____

8. Black-Caribbean

9. Black African

10. Other Black Background- Please specify_____

11. Mixed- White and Black Caribbean

12. Mixed White and Black African

13. Mixed White and Asian

14. Other Mixed Background

15. Chinese

16. Other Ethnic Group- Please specify_____

Generalized Anxiety Disorder Questionnaire – IV

This text box is where the unabridged thesis included the following third party copyrighted material:

Newman, M. G., Zuellig, A. R., Kachin, K. E., Constantino, M. J., Przeworski, A., Erickson, T., & Cashman-McGrath, L. (2002). Preliminary reliability and validity of the generalized anxiety disorder questionnaire-IV: A revised self-report diagnostic measure of generalized anxiety disorder. *Behavior Therapy, 33*(2), 215-233.

DASS21 *Name:* *Date:*

This text box is where the unabridged thesis included the following third party copyrighted

material:

Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the depression anxiety stress scales (2nd.*

Ed.). Sydney: Psychological Foundation 39.

The Penn State Worry Questionnaire (PSWQ)

This text box is where the unabridged thesis included the following third party copyrighted material:

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the penn state worry questionnaire. *Behaviour Research and Therapy, 28*(6), 487-495.

<u>META-COGNITIONS QUESTIONNAIRE 30-</u> *MCQ-30*

AAQ-II

This text box is where the unabridged thesis included the following third party copyrighted material:

Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., . . . Zettle, R. D. (2011). Preliminary psychometric properties of the acceptance and action questionnaire–II: a revised measure of psychological inflexibility and experiential avoidance. *Behavior Therapy, 42*(4), 676-688.

IU Scale (IUS)

Inventory of College Students Recent Life Experiences (ICSRLE)

This text box is where the unabridged thesis included the following third party copyrighted material:

Kohn, P. M., Lafreniere, K., & Gurevich, M. (1990). The inventory of college students' recent life experiences: a decontaminated hassles scale for a special population. *Journal of Behavioral Medicine, 13*(6), 619-630.

This text box is where the unabridged thesis included the following third party copyrighted material:

Kohn, P. M., Lafreniere, K., & Gurevich, M. (1990). The inventory of college students' recent life experiences: a decontaminated hassles scale for a special population. *Journal of Behavioral Medicine, 13*(6), 619-630.

Appendix F

Exploration of Assumptions

Exploration of Normality and Parametric Assumptions

The following is a detailed description of the how the statistical assumptions were explored prior to data analyses.

Normal Distribution

Several variables across the participants showed evidence of skewness and kurtosis and visual inspection suggested non-normal distributions. Consequently, Kolmogorov-Smirnov test of normality was conducted on the distribution of depression (DASS-D), worry (PSWQ, T1), daily hassles T2 (ICSRLE, T2), positive beliefs about worry (MCQ-POS), negative beliefs about the danger of worry (MCQ-NEG-D), IU (IUS), experiential avoidance (AAQ-II), scores by worry (PSWQ, T2). Depression [Statistic (323) =.158, $p<0.001$], PSWQ [Statistic (323) = .085, $p<0.001$], MCQ-POS [Statistic (323) =.103, $p<0.001$], MCQ-30-NEG-D [Statistic (323) = .112, $p<0.001$], ICSRLE [Statistic (323) = .066, $p<0.05$], IUS [Statistic (323) = .109, $p<0.001$] and AAQ-II [Statistic (323) = .101, $p<0.001$], were found to significantly deviate from the normal distribution. Therefore, the assumption of normally distributed data was not met.

Homogeneity

Homogeneity of variance was assessed using Levene's test. The variance of GAD and non-GAD groups were explored. The variance of GAD status and non-GAD scores for depression [$F(1,323) = 48.6$, = $p<0.001$], PSWQ, T1 [$F(1, 323) = 6.06$, $p<0.001$], MCQ-POS [$F(1,584) = 10.62$, $p<0.01$], MCQ-NEG-D [$F(1,323) = 10.59$, $p<0.01$], IUS [$F(1,584) = 9.933$, $p<0.01$] and AAQ-II [$F(1,584) = 11.07$, $p<0.001$] were found to be unequal and therefore did not meet the assumptions of homogeneity of variance. Variance for PSWQ, T2 [$F(1,323) =.380$, $p=.538$] and

ICSRLE, T2 [F(1,323) = 1.083, p=.299] were found to be equal. The assumptions of homogeneity of variances was not met for all variables.

Presence of Outliers

An examination of box plots revealed the presence of outliers on Depression (DASS-D), positive beliefs about worry (MCQ-POS), worry (PSWQ, T1), IU (IUS) and daily hassles (ICSRLE) which appeared to account for the violation of the assumptions of normality distributed data. On closer inspection, there was no evidence of these not being valid responses and they were therefore retained for use in the analyses.

Testing of Assumptions for Regression Analysis

Sample Size

To ensure the sample size was adequate for regression analysis it was determined that a sample of 165 would be required with 11 independent variables. The sample for this study was 323 and was therefore deemed to be adequate.

Multicollinearity

To check variables for the presence of multicollinarity, tolerance values and variance inflation factors (VIFs) were inspected. Tolerance values were greater than 0.1 across all variables and VIF values were all less than 10 therefore suggesting that there were no issues of multicollinearity.

Homoscedasticity and Linearity

The assumption of homoscedasticity and linearity was explored using a scatter plot seen in figure 6, which demonstrates residuals within acceptable limits, therefore indicating assumptions have been met.
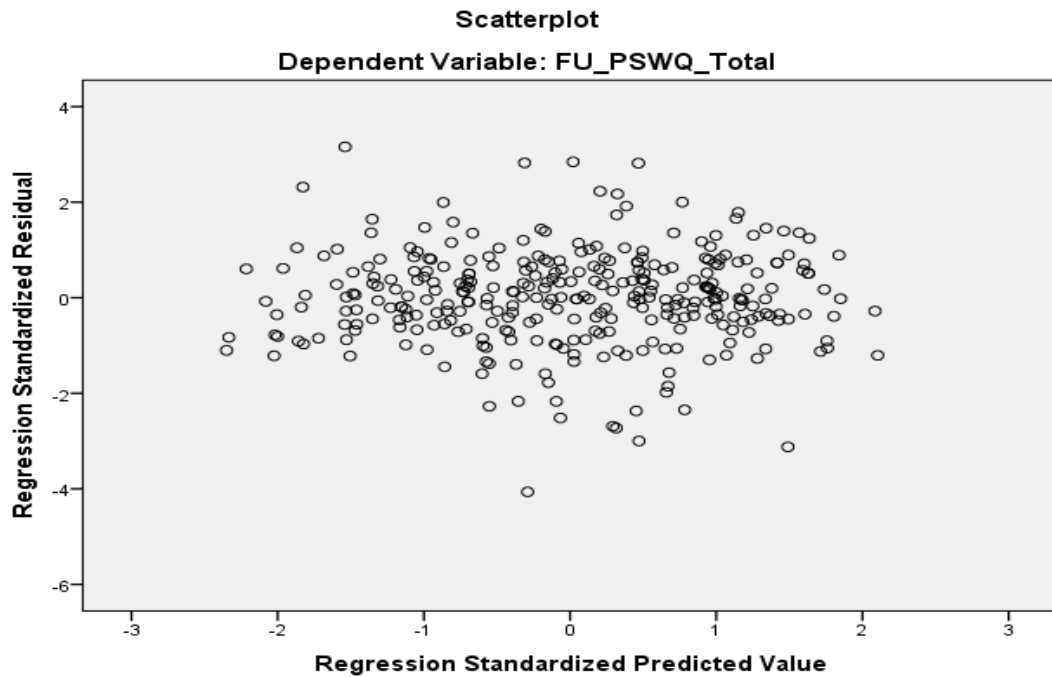
Scatterplot

Dependent Variable: FU_PSWQ_Total

Figure 6: Scatter Plots of Standardised Residuals against Standardised Predicted Values.

Independent Errors

The assumptions of independent errors were investigated using the Duban-Watson Statistic. This was calculated to be 1.962, which was below the required value of 2, therefore the assumption of independent errors was met.

Normally Distributed Residuals

To explore if the residual errors were normally distributed, a histogram and P-P plot were produced which can be seen in figure 7 & 8, which indicate that residuals appeared to be normally distributed; therefore, assumptions of normality were met.
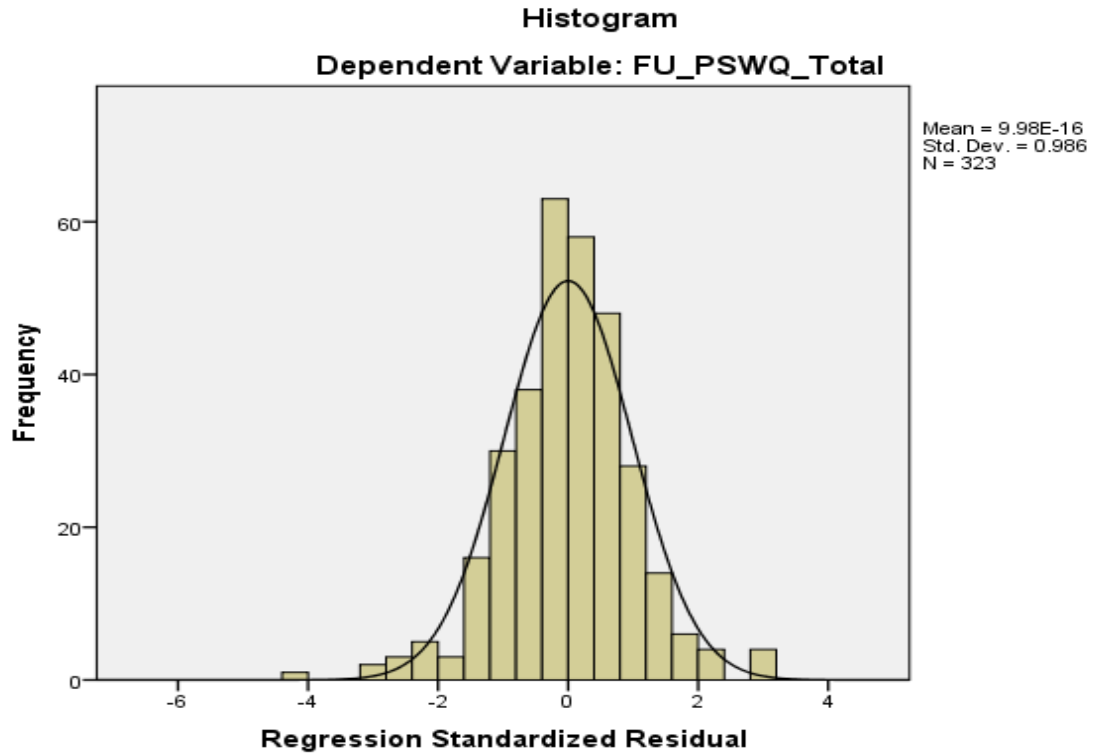
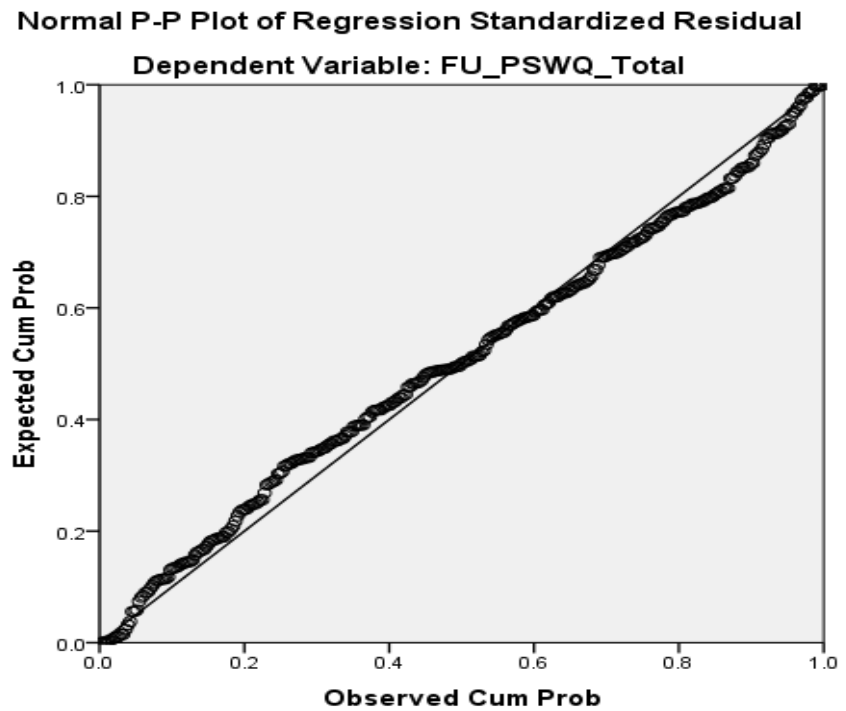**Figure 7:** Histogram of Standardised Residual of Errors for PSWQ.

Figure 8: P-P Plot of Standardised Residual Errors for PSWQ.

Influential Cases

Seven of the cases were found to have standardised residuals on the Mahalanobis above the critical value of 24.32 (α-0.001) (Tabachnick & Fidell, 2007). However, all of the Cook's distance were below 1. Further exploration of the seven cases, revealed they may have had an influence on the overall data, and where therefore removed from further analyses.

Standardized residuals, Cook's distances and Mahalanobis distances were examined to investigate the presence of multivariate outliers. The highest residual score was 3.17 and highest Cook's distance was .096. As standardised residuals need to be above 3.29 (Tabachnick & Fidell, 2007), and Cook's distance less than one (Cook & Weisberg, 1982), these results are suggestive of no multivariate outliers. However, seven cases were found to be outside of the critical range for Mahalanobis distance and where thought to be influencing the data and where therefore removed from further analyses. Examination of residual plots and histograms demonstrated that the assumptions of linearity, homoscdasticity, and normally distributed errors were all met.

References

Cook, R. D., & Weisberg, S. (1982). *Residuals and influence in regression [by] R. Dennis Cook and Sanford Weisberg*: New York: Chapman & Hall, 1982.

Tabachnick, B., & Fidell, L. (2007). *Using multivariate statistics*. Boston: Pearson Education, Inc.