Why do people worry and ruminate?

Investigating factors that maintain repetitive negative thought.

Submitted by Rosemary Emeline Fluellen Kingston to the University of Exeter as a thesis for the degree of Doctor of Philosophy in Psychology, October 2013

I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

Signature: ……

Dedication

To my wonderful dad, and the memory of my lovely mum.

Acknowledgements

To my PhD supervisors, Ed Watkins and Heather O'Mahen, I wish to express my sincere gratitude. I am also very thankful for the following special people: Glynn Davies, Rose Robinson, Sarah Parker, Laura Hammond, Jo Cappell, Pooja Shah, Hetta Roberts, Caroline Farmer, Dale Weston, Heike Echlepp, and Jo Mann. I also want to thank my dad, Barry Kingston, who I have always been able to rely on for support and thoughtful guidance. I am very grateful to the University of Exeter and the Psychology department for their financial support that enabled me to undertake this PhD. I am also very grateful to the Psychology department for giving me the opportunity to gain some very valuable teaching experiences. Finally, I wish to thank everyone who took part in my research studies.

Abstract

The overarching aim of this research was to understand factors implicated in the maintenance of rumination and worry, conceptualised as a transdiagnostic process of repetitive negative thought (RNT), through the use of cross-sectional, prospective, and experimental research designs. Rumination and worry have been repeatedly implicated in the development and maintenance of various forms of psychopathology, in particular, depression and anxiety disorders. Given the negative outcomes for mood and psychopathology, there is a need for a better understanding of vulnerability factors that maintain this unconstructive thinking.

Based on a review of the literature, an integrative theoretical model was developed and tested using structural equation modelling. Using cross-sectional data, the model was tested in a large sample of adults (n = 506). Of the broad range of proximal and distal vulnerability factors examined, only neuroticism and beliefs about the function of repetitive thought remained significantly associated with RNT once current symptoms were statistically controlled. Emotional abuse and abstract processing were indirectly associated with RNT.

Following on from this, a prospective study examined which of these vulnerability factors prospectively predicted change in RNT over six to eight weeks. Only neuroticism and the specific belief that repetitive thought aids instrumental understanding predicted change in RNT, after controlling for depression and anxiety symptoms.

Next, two experimental studies were conducted to explore the causal relationship between RNT and the belief that RNT aids insight and understanding, by experimentally manipulating this appraisal and measuring the impact on state RNT. Whilst methodological issues with the first experimental study precluded clear

conclusions being drawn about the nature of the relationship, the second experimental study demonstrated that participants manipulated to believe that RNT is helpful for increasing insight and understanding had greater levels of state RNT after exposure to a stressor, relative to participants manipulated to believe that RNT is unhelpful.

Finally, in order to see whether rumination has any consequences that may potentially reinforce its further use, an experimental study was conducted to manipulate processing mode (abstract rumination versus concrete thinking) and examine the effect on a range of outcomes relating to insightfulness and avoidance. Whilst rumination did not lead to increased insight, it did afford more justification for avoidance, relative to concrete thinking. The clinical and theoretical implications of these findings are discussed with respect to existing theories of repetitive negative thought.

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Notes on Thesis Structure

This thesis has a paper-based structure, and it reports five studies, four of which have been submitted as papers for publication (see Table *i*). Articles are reported exactly as they appear in publication or as submitted, with the only amendments concerning formatting and figure/table numbering. Since these papers have been written as stand-alone manuscripts, some information is repeated across chapters. As these papers have been submitted as co-authored manuscripts, the candidate's contribution to each paper is outlined in Appendix 1.

At the beginning of each chapter reporting a paper is a preface that outlines how that paper contributes to the overall thesis, and how it follows on from previous work. Moreover, following each paper-based chapter are appendices that report additional information and/or analyses not contained in the paper submitted for publication.

Table i. Publication status of papers presented in this thesis

Chapter	Status
2	Published in *Journal of Experimental Psychopathology*
3	Under review
5	Under review
6	Under review

The overarching aim of this thesis is to increase understanding of the factors that maintain the tendency towards rumination and worry in adults. The reason why an increased understanding of the maintenance of rumination and worry is important is because of the deleterious outcomes of these forms of thinking: rumination and

worry are both associated with the onset and maintenance of a variety of mental health problems, in particular, depression and anxiety. Thus, an understanding of factors that maintain these unconstructive thinking processes can inform treatment and prevention interventions.

The thesis begins with a literature review (Chapter 1). Rumination and worry are defined, and evidence for their negative effects is presented. Theoretical accounts of rumination and worry are reviewed, alongside supporting evidence for these accounts. Then, the argument for considering rumination and worry together as a common transdiagnostic process of repetitive negative thought (RNT) is presented, in which it is noted that (i) rumination and worry are highly correlated and it is difficult to make meaningful distinctions between the two processes; (ii) rumination and worry have similarly negative consequences in terms of mood and psychopathology; and (iii) there are considerable overlaps between the theoretical accounts of rumination and worry. After a review of the vulnerability factors for RNT suggested by the theoretical models, an integrative theoretical model is proposed, in which proximal vulnerability factors (metacognitive beliefs; neuroticism; intolerance of uncertainty; abstract processing; deficiencies in cognitive inhibition; effortful control) are hypothesised to mediate the relationship between distal vulnerability factors (parental overcontrol; childhood abuse) and RNT. Some proximal factors (deficiencies in cognitive inhibition; effortful control) are also hypothesised to moderate the relationship between distal factors and RNT.

Study 1, reported in Chapter 2, aims to test this integrative theoretical model, and in doing so, tests the hypotheses that proximal factors will have a direct effect on RNT, and that distal factors will only have an effect on RNT through their

relationship with proximal factors. The model is tested using structural equation modelling in a large and geographically diverse sample of adults (n = 506).

Study 2, reported in Chapter 3, follows on from the cross-sectional study reported in Chapter 2, and it aims to explore the prospective relationships between the putative vulnerability factors and RNT, by examining which factors maintain RNT over time. The hypotheses to be tested are that proximal factors (e.g., metacognitive beliefs) will predict change in RNT after controlling for symptoms of depression, anxiety and stress, but distal factors (e.g., childhood maltreatment) will not have an effect on maintenance of RNT.

Study 3 and Study 4, reported in Chapter 4 and Chapter 5 respectively, are experimental studies in which a vulnerability factor found to be significant in predicting change in RNT – the belief that repetitive thinking aids understanding and insight – is experimentally manipulated, such that the subsequent effects on RNT can be examined.

Study 5, reported in Chapter 6, focuses on rumination, with the aim of assessing whether an experimental analogue to depressive rumination (abstract rumination) has beneficial outcomes that may reinforce its further use, relative to a non-ruminative form of thinking (concrete thinking). Based on existing theoretical accounts, specific outcomes relating to insight and avoidance are assessed.

The thesis ends with a general discussion (Chapter 7), in which the implications for theoretical models of RNT are discussed, followed by a discussion of the strengths and limitations of the research reported in the thesis, and suggestions for future research studies.

CHAPTER 1: Introduction

1.1. Overview of Literature Review Structure and Introduction to Key Concepts

This literature review chapter is organised into five sections. After briefly outlining some key concepts, in Section 1.2, rumination will be defined and evidence for its negative effects will be presented, followed by a discussion of theoretical models of rumination and relevant evidence. In Section 1.3, worry will be defined alongside evidence of its negative effects, followed by a discussion of the theoretical models of worry and evidence for those models. In Section 1.4, there will be discussion of how rumination and worry can be conceptualised as the transdiagnostic process of repetitive negative thought. There will be an evaluation of the commonality between rumination and worry, in terms of overlaps between the characteristics and qualities of ruminative and worrisome thoughts, their negative effects on mood and psychopathology, and the theoretical models outlined in earlier sections. There will also be discussion of the utility of the transdiagnostic approach. The chapter will conclude with a review of vulnerability factors for repetitive negative thought, and presentation of a hypothesised integrative theoretical model.

Repetitive thought (RT) is defined as "thinking attentively, repetitively or frequently about one's self and one's world" (Segerstrom, Stanton, Alden, & Shortridge, 2003, p. 909). There are many forms of RT, not limited to but including rumination, worry, mind wandering, problem solving, counterfactual thinking, and reflection, with RT referring to processes that can be constructive or unconstructive (Watkins, 2008).

Some forms of RT can be adaptive and beneficial, and lead to a range of constructive outcomes. For example, the process of reflection can be pleasurable and intellectually stimulating, and the process of mental simulation or problem solving

can assist with the generation of useful and creative solutions to unresolved questions (e.g., Harrington & Lofredo, 2010; Hixon & Swann, 1993; May & Etkina, 2002). Watkins (2008) reviewed evidence from cross-sectional, longitudinal and experimental studies demonstrating a variety of constructive outcomes, including how RT can contribute to successful processing of traumatic events, adaptive planning and preparation, and can contribute to the uptake of health-promoting behaviours.

However, this thesis will focus on *repetitive negative thought* (RNT), which refers to negative forms of RT that are often experienced to be unconstructive (Watkins, 2008). Specifically, RNT has four defining characteristics: that it is (i) repetitive; (ii) passive and/or relatively uncontrollable; (iii) characterised by an abstract style of processing; and (iv) focused on negative content (Ehring & Watkins, 2008). Whilst there are differences between particular forms of RNT, these four properties are common to all forms of RNT.

Two forms of RNT that have been widely studied and are associated with the development and maintenance of psychopathology are rumination and worry. In the following sections, these two forms of thought will be defined, along with evidence for their negative effects. Theories of rumination and worry will be presented, followed by a more detailed evaluation of their commonalities and how they can be conceptualised as a transdiagnostic process of RNT.

1.2. Rumination

1.2.1. Defining Rumination

The term *rumination* has been defined as "a class of conscious thoughts that revolve around a common instrumental theme and that recur in the absence of immediate environmental demands requiring the thoughts" (Martin & Tesser, 1996, p.

7). This conceptualisation of rumination does not presuppose whether the content or outcomes of rumination are positive or negative, and instead characterises rumination as a process that is driven by personal goals and concerns. This broad definition is applicable to cases of pathological or depressive rumination, as well as forms of rumination that many healthy individuals engage in from time to time.

A form of pathological rumination, associated with depression, was identified by Nolen-Hoeksema (1991), who provided the following definition of *depressive rumination* with a negative valence (p. 569): "Ruminative responses involve repetitively focusing on the fact that one is depressed; on one's symptoms of depression; and on the causes, meanings, and consequences of depressive symptoms."

Martin and Tesser's (1996) definition refers to rumination that can be positive or negative, and focused in the past, present, or future. Within this conceptualisation, rumination can be constructive or unconstructive, depending on whether the thoughts help or hinder an individual's progress towards an unattained goal (Watkins, 2008). In the course of this thesis, when the term *rumination* is used, it will refer to negatively valenced, unconstructive rumination, as per the Nolen-Hoeksema (1991) definition, unless otherwise specified. However, since the studies reported in this thesis were conducted with nonclinical populations, the term rumination will refer to rumination about negative moods and negative feelings, rather than symptoms of depression. Some examples of depressive ruminative thoughts include, "Why do I react so negatively?" and, "I just can't cope with anything" (Papageorgiou & Wells, 2004).

The Response Styles Questionnaire (RSQ), developed by Nolen-Hoeksema and Morrow (1991), is the most widely used measure of trait rumination. The RSQ contains a subscale, the Ruminative Responses Scale (RRS), designed to assess an individual's tendency to respond with rumination when in a depressed mood. The

RSQ-RRS contains 22 items which describe responses to depressed mood that focus on the self (e.g., "I think back to other times I have been depressed"), symptoms (e.g., "I think about how hard it is to concentrate"), and causes or consequences of the depressed mood (e.g., "I go away by myself and think about why I feel this way"). Respondents rate how typical each response is for them on a scale of 1 (*almost never*) to 4 (*almost always*).[1]

1.2.2. Evidence for the Negative Effects of Rumination

Rumination is a common thought process that most people engage in from time to time (Harvey, Watkins, Mansell, & Shafran, 2004). However, persistent and unconstructive forms of rumination have been associated with the onset and maintenance of symptoms of psychopathology. This section reviews the cross-sectional, prospective, and experimental evidence that demonstrates rumination's deleterious consequences for mood and mental health.

There is an extensive body of evidence that links rumination with depression (Watkins, 2008). A major depressive episode is defined as a period of at least 2 weeks during which there is depressed mood or a lack of interest or enjoyment in activities previously found to be pleasurable (anhedonia), as well as at least five of the following symptoms: changes in weight or appetite; psychomotor agitation or retardation; fatigue or loss of energy; insomnia or hypersomnia; feelings of worthlessness or inappropriate guilt; difficulty thinking, concentrating or making

[1] Distinctions have been made between the "brooding" and "reflection" subtypes of rumination that can be assessed with subscales of the RSQ-RRS (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). However, since this thesis aims to take a broader approach by focusing on repetitive negative thinking as a transdiagnostic process, there will not be further examination of these specific subtypes of rumination.

decisions; and recurrent thoughts of death or suicidal ideation, plans or attempts (American Psychiatric Association [DSM-IV-TR], 2000). These symptoms need to cause clinically significant distress or impairment in social, occupational, or other important areas of functioning almost every day.

Cross-sectional studies of depressed and nondepressed individuals indicate a relationship between rumination and depression. Riso et al. (2003) found that depressed and previously depressed individuals showed significantly greater levels of rumination than people who had never been depressed. Richmond, Spring, Sommerfield, and McChargue (2001) found that adults who ruminated reported greater levels of depressive and dysphoric symptoms. Kuyken, Watkins, Holden, and Cook (2006) found a similar pattern of results in adolescents, with 14-18 year old adolescents who ruminated reporting greater levels of depressive symptoms. Further evidence for the association between rumination and depression comes from studies examining gender differences. There is a gender difference observed in rumination, with females reporting greater levels of rumination than males (Nolen-Hoeksema & Girgus, 1994). There is also a gender difference in depression: From middle adolescence and throughout adulthood, women are twice as likely to have depression as men (Rudolph, 2009). There is evidence that gender differences in depression may be accounted for by gender differences in rumination: Once the effects of rumination have been statistically accounted for, there is no difference in the rate of depression between men and women (Grant et al., 2004), suggesting that rumination may mediate the relationship between gender and depressive disorders.

Prospective longitudinal studies also demonstrate the temporal antecedence of rumination in the development of depression. Depressive rumination predicts the onset of depression (Just & Alloy, 1997), as well as depressive symptoms in both

depressed individuals (Kuehner & Weber, 1999) and nondepressed children (Abela, Brozina, & Haigh, 2002) and adults (Nolen-Hoeksema & Morrow, 1991). Just and Alloy (1997) examined levels of depression and rumination in a prospective study of 189 undergraduates, and found that greater levels of rumination predicted depressive episodes 18 months later. In a large-scale longitudinal study spanning one year in a community sample of 1132 adults, Nolen-Hoeksema (2000) found that rumination predicted the onset of major depressive episodes in people who had never been previously depressed, and it also predicted the severity of the episodes when people with chronic depression and people in remission from depression were compared. Rumination also predicted change in symptoms of depression and anxiety after one year. In a study of shorter duration, Nolen-Hoeksema, Morrow, and Fredrickson (1993) had participants keep a diary of their mood and their responses to their moods for 30 days. Most participants demonstrated a consistent style of responding to their moods, and those that engaged in ruminative responding experienced prolonged periods of depressed mood, after controlling for initial mood severity. Nolen-Hoeksema, Parker, and Larson (1994) conducted a prospective longitudinal study over a period of six months with bereaved adults, and found that adults who had higher levels of rumination at one month experienced higher levels of depressive symptoms at six months, after controlling for initial depression levels, social support, concurrent stressors, gender, and level of pessimism.

Experimental studies provide evidence for the causal role of rumination in depression. Morrow and Nolen-Hoeksema (1990) experimentally manipulated rumination to examine the effects on depressed mood. A depressed mood was induced in all participants (reading an upsetting story about bereavement, accompanied by sad music), and then, participants were given a task that varied according to their

experimental condition (passive/active and ruminative/distracting). In the passive conditions, participants were given written sentences and were told to "think about and concentrate on the meaning" of the sentence. In the passive-ruminative condition, the sentences related to internal emotional states (e.g., "I often wonder why I feel the way I do"). In the passive-distracting condition, the sentences related to external events (e.g., "Canada's biggest industry is lumber"). In the active conditions, participants had to sort and rank giant cards by arranging them over a large table and walking back and forth. In the active-ruminative condition, sentences referred to personal feelings and emotions (cards contained positive, negative and neutral emotional words), and had to be sorted according to the participants' current feelings. In the active-distracting condition, sentences referred to external stimuli (cards contained country names and had to be sorted according to how industrialised the countries were). Participants completed questionnaires about their mood at the beginning of the study, after the mood induction, and after the tasks. The authors found that participants in the distracting-active condition reported the greatest reduction in sadness, followed by the distracting-passive condition, followed by the ruminative-active condition, and finally, the ruminative-passive condition. These findings suggest that whilst activity level has an effect on sadness reduction, degree of rumination has a greater influence on the duration of depressed mood.

In a subsequent adaptation of the rumination/distraction manipulation task, Lyubomirsky and Nolen-Hoeksema (1995) manipulated rumination to examine the effects on negative thinking and problem solving. In this version of the task, participants were asked to focus their attention on and think about a series of 45 items. In the rumination condition, items referred to emotion-focused, symptom-focused, and self-focused topics, although participants were not specifically instructed to think

in a negative way (e.g., “think about your current level of energy”, “think about your character and who you strive to be”). In the distraction condition, items referred to external topics not related to emotions, symptoms, or the self (e.g., “think about a boat slowly crossing the Atlantic”, “think about a double-decker bus driving down the street”). In this study, relative to distraction, dysphoric participants receiving the rumination manipulation endorsed more negative and biased interpretations of situations, were more pessimistic about the future, and generated less effective solutions to interpersonal problems.

Ciesla and Roberts (2007) conducted a further study examining the effect of an experimental manipulation of rumination on mood. Depressed mood was induced in participants by means of a sad film clip, and then participants engaged in a ruminative or distracting task. They used the same sentence reading task as in the Morrow and Nolen-Hoeksema (1990) study described above, with distracting sentences referring to external events and ruminative sentences referring to internal states. Consistent with previous findings, participants in the rumination condition reported greater levels of depressed mood after the rumination manipulation relative to those in the distraction condition.

Further experimental studies demonstrate that rumination has additional negative consequences beyond its influence on mood. Relative to distraction, rumination manipulations resulted in a broad variety of negative effects, including less effective interpersonal problem solving (Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky, Tucker, Caldwell, & Berg, 1999; Watkins & Baracaia, 2002), increased recall of negative memories (Lyubomirsky, Caldwell, & Nolen-Hoeksema, 1998; Moulds, Kandris, & Williams, 2007), and maladaptive recall of over-general memories (Crane, Barnhofer, Visser, Nightingale, & Williams, 2007; Raes, Watkins,

Williams, & Hermans, 2008; Sutherland & Bryant, 2007; Watkins & Teasdale, 2001; Watkins, Teasdale, & Williams, 2008).

Rumination has also been associated with anxiety in cross-sectional, longitudinal, and experimental studies. In a cross-sectional study, Harrington and Blankenship (2002) found moderate correlations between self-reported rumination and depression ($r = .33$) as well as between self-reported rumination and anxiety ($r = .32$), indicating that in this sample, there was little difference between the strength of relationships between rumination and depression, and rumination and anxiety. Kocovski, Endler, Rector, and Flett (2005) found that participants high on social anxiety were more likely to ruminate and less likely to distract after exposure to vignettes about making mistakes in public than participants low on social anxiety. Perini, Abbott, and Rapee (2006) demonstrated that socially phobic participants engaged in more negative rumination in the week after an impromptu speech performance task than nonanxious participants.

Longitudinal studies demonstrate that rumination temporally precedes changes in anxiety symptoms. In a short-term prospective study with adolescents, Schwartz and Koenig (1996) found that rumination predicted anxiety symptoms six weeks later. In further longitudinal studies with adults, Hong (2007) found that rumination predicted subsequent anxiety symptoms after one month, and Calmes and Roberts (2007) demonstrated that rumination predicted change in anxiety symptoms after 6-8 weeks.

A number of longitudinal studies have also studied the relationship between rumination and posttraumatic stress disorder (PTSD). Nolen-Hoeksema and Morrow (1991) found that rumination predicted the level of PTSD symptoms in adults seven weeks after a natural disaster (the Loma Prieta earthquake in 1989). Ehlers, Mayou,

and Bryant (2003) studied rumination and the development of chronic PTSD over a period of six months in children (5–16 years old) following experience of road traffic accidents. Rumination predicted onset and symptom severity of PTSD. The finding that rumination predicts PTSD has been demonstrated multiple times in adult samples (e.g., Ehlers, Mayou, & Bryant, 1998; Kleim, Ehlers, & Glucksman, 2007; Michael, Ehlers, Halligan, & Clark, 2005; Murray, Ehlers, & Mayou, 2002). However, it is important to note that the studies by Ehlers and colleagues used a different measure of rumination rather than the widely-used RSQ-RRS measure (Nolen-Hoeksema & Morrow, 1991). Instead, rumination was measured on brief self-report scales created for these studies, where participants rated whether they dwelled on memories of the accident using a scale from 0 (*no*) to 3 (*yes, often*).

In an experimental manipulation of anxiety and rumination, Blagden and Craske (1996) examined the effects of active or passive rumination or distraction on anxious mood, replicating the method used by Morrow and Nolen-Hoeksema (1990). Anxious mood was induced by participants listing three anxiety-provoking past or future events, and then concentrating on the one which provoked most anxiety whilst listening to a piece of music based on themes of apprehension, fear, and anxiety. The active/passive and rumination/distraction conditions were as previously described in the Morrow and Nolen-Hoeksema (1990) study. Whilst rumination did not amplify the induced anxious mood, it prolonged the symptoms of anxiety at a stable level. Participants in the distraction conditions experienced a reduction in anxiety that was not experienced by participants in rumination conditions, suggesting a relationship between the maintenance of anxiety and rumination.

In addition to rumination's negative effects for anxiety and depression, there is evidence that rumination predicts a range of other psychological disorders. In a

prospective study of 496 female adolescents, Nolen-Hoeksema, Stice, Wade, and Bohon (2007) found that in addition to predicting depressive symptoms, rumination also predicted the onset of binge eating and substance abuse, as well as increases in bulimia symptoms and substance abuse. In a meta-analysis of 114 studies, Aldao, Nolen-Hoeksema, and Schweizer (2010) found that rumination was associated with depression, anxiety, eating disorders, and substance abuse. As such, there is evidence that rumination has a range of negative effects in addition to its effect on depression and anxiety symptoms.

1.2.3. Theoretical Models of Rumination

In this section, there will be a discussion of theories of rumination, and evaluation of the supporting evidence for these models. This section will review the response styles theory (Nolen-Hoeksema, 1987, 1991, 2004; Nolen-Hoeksema et al., 1993), control theory (Martin & Tesser, 1996), processing mode theory (Watkins, 2008), the cognitive inhibition model (Linville, 1996), the operant conditioning functional account of depression and rumination (Ferster, 1973), the metacognitive model of rumination (Papageorgiou & Wells, 2003), developmental accounts of rumination (Conway, Mendelson, Giannopolous, Csank, & Holm, 2004; Rose, 2002); and the personality account of rumination (neuroticism; Roberts, Gilboa, & Gotlib, 1998).

1.2.3.1. Response styles theory.

Response styles theory, the most prominent theory of depressive rumination (RST; Nolen-Hoeksema, 1987, 1991, 2004; Nolen-Hoeksema et al., 1993), proposes that individual responses to symptoms of depression influence the duration of those symptoms, and that ruminative responses lead to a longer duration of depressive

symptoms. According to RST, learning, conditioning, and socialisation processes during childhood are implicated in the development of rumination. Nolen-Hoeksema proposed that rumination is a consistent, enduring and habitual cognitive style, and that it prolongs depressive episodes by influencing information processing and problem solving. She argued that "rumination does not lead to active problem solving to change circumstance surrounding these symptoms. Instead, people who are ruminating remain fixated on the problems and on their feelings about them without taking action" (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008, p. 400).

Four specific mechanisms are hypothesised to explain how rumination prolongs depressive episodes. First, Nolen-Hoeksema et al. (1993) proposed that rumination exacerbates negative thinking. According to RST, depressed mood negatively influences information processing. As such, a depressed person may be more prone to evaluating themselves and situations negatively. This negative information processing then leads to exacerbation of depressive symptoms, creating a vicious circle: depressed mood leads to negative information processing, and negative information processing leads to depressed affect (e.g., Teasdale, 1999). Nolen-Hoeksema proposed that rumination makes people prone to fall into this vicious circle, by making negative thoughts and information more accessible. Essentially, rumination prolongs negative thinking by increasing the accessibility and processing of depressogenic information, such as negative interpretations, memories, and expectations. Lyubomirsky and Nolen-Hoeksema (1995, p. 177) explain that "it is the depressed mood that activates negative thoughts, but self-focused rumination brings these thoughts to the attention of the person and allows these thoughts to affect the person's judgements and interpretations of his or her current situation". This maintains the depressed mood, and the person becomes stuck in a vicious cycle.

Consistent with this hypothesis, a number of studies demonstrate that a ruminative response style can exacerbate negative thinking. Lyubomirsky and Nolen-Hoeksema (1995) found that relative to dysphoric participants receiving a distraction induction, dysphoric participants who ruminated demonstrated more negative and biased interpretations of hypothetical situations. After rumination, dysphoric participants were also more pessimistic about the occurrence of positive future events. Lyubomirsky et al. (1999) found that dysphoric participants receiving a rumination manipulation were more likely to express self-blame, self-criticism, and less self-confidence than dysphoric participants undergoing the distraction manipulation. Greenberg, Pyszczynski, Burling, and Tibbs (1992) demonstrated that following a manipulation of self-focus, participants focusing internally (in a manner characteristic of rumination) were less likely to endorse internal attributions for success than participants who focused externally. Further experimental studies previously outlined in Section 1.2.2 demonstrate the way that rumination influences negative attentional and memory biases. As such, there is extensive evidence consistent with the RST prediction that rumination exacerbates negative thinking.

The second mechanism by which rumination is hypothesised to prolong depression is by reduction of instrumental behaviour. RST proposes that engaging in rumination causes individuals to cease their engagement in activities that would provide them with a sense of control and positive reinforcement, which then contributes to prolonging the depressive episode. Distracting responses can alleviate depressed mood because these activities may be inherently pleasurable, and can suspend rumination until the negative mood has passed (Nolen-Hoeksema et al., 1993; Morrow & Nolen-Hoeksema, 1990). In support of the hypothesis that rumination reduces instrumental behaviour, after a rumination manipulation, relative

to participants who received a distraction manipulation, dysphoric participants reported being less willing to engage in pleasant, distracting activities, even though they believed that such activities would be enjoyable and potentially lift their mood (Lyubomirsky & Nolen-Hoeksema, 1993). Moreover, examining rumination and help-seeking in a study of breast cancer survivors, women who ruminated reported taking on average one month longer to speak to their doctor about their symptoms, relative to women lower on trait rumination (Lyubomirsky, Kasri, Chang, & Chung, 2006).

The third mechanism by which rumination can prolong depression is through the impairment of problem solving, partly through increasing the accessibility of negative cognitions. In support of this, Lyubomirsky and Nolen-Hoeksema (1995) studied adults' performance on an interpersonal problem-solving task (adapted from Platt & Spivack's (1975) Means-Ends Problem-Solving Procedure), and their interpretations of situations, after completing a rumination or distraction manipulation, adapted from Morrow and Nolen-Hoeksema (1990). Dysphoric participants in the rumination condition showed less effective problem solving than dysphoric participants in the distraction condition; there was no difference for participants who were not dysphoric. Follow-up studies have replicated this finding, for example, Lyubomirsky et al. (1999) also used the rumination versus distraction induction and demonstrated that rumination led to dysphoric participants rating their problems as more serious and less likely to be solvable, and they were less likely to report that they would implement solutions to their problems.

The fourth mechanism by which rumination prolongs depression is through the erosion of social support. RST proposes that ruminators behave in a way that negatively impacts social relationships. There is correlational evidence consistent

with this hypothesis, with rumination being associated with a number of negative personal characteristics, including neediness and dependency (Spasojević & Alloy, 2001) and sociotropy (Gorski & Young, 2002). In a study where participants had to evaluate fictitious scenarios about depressed protagonists using ruminative or distracting response styles, ruminative protagonists were perceived more negatively by participants than protagonists who engaged in distraction (Schwartz & Thomas, 1995).

Nolen-Hoeksema (1991) proposed a number of mechanisms by which a ruminative response style can develop. She hypothesised that a tendency towards rumination may develop in children as a result of (i) parental modelling of a ruminative style and/or (ii) because a child is not taught adaptive and active coping strategies for dealing with negative affect or depressed mood. Certain types of parenting are hypothesised to prevent children from successfully acquiring active and constructive ways of dealing with negative moods and situations. Nolen-Hoeksema (1998) suggested that children who experience little control over their environment are at risk of developing a tendency towards depressive rumination. This experience of limited control could occur because parents are overcontrolling and intrusive, giving the child limited opportunity to develop active coping strategies, and/or because the child is brought up under conditions of psychological deprivation and neglect, such that the child's responses repeatedly fail to receive sufficient reinforcement, engendering a passive response style (cf. Ferster, 1973).

Consistent with this hypothesis, there is indirect evidence from a study that did not directly measure rumination, but that demonstrated that parenting style influenced whether 5- to 7-year-old children adopted a passive or active coping style during a problem-solving task (Nolen-Hoeksema, Wolfson, Mumme, & Guskin, 1995).

Specifically, mothers who were overcontrolling had children who became more helpless, passive, and poorer at active problem solving during the task. More direct evidence comes from a study in which adults were asked to retrospectively report on how they were parented and their current levels of rumination (Spasojević & Alloy, 2002). Overcontrolling parenting was associated with rumination, after controlling for symptoms of depression. This relationship was specific to overcontrolling parenting, since parental rejection (also measured) was not significantly associated with rumination. However, this study is limited by its retrospective approach.

Nolen-Hoeksema also hypothesised that rumination may have two potential functional properties that could potentially reinforce the process of ruminative thinking. First, Lyubomirsky and Nolen-Hoeksema (1993) hypothesised that people may engage in rumination as a means of gaining an improved sense of understanding and insightfulness, and to attempt to gain an understanding of the reasons for why things happen. Specifically, they hypothesised that "the perception that one possesses insight (and not actual insight per se) may lead some dysphorics to continue ruminating" (Lyubomirsky & Nolen-Hoeksema, 1993, p. 347). Consistent with this, in a cross-sectional study, people reported that rumination helps them to gain insight into the meanings of their feelings and problems, and discern the reason for why things happen to them (Watkins & Baracaia, 2001). In the only experimental study to experimentally manipulate rumination and examine the effect on subsequent sense of insight and understanding, Lyubomirsky and Nolen-Hoeksema (1993) found that relative to a distraction induction, dysphoric and nondysphoric participants undergoing a rumination induction rated themselves as more insightful. However, this study was limited in that it did not examine the effect of rumination on a real-world problem. Furthermore, perceived insightfulness was only assessed post-manipulation,

so it was not possible to examine the change in perceived insightfulness resulting from rumination. Critically, this study only compared rumination to distraction, such that thinking about the self, feelings and problems (i.e., rumination) was compared with not thinking about feelings and problems. As such, it cannot be concluded that any observed differential effects are specific to rumination rather than the general benefit of thinking about and focusing on the problem, versus not thinking about the problem. As such, further experimental studies addressing these limitations are required.

Second, in addition to this insight hypothesis, in a more recent paper updating response styles theory, Nolen-Hoeksema et al. (2008) hypothesised that rumination may have avoidant functions that negatively reinforce the ruminative thinking. Specifically, they hypothesised that "rumination serves to build a case that the individual is facing a hopelessly uncontrollable situation and so he or she is not able to take action to overcome the situation … rumination provides depressed individuals with the evidentiary base to justify withdrawal and inactivity … The case that is built through rumination provides a rationale for avoiding taking action or responsibility for situations and for withdrawing instead. In turn, the withdrawal and inactivity that is justified by rumination is reinforced because it reduces exposure to an aversive environment" (Nolen-Hoeksema et al., 2008, p. 407). As such, whilst avoidance in itself is not conceptualised as a vulnerability factor for rumination, it can be characterised as a consequence of rumination that may negatively reinforce the ruminative process, thus motivating people to continue ruminating once they have started. Consistent with this, there is cross-sectional evidence demonstrating that that trait rumination is significantly correlated with self-reported avoidance (Cribb, Moulds, & Carter, 2006; Giorgio et al., 2010; Moulds, Kandris, Starr, & Wong, 2007)

and behavioural avoidance (Lyubomirsky et al., 2006). However, thus far, no experimental studies have manipulated rumination and demonstrated that it leads to increased self-reported or behavioural avoidance.

In summary, RST predicts that ruminative responding prolongs depressed moods by enhancing negative thinking, reducing instrumental behaviour, interfering with problem solving, and eroding social support. Such response styles are hypothesised to develop as a result of parental modelling and/or early environments in which children are not taught adaptive ways of responding to mood, potentially because of the child experiencing limited control. Ruminative responses may be maintained and reinforced by a sense of increased insightfulness and justification for avoidance that may arise from engagement in rumination.

1.2.3.2. Control theory models of rumination.

Martin and Tesser (1996) and Watkins (2008) proposed control theory models of rumination, based on Carver and Scheier's (1990) control-process view of emotion regulation. First, Carver and Scheier's (1990) model will be described, followed by discussion of the theories by Martin and Tesser (1996) and Watkins (2008).

1.2.3.2.1. Control-process model of emotion regulation.

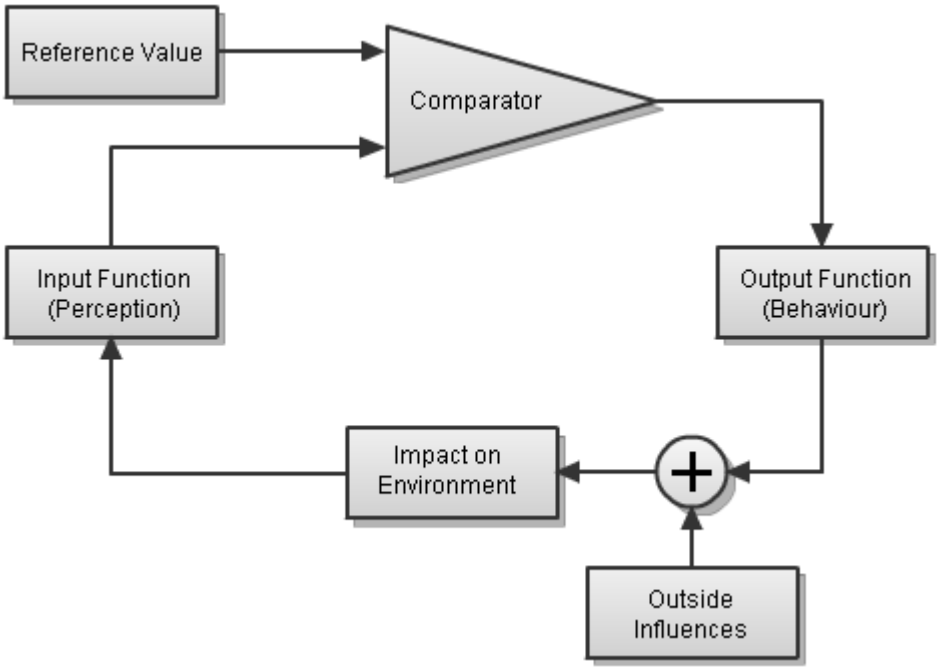

Figure 1.1. Schematic depiction of a feedback loop (Carver & Scheier, 1990).

Carver and Scheier's model (Figure 1.1) proposes that individuals self-regulate their behaviours based on feedback in order to reduce discrepancies between their goal behaviour (the *reference value*) and their perception of the environment (the *input function*). Self-regulation occurs to reduce discrepancies between how an individual wants things to be, and how they perceive things to be. As the individual's behaviour (the *output function*) can have an impact on and change the environment, it can therefore alter the input function, reducing the perceived discrepancy between that and the reference value. In self-regulation models, *feedback* refers to a process where individuals compare their perception of the environment with their reference values, with the intention of reducing discrepancies between actual state and desired goals.

Carver and Scheier suggest that goals are organised in a hierarchical way, depending on the level of abstraction (Figure 1.2). At the highest level of abstraction

are *system concepts*, which typically refer to global values such as the sense of the idealised self (the most frequently used value for this level), or the ideal relationship or society. The next lower level in the hierarchy is comprised of abstract *principles* (e.g., "be kind") that are suggested by the system concept. These principles are implied by the idealised self, and whilst they are not specifications of actions, they refer to qualities that can manifest themselves in many acts. Carver and Scheier (1990, p. 20) note that "people do not just go out and 'do' honesty… rather, people manifest any one (or more) of these qualities while doing more concrete activities". Beneath these principles are more concrete *programmes* (e.g., "help elderly neighbours with their shopping"), which are made up of concrete sequences of behaviours (see Carver & Scheier, 1990, p. 19-20). Although these programmes are still relatively abstract, they are more easily recognised as forms of behaviour. Movement *sequences*, which comprise individual programmes, represent concrete forms of behaviour, with the main difference between programmes and sequences being that programmes involve choice points (where decisions need to be made), whereas sequences are just series of actions that are performed all at once.

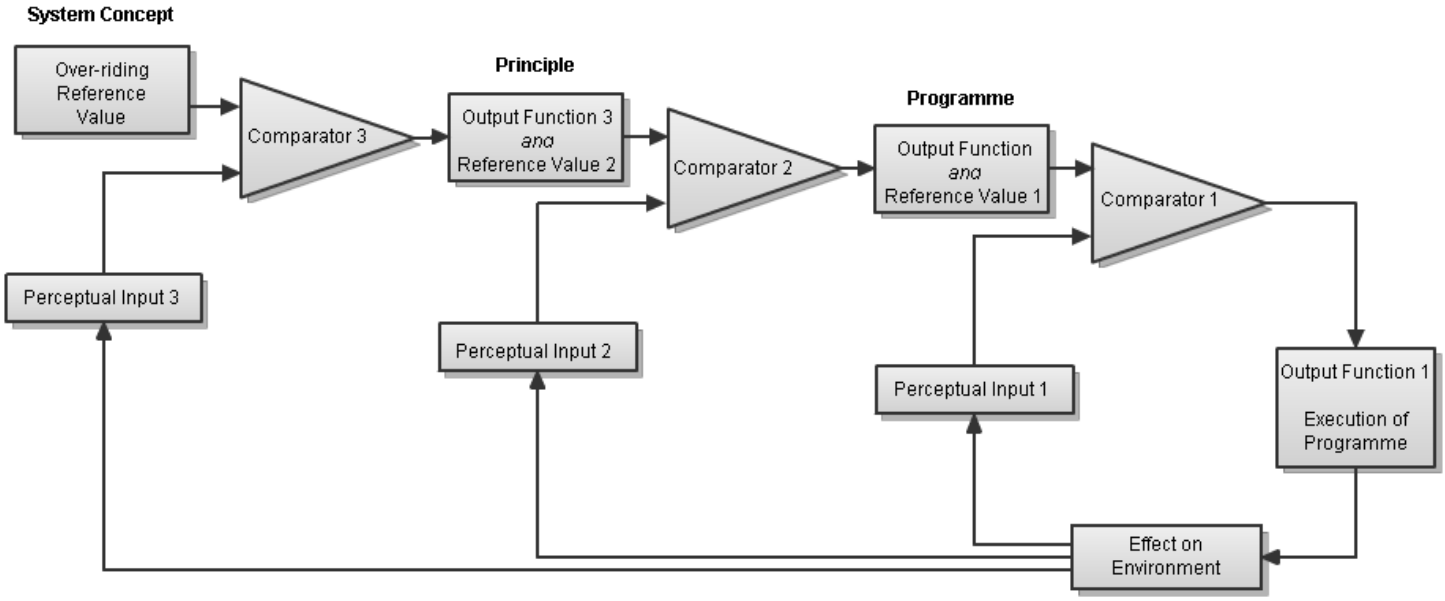

Figure 1.2. Hierarchy of feedback loops, showing the various levels of control, from most abstract to most concrete (Carver & Scheier, 1990).

Carver and Scheier (1990) proposed that affect originates from a *meta-monitoring* system, which checks the rate at which the discrepancies are being reduced and goal progress is being made. The outcome of this checking and comparison process is affect, which is negative if the goal progress is at a rate slower than the standard expected, and positive if the goal progress is at a rate faster than expected. The level of abstraction at which the goal discrepancy is perceived influences the intensity of affect. Discrepancies that are noted at higher levels of abstraction produce more intense affect and emotional impact, and discrepancies at lower, more concrete levels, produce less intense affective changes.

1.2.3.2.2. Control theory of rumination.

Martin and Tesser's (1996) control theory of rumination proposes that personal goal discrepancies drive rumination. Personal goals can be consciously accessible and completion can be easily defined (e.g., "sweep the kitchen floor"), or

they can be non-conscious and have less clear end states (e.g., "encode these behaviours in terms of a trait" when meeting a person and forming an impression) (Martin & Tesser, 1996). Rumination is instigated by problematic progress towards a goal (e.g., slow speed of progress towards goal attainment). These discrepancies in goal progress can occur for a number of reasons: A person's own motivations, interests or abilities may not match their environment, or their environment may be too challenging or not challenging enough. Thus, rumination occurs as a result of goal nonattainment. The focus of rumination is on these unresolved goals, and this is an instrumental process, because making the goal discrepancy more accessible to consciousness has the potential function of facilitating progress, and therefore increasing the likelihood of achieving goal resolution. In this model, rumination continues until the goal is resolved or abandoned.

In Martin and Tesser's model, goal hierarchy is associated with the maintenance of rumination. As in Carver and Scheier's (1990) control theory model, goals at the highest level of abstraction relate to an individual's sense of self and their fundamental values, beliefs and desires, and thus such goals are more long-term and have greater permanence (e.g., "take care of my family"). At the lowest level of the hierarchy are concrete goals that are relevant in the "here and now" and refer to specific tasks or behaviours, and thus are more short-term (e.g., "arrange a meeting with my supervisor"). These lower-level goals instantiate the means to deliver the higher-level goals down to the level of concrete behaviours to be performed. The lowest-level goals take the form of motor actions (e.g., "dial my supervisor's office number into the telephone"). Martin and Tesser (1996) proposed that problematic goal progress relating to higher-level goals, integral to wellbeing, are more likely to instigate persistent rumination, because such goals are more challenging to achieve,

and also harder to abandon, because of their significance to a person's sense of self. However, lower-level goals can produce rumination under certain circumstances. First, low-level goals may trigger rumination if they are closely linked to important high-level goals: Problematic goal progress at this low level may threaten goal attainment of certain higher-level goals. Second, successive nonattainment of lower-order goals may trigger rumination if it jeopardises the achievement of a higher-order goal (e.g., lots of minor goals fail to be achieved, and results in the person perceiving attainment of a higher-level goal, such as control of their own life, to be at risk).

Whilst Martin and Tesser acknowledge that rumination can be a normal and adaptive form of thought, they also explain how rumination can become maladaptive and pathological, and how individuals can find themselves "stuck" in rumination, unable to stop. According to the model, rumination is typically stopped in three ways, either through attainment or abandonment of the goal whose problematic progress triggered rumination, or through distraction (shifting thoughts to something other than the topic of rumination). Distraction only allows for temporary cessation of rumination, and thus, goal attainment or goal abandonment are the only permanent ways to stop rumination.

However, goal attainment, and thus the termination of rumination, can be challenging when the goal is highly abstract. Martin and Tesser proposed that attainment of highly abstract goals can be problematic for two key reasons. First, the goal may be too difficult to reach: For example, attainment may take a long time, or attainment of that goal may threaten the attainment of another goal, or the goal may be so loosely defined that attainment is improbable. Second, it may be difficult to identify what needs to be done to attain the higher-level goal if it is too loosely specified and abstract (e.g., "be happy"). If these lower-level goals cannot be

specified, then goal progress cannot be made, and an individual may become stuck in ruminative thought.

Goal abandonment can also be challenging when the goal is too abstract. More abstract goals tend to be more closely tied into an individual's sense of self, and their overarching and enduring principles, beliefs, and desires. As a result of this degree of abstraction, they are difficult to abandon, thus setting up the conditions for persistent rumination. As higher-level abstract goals can be problematic and more challenging to attain or abandon for the reasons discussed above, the level of abstraction of the unattained goal becomes a risk factor for pathological rumination.

Martin and Tesser's (1996) control theory of rumination explains why people start ruminating, and why rumination is sometimes maintained, resulting in individuals becoming stuck in rumination. Consistent with this account, there is considerable evidence that demonstrates how problems with goal progress can instigate rumination. Millar, Tesser, and Millar (1988) studied 76 undergraduates in their first few weeks of university, and asked them to provide information about activities that they had taken part in at home, and the extent to which they were able to carry on these activities at university. Participants ruminated more about activities that they had previously enjoyed at home but could no longer participate in at university, relative to activities that they could continue. In a diary study of ruminative thoughts and goal progress (Lavallee & Campbell, 1995), participants described the most negative event of each day and rated it according to how much it bothered them. In subsequent analysis of the diaries, events that were most closely related to the participants' own personal goals elicited the greatest amount of rumination about the event, suggesting that nonattainment of personal core goals and problematic goal progress may instigate rumination. Finally, in an experience

sampling study, Moberly and Watkins (2010) demonstrated that low levels of personal goal success were associated with increased levels of ruminative self-focus and negative affect.

Examining the prediction about goal hierarchy, McIntosh, Harlow, and Martin (1995) studied the way in which some people link lower order goals (e.g., being one's ideal weight) with higher order goals (e.g., being happy). They found that participants who were more prone to link lower-order goals with higher-order goals experienced greater levels of rumination and depressive symptoms than participants who did not make such links. This supports the prediction that abstract goals afford persistent rumination because such goals are difficult to achieve or abandon. Participants who consistently linked low-level goals to high-level goals therefore experienced greater discrepancy between their current state and their desired state (e.g., "be happy"), because the high-level goal is abstract and ill-defined, but at the same time, tied in to their sense of self, and thus is harder to abandon, leading to persistent rumination.

1.2.3.2.3. Processing mode theory.

Watkins (2008) proposed an extension to and elaboration of Martin and Tesser's (1996) theory, to explain how RT can have constructive or unconstructive outcomes. Martin and Tesser's control theory account demonstrated that abstract rumination leads to persistent rumination, but their account did not address the consequences of rumination. Processing mode theory (Watkins, 2008) hypothesises that the consequences of rumination are determined by an interaction between structural aspects of rumination (i.e., valence, whether positive or negative) and the process aspects of rumination (i.e., level of construal, whether information is processed in at an abstract high level or a concrete low level).

Watkins (2008) proposed that the valence of cognition (e.g., the ruminative thoughts, the individual's mood) determines whether rumination is helpful or unhelpful. RT with negative valence is likely to lead to more negative thoughts and feelings. As RT is hypothesised to amplify and exacerbate the existing valence of thoughts, if the content is negatively valenced, RT will increase the level of negativity. Negative cognitions are proposed to lead to negative consequences, negative mood, and thus, negative outcomes for rumination. In addition to this, Watkins (2008) proposed that when an individual has negative beliefs and expectations, goal persistence will be less, and an individual will judge goal progress less favourably, perceiving greater goal discrepancy. This will lead to a disengagement from goal pursuit, and thus, an unresolved goal, resulting in rumination with unconstructive consequences (e.g., Lavallee & Campbell, 1995; Millar et al., 1988; Moberly & Watkins, 2010).

Watkins (2008) also proposed that level of construal influences the outcome of rumination. High-level abstract construals are characterised by being general, superordinate and decontextualised, whereas low-level concrete construals are characterised by being specific, subordinate and contextualised. Concrete representations focus on the "how", means, processes, feasibility, and planning of outcomes. Abstract representations focus on the "why", ends, purposes, desirability and importance of outcomes. Consistent with Martin and Tesser's (1996) control theory account, the level of construal relates to the level of identification of goals and behaviours in the goal hierarchy, that is, whether they constitute high-level or low-level goals. All actions, events, and goals can be construed at varying levels of abstraction (Watkins, 2008, p. 187): for example, a behaviour could be described as "laziness" (an abstract, global trait that would be identified higher in the goal

hierarchy) or "tiredness" (a concrete, specific state that would be identified lower in the hierarchy). Watkins (2008) proposed that there are advantages and disadvantages to these different levels of construal.

In some contexts, abstract processing can have more constructive outcomes than concrete construal. First, Watkins (2008) proposed that higher-level construal allows for increased stability and consistency of behaviour across different situations, with less interference from situational demands, resulting in less distractibility and impulsiveness. Abstract construals are more stable, because they are more distanced from the context and situational issues, and are more focused on higher-level, long-term goals and purposes. Second, higher-level construals allow for more flexibility in responding to problematic goal progress with lower-level goals, as alternative sub-goals can be generated. Therefore, for familiar, straightforward, and positive situations, representing goals at a higher level of construal would result in more constructive consequences.

However, in some contexts, abstract processing can be less constructive than concrete processing. First, Watkins (2008) proposed that construal level is hypothesised to influence problem solving. Identifying a goal at a more concrete level of construal can result in better problem solving, because lower-level processing provides more specific and detailed information about the actions required and the alternatives available when encountering a challenging or novel situation, thus leading to more successful problem solving. Consistent with this, Watkins and Moulds (2005b) manipulated processing mode and found that compared with abstract processing, concrete processing improved social problem solving. In addition, Watkins and Baracaia (2002) found that process-focused questions about problems (i.e., concrete processing) improved social problem solving in currently depressed

patients relative to state-oriented questions (i.e., abstract processing, analogous to depressive rumination).

Second, level of construal is hypothesised to influence self-regulation. A lower level of construal can be beneficial when abstract self-focus could have unconstructive outcomes for self-regulation. For example, if someone was feeling highly anxious before taking a test, it may be more beneficial for them to process at a lower level of construal and focus on more concrete behaviours, such as locating the examination hall, rather than processing at an abstract level, such as considering the importance of passing the test. Leary, Adams, and Tate (2006) proposed that concrete processing can assist with self-regulation by reducing anxiety, focusing on immediate situational demands, and by requiring fewer cognitive resources and less mental effort. In a meta-analytic review, Gollwitzer and Sheeran (2006) found that having *implementation intentions* (i.e., specific plans about when, where, and how to respond to achieve goal attainment) significantly increased the likelihood of goal attainment and reduced the likelihood of individuals persevering with unhelpful courses of action and being "derailed" from successful progress as a result of conflicting situational interference.

Third, construal level influences the degree of generalisation. Abstract construal allows for generalisation across various situations, and can be advantageous when it affords helpful cross-situational inferences. In negative situations, concrete processing can be more adaptive as it can prevent negative overgeneralisations being made, when situation-specific appraisals would be more appropriate (Hamilton, Greenberg, Pyszczynski, & Cather, 1993). For example, following exam failure, a concrete level of construal may be more adaptive (e.g., "I should have revised at the weekend instead of seeing my friends") than an abstract level of construal (e.g., "I

can't do anything right"). Carver (1998) conducted a short-term prospective longitudinal study, where participants self-reported tendency to generalise in response to negative situations was assessed (e.g., "a single failure can change me from feeling OK to seeing only the bad in myself"). At the 6-week follow-up, generalisation predicted subsequent depressive symptoms, even when baseline levels of depression were controlled for. An interaction between generalisation and experience of adverse events was found, indicating that adverse events also contributed to depressive symptoms, but only in participants who reported greater tendencies to generalise. This evidence is consistent with the hypothesis that abstract, high-level construal in response to negative situations can cause negative outcomes. Carver (1998, p. 617) proposed that "generalisers are people who are trying to control their lives at too high a level of abstraction…the person trying to control behaviour from too high a level will experience a setback at a lower level not as a task failure, but as a failure of the self. Given this difference in the meaning of failure, generalisers are more vulnerable to experiencing depressive symptoms than other people".

This processing mode account is consistently supported by studies indicating that low-level, concrete thinking is more adaptive than high-level abstract rumination, with abstract rumination leading to a variety of unconstructive outcomes. First, Watkins and Teasdale (2001) examined the effects of high levels of abstraction in a study of overgeneral memory in depressed participants, by experimentally manipulating thinking styles. Overgeneral memory refers to the tendency to recall past events in a broad and categorical manner (i.e., recalling summaries of repeated past experiences rather than recalling specific events), and it has been implicated in the maintenance of depression (Williams et al., 2007). The experimenters used a modified version of Nolen-Hoeksema and Morrow's (1993) rumination versus

distraction induction procedure, using a 2 x 2 design to manipulate analytical thinking (high or low) and self-focus (high or low). The specificity of participants' memories was examined pre- and post-manipulation, using the autobiographical memory test (AMT; Williams & Broadbent, 1986). Overgeneral memory reduced following the low-analysis manipulations, and increased following the high-analysis manipulations. Consistent with processing mode theory, abstract processing led to unconstructive outcomes for overgeneral memory.

Second, examining the effects of abstract processing on emotional recovery after a failure, Watkins (2004a) gave participants a negative mood induction that took the form of a challenging cognitive task that they would fail at, and informed them that this task acted as a brief measure of IQ and was correlated with academic and career outcomes. Following the task, participants had to write three brief expressive essays at intervals over the next 24 hours. Participants were allocated to either the *conceptual-evaluative* condition (i.e., abstract processing), where they were asked to write about the causes, reasons and meanings for their task performance and feelings (focusing on the "why", e.g., "write about why you feel the way you do after the test"), or the *experiential* condition (i.e., concrete processing), where they were asked to write about their direct experiences of their task performance and feelings (focusing on the "how", e.g., "write about how you approached the problems and your thinking process as you tried to find the answers"). An interaction between processing mode and trait rumination was found: Participants in the abstract processing condition who also had high levels of trait rumination reported significantly higher levels of depressed mood and intrusions than those in the concrete processing condition. Moreover, 12 hours after the failure experience, participants in the abstract processing

condition, who reported greater tendency to ruminate, experienced greater levels of negative mood.

Third, examining the effect of processing mode on emotional vulnerability to negative events, Watkins, Moberly, and Moulds (2008) allocated participants to one of two processing mode training conditions: abstract processing, analogous to depressive rumination (participants considered causes, meanings and implications of a variety of scenarios), or concrete processing, inconsistent with depressive rumination (participants considered concrete, sensory details of scenarios). After subsequent exposure to a stressful failure task, participants in the abstract processing condition had a greater negative emotional response than participants in the concrete processing condition.

Fourth, examining the effect of processing mode on mood and physiological arousal following trauma, Ehring, Szeimies, and Schaffrick (2009) exposed participants to video clips of distressing scenes following motor vehicle accidents, and then were assigned to one of three conditions: abstract thinking, concrete thinking, or distraction. In the abstract thinking condition, participants read and dwelled on abstract, ruminative sentences related to the topic of the video (e.g., "why do so many accidents have to happen?"). In the concrete thinking condition, participants focused on concrete sentences relating to the topic (e.g., "what are the different reasons for accidents happening?"). In the distraction condition, participants read and mentally answered questions unrelated to the video topic (e.g., "please try and recall as many rivers flowing through Germany as you can think of"). Participants in the abstract thinking condition experienced longer maintenance of negative mood and physiological arousal after the distressing video than participants in the concrete thinking and distraction conditions, consistent with processing mode theory.

Finally, Watkins and Moulds (2007) examined reduced concreteness in rumination, using a modified version of the Problem Elaboration Questionnaire (Stöber & Borkovec, 2002). They found that currently depressed participants generated more abstract descriptions of their problems and the possible consequences of the problems than participants who had previously been depressed, and never-depressed control participants. There were no significant differences between the concreteness of descriptions and consequences given by the never-depressed and previously depressed groups. Whilst the data are correlational, these studies are consistent with processing mode theory and demonstrate an association between abstract processing and symptoms of psychopathology.

Whilst the studies outlined above did not manipulate processing style to examine subsequent engagement in RNT, they demonstrated that manipulating abstract processing lead to less constructive outcomes, relative to concrete processing, consistent with processing mode accounts of RNT.

1.2.3.3. Cognitive inhibition models of rumination.

A number of researchers have proposed that cognitive inhibitory and control processes are implicated in the tendency towards persistent, unconstructive rumination (Hertel, 1997; Joormann, 2004, 2005; Linville, 1996). Inhibition has been clearly defined by MacLeod (2007, p. 5) as "the stopping or overriding of a mental process, in whole or in part, with or without intention".

Linville (1996) proposed that attention inhibition may underlie ruminative thought. She proposed that attentional inhibition is "essential for maintaining a coherent stream of thought" (p. 123) and that it involves excitation of relevant information, and inhibition of non-relevant information. Linville proposed that rumination and attentional inhibition are both goal-directed processes, with inhibition

aiding goal progress by focusing attention on goal-relevant information. She proposed two mechanisms by which inhibitory processes can foster rumination.

First, rumination can occur when inhibitory processes are functioning normally. Ruminative thoughts may enter consciousness because they are strongly related to high-level goals that are currently active; even though the ruminative thoughts may be goal relevant, they are not relevant to the goal at hand. Linville also suggested that inhibitory processes are imperfect and off-task thoughts may "leak" into working memory, when they are usually stopped by inhibitory mechanisms.

Second, rumination can occur when inhibitory mechanisms have been weakened. Linville argued that there are considerable individual differences in inhibitory ability, and there are also certain populations who show deficiencies in attentional inhibition (e.g., people with depression (Linville, 1994), obsessive-compulsive disorder (Enright & Beech, 1993), and older adults with cognitive memory deficits (Kane, Hasher, Stoltzfus, Zacks, & Connelly, 1994)). Weakened inhibitory mechanisms can allow for ruminative thoughts to enter working memory and disrupt goal-related thought processes. This can also result in ruminative thoughts that were once relevant staying in working memory, despite no longer being relevant to the current goal. Deficiencies in inhibition could also allow for lower level and less important goals to intrude into working memory, disrupting the goal hierarchy.

Joormann (2004, 2005, 2010) proposed a similar theory in which inhibitory deficits prevent the expulsion of negative material from working memory, leading to uncontrollable and persistent rumination. Working memory has limited capacity and as a result of this, effective inhibitory processing is necessary to limit the information that enters working memory, and to update and remove information from working memory when it is no longer pertinent (Hasher, Zacks, & May, 1999).

Joormann (2010) hypothesised that deficiencies in controlling inhibition processes in working memory contribute towards rumination via several pathways. Specifically, she hypothesised that the inability to expel irrelevant mood-congruent items from working memory leads to persistent rumination. Deficiencies in cognitive inhibition are also hypothesised to hinder the use of more adaptive strategies by interfering with the processing of new information and effective reappraisal. Lastly, inhibitory deficiencies make it challenging to retrieve mood-incongruent material (e.g., recalling happy memories to alleviate sad moods). As such, cognitive inhibition deficits contribute to unconstructive emotion regulation strategies, in particular, persistent rumination.

More recently, Koster, De Lissnyder, Derakshan, and De Raedt (2011) developed an approach to depressive rumination stemming from a cognitive science perspective, termed the impaired disengagement hypothesis. In this model, internal or external stressors that conflict with an individual's goals drive negative critical thinking, which creates a negative mood state. Koster et al. (2011) hypothesised that this critical thinking ceases when a solution is found to the problem, or an individual engages in deliberate or automatic emotion regulation. However, in most individuals, this critical thinking signals cognitive conflict because the negative thoughts and moods contrast with existing positive self views. This conflict then leads to disengagement from the negative thoughts, which affords reappraisal of the situation, or distraction from the negative thoughts and mood. However, under certain conditions, disengagement from the negative thinking does not occur. Koster et al. (2011) hypothesised that impaired conflict signalling (e.g., because negative thinking may cause less conflict in an individual with negative self-schemas) or impaired

attentional control (e.g., as a result of depression) prevent disengagement of attention, which results in persistent cycles of unconstructive rumination.

A number of correlational studies have demonstrated an association between cognitive inhibition and rumination (e.g., Hertel & Gerstle, 2003; Joormann, 2006; Joormann & Gotlib, 2010; Whitmer & Banich, 2007; Whitmer & Banich, 2010). In a quasi-experiment, Davis and Nolen-Hoeksema (2000) examined the performance of ruminators and nonruminators on the Wisconsin Card Sorting Task (WCST; Grant & Berg, 1948). Ruminators made significantly more errors of perseveration than nonruminators, indicating that they had a more inflexible cognitive style, even when levels of general intelligence and depression were controlled for. However, as this study only illustrates a correlation, it does not give evidence for cognitive inflexibility playing an aetiological role in the development and maintenance of rumination.

There are also a small number of longitudinal studies that demonstrate that inhibitory deficits temporally precede changes in rumination (Demeyer, De Lissnyder, Koster, & De Raedt, 2012; De Lissnyder, Koster, Goubert, Onreadt, Vanderhasselt, & De Raedt, 2012; Zetsche & Joormann, 2011). However, there are no experimental studies that have directly tested the hypothesis that inhibitory deficits causally contribute to rumination.

As such, further studies are required to examine the relationship between cognitive inhibition and rumination. Specifically, the direction of causality in the relationship between rumination and inhibition has yet to be established: People who ruminate may find that rumination utilises cognitive resources and thus impairs their inhibitory abilities because they are working at a high level of cognitive load, or people may start to ruminate and persevere with rumination because they are unable to inhibit or control their cognitions. Whilst there is currently no experimental

evidence manipulating inhibitory processes and examining the effects on rumination, experimental studies manipulating rumination have demonstrated effects on inhibitory processes, in contrast to what is predicted by the theoretical models outlined previously. For example, experimental manipulations demonstrate that rumination causally influences random number generation, such that rumination makes it less easy for individuals to inhibit the natural tendency to count in sequences (Watkins & Brown, 2002), and leads to interference errors on Stroop tasks (Philippot & Brutoux, 2008).

Whilst these studies demonstrate a relationship between rumination and deficiencies in inhibitory control, they do not provide evidence for the aetiology of rumination; that is, it is unclear whether in depressed individuals, a tendency towards an inflexible cognitive style precedes or follows engagement in rumination. Therefore, further experimental studies are required that manipulate cognitive control, to measure its effects on levels of repetitive thought.

A specific self-regulatory concept relevant to the literature on cognitive inhibition is the construct of effortful control, which has been studied with respect to rumination. *Effortful control* refers to the capacity to self-regulate and control emotional and behavioural responses, such as the ability to inhibit and activate behaviours when necessary, as well as the ability to focus and shift attention (Rothbart, 1989).

Studies have demonstrated a cross-sectional association between rumination and effortful control (Hilt, Armstrong, & Essex, 2012; Verstraeten, Bijttebier, Vasey, & Raes, 2011; Verstraeten, Vasey, Raes, & Bijttebier, 2009), however in a study using alternative self-report measures, a correlation between rumination and effortful control was not found (Mezulis, Simonson, McCauley, & Vander Stoep, 2011). There

is also prospective evidence demonstrating that effortful control prospectively predicts rumination (Hilt et al., 2012).

Rather than being characterised as a risk factor for RNT, some researchers have hypothesised that effortful control may moderate the relationship between negative affectivity and depression. Consistent with this, Verstraeten et al. (2009) found that rumination mediated the relationship between negative affectivity and depression, and this relationship was moderated by effortful control. Individuals who reported lower levels of effortful control (i.e., a weaker capacity to self-regulate behavioural and emotional responses, such as inhibiting or interrupting thoughts, and switching the focus of attention) may persevere with rumination, finding it hard to disengage, and thus making them more vulnerable to depression. In a further study exploring the different components of effortful control, Verstraeten et al. (2011) found that depression symptoms were associated with activation control and inhibitory control, whereas anxiety symptoms were associated with attentional control. However, when analysing their prospective data, Verstraeten et al. (2009) found that effortful control did not contribute towards change in depression symptoms. This null finding with prospective data has been replicated by Mezulis et al. (2011).

Alternatively, some researchers have hypothesised that deficiencies in effortful control may be a consequence, rather than a cause, of rumination. For example, in a longitudinal study with adolescents, Connolly et al. (2014) found that rumination prospectively predicted decreases in attentional switching 15 months later. As such, future studies should explore the relationship between rumination and components of effortful control, with prospective studies exploring the longitudinal relationships between effortful control and rumination, and experimental studies

manipulating components of effortful control and measuring the effect on subsequent rumination.

1.2.3.4. Functional and operant conditioning accounts of rumination and depression.

A number of accounts propose that individuals may develop a tendency towards rumination because it serves a function for them (i.e., a functional approach to rumination). In particular, Martell, Addis, and Jacobson (2001) proposed that "although the rumination may be experienced as aversive to the individual, it is possible that it is maintained by the avoidance of even more aversive conditions" (p. 121). Rumination can thus be conceptualised as a mechanism that helps depressed individuals to avoid engaging with their aversive environment and depressive symptoms by preoccupying their attention (Nolen-Hoeksema et al., 2008), and by passively avoiding the negative outcomes that active responses may trigger (Ferster, 1973).

The role of avoidance and escape in the development of depression was developed by Ferster's (1973, 1974) functional analysis of behaviour. Ferster's model is based on the principles of operant conditioning, and through observations of the behaviour of people with depression. Operant conditioning (Skinner, 1953) refers to the modification of voluntary behaviours emitted by the organism, and in contrast to classical conditioning (Pavlov, 1927), emphasises the active role of the organism "operating" on his or her own environment. Two types of learning occur in operant conditioning. *Contingency-governed behaviour* refers to behaviour that has been directly influenced by contingencies of reinforcement. *Rule-governed behaviour* refers to behaviour that is not sensitive to contingencies of reinforcement, because

that behaviour is controlled by verbal (or imagined) descriptions of contingencies, such as instructions, advice, and laws, rather than direct experiences.

Referring to contingency-governed behaviours, the consequence of the response influences the occurrence of that behaviour in the future. *Reinforcers* increase the likelihood of responses occurring in the future. *Positive reinforcement* refers to responses that are followed by the presentation of a stimulus that increases the chance of that behaviour occurring (usually, the reinforcer is a pleasant stimulus). *Negative reinforcement* (or *escape*) refers to the removal of a stimulus that increases the chance of the behaviour occurring (usually, something aversive is removed). *Punishers* decrease the likelihood of responses occurring in the future. *Positive punishment* refers to the presentation of a stimulus that decreases the likelihood of the behaviour occurring again (usually, the punisher is an aversive stimulus). *Negative punishment* (or *penalty*) refers to the removal of a stimulus that decreases the chance of a behaviour occurring (usually, something pleasant is removed).

Ferster's (1973) model applies the principles of operant conditioning to the development and maintenance of depression. In this analysis, Ferster identified two key observations of the functional behaviour of the depressed person that are explained in operant conditioning terms. First, Ferster (1973) proposed that depression is typified by "a reduced frequency of adjustive behaviours" (p. 857), as the frequency of positively reinforced behaviours (e.g., hobbies and socialising) significantly declines. Ferster argued that passive responding emerges under conditions of deprivation and neglect: When behaviours do not result in positive reinforcement, the contingency learnt is that there is no value in being active. Moreover, when active responses repeatedly fail to receive sufficient reinforcement, this engenders passive responses, such as rumination. Thus, this operant conditioning

analysis predicts that an environment characterised by neglect, limited positive reinforcement, and/or the experience of limited control, would engender the development of a passive response style. This analysis leads to the prediction that a period of uncontrollable stress and non-contingency would lead to increased levels of rumination.

Second, Ferster proposed that "the repertoire of a depressed person is a passive one" (Ferster, 1973, p. 859), as people with depression respond passively to aversive events. Ferster hypothesised that passive responses may serve the function of avoiding aversive consequences in certain situations, such as in social interactions with others, and thus are negatively reinforced. For example, complying with the demand of another person by responding passively avoids aversive consequences that could potentially arise if the depressed person refused to comply. In this case, the depressed person's passive response is negatively reinforced, as it allows the person to avoid an aversive response. Ferster also identified a second component of passivity in the depressed person's failure to adequately deal with aversive social events, proposing that depressed individuals passively assume responsibility for negative situations because they do not actively seek out information that confirms or contradicts this assumption of responsibility. Thus, rumination, as a form of passive response, can become reinforced and increase in frequency because its passive nature affords avoidance of aversive situations that may potentially arise from more active ways of responding to low moods (e.g., active responding may exacerbate difficulties, lead to interpersonal conflict, etc.). Specifically, rumination may develop as a form of contingency-governed behaviour that is negatively reinforced.

Whilst Ferster's (1973) account concerns depression rather than rumination specifically, rumination can serve an avoidant function in a number of different ways.

For example, people may believe that thinking in the head is safer than taking the risk of failure or humiliation in the real world, or that thinking about something means the person can avoid actually having to do it. People may believe that thinking about something can help to second-guess or anticipate another's response, thus avoiding further trouble. Rumination may act as a form of problem solving, which can be reinforced if the problem solving is effective and avoids negative outcomes. Rumination may also change an emotional state in a way that is negatively reinforced, by avoiding the aversive experience of a particular emotion (e.g., switching anger for sadness).

Moreover, Ferster (1973) hypothesised that that the reinforcement of certain behaviours in response to aversive circumstances can account for the extension of those behaviours to less appropriate situations, as a result of the behaviour having been effective in the past. Applying Ferster's model to rumination, rumination may be partially reinforced as an avoidance mechanism in some situations, but if an individual is poor at discriminating when rumination would be a helpful strategy, they may use it when it is less appropriate and less helpful. For example, considering the constructive forms of RNT outlined in Section 1.1, rumination may be experienced to be helpful in some scenarios (e.g., aiding successful processing of a traumatic event), but may become unconstructive when it becomes persistent or if an individual becomes "stuck" in cycles of rumination (e.g., repeatedly dwelling on the same aspects of a previous trauma).

Furthermore, partial reinforcement is more resistant to extinction than continuous reinforcement (Jenkins & Stanley, 1950), and therefore, people may find it difficult to abandon rumination as a strategy, even when it ceases to be helpful. The partial reinforcement effect creates a sense of persistence in individuals, argued to be

the root of superstitious behaviour by Skinner (1948), because the individual expects their responses to be reinforced, and when they are not reinforced, the individual may persist with the behaviour with the belief that continuing the behaviour will mean the reinforcement will eventually happen. Therefore, if rumination is partially reinforced as an avoidance strategy, people may find it difficult to abandon, and persist with rumination even when it becomes unhelpful, ineffective, or even detrimental to the individual.

To explore in more detail how these passive and avoidant responses are initially developed, Gilbert (1984, p. 55) suggested that "those most prone to depression are individuals who have developed a limited response repertoire and have failed to learn to generate alternative, adaptive, reinforcable behaviours when adjustments in responding are required". Ferster (1973) proposed that stimulus discrimination learning is responsible for the development of an adaptive response repertoire, and that problems with this can block the development of appropriate alternative ways of responding. *Stimulus discrimination learning* refers to the process by which individuals learn to respond with a particular behaviour in the presence of some stimuli, but not other stimuli, through the differential reinforcement (and punishment or ignoring) of their responses. Gilbert (1984) proposed that successful learning depends on predictable and accurate reinforcement of behaviours, and for children to be able to learn the outcomes of their own behaviours, parents and caregivers need to be sensitive and respond accurately and appropriately to the child's behaviour. If parental responses are arbitrary, unpredictable, or inaccurate, effective learning does not take place, and the child fails to develop subtle discrimination learning for social situations, and exploratory responses are inhibited. Essentially, "if the child does not know whether he will be shouted at, smacked, ignored, or smiled at

for exploring, then exploring becomes an extremely hazardous venture" (Gilbert, 1984, p. 55). As a result of this poor stimulus discrimination learning, Ferster suggested that the child develops a highly limited response repertoire, because the parent does not help the child learn, through contingencies of reinforcement, the different strategies for responding to aversive situations. Therefore, without this broad response repertoire, the child responds passively, using strategies such as rumination, to aversive events.

Developing this argument, there are constructive forms of RT (see Section 1.1), and RT can be constructive in certain situations. However, impaired stimulus discrimination may result in individuals persisting with rumination when it ceases to be constructive. For example, individuals may find it difficult to differentiate between rumination and problem solving, and because problem solving is sometimes reinforced, so too are other less helpful forms of repetitive thought.

Compared with other theoretical models, there is relatively little research that has examined this avoidance account of rumination. There is some cross-sectional evidence demonstrating that trait rumination correlates with self-reported avoidance (Cribb et al., 2006; Giorgio et al., 2010; Moulds et al., 2007) and behavioural avoidance (Lyubomirsky et al., 2006). However, this research is limited by its correlational approach. Thus far, there have been no experimental studies that have demonstrated that rumination affords increased avoidance (i.e., by manipulating rumination and demonstrating that it leads to avoidant outcomes). Moreover, there have been no studies to specifically test the reinforcement hypothesis (i.e., that justification for avoidance elicited by rumination leads to more rumination). As such, further experimental studies are required to test this functional account of rumination.

1.2.3.5. Metacognitive model of rumination.

Metacognition refers to "knowledge and cognition about cognitive phenomena" (Flavell, 1979, p. 906). Specifically, metacognitive beliefs concern "the costs and benefits of particular types of thinking … these beliefs have motivational consequences by encouraging the individual to engage in certain types of thinking or expend effort in controlling thoughts" (Wells, 1995, p. 303).

The metacognitive model of rumination (Papageorgiou & Wells, 2003) proposes that beliefs about rumination are involved in its activation and maintenance as a coping strategy, as the ruminative process occurs within a feedback loop which allows for rumination to be sustained, despite its negative consequences. Initially, positive beliefs about rumination motivate individuals to engage in rumination when faced with difficulties (e.g., "Ruminating about the past helps me to prevent future mistakes and failures"). Once engaged in sustained rumination, negative beliefs about rumination become activated, such as beliefs about its uncontrollability, harmfulness, and detrimental social consequences, and this contributes to the development of depressive symptoms (e.g., "I can't stop myself from ruminating", "Nobody wants to be with people who ruminate all the time"). The depressive symptoms lead to the experience of reduced metacognitive confidence (e.g., "My memory can mislead me at times"), which contributes to sustaining the negative beliefs about rumination, as well as maintaining the positive beliefs relating to the need to ruminate to help cope with difficulties. Thus, individuals become stuck in a vicious cycle of persistent rumination.

A number of studies are consistent with the hypothesis that metacognitive beliefs about rumination are associated with persistent engagement in rumination. Correlational studies demonstrate relationships between having metacognitive beliefs

about the function of rumination, and engaging in greater levels of rumination (e.g., de Jong-Meyer, Beck, & Riede, 2009; Papageorgiou & Wells, 2001a, 2001b, 2003; Watkins & Baracaia, 2001, Watkins & Moulds, 2005a). Moreover, in studies specifically examining the metacognitive model of rumination (Papageorgiou & Wells, 2003), structural equation modelling has been used to demonstrate that the model provides a good statistical fit to the data (Papageorgiou & Wells, 2003; Roelofs, Papageorgiou, Gerber, Huibers, Peeters, & Arntz, 2007; Roelofs, Huibers, Peeters, Arntz, & van Os, 2010).

In a quasi-experiment, Moulds, Yap, Kerr, Williams, and Kandris (2010) exposed individuals with high versus low levels of positive beliefs about rumination to an insolvable anagram task, and assessed subsequent self-reported rumination. Regardless of whether participants received positive, negative, or neutral feedback about anagram performance, participants with higher endorsement of positive beliefs about rumination reported more state rumination than participants with lower levels of positive beliefs.

A small number of prospective longitudinal studies also provide support for the metacognitive model of rumination. In a study examining the metacognitive model of rumination and depression in a nonclinical sample, Papageorgiou and Wells (2009) found that negative metacognitive beliefs about rumination predicted subsequent symptoms of depression 12 weeks later, after controlling for baseline levels of rumination and depression. However, this study did not examine whether these beliefs predicted change in rumination itself. Specifically examining whether beliefs predicted future rumination, Weber and Exner (2013) found that in a nondepressed student sample, positive metacognitive beliefs about rumination predicted changes in rumination two months later. However, there have been no

experimental studies that test the metacognitive model of rumination by manipulating beliefs about rumination and measuring the effect on subsequent engagement in rumination.

However, one methodological concern arising from the literature in this area is that it is possible that there may be contamination between measures of rumination, and measures of beliefs about rumination, as there may be some overlap in the way these variables are measured. For example, a widely used measure of beliefs about rumination, the Positive Beliefs About Rumination Scale (PBRS; Papageorgiou & Wells, 2001a), contains items such as "In order to understand my feelings of depression I need to ruminate about my problems", and "I need to ruminate about my problems to find the causes of my depression". This could potentially overlap with items on the RSQ-RRS (Nolen-Hoeksema & Morrow, 1991), such as "Analyse your personality to try and understand why you are depressed" and "Try to understand yourself by focusing on your depressed mood". As such, it is important to give careful consideration to the way these variables are assessed.

Taken together, these findings are consistent with the hypothesis that positive beliefs about rumination (e.g., believing that rumination helps with problem solving) may contribute to a tendency to engage in rumination when faced with difficulties, but as the evidence is correlational and prospective, as yet, it is not possible to conclude whether beliefs about rumination cause a tendency towards rumination.

1.2.3.6. Developmental accounts of rumination.

Theoretical links have been made between a number of experiences early in life and the development of rumination. Specifically, rumination has been associated with parental modelling (specifically, co-rumination between parents and children), and traumatic life events, particularly abuse and maltreatment in childhood.

Co-rumination between parents and children may play a role in a parent socialising a child into the use of rumination, as a result of the parent modelling the ruminative process. Co-rumination, a form of rumination that can occur in dialogue between individuals and is usually unconstructive, specifically refers to "extensively discussing and revisiting problems, speculating about problems, and focusing on negative feelings" (Rose, 2002, p. 1830). In a study specifically examining mother-adolescent co-rumination, Waller and Rose (2010) found that mothers were significantly more likely to co-ruminate with daughters rather than sons (a possible explanation for greater levels of rumination found in female adolescents, cf. Nolen-Hoeksema, 1991). They also found that level of mother-adolescent co-rumination was significantly and positively associated with adolescent symptoms of depression and anxiety. The finding that co-rumination predicts depression symptoms has been repeated in several studies (Hankin, Stone, & Wright, 2010; Stone, Hankin, Gibb, & Abela, 2011; Stone, Uhrlass, & Gibb, 2010; Waller & Rose, 2013). However, these studies do not demonstrate that co-rumination between parents and children causes the development and/or maintenance of intrapersonal rumination in children. As such, these studies do not establish whether or not parental modelling of ruminative thinking via the interpersonal process of co-rumination is a vulnerability factor for intrapersonal rumination.

In the only study to directly examine the relationship between mother and child rumination (Gibb, Grassia, Stone, & Uhrlass, 2012) demonstrated that whilst the children of mothers with a history of depression had significantly greater levels of brooding rumination, with the magnitude of the relationship being influenced by the degree of the child's exposure to the maternal depression (i.e., duration and recurrence of depression), no significant relationship was found between mother and

child brooding rumination. However, as the children included in this study were between 8 – 12 years old (mean age 9.97 years), it is possible that the capacity to engage in ruminative thinking was yet to develop in some of the younger children in this sample. Whilst the evidence concerning the age at which rumination develops is inconsistent, Hampel and Petermann (2005) found that early adolescents (10 - 12 years) and middle adolescents (12 – 13 years) reported significantly more rumination than children in late childhood (8 – 10 years). As such, further longitudinal and experimental studies are required to examine the direct relationship between parental modelling of a ruminative thinking style and rumination in children and adolescents.

In addition, it has also been hypothesised that traumatic events, in particular, abuse and maltreatment in childhood, are associated with the development of rumination. Spasojević and Alloy (2002) hypothesised that depressive rumination might develop as a result of maltreatment and abuse in childhood, because these sorts of experiences may lead children to feel as though they have little control over their lives and personal environments. In addition, Conway et al. (2004) proposed a variety of different pathways by which maltreatment can confer vulnerability to rumination. First, they suggest that abuse may make individuals become less trusting and more withdrawn, and thus when faced with a low mood, they may choose to ruminate rather than seek social support. Second, they proposed that abuse may make individuals feel powerless, and thus abused individuals may choose not to engage in externally-oriented forms of problem solving. Third, they highlight that some people who have been abused have a tendency to blame negative outcomes on personal characteristics which they judge to be stable and internal, resulting in increased rumination when faced with negative situations. Finally, they suggest that low self-esteem, which often results from the experience of abuse, may mean that abused

individuals have a tendency to overgeneralise the consequences when faced with negative outcomes, also fostering increased rumination.

Consistent with this hypothesis, Conway et al. (2004) found that retrospective self-reports of sexual abuse in childhood and adulthood were associated with increased levels of self-reported rumination on sadness. Examining emotional abuse, Raes and Hermans (2008) found that rumination was correlated with retrospective reports of childhood emotional abuse, and that rumination mediated the relationship between childhood emotional abuse and depression in adulthood. In a study of currently depressed adults, Barnhofer, Kuehn, de Jong-Meyer, and Williams (2007) found that in female participants, experience of physical or sexual assault lead to more positive beliefs about the benefits of rumination: Depressed participants without a history of abuse reported fewer positive beliefs. This finding suggests that for people who have experienced this type of trauma, rumination may be perceived to have functional properties for coping with the emotional consequences of abuse. Spasojević and Alloy (2002) found that in adult participants, retrospective report of the experience of sexual and emotional abuse in childhood was associated with increased levels of rumination.

In addition, several studies have demonstrated an association between other traumatic life events and rumination. For example, rumination has been associated with bereavement (e.g., Nolen-Hoeksema & Davis, 1999; Nolen-Hoeksema, McBride, & Larson, 1997; Nolen-Hoeksema et al., 1994), the experience of natural disasters (e.g., Nolen-Hoeksema & Morrow, 1991), chronic illness (e.g., Soo, Burney, & Basten, 2009), and road traffic accidents (e.g., Ehlers et al., 1998, 2003; Ehring, Frank, & Ehlers, 2008).

1.2.3.7. Personality accounts of rumination.

Neuroticism has been proposed as a personality trait that may confer increased vulnerability to rumination. *Neuroticism* refers to an individual's relatively stable tendency to experience negative emotional states, such as feelings of anxiety, sadness, and anger (Eysenck & Eysenck, 1991). Neuroticism involves difficulties with emotion regulation, and an individual high on neuroticism is "overly emotional, reacting too strongly to all sorts of stimuli, and finds it difficult to get back on an even keel after each emotionally arousing experience" (Eysenck & Eysenck, 1991, p. 4).

In terms of the origins of neuroticism, genetic and environmental contributions to the development of trait neuroticism are roughly equal (Laceulle, Ormel, Aggen, Neale, & Kendler, 2013). Neuroticism predicts a range of negative outcomes and psychopathologies; in particular, it predicts the development of depression and anxiety, as well as poor prognosis for the course of these disorders (Clark, Watson, & Mineka, 1994).

In considering how neuroticism may influence rumination, it is important to consider the cognitive substrates underpinning neuroticism. In a recent review of the neuroticism literature, Augustine, Larsen, and Lee (2013) identified four different levels of processing which are influenced by neuroticism, noting that neuroticism influences (i) stimulus reactivity; (ii) cognitive style; (iii) how information is encoded and recalled; and (iv) judgments and decision-making. The evidence for each of these cognitive components associated with neuroticism will be briefly reviewed, with respect to how they may relate to rumination.

First, Augustine et al. (2013) reviewed evidence that neuroticism influences stimulus reactivity, noting that individuals high in neuroticism have stronger negative affective reactions to stimuli, with evidence for this coming from inside and outside

of the laboratory. In the lab, individuals high on neuroticism show greater negative emotional reactions to mood inductions (Larsen & Ketelaar, 1991), false performance feedback (Larsen & Kelelaar, 1989), and affective images and videos (e.g., Augustine & Larsen, 2011; Hemenover, 2003). Outside of the lab, individuals high on neuroticism report more minor symptoms of illnesses (Larsen & Kasimatis, 1991), more undesirable daily events (David, Green, Martin, & Suis, 1997), day-to-day problems (Suls & Martin, 2005), and more negative appraisals of daily stressors (Gunthert, Cohen, & Armeli, 1999).

Second, neuroticism influences cognitive style such that it is associated with attentional focus towards negative stimuli, inconsistent and erratic responses to stimuli, and inefficient allocation of effort to task demands (Augustine et al., 2013). There is evidence that individuals high on neuroticism are more likely to attend to negative stimuli and have a negative self-focus (e.g., Field, Joudy, & Hart, 2010). Moreover, there is evidence that neuroticism is associated with erratic responses to stimuli, termed the mental noise hypothesis (Robinson & Tamir, 2005): Individuals high on neuroticism show considerable variation in reaction time across trials, whereas individuals low on neuroticism show more even distribution of reaction time, with reaction time peaking on the point on the point of decision in these tasks. This "noise" observed in the responses of neurotic individuals is thought to reflect interference from other sources, such as deficiencies in executive functioning.

Third, neuroticism is hypothesised to influence encoding and recall of information, with Augustine et al. (2013, p. 321) hypothesising that "the highly neurotic individual should possess a broad and densely interconnected associative network for negative information. With more negative experiences and a bias toward interpreting events as negative, those higher in neuroticism possess memory systems

that are relatively awash with negative affective information". Whilst there is less direct evidence in support of this hypothesis, there is evidence that neuroticism is associated with negative affective priming (Robinson, Ode, Moeller, & Goetz, 2007).

Finally, neuroticism is hypothesised to influence judgments and decision-making (Augustine et al., 2013). Consistent with this, there is evidence that individuals high on neuroticism are quicker to make evaluations of word categories when experiencing negative mood (e.g., sadness), relative to individuals lower on neuroticism (Tamir & Robinson, 2004). There is also evidence that individuals high on neuroticism are more prone to relying on the recognition heuristic (Hilbig, 2008), which refers to the notion of making decisions based on recognition or familiarity only, rather than making use of further knowledge (Goldstein & Gigerenzer, 2002).

Considering accounts of how rumination may be associated with neuroticism, Nolen-Hoeksema et al. (1994) hypothesised that the personality trait of neuroticism may manifest itself in the cognitive domain as an increased tendency to engage in repetitive thought in response to depressed moods. Rumination is hypothesised to be a specific mechanism by which the global trait of neuroticism is related to depression, and Nolen-Hoeksema et al. (1994) proposed that rumination might mediate the relationship between the personality trait of neuroticism and symptoms of depression. Elaborating on this, Roberts et al. (1998) hypothesised that individuals high on neuroticism tend to focus their attention on negative moods and experiences by engaging in rumination, which then amplify these moods and experiences, resulting in the prolonging of the negative mood. This is consistent with the cognitive mechanisms underpinning neuroticism reviewed previously (Augustine et al., 2013), specifically, that neuroticism influences negative stimulus reactivity and is associated with processing biases towards negative stimuli.

A number of cross-sectional studies find evidence consistent with the hypothesis that rumination and neuroticism are associated. In studies using nonclinical adult samples, rumination fully mediated the relationship between neuroticism and symptoms of depression (Kuyken et al., 2006; Muris, Roelofs, Rassin, Franken, & Mayer, 2005). Rumination partially mediated the relationship between neuroticism and depression in nonclinical adolescents (Muris, Fokke, & Kwik, 2009) and in currently depressed adults (Roelofs, Huibers, Peeters, Arntz, & Van Os, 2008).

In a further nonclinical sample, Roelofs, Huibers, Peeters, and Arntz (2008) found that rumination on sadness partially mediated the relationship between neuroticism and symptoms of depression. Moreover, Nolan, Roberts, and Gotlib (1998) found that rumination was correlated with neuroticism, and it mediated the prospective relationship between neuroticism and depression (rumination and neuroticism were measured at one time point which precluded examination of their prospective relationship). Roberts et al. (1998) found that rumination fully mediated the relationship between neuroticism and number of lifetime episodes of dysphoria. Finally, Verstraeten et al. (2009) conducted a moderated mediation analysis with cross-sectional data and found that the relationship between negative affectivity (neuroticism) and depression symptoms was mediated by rumination, but with the relationship between neuroticism and rumination moderated by effortful control (only at low levels of effortful control was the relationship between neuroticism and rumination significant).

There is also prospective evidence consistent with the hypothesis that neuroticism is a vulnerability factor for rumination. Barnhofer and Chittka (2010) found that neuroticism prospectively predicted rumination, measured six years later, and that rumination significantly mediated the relationship between neuroticism and

current depression. When analysing prospective data, Verstraeten et al. (2009) did not find that rumination mediated the prospective relationship between negative affectivity (neuroticism) and depression, but when conducting a moderated mediation analysis with the rumination–depression relationship being mediated by effortful control, moderated mediation was found, such that rumination only prospectively predicted depression at low levels of effortful control.

In addition, a number of cross-sectional studies not specifically examining the meditational relationship between neuroticism, rumination, and depression have demonstrated significant associations between rumination and neuroticism, in currently depressed samples (Bagby & Parker, 2001; Lam, Smith, Checkley, Rijsdijk, & Sham, 2003) and nonclinical samples (Hankin, Lakdawalla, Carter, Abela, & Adams, 2007; Wupperman & Neumann, 2006).

In summary, these findings provide support for the relationship between neuroticism and rumination, however due to the cross-sectional and longitudinal approaches adopted, they do not provide casual evidence for the hypothesis that neuroticism contributes to a tendency towards rumination.

1.3. Worry

1.3.1. Defining Worry

Worry refers to "a chain of thoughts and images, negatively affect-laden and relatively uncontrollable; it 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" (Borkovec, Robinson, Pruzinsky, & DePree, 1983, p. 10). Worry is characterised by a focus on anticipated future threat or uncertainty (Watkins, 2008); examples of worrisome thoughts include, "What if I mess up at my interview

tomorrow?" or, "How am I going to pay for that expensive repair bill?" There is considerable overlap between worrisome thoughts and ruminative thoughts. For example, Watkins (2008) observed that both worry and rumination involve repetitive thought focused on more general meanings and implications, rather than on more specific and concrete details. This commonality between the characteristics of rumination and worry will be fully addressed in Section 1.4.1.

The Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) is the most widely used measure of trait worry. The PSWQ examines the general tendency towards engagement in worry, as well as how excessive and generalised the worry is (Molina & Borkovec, 1994). It contains 16 items that take the form of statements (e.g., "Once I start worrying, I can't stop", "I find it easy to dismiss worrisome thoughts"), and respondents are instructed to rate how characteristic each item is of themselves, on a scale from 1 (*not at all typical*) to 5 (*very typical*).

1.3.2. Evidence for the Negative Effects of Worry

Worry is highly prevalent, being described as a "pervasive human activity…nearly everyone is periodically aware of its occurrence, and for some it is a constant but unwanted and severe companion" (Borkovec, 1994, p. 5). Like rumination, worry is also associated with a number of negative psychological processes. Chronic worry is the central feature of generalised anxiety disorder (GAD; American Psychiatric Association [DSM-IV-TR], 2000), as well as contributing to the maintenance of other anxiety disorders (Watkins, 2008). A better understanding of the development and maintenance of worry can assist in understanding anxiety disorders and developing effective treatment and prevention interventions (Borkovec, 1994).

Anxiety disorders refer to a range of conditions, including panic disorder, obsessive-compulsive disorder (OCD), social phobia, posttraumatic stress disorder (PTSD), and GAD. In the context of the literature on pathological RNT, rumination and worry have most frequently been studied with respect to GAD, social anxiety, and PTSD (Watkins, 2008).

GAD is characterised by excessive anxiety and worry for at least six months. The anxiety and worry relate to a number of different activities and events, is hard for the individual to control, and is accompanied by a number of symptoms, including restlessness, difficulties concentrating, being easily fatigued, irritability, muscle tension, and disturbed sleep (American Psychiatric Association [DSM-IV-TR], 2000).

PTSD involves the development of symptoms following exposure to a highly traumatic stressor and subsequently reacting with feelings of fear, horror or helplessness. In PTSD, the individual persistently re-experiences the traumatic event, avoids stimuli associated with the trauma, and experiences persistent increased arousal (American Psychiatric Association [DSM-IV-TR], 2000).

Cross-sectional studies demonstrate a relationship between worry and anxiety. In undergraduate samples, worry is strongly correlated with trait anxiety (Borkovec et al., 1983) and symptoms of GAD (Meyer et al., 1990; Segerstrom et al., 2000). In a study of Cambodian refugees who had experienced highly traumatic events, worry was associated with symptoms of PTSD (Hinton, Nickerson, & Bryant, 2011). Similar findings have been reported in cross-sectional studies with children and adolescents. Weems, Silverman, and La Greca (2000) studied children aged 6–16 years old who had been referred to a clinic with anxiety or phobia problems. On a variety of self-report measures of worry and anxiety, anxiety was significantly correlated with a variety of aspects of worry (e.g., number, intensity, and frequency of worries).

Longitudinal studies demonstrate that worry is a temporal antecedent of changes in anxiety symptoms. In studies with adults, worry predicted change in anxiety symptoms (after one month, Hong, 2007; after 6-8 weeks, Calmes & Roberts, 2007). Worry during a stressful period (undergraduate university examinations) also predicted anxiety symptoms one week after termination of the stressor (Segerstrom et al., 2000). Worry also predicted symptoms of PTSD after 6 months (Holeva, Tarrier, & Wells, 2001). In a study of undergraduates, worry predicted symptoms of stress three months later (Roussis & Wells, 2008).

Experimental studies manipulating worry demonstrate its causal influence on symptoms of anxiety. Borkovec and Hu (1990) experimentally manipulated worry prior to mental imagery of a feared activity (public speaking), and found that participants in the worrisome thinking group had greater self-reported fear in response to the mental imagery relative to participants in the relaxed and neutral thinking groups. In a similar study, participants experimentally manipulated to worry showed greater fear and vividness responses to phobic images relative to participants who engaged in relaxed thinking (Borkovec, Lyonfields, Wiser, & Deihl, 1993). McLaughlin, Borkovec, and Sibrava (2007) experimentally manipulated worry and found that it led to increased negative affect, and increased symptoms of depression and anxiety.

Studies examining worry, alongside or independently of rumination, provide evidence for its association with depression. In a correlational study, Segerstrom et al. (2000) found that worry was associated with symptoms of depression. Moreover, in a study involving factor analysis of measures of rumination, worry, depression, and anxiety, Fresco, Frankel, Mennin, Turk, and Heimberg (2002) found two distinct factors that accounted for the majority of the variance on the measures of worry and

rumination, which they termed *worry engagement* and *dwelling on the negative*, respectively. Both of these factors were correlated with each other, as well as being correlated with measures of depression, indicating a relationship between worry and depressive symptoms. Starcevic (1995) examined worry in individuals with diagnoses of depression or GAD, and found that mean PSWQ scores of depression and GAD participants fell within less than one point of each other, indicating an almost identical mean score for each group. As such, these results support existing findings demonstrating the association between worry and anxiety, but they also suggest worry may be significantly related to depression.

Worry has additional negative consequences beyond its association with depression and anxiety. In correlational studies, worry has been associated with sleeping difficulties and insomnia (Harvey, 2000), elevated levels of the stress hormone cortisol (Schlotz, Hellhammer, Schultz, & Stone, 2004), and self-reported fatigue (Andrea et al., 2004). In prospective studies, worry predicts impaired wound repair and recovery post-surgery (Broadbent, Petrie, Alley, & Booth, 2003), decreased functional status (e.g., mobility, grip strength) in arthritis patients (Evers, Kraaimaat, Geenen, & Bijlsma, 1998), delayed healing in psoriasis patients (Fortune et al., 2003), and lower numbers of cells that respond to infection (Segerstrom, Solomon, Kemeny, & Fahey, 1998).

1.3.3. Theoretical Models of Worry

In this section, there will be a discussion of theoretical models of worry, and evaluation of the supporting evidence for these models. This section will review the avoidance and reduced concreteness theories of worry (Borkovec, 1994; Stöber, 1998), the intolerance of uncertainty model of worry (Krohne, 1989; Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994), the metacognitive model of worry

(Wells, 1995), developmental accounts of anxiety (e.g., Chorpita & Barlow, 1998; Rapee, 1997), and temperamental models of anxiety (behavioural inhibition; Biederman et al., 1993).

1.3.3.1. Avoidance and reduced concreteness theories of worry.

Like rumination, worry is hypothesised to have avoidant functions. Borkovec (1994) characterised worry as an internal verbal-linguistic function that allows cognitive avoidance of threatening information. This theory is based on a series of findings from individuals with GAD: When asked about the benefits that they derive from worrying, the reasons most frequently offered refer to an avoidance of threat (Borkovec, 1994). Like Ferster's (1973) functional operant conditioning account (see Section 1.2.3.4), Borkovec proposed that worry is reinforced and strengthened in a similar avoidance paradigm. He proposed five ways that worry could be reinforced, either immediately, or through a delayed schedule of reinforcement (Borkovec, 1994, p. 16):

1. Worry as "superstitious avoidance of catastrophe": the belief that worrying about an event means that it is less likely to occur. This belief receives delayed negative reinforcement as a result of the nonoccurrence of the feared catastrophe.

2. Worry as "actual avoidance of catastrophe": the belief that worry can serve as a method of problem solving that can assist with preventing an event. Again, this receives delayed negative reinforcement when the event does not occur.

3. Worry as "avoidance of deeper emotional topics": worrying about certain topics as a means of distracting attention and thought away from other emotional topics that the individual does not want to think about. This receives immediate negative reinforcement when this emotional avoidance strategy is effective.

4. Worry as "coping preparation": the belief that worrying about a future event will assist in dealing with that event if it occurs. This belief is reinforced when emotional reactions to events are perceived as having been moderated by the preceding worry and expectation of a negative emotional reaction.

5. Worry as a "motivating device": worrying about tasks acts as an unpleasant stimulus, to encourage the individual to complete the tasks at hand. The worry acts as an aversive stimulus, and when tasks are accomplished, the belief is reinforced.

Borkovec (1994) further hypothesised that worrying is negatively reinforced by suppression of the autonomic features of the anxious experience, which in turn, leads to inhibition of emotional processing. The immediate function of worry (suppression of autonomic activity) is the feature that gives rise to the maintenance of anxiety, through perpetuating threatening meanings (by preventing emotional processing).

This theory is based on evidence that demonstrates that verbal-linguistic thought has little effect on cardiovascular activity, when compared to imagery of the same material (Vrana, Cuthbert, & Lang, 1986). Borkovec (1994) proposed that abstract conceptual thought (e.g., worry) has few connections to physiological channels and occurs in relative isolation from physiological and behavioural channels, and that this has adaptive value in evolutionary terms: "Because thought is not immediately expressed in efferent channels, humans are able to delay overt responding, search memory for usable information, manipulate symbols, deploy logical analysis and problem-solving tactics, and freely experiment with possibilities in the absence of any environmental consequences during such processing" (p. 18). However, Borkovec proposed that this system also allows individuals to engage in maladaptive forms of thought, such as pathological worry.

In terms of the mechanisms responsible for this suppression effect, one theory is that it relates to the way in which worrisome thought can be characterised by reduced concreteness (Borkovec, Ray, & Stöber, 1998). The reduced concreteness theory of worry (Stöber & Borkovec, 2002) elaborates on the avoidance theory of worry (Borkovec, 1994), proposing that worrying about problems in an abstract way reduces the likelihood of finding concrete solutions to these problems, thus allowing the problem to remain unresolved, and the worrying to continue. Moreover, the act of worrying in an abstract manner is reinforced. As outlined previously, verbal thought generates fewer physiological symptoms of anxiety (e.g., increased heart rate) than mental images. Whilst mental images can be primed by verbal thoughts, generating mental images from abstract (rather than concrete) mental verbalisations is more time consuming, and it produces images that are less vivid (Paivio & Marschark, 1991). As such, if worrisome thought is verbally abstract, mental images may still be produced, but they will be less vivid and intrusive, affording commensurate reduction in physiological symptoms of anxiety. Therefore, worry will be negatively reinforced as a result of the commensurate reduction in the somatic anxiety response resulting from focusing on verbal thoughts of an abstract nature (Borkovec et al., 1998). It is noteworthy that both the reduced concreteness theory of worry (Stöber & Borkovec, 2002) and the processing mode theory of RT (Watkins, 2008) implicate level of abstraction in influencing engagement in RNT.

There is empirical evidence for a relationship between reduced concreteness and worry. Stöber, Tepperwien, and Staak (2000, Study 2) had undergraduate student participants elaborate on personal problems using catastrophising interviews (where participants were asked "what worries you most about *X*?", with step X being substituted with what the participant gave in the previous answer, until the participant

could not generate any further new answers; cf. Vasey & Borkovec, 1992). Worry was associated with reduced concreteness of problem elaborations, such that more worrisome problems were elaborated on in a more abstract way than less worrisome problems. The same pattern of findings was observed in a study of participants with GAD (Stöber et al., 2000, Study 1), where participants used problem elaboration charts that required them to write about three potential antecedents of problems, and three potential consequences: more worrisome problems were associated with less concrete elaborations.

Further evidence comes from a study comparing GAD participants with nonclinical control participants (Stöber & Borkovec, 2002). Participants completed a problem elaboration questionnaire, where they wrote descriptions of two current problems, followed by three potential consequences of each problem. Participants with GAD, the hallmark of which is excessive and generalised worry, generated answers that were rated as significantly less concrete than the nonclinical participants, providing further support for the reduced concreteness theory of worry.

There is also an extensive literature indicating that worry reduces physiological responding relative to other forms of thought, which is consistent with Borkovec's (1994) hypothesis that worrying inhibits emotional responding, and Stöber & Borkovec's (2002) hypothesis that abstract worrying affords a reduction in aversive symptoms of anxious arousal. For example, there is evidence that worry suppresses somatic anxiety by suppressing the cardiovascular response to threatening images. Borkovec and Hu (1990) conducted an experiment examining the physiological effects of worry, in which speech-anxious participants had to use mental imagery to visualise giving a speech to a large group of people. Prior to the imagery, participants had to engage in worrisome thinking, relaxed thinking, or

neutral thinking. Participants in the worrisome thinking group showed little or no cardiovascular response to the phobic imagery, which contrasted with those in the relaxed and neutral thinking groups, who showed significant heart rate reactions to the phobic imagery. This study provides evidence that worrying suppresses the aversive physiological features of anxiety, which may result in worry being negatively reinforced as an avoidance response to aversive situations. In a similar study, participants experimentally manipulated to worry with a focus on verbal thoughts showed significantly less heart rate response to phobic images, relative to participants who engaged in relaxed thinking (Borkovec et al., 1993).

1.3.3.2. Intolerance of uncertainty model of worry.

Intolerance of uncertainty is defined as "the tendency to react negatively on an emotional, cognitive, and behavioural level to uncertain situations and events ... individuals who are intolerant of uncertainty find ambiguity stressful and upsetting, believe uncertainty is negative and should be avoided, and have difficulty functioning in uncertain situations" (Buhr & Dugas, 2006, p. 223). Krohne (1993) proposed that individuals with GAD are intolerant of the autonomic arousal associated with anxiety, as well as intolerant of uncertainty.

It has been hypothesised that intolerance of uncertainty leads to worry for two key reasons (Freeston et al., 1994). First, an individual who is intolerant of uncertainty may engage in worry if they believe that worrying helps them to increase their sense of control and reduce uncertainty. Second, intolerance of uncertainty may lead to increased anxious physiological arousal in uncertain situations (Krohne, 1989). Therefore, if an individual is intolerant of this sort of anxious arousal, worrying may help to reduce these aversive physical symptoms, as it involves thoughts of a verbal-linguistic nature, which is associated with less physiological arousal than imagery of

the same material. Krohne (1989) proposed that people who are intolerant of uncertainty typically utilise "vigilant" coping strategies (e.g., "anticipation of negative events", "planning for the future"), the functions of which appear to have considerable overlap with commonly reported functional and metacognitive beliefs accounts of RNT (e.g., Borkovec, 1994; Papageorgiou & Wells, 2003).

A number of studies demonstrate a cross-sectional relationship between intolerance of uncertainty and worry. In undergraduate samples, intolerance of uncertainty, measured by the self-report Intolerance of Uncertainty Scale (IUS; English version, Buhr & Dugas, 2002; French version, Freeston et al., 1994) was correlated with trait worry (Buhr & Dugas, 2006; Dugas, Freeston, & Ladouceur, 1997). The same pattern of findings emerges in adolescent samples (Laugesen, Dugas, & Bukowski, 2003). In developing the Intolerance of Uncertainty Scale, in addition to demonstrating the correlational relationship between intolerance of uncertainty and trait worry, Freeston et al. (1994) demonstrated that participants with GAD scored significantly higher on the IUS than nonclinical participants. Moreover, in a study using both dysphoric and nondysphoric participants, worry was associated with intolerance of uncertainty across dysphoria status (de Jong-Meyer et al., 2009). Finally, whilst fewer studies have examined rumination and intolerance of uncertainty, there is evidence for a cross-sectional association between the two constructs from studies examining both worry and rumination alongside intolerance of uncertainty. Rumination has been associated with intolerance of uncertainty in both dysphoric and nondyphoric participants (de Jong-Meyer et al., 2009). Additionally, in a study of participants with depression and/or GAD, rumination fully mediated the relationship between intolerance of uncertainty and depression, and worry partially mediated the relationship between intolerance of uncertainty and anxiety (Liao & Wei, 2011).

The only English-language experimental study to attempt to manipulate intolerance of uncertainty used a gambling task, and following the experimental manipulation, participants manipulated to have greater intolerance of uncertainty showed greater levels of worry, relative to those manipulated to have less intolerance of uncertainty (Ladouceur, Gosselin, & Dugas, 2000). However, there are a number of methodological limitations to this study, the first of which is that arguably, the researchers actually manipulated uncertainty itself, rather than intolerance of uncertainty. The manipulation involved relaying information to participants that led them to believe their chances of winning on a gambling task were high (allegedly decreasing intolerance of uncertainty) or low (allegedly increasing intolerance of uncertainty). However, it could be argued that this manipulation actually influenced sense of uncertainty, with participants being manipulated to feel more or less certain about winning, without any actual manipulation of how tolerable that sense of certainty was for them. Moreover, the conclusions are limited in that this study did not measure levels of generalised worry, only worry relating to one specific topic (worry about a fictitious charity not receiving money if participants lost at a gambling task). In addition, no baseline measures of worry were taken prior to the manipulation of intolerance of uncertainty, and therefore the study does not demonstrate that the manipulation caused greater worry, only that those participants in the high intolerance of uncertainty group displayed more worry than those in the low intolerance of uncertainty group.

Whilst there is some evidence for the association between intolerance of uncertainty and worry (and to a much lesser extent, rumination), the extant evidence is generally limited by its correlational approach, precluding examination of whether intolerance of uncertainty causally influences worry. As such, further experimental

studies are required to test the causal relationship between intolerance of uncertainty and worry.

1.3.3.3. Metacognitive model of worry.

The metacognitive model of worry (Wells, 1995) proposes that worry is initiated by metacognitive beliefs about the effects of worry, and it becomes harmful when individuals begin to worry about worrying (i.e., meta-worry or "Type 2" worry). Wells (1995) proposed that individuals are initially motivated to engage in worry in response to real or imagined threats. This tendency is hypothesised to arise for a variety of reasons (e.g., parental modelling of the benefits of worry; worry protecting against unexpected negative events; worry being associated with the non-occurrence of feared events).

Wells (1995) hypothesised that harmful meta-worry can develop for four reasons. First, repeated engagement in worry may lead to automatisation of the worry process in response to a variety of cues. As a result of how easily it is elicited, individuals may then perceive the worry as uncontrollable, and these negative beliefs about worry can contribute to engagement in meta-worry. Second, individuals may not attempt to stop worrying as a result of having positive beliefs about its utility, or perceiving it to be uncontrollable, leading to unrestrained engagement in worry. Third, individuals may develop meta-worry as a result of experiencing life events that demonstrate the harmful effects of excessive worrying (e.g., observing a parent who modelled worrying developing mental health problems). Finally, engagement in worry may block emotional processing of difficulties, and as such, this may lead to meta-worry about diminished mental control. Wells (1995, p. 306) suggested that individuals with GAD are in a state of "meta-cognitive dissonance in which positive beliefs about worrying and negative beliefs co-exist. Beliefs about the advantages of

worrying or the costs of not worrying are likely to contribute to worry periods of longer duration. For example, the belief that one must ruminate on a problem until an answer is found or until things feel as if they will be alright will motivate the use of worry as a strategy and increase the duration of worry episodes".

A number of studies are consistent with the hypothesis that metacognitive beliefs about worry are associated with engagement in worry. Correlational studies demonstrate an association between having metacognitive beliefs about the utility of worry, and engaging in greater levels of worry (Bacow, Pincus, Ehrenreich, & Brody, 2009; Cartwright-Hatton & Wells, 1997; Davis & Valentiner, 2000; de Jong-Meyer et al., 2009; Irak & Tosun, 2008; Nuevo, Montorio, & Borkovec, 2004; Wells, 2005; Wells & Cartwright-Hatton, 2004; Wells & Papageorgiou, 1998; Yilmaz, Gençöz, & Wells, 2008).

Two prospective longitudinal studies also provide support for metacognitive models of worry. In a prospective study examining worry and maladaptive coping with a four-month follow-up, baseline levels of positive and negative metacognitive beliefs predicted subsequent level of worry, after controlling for initial levels of worry (Sica, Steketee, Ghisi, Chiri, & Franceschini, 2007). In addition, avoidant/maladaptive coping was predicted by positive metacognitive beliefs about worry, after controlling for baseline levels of avoidant/maladaptive coping. In a prospective study examining the prospective relationships between stressful events, positive beliefs about worry and engagement in worry, Iijima and Tanno (2013) found that positive beliefs about worry significantly moderated the relationship between stressful events and worry, with stressful events leading to greater levels of worry in individuals with high positive beliefs about worry.

Only one study has experimentally manipulated beliefs about worry to examine the effects on engagement in worry. Prados (2011) manipulated beliefs about the utility of worry, and found no differences in worrisome thoughts between groups manipulated to perceive worry as constructive versus unconstructive. However, there were a number of methodological issues with this study. First, it is possible that the overt manipulation of beliefs about worry may have resulted in demand effects, since the manipulation was quite explicit (e.g., "According to prestigious scientists, worry has positive consequences…"; Prados, 2011, p. 218). Second, there were potential methodological issues with the prompts used to afford engagement in worry. In the first experiment, participants received a "worrisome message" about the disappearance of an indigenous Amazonian culture. Due to this message not being personally relevant to participants, it may have been insufficiently powerful to prompt engagement in worry. In the second experiment, participants were instructed to engage in worry about an important exam. This may have had the opposite impact, since instructing participants to engage in worry may have resulted in high levels of worry in all participants, potentially reducing the capacity to observe a difference between experimental groups. As such, it is not possible to conclude from the limited experimental evidence whether manipulating beliefs about worry influences engagement in worry.

1.3.3.4. Developmental accounts of worry.

A number of theoretical models suggest that certain experiences within childhood and adolescent development contribute to the development of worry and anxiety. Whilst some of these models have tended to focus on anxiety generally, rather than worry, since worry is a central feature of anxiety, it is still helpful to review these developmental theoretical models. These models specifically focus on

the influence of three factors: parental modelling, overcontrolling parenting, and traumatic life events, including abuse and maltreatment.

In the general sense, parental modelling refers to the way in which children acquire behaviours through observation of their parents' actions. Parental modelling of anxious behaviour refers to parents "describing problems to children as irresolvable or dangerous, encouraging (rewarding) children to view problems in a catastrophic manner, and extinguishing or punishing children's expressions of coping thoughts and problem solving strategies" (Wood, McLeod, Sigman, Hwang, & Chu, 2003). Wood et al. (2003, p. 135) explain that "children of parents who frequently model anxious behaviour may come to believe that there is no way of coping effectively with problems and are not likely to develop strategies that can reduce anxiety". In an early theoretical account of how parents can model anxious behaviours, Rachman (1977) proposed that anxiety can be transmitted via operant conditioning processes. He hypothesised that anxiety can be transmitted indirectly, through observational learning (i.e., parental modelling), or by the direct transmission of information from parent to child (i.e., verbal instructions). For example, if a child witnesses a parent's anxious reaction to a feared stimulus or situation (e.g., running late for an appointment), the child may go on to imitate or model these reactions in the presence of that stimulus in the future. Ollendick, Vasey, and King (2001) proposed that observational learning can also occur as a result of children's observations of the way in which parental behaviours are reinforced: They hypothesise that if a child witnesses that parental avoidant responses to aversive or feared stimuli result in a reduction in parental anxiety, they may develop rule-governed behaviours which result in them responding with avoidance to anxiety-provoking situations. In terms of the verbal transmission of information resulting in the operant conditioning of anxiety,

Ollendick et al. (2001) proposed that many anxious behaviours are both positively and negatively reinforced, for example, "the child who worries excessively about how he or she will do on a test is offered encouragement and consolation from teachers and peers alike", and "the 'anxious' child…is frequently allowed to escape or avoid the unpleasant aspects of the situation and, in turn, may be negatively reinforced" (p. 240).

There is evidence consistent with the hypothesis that parental modelling may lead to worry. First, there is indirect evidence that demonstrates an association between parental modelling and anxiety, rather than worry specifically. In an observational study where children had to interpret ambiguous scenarios, anxious children were more likely to switch from a nonthreatening to a threatening interpretation after discussion with their parents, with nonanxious children showing the opposite pattern of responding (Barrett, Rapee, Dadds, & Ryan, 1996; Dadds, Barrett, Rapee, & Ryan, 1996). Moreover, there is observational evidence that anxious mothers catastrophise more in the presence of their children than nonanxious mothers (Moore, Whaley, & Sigman, 2004; Whaley, Pinto, & Sigman, 1999). In a further correlational study, maternal expression of fear mediated the relationship between mother and child fearfulness (Muris, Steerneman, Merckelbach, & Meesters, 1996). However, it is important to note that these studies did not directly measure worry.

Second, there is some direct correlational evidence demonstrating an association between anxious rearing behaviours and worry in children. Muris, Meesters, Merckelbach, and Hülsenbeck (2000) conducted a correlational study in which children were asked to report on their perceptions of the rearing behaviours of their parents, along with their own levels of worry. Anxious rearing behaviours (e.g., "your parents are scared when you do something on your own") were positively

associated with children's level of worry. This study is limited by its correlational approach, as well as its operationalisation of parental anxious rearing (entirely measured through child self-report), however the evidence is consistent with the hypothesis that parental modelling may influence child worry. However, longitudinal studies and experimental studies manipulating parental modelling behaviours are required in order to establish the direction of causality between child worry and parental modelling.

Overcontrolling parenting has been highlighted as a vulnerability factor for the development of anxiety. Parental overcontrol is characterised as "a pattern of behaviour involving excessive regulation of children's activities and/or routines, high levels of parental vigilance and intrusion, and the discouragement of independent problem-solving ... [it] is assumed to limit the development of children's autonomy, lead to perceptions of the environment as uncontrollable and a limited sense of personal competence of mastery" (Bögels & Brechman-Toussaint, 2006, p. 841). Several theoretical accounts emphasise the role of parental overcontrol in the development of anxiety. Rapee (1997, p. 62) hypothesised that "excessive protection from a parent may help to provide information to the child that the world is a dangerous place and may also reduce the child's opportunities for learning otherwise". Similarly, Thompson (2001, p. 173) proposed that "by responding overprotectively and overcontrollingly … caregivers provide little or no opportunity for [children] to master the anxiety … In doing so, parents may be inadvertently reinforcing and also modelling anxious behaviour and poor self-regulatory strategies". In addition to this, Chorpita and Barlow (1998) proposed that overcontrolling parenting may be problematic because of its negative effects on perceived control. Chorpita and Barlow (1998, p. 5) defined control as "the ability to personally influence events and

outcomes in one's environment, principally those related to positive or negative reinforcement … control, as such, can implicitly allow prediction of when something will happen, such as the termination of an aversive event". They hypothesised that children who experience a low sense of control, either through the experience of overcontrolling, overprotective and intrusive parenting styles, or through being raised in an uncontrollable, unpredictable home environment, are more likely to be at risk for interpreting subsequent events as out of their control, increasing vulnerability to anxiety.

Whilst not examining worry directly, several comprehensive reviews have examined the relationship between parental overcontrol and anxiety in children (Bögels & Brechman-Toussaint, 2006; Rapee, 1997; Wood et al., 2003), which is relevant given the close relationship between worry and anxiety. Moreover, in a meta-analysis examining the effects of parenting styles on the development of anxiety (Gerlsma, Emmelkamp, & Arrindell, 1990), the development of anxiety disorders in childhood was associated with parenting styles high in psychological control. In addition, evidence from several studies demonstrates that relative to mothers of nonanxious children, mothers of anxious children display more intrusive, unsolicited and negative involvement when their children complete challenging tasks (Hudson & Rapee, 2001, 2002), grant less autonomy (Moore et al., 2004; Whaley et al., 1999), and are more controlling, and more likely to display aversive affect and behaviours (Dumas, LaFreniere, & Serketich, 1995). However, it is important to note that these studies did not measure the effect of parental overcontrol on worry directly.

In a study directly examining worry and parental overprotection, Manfredi et al. (2011) employed a retrospective correlational design and found that participant-reported parental overprotection was associated with current levels of worry, after

controlling for symptoms of anxiety and depression. However, this retrospective design is limited in that retrospective reports can be influenced by current mood, beliefs, and adult interpretations of events, and the correlational approach precludes conclusions as to whether parenting style is a vulnerability factor that temporally antecedes and causally influences worry. As such, further longitudinal and experimental studies are required to examine the relationship between parental overcontrol and worry.

Traumatic events, including childhood abuse and maltreatment, have also been implicated in the development of worry and anxiety. The avoidance theory of worry (Borkovec, 1994), outlined in Section 1.3.3.1, hypothesises that worry functions as a form of cognitive avoidance, which is reinforced and strengthened under particular conditions. Worry is hypothesised to have a number of functions that may be particularly relevant for individuals who have experienced traumatic life events and childhood abuse. For instance, Borkovec (1994) proposed that worry can serve as a form of problem solving that may help prevent a negative event from occurring, and this is negatively reinforced if the feared event does not occur. Worry is also thought to help people "prepare for the worst" by assisting individuals with coping and dealing with emotional reactions if the feared event does occur.

Consistent with this, several studies have demonstrated a correlational association between GAD (the hallmark of which is pathological worry) and traumatic life events. Torgersen (1986) found that individuals with GAD were significantly more likely to have had one or both parents die before they were 16 years old. Blazer, Hughes, and George (1987) found that individuals who reported experiencing at least one negative, unexpected, and important life event were three times more likely to develop GAD than people who had not had such an experience.

Roemer, Molina, Litz, and Borkovec (1996/1997) examined nonclinical participants who met the criteria for GAD, as well as clinical participants who had received an official diagnosis of GAD. They found that both groups of GAD participants had retrospectively reported that they experienced significantly more potentially traumatic events than nonanxious participants. However, all of this evidence is correlational, and thus it is not possible to draw conclusions about the causal relationship between traumatic life events and worry. Moreover, the specificity of the association between traumatic life events and worry is unclear, since abuse and trauma predict a range of psychopathologies. As such, it is difficult to ascertain the specific relationship between these two factors.

To conclude, these developmental accounts implicate parental modelling, parental overcontrol, and the experience of traumatic life events, including abuse and maltreatment, in the development of worry. However, the evidence is limited in that much of it is retrospective and correlational, and/or examines anxiety, rather than worry directly.

1.3.3.5. Temperamental account of worry.

Behavioural inhibition refers to the tendency to be shy, inhibited, and fearful in response to unfamiliar events or people and stressful situations, and it has been associated with the development of anxiety disorders (Kagan, Snidman, Arcus, & Reznick, 1994; Rapee, 2001). Fisak and Grills-Taquechel (2007) proposed three pathways by which behavioural inhibition may put children at risk for the development of anxiety. First, children may inherit a behaviourally inhibited temperament from parents, who may additionally model anxious and fearful behaviour, so the child may be vulnerable to anxiety as a result of both parental modelling and temperamental factors. Second, behaviourally inhibited children may

elicit more anxious behaviours from their parents, which may increase symptoms of anxiety in children and/or parents. Finally, certain learning mechanisms (e.g., parental modelling) may have a greater impact on children who are behaviourally inhibited relative to children who are less inhibited, such that children with an inhibited temperament may be more vulnerable to developing anxiety via parental modelling and socialisation processes. However, it is important to note that these theoretical accounts of behavioural inhibition refer to anxiety more generally, rather than worry. Whilst these accounts may be relevant in understanding vulnerability to worry due to worry being a central feature of GAD, it is nonetheless important to note that these accounts do not specifically refer to worry.

Examining the evidence for this account, a number of studies have examined behavioural inhibition and its relationship with anxiety disorders more generally (e.g., Biederman et al., 1993; Muris, van Brakel, Arntz, & Schouten, 2011; Rosenbaum et al., 1993), but fewer studies have specifically examined the link between behavioural inhibition and worry. Correlational studies specifically examining worry (Muris, Merckelbach, Wessel, & Ven, 1999) and rumination (Leen-Feldner, Zvolensky, Feldner, & Lejuez, 2004) in nonclinical samples alongside behavioural inhibition have found significant associations between these factors. However, in a study specifically examining GAD, the authors found that behavioural inhibition made no contribution to the development of GAD symptoms over and above measures of childhood cognitive performance (Martin et al., 2007). However, behavioural inhibition appears to be strongly related to neuroticism (e.g., Jorm et al., 1999), which has been consistently linked with the development of rumination as outlined previously.

As such, it is not possible to draw conclusions about the relationship between behavioural inhibition and worry due to a lack of longitudinal and experimental evidence demonstrating that behavioural inhibition temporally precedes and causally contributes to worry. Further studies of a prospective and experimental nature are required to shed more light on the nature of the relationship between these factors.

1.4. Repetitive Negative Thought: The Transdiagnostic Approach

Where possible, this thesis will aim to consider rumination and worry together, as a transdiagnostic process of RNT (Ehring & Watkins, 2008; Harvey et al., 2004; Nolen-Hoeksema & Watkins, 2011). The term *transdiagnostic* refers to a process that is present across multiple psychiatric diagnoses and that causally contributes to those disorders (Harvey et al., 2004). Recent reviews have marshalled evidence that RNT is found in nearly all Axis I psychiatric disorders and that it prospectively predicts symptoms in longitudinal studies (Aldao et al., 2010; Ehring & Watkins, 2008; Harvey et al., 2004; Nolen-Hoeksema & Watkins, 2011; Watkins, 2008). There are considerable benefits to be gained from a better understanding of RNT's aetiology as a means to develop more parsimonious theoretical accounts and to improve treatment and prevention interventions.

In the following section, the justification for considering rumination and worry together as a common process of RNT will be presented. There will also be discussion of the transdiagnostic approach, and a summary of the vulnerability factors for RNT that emerge from the rumination and worry theoretical accounts discussed in the previous sections.

1.4.1. Justification for Studying Repetitive Negative Thought

There are three primary justifications for studying rumination and worry together, as the process of RNT. First, rumination and worry are highly correlated and it can be difficult to make meaningful distinctions between the qualities and characteristics of the two processes. Second, rumination and worry have similarly negative consequences in terms of mood and psychopathology. Finally, there is considerable overlap between theoretical accounts of rumination and worry. Evidence for these justifications will now be presented in more detail.

1.4.1.1. Commonality between characteristics of rumination and worry.

Ehring and Watkins (2008) identified four common processes that characterise RNT, specifically, that it is (i) repetitive; (ii) passive and/or relatively uncontrollable; (iii) characterised by an abstract style of processing; and (iv) focused on negative content (Ehring & Watkins, 2008). They proposed that whilst forms of RNT, such as rumination and worry, are characterised by these fundamental *processes*, different forms of RNT may differ in *content*, noting that "the definitions [of different forms of RNT] differ considerably regarding the exact content the thinking is supposed to be focused on (e.g., symptoms of depression; future negative events; past traumas, or recent social situations)" (Ehring & Watkins, 2008, p. 193).

A number of studies have attempted to distinguish between rumination and worry by examining the content of each type of thought. When comparing rumination, worry, depression, and anxiety, thoughts about past losses correlated more strongly with levels of rumination and depressive symptoms, whereas thoughts about future threats and questioning thoughts about uncertainties correlated more strongly with levels of worry and anxiety symptoms (Beck, Brown, Eidelson, Steer, & Riskind, 1987).

However, this distinction is not clear-cut or categorical. There is evidence that it is difficult to make meaningful distinctions between the qualities of ruminative thought and worrisome thought. Segerstrom et al. (2000, p. 672) suggested that "the concepts of depressive rumination and anxious worry appear to share some common elements, most notably the idea of repetitive thought focused on negative events. The extent to which the two constructs have unique or specific features remains to be established". Evidence from studies comparing these two constructs reveals strong correlations and little disparity between rumination and worry on the standard measures (e.g., Fresco et al., 2002; Hong, 2007; Muris et al., 2005; Watkins, 2004b; Watkins, Moulds, & Mackintosh, 2005). For instance, Segerstrom et al. (2000) found strong correlations (r = .52 - .55) between measures of worry and rumination in clinical and nonclinical samples.

Specifically, although the content of worrisome thoughts often relates to future events, people can worry about the past: for example, worrying that a recently submitted academic essay may contain errors (Molina, Borkovec, Peasley, & Person, 1998), and people can ruminate about the future, for example, ruminating about their flaws and whether this would influence their chances of finding a suitable romantic partner (Nolen-Hoeksema, 1991). Additionally, when comparing rumination and worry on a range of variables concerning general properties of the thought, few differences are found: Watkins et al. (2005) compared thoughts on a range of 53 dimensions and only found significant differences between worry and rumination on 7 dimensions. Specifically, the main meaningful differences concerned temporal orientation (worry was more about the future), feelings of insecurity (worry was associated with greater feelings of insecurity), and basis in reality (rumination was associated with more real problems and concerns). In a prospective longitudinal study,

Hong (2007) found that scores on measures of worry and rumination were highly correlated. Thus, the commonality between the qualities and characteristics of ruminative and worrisome thoughts provides some justification for studying the two processes together as a common process of RNT.

1.4.1.2. Commonality between consequences of rumination and worry.

Harvey et al. (2004) and Ehring and Watkins (2008) proposed that RNT is a transdiagnostic process because it is present across a wide range of psychological disorders, and causally contributes to those disorders. There is a high degree of comorbidity between the disorders that rumination and worry predict, and there is also overlap between the disorders predicted by rumination and worry (see Sections 1.2.2 and 1.3.2 for detailed reviews of the consequences of rumination and worry).

In summary, depression is prospectively predicted by both rumination (e.g., Just & Alloy, 1997; Nolen-Hoeksema, 2000; Nolen-Hoeksema et al., 1994) and worry (Calmes & Roberts, 2007; Hong, 2007). Experimental studies demonstrate that manipulating rumination (e.g., Ciesla & Roberts, 2007; Morrow & Nolen-Hoeksema, 1990) and worry (McLaughlin et al., 2007) lead to greater depressive symptoms. Anxiety is also prospectively predicted by both rumination (Calmes & Roberts, 2007; Hong, 2007; Schwartz & Koenig, 1996) and worry (Calmes & Roberts, 2007; Hong, 2007). Experimental evidence further indicates that manipulating rumination (Blagden & Craske, 1996) and worry (e.g., Borkovec & Hu, 1990; McLaughlin et al., 2007) both cause greater symptoms of anxiety. In addition, rumination and worry both prospectively predict symptoms of PTSD (e.g., Ehlers et al., 2003; Holeva et al., 2001; Nolen-Hoeksema & Morrow, 1991). Finally, there is a high degree of comorbidity between depression and anxiety disorders (Brady & Kendall, 1992). It has been argued that comorbidity between anxiety and depression is the rule, rather

than the exception (Aina & Susman, 2006), as more than 50% of depressed or anxious individuals experience a comorbid depressive or anxiety disorder (Hirschfeld, 2001). This is consistent with the characterisation of worry and rumination as a common process of RNT that underlies both disorders.

As such, since rumination and worry have similar consequences in terms of mood and psychopathology, with both predicting depression and anxiety, these overlapping outcomes provide further justification for considering rumination and worry together as a single common process of RNT.

1.4.1.3. Commonality between theoretical accounts of rumination and worry.

In reviewing the theoretical accounts of rumination and worry, it becomes apparent that there is considerable overlap between the hypothesised models for worry and rumination. Abstract processing is implicated by control theory and processing mode accounts of rumination (Martin & Tesser, 1996; Watkins, 2008), as well as by the reduced concreteness theory of worry (Stöber & Borkovec, 2002). Metacognitive beliefs are emphasised in theoretical accounts of rumination (Papageorgiou & Wells, 2003; Watkins & Baracaia, 2001) and worry (Wells, 1995). The highly related personality and temperamental constructs of neuroticism and behavioural inhibition are hypothesised to be vulnerability factors for rumination (e.g., Nolen-Hoeksema et al., 1994; Roberts et al., 1998) and anxiety (e.g., Kagan et al., 1994). Functional properties of RNT, specifically its avoidant function, are emphasised in theoretical models of rumination (Ferster, 1973; Martell et al., 2001) and worry (Borkovec, 1994). Certain parenting styles, particularly overcontrolling and intrusive parenting, as well as parental modelling, are implicated in theoretical accounts of rumination (e.g., Nolen-Hoeksema, 1998, Rose, 2002; Spasojević &

Alloy, 2002) and worry (e.g., Chorpita & Barlow, 1998; Rachman, 1977). Finally, negative early life experiences, particularly abuse, maltreatment, and the experience of traumatic events, are implicated in developmental accounts of rumination (e.g., Conway et al., 2004; Nolen-Hoeksema, 1991) and worry/anxiety (Borkovec, 1994).

The similarities across the theoretical models for rumination and worry provides further reasons for considering that it may be parsimonious to consider a common process of RNT incorporating both worry and rumination. It is clear that there is substantial overlap between the underlying processes implicated in many of the theoretical accounts.

1.4.2. The Transdiagnostic Approach

The transdiagnostic approach refers to an "across disorder" perspective, rather than a "disorder-focus" perspective, with transdiagnostic processes referring to processes that are present across multiple disorders and that play a causal role in the onset or maintenance of those disorders (Harvey et al., 2004). Rather than focusing on specific disorders and examining the aetiology and maintenance of those specific disorders, the transdiagnostic approach involves examining parallel processes (e.g. social, emotional and psychological processes; aetiological and maintaining processes) that occur across a range of disorders (Harvey et al., 2004). There is plausible evidence that supports the transdiagnostic approach, with Harvey et al. (2004) highlighting some specific strands of evidence in support of this approach. First, they note that there is a high degree of comorbidity across disorders, and they highlight evidence that a treatment focused on one disorder can alleviate symptoms of other disorders that are not the target of the original intervention. Second, they note that attention, memory, reasoning, thought, and behavioural processes are consistently

implicated in disorder-focused models of psychopathology and that these processes are common to multiple disorders.

Harvey et al. (2004) proposed three distinct advantages to the transdiagnostic approach. First, psychological disorders are often highly comorbid and individuals rarely present with a "pure" case of one single disorder. As such, the transdiagnostic approach is helpful in affording a better understanding of comorbidity. Second, the transdiagnostic approach allows for the constructive transfer of theoretical and treatment advances across disorders. Third, the transdiagnostic approach can contribute to an understanding of how treatments influence a range of across-disorder symptoms, and maximise positive treatment effects. As disorder-focused randomised controlled trials (RCTs) tend to assess the presence and severity of single disorders pre- and post-treatment, it is not usually known how the treatment may influence symptoms of other unmeasured comorbid disorders. As such, by taking a transdiagnostic approach through tailoring treatments to comorbid conditions and measuring a range of across-disorder symptoms pre- and post-treatment, positive treatment effects can be maximised, and it can also result in a better understanding of how particular treatments impact a range of symptoms.

Nolen-Hoeksema and Watkins (2011) further argued that "there is growing agreement that the heterogeneous disorders in our current diagnostic system are each made up of dysfunctional versions of processes that vary along continua in the general population" (p. 590), and as such, by focusing on basic dysfunctional processes that can be present across the whole spectrum, including in healthy individuals, it allows a more parsimonious fundamental understanding of these processes. They further argued that the parsimonious nature of the transdiagnostic approach affords more efficient assessment and training, since it would be more efficient to focus on

transdiagnostic factors than the large number of discrete categories of disorders identified in the DSM. The recent Research Domain Criteria project (RDoC) from the National Institute of Mental Health aims to take a transdiagnostic approach by defining basic dimensions of functioning (e.g. working memory, stress regulation) across multiple methods of analysis (e.g., genes, behaviour, neuroscience, etc.) that cut across traditional categories of disorders. As such, by focusing on fundamental transdiagnostic mechanisms rather than arbitrarily defined symptom presentations, this leads towards a more integrative understanding of psychopathology.

To recap on the transdiagnostic conceptualisation of rumination and worry as a common process of RNT, RNT is proposed to have four defining characteristics: it is (i) repetitive; (ii) passive and/or relatively uncontrollable; (iii) abstract in processing style; and (iv) focused on negative content (Ehring & Watkins, 2008). Ehring and Watkins (2008) distinguish between *content* and *process* aspects of RNT, noting that whilst rumination and worry have some difference in content (e.g., rumination may focus more in depressive symptoms, past events, and failures, whereas worry may focus more on future uncertainty and anxious feelings), they both reflect a tendency towards unhelpful, abstract, and repetitive focus on negative content, despite these differences in content. They proposed that "there are no clear criteria to judge whether the small number of differences found … should be interpreted as evidence for different processes or not. However, it can be argued that in such a situation, preference should be given to the more parsimonious hypothesis, namely that worry and rumination share the same process and only differ in content" (Ehring & Watkins, 2008, p. 195). As outlined previously (see Section 1.4.1.2), rumination and worry predict an overlapping range of disorders (Aldao et al., 2010; Nolen-Hoeksema et al., 2007); Ehring and Watkins (2008) identified 13 distinct

disorders in which elevated RNT is observed, noting that RNT is present in almost all Axis 1 disorders. As such, this provides further support for RNT being considered as a transdiagnostic process.

1.4.3. Vulnerability Factors for Repetitive Negative Thought

Given the deleterious and wide-ranging outcomes of RNT, it is of considerable clinical utility to have a better understanding of its aetiology and maintenance. An awareness of factors that are implicated in vulnerability to RNT can inform treatment and prevention interventions. In reviewing the theoretical accounts of rumination (see Section 1.2) and worry (see Section 1.3), a range of vulnerability factors have been identified, along with discussion of the extant evidence for these factors. In the following section, there will be a brief recap of the vulnerability factors that have emerged from the models, and a summary of any gaps in the research evidence for these factors.

1.4.3.1. Parental modelling and socialisation of repetitive negative thought.

Parental modelling, the process of transmitting the tendency towards RNT by maternal or paternal modelling of an unconstructive ruminative or worrisome style, is implicated as a vulnerability factor for RNT as a result of several different theoretical accounts, including response styles theory (Nolen-Hoeksema, 1998; see Section 1.2.3.1), co-rumination accounts of rumination (Rose, 2002; see Section 1.2.3.6), and developmental accounts of anxiety (Rachman, 1977; Wood et al., 2003; see Section 1.3.3.4). There is a lack of research directly examining the effects of parental modelling on the development of RNT, for example, by observing parental modelling of RNT and measuring child RNT, by examining whether parental modelling of RNT

prospectively predicts child RNT, or through experimentally manipulating parental modelling processes and measuring the effects on subsequent child engagement in RNT.

The extant correlational evidence is scarce and the results are inconsistent: child-reported parental anxious rearing was associated with child worry (Muris et al., 2000), but in a study examining rumination, mother and child brooding rumination were not correlated (Gibb et al., 2012). There is some indirect evidence from studies in which RNT is not directly measured. For example, in studies of co-rumination, maternal co-rumination predicts child depression (e.g., Waller & Rose, 2010), and in studies of anxiety, anxious children were more likely to switch to a threatening interpretation of an ambigious situation after discussion with parents (Barrett et al., 1996, Dadds et al., 1996). As such, further correlational, prospective and experimental studies are required to directly examine the hypothesis that parental modelling of RNT affords vulnerability to RNT in children.

1.4.3.2. Parental overcontrol.

Parental overcontrol, a parenting style characterised as excessively controlling, intrusive, and vigilant, is implicated as a vulnerability factor for RNT in a number of theoretical accounts, including response styles theory (Nolen-Hoeksema, 1998; see Section 1.2.3.1), and developmental accounts of anxiety (Bögels & Brechman-Toussaint, 2006; Rapee, 1997; see Section 1.3.3.4).

There is a lack of direct evidence examining the effect of parental overcontrol on RNT. The extant research evidence is limited by its retrospective and correlational approach (Manfredi et al., 2011; Spasojević & Alloy, 2002). There is some indirect evidence demonstrating an association between parental overcontrol and anxiety (e.g., Gerlsma et al., 1990; Hudson & Rapee, 2001, 2002), and evidence from an

observational study with children demonstrating that overcontrolling parenting was associated with passive responding (Nolen-Hoeksema et al., 1995), but these studies do not directly measure RNT. As such, further correlational, prospective and experimental studies examining the relationship between parental overcontrol and RNT are required. In addition, studies using observational methods in addition to child- or parent-reported overcontrol would be useful in elucidating the nature of the relationship between the factors. Studies with children and adolescents would be helpful in avoiding problems of retrospective reporting of parenting styles (e.g., inaccurate or biased recall).

1.4.3.3. Abuse, maltreatment and traumatic life events.

The early experience of traumatic life events, including abuse and maltreatment, is implicated in the development of RNT in a number of theoretical models, including the avoidance model of depression (Ferster, 1973; see Section 1.2.3.4), developmental accounts of rumination (Conway et al., 2004; Spasojević & Alloy, 2002; see Section 1.2.3.6), and the avoidance theory of worry (Borkovec, 1994; see Section 1.3.3.1).

There is a body of evidence demonstrating an association between various types of abuse or maltreatment and RNT (e.g., Raes & Hermans, 2008; Spasojević & Alloy, 2002), and further studies demonstrating an association between various traumatic life events and RNT (e.g., Ehlers et al., 1998; Roemer et al., 1996/1997, Torgersen, 1986). Whilst it would not be possible to provide experimental evidence due to the nature of these vulnerability factors, prospective studies in children and adolescents examining the effects of the experience of abuse, maltreatment and traumatic life events on RNT would be helpful in establishing the relationship between these factors.

1.4.3.4. Abstract thinking styles.

A number of theoretical models propose that under certain conditions, adopting an abstract mode of thinking and processing of information can lead to unhelpful and persistent RNT. Abstract processing is implicated as vulnerability factor for unconstructive RNT by a number of models, including the control theory of rumination (Martin & Tesser, 1996; see Section 1.2.3.2.2), processing mode theory (Watkins, 2008; see Section 1.2.3.2.3), and the reduced concreteness theory of worry (Stöber & Borkovec, 2002; see Section 1.3.3.1).

Correlational evidence indicates that individuals more prone to link low-level goals to high-level, abstract goals were more prone to rumination (McIntosh et al., 1995). Experimental studies manipulating processing mode have demonstrated that abstract processing has a range of negative outcomes, for example, overgeneral autobiographical memories and prolonged negative emotional responses (e.g., Watkins, 2004; Watkins et al., 2008, Watkins & Teasdale, 2001). However, these experimental studies have not examined the effect of a processing mode manipulation on the frequency and duration of RNT itself. As such, there is a lack of evidence demonstrating the relationship between abstract processing and RNT. To rectify this, further correlational studies are required to see whether abstract processing style and persistent RNT are significantly associated, but critically, prospective studies and experimental studies are required to test whether abstract processing temporally precedes and causes vulnerability RNT. Martin and Tesser (1996) and Watkins (2008) make different predictions for the relationship between abstract processing and RNT. The prediction from Martin and Tesser's account is that abstract processing would lead to more potential triggers for rumination (i.e., as a result of unresolved goals), and this would lead to an increased frequency of rumination (i.e., more trait

rumination). The prediction from Watkins' account is that abstract processing leads to ineffective episodes of rumination with unconstructive consequences, which is likely to cause these episodes to become prolonged (i.e., more extended state rumination).

1.4.3.5. Metacognitive beliefs about repetitive negative thought.

Metacognitive beliefs about RNT refer to beliefs and appraisals about the costs and benefits of RNT (e.g., believing that RNT increases sense of understanding and insight). Theoretical accounts implicating metacognitive beliefs in the development and maintenance of RNT include the metacognitive model of rumination (Papageorgiou & Wells, 2003; see Section 1.2.3.5) and the metacognitive model of worry (Wells, 1995; see Section 1.3.3.3).

There is a substantial body of correlational evidence that demonstrates significant cross-sectional associations between metacognitive beliefs and RNT (e.g., Cartwright-Hatton & Wells, 1997, Papageorgiou & Wells, 2003; Watkins & Baracaia, 2001), and there are also a small number of prospective studies (Iijima & Tanno, 2013; Sica et al., 2007, Weber & Exner, 2013). However, there have been no experimental studies that have experimentally manipulated metacognitive beliefs and examined subsequent engagement in rumination. There has been only one experimental study that has examined the effect of manipulating beliefs on worry (Prados, 2011), and this study had some methodological limitations (see Section 1.3.3.3). As such, prospective studies examining how metacognitive beliefs influence change in RNT over time, and experimental studies manipulating metacognitive beliefs, are critically required to establish the relationship between this vulnerability factor and RNT.

1.4.3.6. Deficiencies in cognitive inhibition and cognitive control.

Deficiencies in cognitive control and inhibition, and impairments in disengaging from negative material, have been implicated as a risk factor for persistent rumination in a number of theoretical models (Hertel, 1997; Joormann, 2004, 2005; Linville, 1996; Koster et al., 2011; see Section 1.2.3.3).

There is some correlational evidence demonstrating an association between deficiencies in cognitive inhibition and rumination (e.g., Hertel & Gestle, 2003; Joormann, 2006), and evidence from several prospective studies demonstrating that deficiencies in cognitive inhibition temporally precede changes in rumination (e.g., Demeyer et al., 2012). However, there have been no experimental studies that have experimentally manipulated cognitive inhibitory mechanisms and measured the effect on subsequent RNT, although there have been experimental studies demonstrating that manipulating rumination leads to inhibitory deficits (e.g., Watkins & Brown, 2002). As such, further prospective and experimental studies are required to elucidate the nature and direction of the relationship between cognitive inhibition deficiencies and RNT.

1.4.3.7. Intolerance of uncertainty.

Intolerance of uncertainty, the tendency to respond to uncertain and ambiguous situations in a negative way on emotional, cognitive and behavioural levels, has been implicated as a vulnerability factor for worry (Freeston et al., 1994; see Section 1.3.3.2).

Regarding the extant research evidence, there have been several correlational studies demonstrating an association between intolerance of uncertainty and worry (e.g., Buhr & Dugas, 2006; Dugas et al., 1997), and a smaller number of studies demonstrating a correlation between intolerance of uncertainty and rumination (e.g.,

de Jong-Meyer et al., 2009). However, there have been no prospective studies that examine how intolerance of uncertainty influences RNT over time. Moreover, there has only been one study that has attempted to experimentally manipulate intolerance of uncertainty and measure the effect on subsequent engagement in worry (Ladouceur et al., 2000). However, it can be argued that this study has some methodological limitations that preclude drawing conclusions about the causal relationship between intolerance of uncertainty and RNT (see Section 1.3.3.2). As such, longitudinal studies and further experimental studies are required in order to reveal more about the relationship between intolerance of uncertainty and RNT.

1.4.3.8. Neuroticism and behavioural inhibition.

The constructs of neuroticism and behavioural inhibition have been implicated as vulnerability factors in personality and temperamental models of rumination (Nolen-Hoeksema et al., 1994) and worry (Kagan et al., 1994, Rapee, 2001).

There is a considerable body of correlational evidence linking neuroticism, and to a lesser extent, behavioural inhibition, with RNT (e.g., Kuyken et al., 2006; Roelofs et al., 2008; Muris et al., 1999), although it is worth noting that neuroticism has generally been studied with respect to rumination, and behavioural inhibition with respect to anxiety and worry. There is also prospective evidence demonstrating that neuroticism prospectively predicts rumination (e.g., Barnhofer & Chittka, 2010), but there is no prospective evidence demonstrating the longitudinal association between behavioural inhibition and RNT. In addition, there is a lack of experimental evidence that demonstrates the causal relationship between neuroticism/behavioural inhibition and RNT. As such, further longitudinal studies and experimental studies are required to establish the relationship between these factors and RNT.

1.4.3.9. Functional properties of repetitive negative thought: Insight and avoidance.

A key question in understanding the mechanisms underlying RNT is: "What makes it so difficult to break free of rumination once it has begun?" (Nolen-Hoeksema et al., 2008, p. 418). As such, whilst not characterised as vulnerability factors in the same way as the other factors reviewed in this section (i.e., factors that temporally precede and causally contribute to RNT), there are two additional factors suggested by theoretical models, classified as consequences of RNT, that may reinforce and maintain the process of RNT once it has begun.

First, engagement in RNT may increase sense of insight and understanding, with this increased sense of insightfulness being a potential consequence of RNT that may reinforce its further use (Lyubomirsky & Nolen-Hoeksema, 1993; Watkins & Baracaia, 2001). Second, engagement in RNT may afford avoidance of feared situations, which may negatively reinforce further engagement in RNT. This avoidant property of RNT has been suggested as a possible maintaining consequence of RNT in several theoretical models including recent updates to response styles theory (Nolen-Hoeksema et al., 2008), and functional behavioural models of rumination and depression (Ferster, 1973; Martell et al., 2001).

There is limited cross-sectional (Watkins & Baracaia, 2001) and experimental evidence (Lyubomirsky & Nolen-Hoeksema, 1993) demonstrating an association between rumination and an increased sense of insightfulness. The evidence from the only experimental study to test that rumination leads to increased insightfulness (Lyubomirsky & Nolen-Hoeksema, 1993) is limited by (i) not examining insightfulness with reference to a real-world problem; (ii) only examining insightfulness post-rumination manipulation, rather than pre- and post-manipulation;

and (iii) comparing rumination with distraction (i.e., thinking versus not thinking), rather than with an appropriate thinking control. Regarding the potential avoidance functions of RNT, there is cross-sectional evidence demonstrating an association between rumination and avoidance (Cribb, et al., 2006; Giorgio et al., 2010; Lyubomirsky et al., 2006; Moulds et al., 2007). However, there is a lack of experimental evidence demonstrating that rumination leads to increased avoidance.

1.4.4. Development of Repetitive Negative Thought

One consideration in examining the aetiology of RNT is to consider it within a developmental context; that is, to examine at what ages RNT becomes manifest. Reviewing the literature on depressive rumination, a number of prospective longitudinal studies suggest that children develop the capacity for depressive rumination during late childhood and early adolescence, at approximately 10 – 12 years old (Abela, Aydin, & Auerbach, 2007; Abela et al., 2002; Broderick & Korteland, 2004; Driscoll, Lopez, & Kistner, 2009; Hilt, McLaughlin, & Nolen-Hoeksema, 2010; Jose & Brown, 2008; Roelofs et al., 2009). During this period of early adolescence, the gender difference in rumination seems to emerge, with girls reporting greater levels of rumination than boys (Abela, Parkinson, Stolow, & Starrs, 2009; Hankin, 2008; Roelofs et al., 2009; Schwartz & Koenig, 1996; Verstraeten et al., 2009), although research findings are inconsistent and not all prospective longitudinal studies have found a gender difference at this stage (Abela et al., 2007; Abela et al., 2002; Broderick & Korteland, 2004). Critically, this period of late childhood and early adolescence is also when rumination begins to predict subsequent depressive symptoms (Abela et al., 2002; Abela et al., 2007; Broderick & Korteland, 2004; Hankin, 2008; Hilt et al., 2010; Roelofs et al., 2009; Verstraeten et al., 2009), as well as other psychological disorders including substance abuse and eating disorders

(Nolen-Hoeksema et al., 2007). Thus, there is considerable value in understanding the aetiology of pathological RNT, such that children at risk of becoming pathological ruminators and worriers can be identified, and also so that RNT can be targeted as a primary prevention strategy to avoid the development of potential future psychopathology.

Reviewing the developmental literature on worry suggests that worry emerges earlier in development than rumination, and it is thought that this is because relatively young children are able to engage in less abstract forms of worry without being constrained by their cognitive developmental stage (Vasey & Daleiden, 1994). Vasey and Daleidin (1994, p. 193) proposed that worry in children becomes more abstract and widely focused from approximately 8 years old, and that the "increased ability to conceptualise elaborate sequences of negative consequences is likely to increase the potential severity and generality of worry".

Consistent with this, worry about physical threats declines as the child grows older: Vasey, Crnic, and Carter (1994) found that 8- to 9-year-olds and 11- to 12-year-olds worried significantly less than 5- to 6-year-olds about physical threats to well-being, such as injury, sickness and kidnapping. Furthermore, worry about more abstract and psychological threats increases as the child develops: Vasey et al. (1994) found that 11- to 12-year-olds worried significantly more about threats relating to social evaluation and psychological well-being (e.g., being disliked, feeling incompetent) than 5- to 6-year-olds and 8- to 9-year-olds. In addition, Muris, Merckelbach, Gadet, and Moulaert (2000) found that 10- to 12-year-olds worried significantly more about social threats and test performance than younger children 4- to 6-year-olds and 7- to 9-year-olds.

Further evidence for the early aetiology of worry comes from clinical studies of individuals with GAD. People with GAD frequently report that they have been anxious for as long as they can recall (Rapee, 1985), and Rapee (2001, p. 482) proposed that "this would seem to suggest, that GAD, or at least many of its features, are an extension of basic features of the individual's personality". Whilst there have been a number of prospective longitudinal and experimental studies conducted with adult participants examining the casual relationship between worry and clinical symptoms of anxiety (Calmes & Roberts, 2007; Hong, 2007; McLaughlin et al., 2007; Segerstrom et al., 2000), there have been no prospective longitudinal studies conducted with children and adolescents examining the developmental trajectory of worry and its relationship with anxiety symptoms. However, a number of correlational studies that have been conducted with younger participants indicate that there is a positive association between worry and anxiety symptoms in children and adolescents (e.g., Chorpita, Tracey, Brown, Collica, & Barlow, 1997; Layne, Bernat, Victor, & Bernstein, 2009; Muris, Meesters, & Gobel, 2001; Rood, Roelofs, Bögels, & Alloy, 2010; Weems et al., 2000). Therefore, understanding the aetiology of RNT is important as it would enable the identification of individuals at risk for psychopathology, and it would inform the development of effective early prevention interventions for anxiety and depression.

1.5. General Considerations in the Literature on Vulnerability to Repetitive Negative Thought

In this section, there will be a review of some general theoretical and methodological issues that are relevant to the study of vulnerability to RNT. First, it is important to consider the differences between state and trait RNT. Much of the theoretical and empirical literature has focused on trait RNT. Factors that cause a bout

or episode of rumination or worry (i.e., state RNT) may differ from factors that cause a pervasive tendency towards rumination or worry (i.e., trait RNT). For example, high levels of perceived stress may trigger a bout of worry, but on-going perceived stress alone may not be sufficient to make an individual develop a tendency to worry. As a further example, the experience of parental overcontrol in childhood may not predict bouts of rumination in adulthood, but it may be a factor in the development of a tendency towards trait rumination.

Second, it is also important to consider differences between factors that cause the onset of trait RNT in childhood and adolescence, and factors that maintain RNT in adulthood. Whilst Nolen-Hoeksema et al. (1993) defined rumination as a consistent, enduring and habitual cognitive style, it is currently unknown whether the factors that are associated with the development of a ruminative response style in childhood are the same factors that maintain rumination in adulthood. For example, the experience of childhood abuse or maltreatment may contribute to the onset of rumination in childhood and adolescence, but these particular experiences may not be what maintain the trait towards rumination in later adulthood.

Third, in considering what factors are associated with vulnerability to RNT, it is important to consider how the factors may be related to each other, as well as the underlying mechanisms by which they confer vulnerability to RNT. Factors may interact with each other and act as mediators or moderators of the relationship with RNT. A mediator variable refers to "a variable that occurs in the causal pathway from an independent to a dependent variable. It causes variation in the dependent variable, and in itself is caused to vary by the independent variable" (Last, 1995, p. 87). Considering its temporal location, a mediator variable "occurs after that which it mediates and before the outcome" (Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001,

p. 849), although Kraemer et al. (2001) note that mediation is often assessed in cross-sectional studies where temporal precedence cannot be determined. A moderator variable is an effect modifier, such that a moderator variable is one that "affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable" (Baron & Kenny, 1986, p. 1174).

To illustrate this distinction with the vulnerability factors reviewed previously, maltreatment in childhood (an independent variable) may cause vulnerability to RNT (the dependent variable). It is possible that childhood maltreatment could also lead to deficiencies in cognitive inhibition (a mediator variable), as inhibitory mechanisms are hypothesised to be weakened by stress and depression (Linville, 1996). In turn, deficiencies in cognitive inhibition may cause individuals to become stuck in cycles of unconstructive RNT. An alternative possibility is that the relationship between childhood maltreatment and RNT may be moderated by poor effortful control (a moderator variable), such that childhood maltreatment may only lead to RNT in individuals with poor effortful control.

Furthermore, when considering the possible vulnerability factors for developing a tendency towards RNT, it is important to consider how each factor contributes to the risk, and whether they contribute in a way that is additive or multiplicative. For example, when considering early experiences (e.g., parental modelling and overcontrol, abuse and maltreatment), it could be that the risk for pathological repetitive increases in a linear way for each additional vulnerability factor, or it could be that for each additional vulnerability factor, the risk increases exponentially.

Although some specific methodological concerns have already been addressed alongside discussion of the research evidence, a number of methodological issues are

common to the studies examining the development and maintenance of RNT. First, most studies have tended to examine rumination and worry separately, despite their considerable commonality, common effects, and overlap (see Section 1.4.1). Second, the majority of studies have tended to examine vulnerability factors in isolation, rather than considering them together. As such, it is not known how these factors interact, whether factors moderate or mediate each other, and which factors remain associated with RNT whilst other factors are statistically controlled.

Third, much of the evidence associating these factors is correlational, although there is some evidence from prospective longitudinal studies for some factors. There has been very little experimental research in which vulnerability factors are manipulated and the effect on subsequent RNT is examined. This is problematic as experimental studies are the only way to infer the causal relationships between putative vulnerability factors and RNT. For some factors, experimental manipulation would be impossible (e.g., abuse, maltreatment, traumatic events), but for other factors, it would be possible to devise experimental paradigms that manipulate the vulnerability factor and measure the effects on RNT. Finally, studies have tended to rely heavily on self-report questionnaire measures, both of RNT and also of vulnerability factors. Whilst it is difficult to envisage appropriate alternative methods for measuring certain factors other than self-report (e.g., beliefs about the function of RT), for some factors, it would be helpful to consider alternative ways of measurement where possible.

1.6. An Integrative Theoretical Model of Vulnerability to Repetitive Negative Thought

As outlined previously, it is important to consider how the vulnerability factors reviewed may relate to one another, and develop hypotheses about the nature

of the relationships between the vulnerability factors. In considering the relationship between the various vulnerability factors and RNT, it is helpful to consider the conceptual framework proposed by Nolen-Hoeksema and Watkins (2011). They recently distinguished between distal and proximal vulnerability factors for transdiagnostic processes, using the specific example of RNT, arguing that vulnerability factors vary in their causal distance to rumination and worry. Distal factors refer to "environmental and congenital biological variables relatively distal to observable symptoms of disorders", whereas proximal factors refer to "within-person variables that are more proximal to symptoms of disorders" (p. 593). Nolen-Hoeksema and Watkins (2011) proposed that distal factors generally tend to be distant in time from symptoms of psychopathology, although this is not always the case, and they tend to be difficult to control or modify. In contrast, proximal factors follow distal risk factors in time, but precede symptoms of psychopathology, and tend to be easier to control or modify. Nolen-Hoeksema and Watkins (2011) argued that distal factors do not directly cause symptoms such as RNT, but that they influence symptoms via mediating proximal factors, which have a direct effect on RNT.

Distal vulnerability factors can further be characterised as "experiences or characteristics that are usually independent of any actions of the individual – basically, they 'happen' to the individual – and they set the stage for proximal risk factors (or mediators) that more directly lead to psychopathology" (Nolen-Hoeksema & Watkins, 2011, p. 593). Nolen-Hoeksema and Watkins proposed two categories of distal vulnerability factors: (i) environmental context factors (e.g., parental psychopathology, childhood maltreatment), and (ii) congenital biological abnormalities (e.g., genetic abnormalities). There are three categories of proximal vulnerability factors: (i) biological factors that lead directly to maladaptive emotional, cognitive, or

behavioural tendencies (e.g., hyperactivity in the amygdala associated with increased emotional reactivity); (ii) cognitive deficits and biases in information processing (e.g., attentional biases), and (iii) individual difference factors reflecting tendency towards certain response styles (e.g., attributional style, personality factors). It is important to note that distal and proximal factors do not refer to hard and fast categories into which each vulnerability factor can be easily categorised; instead, there may be a continuum between proximal and distal factors, with some factors sharing both proximal and distal qualities.

Building upon this conceptualisation, it is possible to develop an integrative model of vulnerability to RNT in which the relationship between distal vulnerability factors (e.g., parental modelling, parental overcontrol, abuse) and RNT is mediated by proximal factors (e.g., abstract processing style, metacognitive beliefs about the function of RT). Within this conceptualisation, neuroticism can be characterised as an intermediate factor with both proximal and distal qualities. Like other proximal variables, it is a within-person characteristic that influences how someone may respond in the here-and-now due to its influence on cognitive processing (e.g., stimulus reactivity, attentional biases; cf. Augustine et al., 2013), and it is thus likely to have a direct effect on RNT, but like other distal variables, it has genetic and environmental origins (e.g., Loehlin, 1992). As such, neuroticism may have a direct effect on RNT, as well as an indirect effect via mediating proximal factors.

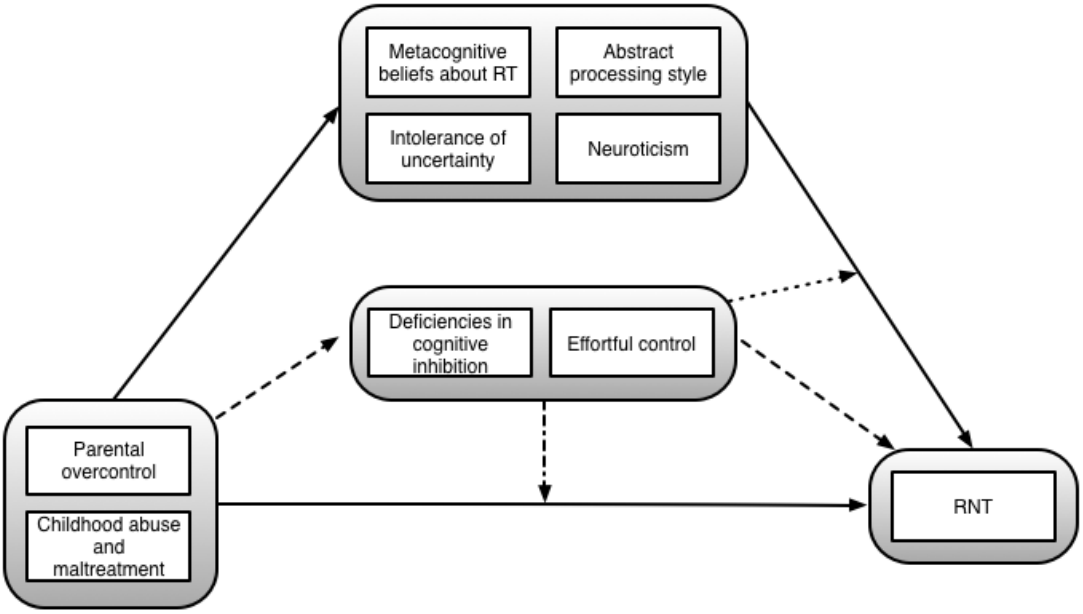

Figure 1.1. Hypothesised integrative theoretical model illustrating the potential relationships between proximal and distal factors and RNT.

In addition to the broad conceptualisation of factors as either proximal or distal, it is also beneficial to give theoretical consideration to the specific relationships that may exist between the putative vulnerability factors, in particular, the way in which distal factors may potentially cause the development of proximal factors, developing the hypothesised meditational relationship outlined above. Figure 1.1 displays an illustration of the potential relationships that may exist between putative vulnerability factors and RNT (note that dashed, dotted, and dashed-dotted lines illustrate the potential moderation/mediation alternatives for the role of effortful control and cognitive inhibition). This relationships depicted in this model will now be outlined in more detail.

In terms of how the tendency towards abstract processing may develop with respect to distal vulnerability factors, abstract thinking may be a form of rule-governed behaviour which develops as a result of operant conditioning processes:

Individuals may believe that there is value to being abstract, and thus develop an abstract processing style. Alternatively, abstract thinking may develop as a direct result of operant conditioning via procedural learning, and it does not necessarily need to be a consciously learned rule. In addition to this, abstraction may develop as a result of poor stimulus discrimination learning, in that individuals may not be able to switch strategies according to whether abstract or concrete processing is more appropriate. For example, early experiences of parental overcontrol or inconsistency may impair stimulus discrimination learning such that children may begin to respond in an unconstructively abstract manner to negative events, when more concrete processing would be more adaptive. As such, the early experience of limited control may result in a tendency towards more generalised abstract processing, despite its potentially unconstructive consequences. Thus, abstract thinking may develop as a consequence of environments characterised by non-contingency, such as the experience of parental overcontrol, abuse, neglect, or ongoing stress. Abstraction may act as a mediator between these factors and rumination, developing via learning and operant conditioning processes.

Considering the relationship between deficiencies in cognitive inhibition and the other vulnerability factors, it has been previously hypothesised that inhibitory deficits can arise as a result of ongoing stress and depression (Linville, 1996). As such, highly stressful early life experiences, such as abuse, traumatic events, or being parented in a psychologically overcontrolling manner, could potentially contribute towards increased susceptibility to deficiencies in cognitive inhibitory mechanisms. Alternatively, cognitive inhibition may act as a moderator of the relationship between negative early life experiences and repetitive thought: an individual who has had certain life experiences conferring vulnerability to RNT may be more prone to RNT if

they have deficient inhibitory mechanisms, and less prone to RNT if their inhibitory mechanisms are functioning normally (cf. the finding from Hilt et al., 2012, demonstrating that effortful control interacted with overcontrolling parenting to predict rumination). On the other hand, if an individual does not have any pre-existing tendency towards repetitive thought, their tendency to ruminate and worry in response to difficulties may not be influenced or exacerbated by their inhibitory abilities, and it may cease to be a relevant factor. An alternative hypothesis is that there may be a main effect of cognitive inhibition, in that poor cognitive inhibition may be associated with a greater tendency towards repetitive thought, regardless of any early life experiences. Moreover, combining the two explanations, there may be both a main effect and a moderating effect of cognitive inhibition on repetitive thought.

Metacognitive beliefs about RNT may also develop as a result of certain early experiences. Wells (1995) hypothesised that a range of developmental experiences may result in the development of metacognitive beliefs, proposing that parental modelling of RNT may result in children developing beliefs about the utility of RNT, and/or the experience of uncontrollable and negative environments may lead to beliefs about RNT buffering against the impact of unexpected negative events. Applying the operant conditioning model (Ferster, 1973) to the development of metacognitive beliefs, positive beliefs about the functions of RT can be conceptualised as a form of rule-governed behaviour that may lead to an increase in repetitive thought. Individuals may also form rule-governed behaviours about the value of being abstract (e.g., that being abstract helps them to understand things better), and this may have been reinforced in the past. The avoidance theory of worry (Borkovec, 1994) is concordant with this view, proposing that worry is reinforced because it appears to have positive consequences (i.e., it allows for cognitive avoidance of threatening

information). Based on these theories, it can be hypothesised that individuals who develop rule-governed contingencies concerning the positive functions of RNT would be more likely to engage in RNT, and develop a tendency to ruminate and worry in response to negative situations. Such beliefs may mediate the relationship between particular life experiences and rumination: Positive beliefs about repetitive thought may lead to greater levels of RNT, and certain early learning experiences and operant conditioning processes may lead to the development of these metacognitive beliefs through the mechanisms outlined above.

Similarly, such stressful and negative early experiences may also lead to a person developing an intolerance of uncertainty. Repeated experience of uncontrollable and unpleasant events in early life, such as ongoing abuse or maltreatment, may contribute towards an individual developing the tendency to find uncertain situations stressful and upsetting. Individuals may learn to feel threatened by uncertain situations as a result of ongoing negative experiences characterised by little certainty and control. In contrast, someone who has not had negative experiences in which their sense of personal control is violated may not find the idea of uncertainty so stressful. As such, intolerance of uncertainty may mediate the relationship between early experiences and RNT.

Finally, considering neuroticism as a variable with proximal and distal qualities, it is important to consider how it may be related to the other vulnerability factors reviewed. Like other proximal factors, the development of neuroticism may arise from particular early life experiences. As genetic heritability only accounts for half of the variance in the trait of neuroticism (Goldberg, 2000), social and environmental factors, such as aversive early life experiences, may be implicated in its development. Specifically, it has been hypothesised that abuse and maltreatment

experiences may contribute to the development of neuroticism (e.g., Goldberg, 2000; Lahey, 2009; Roy, 2002). Like the other proximal variables, neuroticism may act as a mediator of the relationship between abuse and RNT, such that individuals who have experienced maltreatment in childhood may develop the trait of neuroticism, and as a result of this tendency to experience negative mood states, may be more prone to developing a tendency towards pathological RNT. In addition, neuroticism has also been associated with reduced effortful control. Several studies have demonstrated an association between neuroticism or negative emotionality and low levels of effortful control (Moriya & Tanno, 2008; Muris, de Jong, & Engelen, 2004), and it has been hypothesised that effortful control moderates the relationship between neuroticism and anxiety (Lonigan & Phillips, 2001).

1.7. Research Objectives

Taking into account the theoretical and methodological considerations outlined above, three primary research objectives have been generated. The first objective is to explore the relationships between the hypothesised vulnerability factors and RNT, by developing and testing a theoretical model of RNT in a large nonclinical sample of adults. Whilst a cross-sectional study is not sufficient to establish causality, this study will address some of the shortcomings outlined previously by examining rumination and worry together, alongside a variety of vulnerability factors, such that the relationship between vulnerability factors can be examined in light of the integrative model outlined in Section 1.6. This study will help to illustrate which factors may be particularly important in maintaining RNT in adulthood.

The second objective is to build upon this cross-sectional research by exploring the longitudinal relationships between the hypothesised vulnerability factors and RNT, by examining which vulnerability factors predict change and

maintenance in RNT over time. Again, this study will not establish causality as it does not involve the experimental manipulation of variables, but it will provide a necessary step in establishing the causal relationships by exploring which factors are temporal antecedents of changes in RNT. Referring back to the theoretical conceptualisation of proximal and distal vulnerability factors proposed by Nolen-Hoeksema and Watkins (2011), this study will test the hypothesis that current, within-person proximal factors may be more important in maintaining RNT than historic distal factors.

The third objective is to examine the causal relationship between vulnerability factors and RNT by conducting experimental studies in which variables implicated in the maintenance of RNT are manipulated, and the effect on subsequent RNT is examined. This will fill a critical gap in the literature by (i) providing experimental evidence that can establish causal relationships between RNT and factors implicated in its maintenance; and (ii) by examining the effects on state rumination, rather than trait rumination, as state rumination is an important and understudied process.

There are two important points to be noted with respect to the approach taken for the research in this thesis. First, the research studies in this thesis will make use of analogue rather than clinical samples, and there are several justifications for this approach. First, worry and rumination are on a continuum that spans both normal and pathological forms of RNT, and as such, the difference between normal and pathological RNT is dimensional, rather than categorical (Nolen-Hoeksema & Watkins, 2011). Second, as yet, there is no theoretical argument for different processes causing vulnerability to RNT in analogue versus clinical populations. If there is no reason to think that qualitatively different processes drive RNT in healthy samples, it makes sense to initially use analogue samples to test the hypotheses, due to the practical advantages of this approach (e.g., relative ease of participant

recruitment leading to good statistical power when testing complex integrative models). Finally, as transdiagnostic processes such as RNT reflect universal human mechanisms that cut across disorder and normal behaviour (Ehring & Watkins, 2008), it seems logical to initially use an unselected sample to test the hypotheses.

Second, the thesis will focus on exploring what factors are involved in the maintenance, rather than aetiology, of RNT. Examining aetiology would necessarily involve extended longitudinal prospective studies with children and adolescents, which given the time constraints of the PhD project are less manageable. As such, the focus of the thesis will involve examining factors with respect to their involvement in the maintenance of RNT in adulthood.

CHAPTER 2: Study 1 - An Integrated Examination of Risk Factors for Repetitive Negative Thought

2.1. Preface

This chapter describes a cross-sectional study designed to examine the relationships between rumination and worry, conceptualised as a transdiagnostic process of RNT, and a wide range of vulnerability factors. Based on a review of the literature examining vulnerability factors for RNT, an integrative model of the relationships between these factors and RNT was developed and tested using structural equation modelling (see Chapter 1, Section 1.6 for detailed discussion of the model). This study is reported in the following article:

Kingston, R. E. F., Watkins, E. R., & O'Mahen, H. A. (2013). An integrated examination of risk factors for repetitive negative thought. *Journal of Experimental Psychopathology*, 4, 161-181.

Considering the research objectives of the PhD, this study aimed to contribute to the literature by examining rumination and worry together, alongside a range of vulnerability factors. The study also attempted to replicate the finding reported by Spasojević and Alloy (2002) in which retrospective reports of overcontrolling parenting were associated with rumination after controlling for current symptoms of depression (see Appendix A, Section 2.7 for a more detailed discussion).

It is important to note that one additional measure was used in this study but not reported in the published article. In Appendix C (Section 2.9), there will be a more detailed discussion and analysis of the excluded measure, the Effortful Control Scale (Lonigan & Phillips, 2001).

Kingston, R. E. F., Watkins, E. R., & O'Mahen, H. A. (2013). An integrated examination of risk factors for repetitive negative thought. *Journal of Experimental Psychopathology*, 4, 161-181.

2.2. Abstract

The two most common forms of repetitive negative thought (RNT) are rumination and worry, which are both repeatedly implicated in the onset and maintenance of depression and anxiety disorders. It is therefore of theoretical and clinical value to understand why people engage in worry and rumination, despite their negative consequences. A variety of vulnerability factors have been implicated, including distal factors relating to personality, abuse, and overcontrolling parenting; and proximal cognitive factors, including abstract processing and perceptions of the function of repetitive thought (RT). The current study provided a cross-sectional examination of these vulnerability factors alongside rumination and worry in a large sample of adults, with reference to a new integrative model of RNT. Structural equation modelling analyses indicated that a model in which neuroticism and emotional abuse were related to RNT via their association with perceptions about the function of RT provided a good fit to the data.

2.3. Introduction

Repetitive thought (RT), defined as "thinking attentively, repetitively or frequently about one's self and one's world" (Segerstrom, Stanton, Alden, & Shortridge, 2003, p. 909), can have both constructive and unconstructive consequences (Watkins, 2008). The two main forms of unconstructive RT are depressive rumination and worry. Depressive rumination refers to the process of repetitively focusing on one's own feelings of depression and distress, and the causes,

meanings and consequences of these feelings (Nolen-Hoeksema, 1991). Worry refers to a series of relatively uncontrollable negative thoughts and images, focused on future uncertainties, potential risks, and negative outcomes (Borkovec, Robinson, Pruzinsky, & DePree, 1983). Both prospective longitudinal studies and experimental studies have implicated depressive rumination in the onset and maintenance of anxiety and depression (e.g., Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Watkins, 2008). Similarly, excessive worry is a key feature of generalised anxiety disorder (American Psychiatric Association, 2000) and is implicated in the development and maintenance of anxiety disorders (Borkovec, 1994).

Both worry and rumination have been proposed to reflect a common process of repetitive negative thought (RNT; Ehring & Watkins, 2008; Segerstrom, Tsao, Alden, & Craske, 2000; Watkins, 2008) since they both involve (i) repetitive thought focused on negative content; (ii) abstract processing of information, focused on decontextualised representations of the meanings and implications of events (Ehring & Watkins, 2008); and (iii) are experienced as passive and relatively uncontrollable. Moreover, there is considerable evidence indicating commonality between worry and rumination, consistent with an underlying common process. Standardised worry and rumination questionnaires are typically highly correlated (Penn State Worry Questionnaire, PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990; Response Styles Questionnaire, RSQ; Nolen-Hoeksema & Morrow, 1991). Structural equation modelling finds that these measures load on a common factor with both forms of RNT related to anxiety and depression (Fresco, Frankel, Mennin, Turk, & Heimberg, 2002; McEvoy, Mahoney & Moulds, 2010; Segerstrom et al., 2000). When individuals rated personal examples of worry and rumination on multiple cognitive dimensions, few differences were found (Watkins, Moulds, & Mackintosh, 2005) other than temporal

orientation, with worry and rumination predominantly focused on the future versus the past, respectively. Experimental manipulations find that both worry and rumination increase self-reported anxiety and depression, relative to control conditions (e.g., Blagden & Craske, 1996; McLaughlin, Borkovec, & Sibrava, 2007). Thus, convergent evidence indicates considerable similarities between the processes and consequences of worry and rumination.

RNT is characterised as a transdiagnostic process, that is, a process present across multiple psychiatric diagnoses that causally contributes to those disorders (Harvey, Watkins, Mansell, & Shafran, 2004). Recent reviews have marshalled evidence that RNT is found in nearly all Axis I psychiatric disorders and that it prospectively predicts symptoms in longitudinal studies (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Ehring & Watkins, 2008; Harvey et al., 2004; Nolen-Hoeksema & Watkins, 2011; Watkins, 2008). There are considerable benefits to be gained from a better understanding of RNT's aetiology as a means to develop more parsimonious theoretical accounts and to improve treatment and prevention interventions. Specifically, understanding which factors contribute to individual differences in RNT would allow clinicians to determine who may be at risk and assess these vulnerability factors at an earlier stage, and to target specific mechanisms underpinning the development of RNT. Given that RNT is associated with multiple psychological disorders, an integrated model enabling clinicians to better identify when and for whom intervention may be necessary, and highlighting tractable mechanisms for change, can potentially enhance treatments, enable earlier help for vulnerable individuals, and prevent future disorder.

However, knowledge of the factors underpinning individual differences in RNT is less developed than knowledge of its negative consequences. Theories to

explain RNT include response styles theory (Nolen-Hoeksema, 1987, 1991, 2004), control theory (Martin & Tesser, 1996; Watkins, 2008), avoidance and reduced concreteness theories (Borkovec, 1994; Stöber, 1998), and metacognitive models (Wells, 1995; Papageorgiou & Wells, 2003). Across these theories, a number of common factors emerge as potential contributors to individual differences in RNT.

First, parental overcontrol, where children's activities are excessively regulated by parents that are highly vigilant and intrusive (Bögels & Brechman-Toussaint, 2006), is hypothesised to be a risk factor for RNT (Nolen-Hoeksema, 1991; Rapee, 1997). Nolen-Hoeksema (1991) suggested that if parents are overcontrolling and intrusive, the child may have limited opportunities to develop active coping strategies, thereby engendering a passive response style, leading to rumination. Rapee (1997) suggested that such overcontrol may lead children to believe that their environment is threatening and dangerous, whilst preventing them from challenging this belief, thereby engendering worry. Consistent with this hypothesis, adult retrospective self-report of overcontrolling parenting is associated with trait rumination (Spasojević & Alloy, 2002) and trait worry (Zlomke & Young, 2009). Moreover, in a prospective longitudinal study, observed maternal overcontrol at age 4 predicted depressive rumination at age 16 (A. Mills, unpublished data, 2003).

Second, early experiences of abuse and maltreatment are hypothesised to be associated with RNT via two pathways: (i) engendering an experience of limited control over the environment leading to withdrawal, reduced problem-solving, and increased internal focus (Conway, Mendelson, Giannopolous, Csank, & Holm, 2004); (ii) through RNT acting as a coping strategy by preparing for the worst, anticipating, and mitigating the impact of negative events (Borkovec, 1994). Consistent with this hypothesis, there is a robust association between childhood maltreatment and

depressive rumination (Barnhofer, Kuehn, de Jong-Meyer, & Williams, 2007; Conway et al., 2004; Raes & Hermans, 2008; Spasojević & Alloy, 2002) and generalised anxiety disorder, characterised by chronic worry (Brown & Harris, 1993; Brown, Harris, & Eales, 1993; Roemer, Molina, Litz, & Borkovec, 1997).

Third, personality factors such as neuroticism are associated with RNT. Nolen-Hoeksema, Parker, and Larson (1994) hypothesised that neuroticism may manifest itself cognitively as an increased tendency to engage in RNT in response to depressed moods. Neuroticism and RNT are associated in correlational and prospective studies, with the relationship between neuroticism and psychopathology often mediated by rumination (e.g., Barnhofer & Chittka, 2010; Kuyken, Watkins, Holden, & Cook, 2006; Muris, Fokke, & Kwik, 2009; Roberts, Gilboa, & Gotlib, 1998; Roelofs, Huibers, Peeters, Arntz, & Van Os, 2008) and worry (Muris, Roelofs, Rassin, Franken, & Mayer, 2005; Roelofs, Huibers, Peeters, & Arntz, 2008).

Fourth, intrapersonal cognitive factors are proposed to influence individual differences in RNT. Watkins (2008) reviewed evidence that an abstract processing style, characterised by general decontextualised representations focused on meanings, causes, and implications (e.g., "why" an event happened) leads to persistent and unconstructive RNT, relative to a more concrete style, characterised by detailed and specific contextualised representations focused on the means and sequence by which an event or action occurs. Similarly, the reduced concreteness theory (Borkovec, Ray, & Stöber, 1998; Stöber, 1998; Stöber & Borkovec, 2002) proposes that worry is predominantly experienced in a more abstract-verbal form rather than in a concrete-visual imagery form. As abstract thoughts are hypothesised to evoke mental images with less ease, speed, and vividness than concrete thoughts (Stöber & Borkovec, 2002), this reduction in vivid, aversive imagery is hypothesised to reduce the somatic

symptoms of anxiety, further reinforcing the abstract worrisome thoughts. Consistent with these hypotheses, experimental studies manipulating processing style have found that an abstract style results in increased RNT (Watkins, 2004; Moberly & Watkins, 2006), impaired problem-solving (Watkins & Baracaia, 2002; Watkins & Moulds, 2005b) and increased emotional reactivity to a subsequent failure (Watkins, Moberly, & Moulds, 2008), relative to a concrete style.

Fifth, the perception that RT is functional is associated with individual differences in RNT. The avoidance theory suggests that worry is maintained because it is perceived to have reinforcing functions (Borkovec, 1994), such as avoiding future problems (see similar accounts of rumination: Martell, Dimidjian, & Herman-Dunn, 2010; Watkins & Moulds, 2007). Metacognitive models propose that positive beliefs about its utility lead individuals to engage in RNT (Papageorgiou & Wells, 2003; Wells, 1995). Consistent with these hypotheses, there is a significant positive correlation between endorsement of instrumental functions of RT and rumination (Papageorgiou & Wells, 2003; Watkins & Baracaia, 2001, Watkins & Moulds, 2005a) and worry (Cartwright-Hatton & Wells, 1997; Wells & Cartwright-Hatton, 2004; Wells & Papageorgiou, 1998). There is also experimental evidence that endorsing instrumental functions for RT may be causally associated with increased RNT (Moulds, Yap, Kerr, Williams, & Kandris, 2010).

Thus, there is evidence suggesting that multiple variables may contribute to vulnerability for both worry and rumination, supporting a common process of RNT. However, to date, research into the aetiology of RNT is limited because it has tended to (a) retrospectively examine each potential explanatory factor in isolation, rather than studying multiple factors simultaneously; (b) use relatively small samples; (c) examine worry and rumination separately. Therefore, it is not known how these

factors interact, whether they moderate or mediate each other, or which factor(s) would remain significantly associated with RNT once others are statistically controlled. Critically, there is no integrative theoretical model that attempts to explain how these distinct factors interact. These risk factors are unlikely to be independent of each other, and thus it is necessary to consider them together to determine potential relationships between them. If risk factors are studied independently, it is not possible to tell if the effect of any given variable on RNT is directly due to the variable studied, or indirectly via its relationship to other (potentially unobserved) risk factors. This study aims to rectify these limitations by examining all of these factors concurrently with measures of worry and rumination in a large sample, with reference to a new integrative model of RNT.

Nolen-Hoeksema and Watkins (2011) recently distinguished between distal and proximal vulnerability factors for RNT, arguing that vulnerability factors vary in their causal distance to rumination and worry. Distal factors refer to "environmental and congenital biological variables relatively distal to observable symptoms of disorders", whereas proximal factors refer to "within-person variables that are more proximal to symptoms of disorders" (p. 593). Nolen-Hoeksema and Watkins (2011) proposed that distal factors do not directly cause symptoms such as RNT, but that they influence symptoms via mediating proximal factors, which have a direct effect on RNT. Building on this analysis, we propose an integrative model in which the relationship between distal vulnerability factors (parenting style, abuse) and RNT is partially mediated by proximal cognitive factors (abstract processing style, perceived RT function), which will directly be associated with RNT. We propose that neuroticism is an intermediate factor with both proximal and distal qualities: Like other proximal variables, it is a within-person characteristic that we hypothesise will

have a direct effect on RNT, but like other distal variables, it has genetic and environmental origins (e.g., Loehlin, 1992). We hypothesise that neuroticism will indirectly influence RNT via proximal cognitive factors.

This integrative model for individual differences in RNT, including the hypotheses outlined above, results in the following specific predictions (see Figure 2.1): (1) Measures of rumination and worry will form a valid latent variable consistent with our hypothesis of an underlying RNT construct; (2) Distal vulnerability factors of (a) perceptions of overcontrolling parenting and (b) childhood abuse/maltreatment will be associated with increased RNT; (3) These relationships will be at least partially mediated by proximal cognitive vulnerability factors of (a) abstract processing and (b) perceived function of RT, which will be associated with increased RNT; (4) Neuroticism will have both an indirect effect (via the proximal cognitive mediator of perceived RT function) and a direct effect on RNT; (5) Given the extensive evidence that RNT is associated with increased anxiety and depression (Watkins, 2008), current distress will be associated with increased RNT, since individuals experiencing distress may be more likely to use passive coping strategies like RNT. Nonetheless, we hypothesise that other factors will still show a relationship with RNT over and above the effects of current distress.

The current study provides a preliminary test of the model outlined in Figure 2.1. Although the theoretical model predicts causal directions, it will not be possible to establish the direction of causality between the variables in the current study, which tests cross-sectional associations as a necessary first step in discovering the nature of the relationships between these factors. Structural equation modelling (SEM) is an effective way of examining the relationships between multiple variables in a single analysis. As SEM requires large sample sizes, the current study investigated these

factors in a large adult sample. The study will test whether this model provides the best fit to the data, or whether theoretically plausible variants of the model are superior.

2.4. Method

2.4.1. Participants

One hundred and fifty-four university departments across the UK were contacted and requested to circulate an e-mail message to current undergraduate students within their departments. The e-mails contained a web-link to an online questionnaire, where potential participants saw a webpage inviting them to take part in a study about worry and rumination. A total of 1,238 people initially visited the online questionnaire webpage, and of these, 506 participants completed the full set of questionnaires (85% female, 15% male; age range 18 – 57, M = 22.15 years, SD = 5.79; 83.79% identified themselves as British, 10.28% as non-British European, 3.16% as Asian, 2.37% as North American, and 0.40% as Australian). Although participants were not selected on the basis of symptoms, 147 participants (29.05%) scored 20 or more (indicating moderate or severe depression) on the Beck Depression Inventory-II (Beck, Steer, & Brown, 1996).

2.4.2. Measures

2.4.2.1. Repetitive thought.

Response Styles Questionnaire – Ruminative Response Scale (RSQ-RRS, Nolen-Hoeksema & Morrow, 1991*)*. The RSQ-RRS is the standard measure of depressive rumination, and assesses ruminative responses to depressed mood which are focused on the self, symptoms, and possible causes and consequences of their

mood. We used a 25-item version, which amalgamates the two existing 22-item versions of the scale: The measure includes all items from the original 22-item version, plus three additional items from the other 22-item version used by Treynor et al. (2003), designed to tap into the reflection versus brooding components of rumination. Scores range from 25 to 100, with higher scores indicating greater trait rumination. The measure has acceptable convergent validity and high internal consistency (α = .89; Nolen-Hoeksema & Morrow, 1991).

Penn State Worry Questionnaire (PSWQ, Meyer, Miller, Metzger, & Borkovec, 1990). The PSWQ is a 16-item measure designed to examine the trait of worry. It evaluates the tendency of an individual to engage in excessive, uncontrollable and generalised worry, and the measure has sound psychometric properties (Molina & Borkovec, 1994). Scores range from 16 to 80, with higher scores indicating greater trait worry. The questionnaire possesses high internal consistency and construct validity (Molina & Borkovec, 1994).

2.4.2.2. Symptoms and current stress.

Beck Depression Inventory – II (BDI-II, Beck, et al., 1996*).* The BDI-II is a 21-item questionnaire designed to measure the intensity of somatic and affective symptoms of depression. Scores range from 0 to 63, with higher scores indicating more intense symptoms of depression. The measure has been widely used and has been found to be a reliable instrument with high internal consistency (α = .91; Dozois, Dobson, & Ahnberg, 1998).

State-Trait Anxiety Inventory – State subscale (STAI, Spielberger, 1989*)*. The state subscale of the STAI is a 20-item measure designed to measure respondents' current experience of state anxiety. Respondents are required to rate various statements (e.g., "I feel calm", "I feel nervous") on a 4-point scale ranging from "not

at all" to "very much", to indicate how they have been feeling for the past two weeks. Scores range from 20 to 80, with higher scores indicating greater state anxiety. The measure has high internal consistency (Barnes, Harp, & Jung, 2002).

Perceived Stress Scale (PSS; 10-item version, Cohen & Williamson, 1988*)*. The PSS is a 10-item questionnaire measuring the degree to which respondents appraise their current life situation as stressful. Items measure current levels of perceived stress, as well as how uncontrollable, unpredictable and overloaded respondents perceive their lives to be. Scores range from 0 to 40, with higher scores indicating greater levels of perceived stress. The scale has adequate internal consistency and construct validity (Cohen & Williamson, 1988).

2.4.2.3. Early experiences.

Children's Report of Parental Behaviour Inventory (30-item version, CRPBI-30, Schludermann & Schludermann, 1988*)*. The CRPBI-30 is a shortened form of the 108-item CRPBI (Schludermann & Schludermann, 1970), which is in itself derived from the original 260-item CRPBI (Schaefer, 1965) designed to measure parenting behaviours of the respondents' mothers and fathers. Three dimensions of parenting behaviours are examined and rated on a 3-point scale: acceptance versus rejection, firm versus lax behavioural control, and psychological autonomy versus psychological control. Scores range from 0 to 10 on each dimension, with higher scores representing greater acceptance, greater firm behavioural control, and greater psychological control on the respective dimensions. In the current sample there was good to excellent internal consistency (Mother: Acceptance α = .93, Firm Behavioural Control α = 86, Psychological Control α = 86; Father: Acceptance α = .94, Firm Behavioural Control α = .86, Psychological Control α = .87).

*Life Events Questionnaire (*LEQ, Gibb et al., 2001). The LEQ is an 82-item measure which assesses previous experiences of neglect and abuse in childhood. Various maltreatment experiences are listed, and participants are instructed to respond with "yes", "no", or "not sure", to indicate whether they have experienced each event. For the purposes of this study, several minor modifications were made: Only the abuse, rather than neglect subscales were administered, since there was no hypothesis relating to neglect; no additional detail was requested about abuse experiences (e.g., frequency, age at occurrence); and the initial instructions were modified to ask about events that occurred before 16, rather than 15, years of age. Scores range from 0 to 28 on the emotional abuse subscale, 0 to 10 on the physical abuse subscale, and 0 to 26 on the sexual abuse subscale, with higher scores indicating more experiences of abuse. The LEQ demonstrates good internal consistency (α = .89, Gibb et al., 2001).

2.4.2.4. Cognitive factors.

Beliefs about the Function of RT - Why Ruminate scale. The Why Ruminate scale (Watkins & Baracaia, 2001) is a 46-item questionnaire measuring perceived benefits and functions of rumination. Face valid items were written based on clinical experiences with depressed patients (Watkins & Baracaia, 2001), and items were adapted from questionnaires measuring metacognitive beliefs about worry (Freeston, Rheaume, Letarte, Dugas, & Ladouceur, 1994; Cartwright-Hatton & Wells, 1997). The measure consists of four subscales: (1) the use of rumination for instrumental understanding (e.g., "I ruminate to try and find the answer to my problems"; score range 14 to 70), (2) rumination for self and social control (e.g., "I ruminate to have better control over my life"; score range 11 to 55), (3) rumination for motivation, learning and problem-solving (e.g., "I ruminate to try and maintain my standards"; score range 7 to 35), and (4) rumination for reducing past distress (e.g., "I ruminate to

remove the pain of upsetting memories and images"; score range 6 to 30). Participants are instructed to indicate the extent to which they believe each statement is true for them on a scale from 1 ("not true at all") to 5 ("completely true"). For the current sample, internal consistency for the subscales was good to excellent (instrumental understanding α = .93; self and social control α = .90, motivation, learning and problem-solving α = .84, reducing past distress α = .83).

*Abstract thinking styles - Problem Elaboration Questionnaire (*PEQ, Stöber & Borkovec, 2002). The PEQ instructs participants to identify two significant problems that they are currently experiencing, and then asks them to provide an open-ended description of each problem, followed by an account of three possible consequences of each problem. The wording of the instructions was modified so as to make the task relevant to RNT (Watkins & Moulds, 2007), such that the instructions read: "Please note down two major problems or issues that you are currently ruminating about (that is repeatedly dwelling on and frequently thinking about). These problems or issues should be ones that you are greatly concerned about and spend a lot of time thinking about". The written problem descriptions and consequences were then rated by the experimenter for level of concreteness on a 5-point Likert scale: 1 (abstract), 2 (somewhat abstract), 3 (neither-nor), 4 (somewhat concrete), 5 (concrete), giving each participant two scores (one for the problem description, and one for the consequence description). After responses were coded, mean scores were calculated for problem descriptions, and consequence descriptions. Inter-rater reliability was good (mean Cohen's kappa = .76).

Neuroticism - Revised Eysenck Personality Questionnaire – Short Form (Neuroticism subscale; EPQ-R; Eysenck, Eysenck, & Barratt, 1985). This questionnaire contains a 12-item subscale which measures the personality trait of

neuroticism. Participants indicate their response to each item (e.g., “does your mood often go up and down?”) by endorsing “yes” or “no”. Internal consistency for this measure is good (α = .80 – 84; Eysenck, Eysenck, & Barratt, 1985).

2.4.3. Procedure

On visiting the study’s website, participants were presented with information about the purpose of the research and the nature of the questions that they would be asked. Participants were informed that some questionnaires explored personal topics relating to low moods and negative events in childhood concerning parenting, abuse, and maltreatment. After giving informed consent, participants then went on to complete the online questionnaires. Prior to commencing recruitment for this study, ethical approval was sought and granted by the departmental research ethics committee.

2.4.4. Data Analytic Strategy

Structural equation modelling (SEM) analyses were conducted in order to test the hypothesised theoretical model. SEM enables the researcher to explore the relationships between observed (measured) and unobserved (latent) variables, and therefore test multiple hypotheses about these relationships simultaneously. Whilst SEM requires the researcher to generate a priori models to be tested, it can be used in both a confirmatory and an exploratory sense, such that models which make theoretical sense and provide a good statistical fit to the data can be generated (Kline, 1998). SEM analyses were conducted using the AMOS statistical software (Arbuckle, 2009).

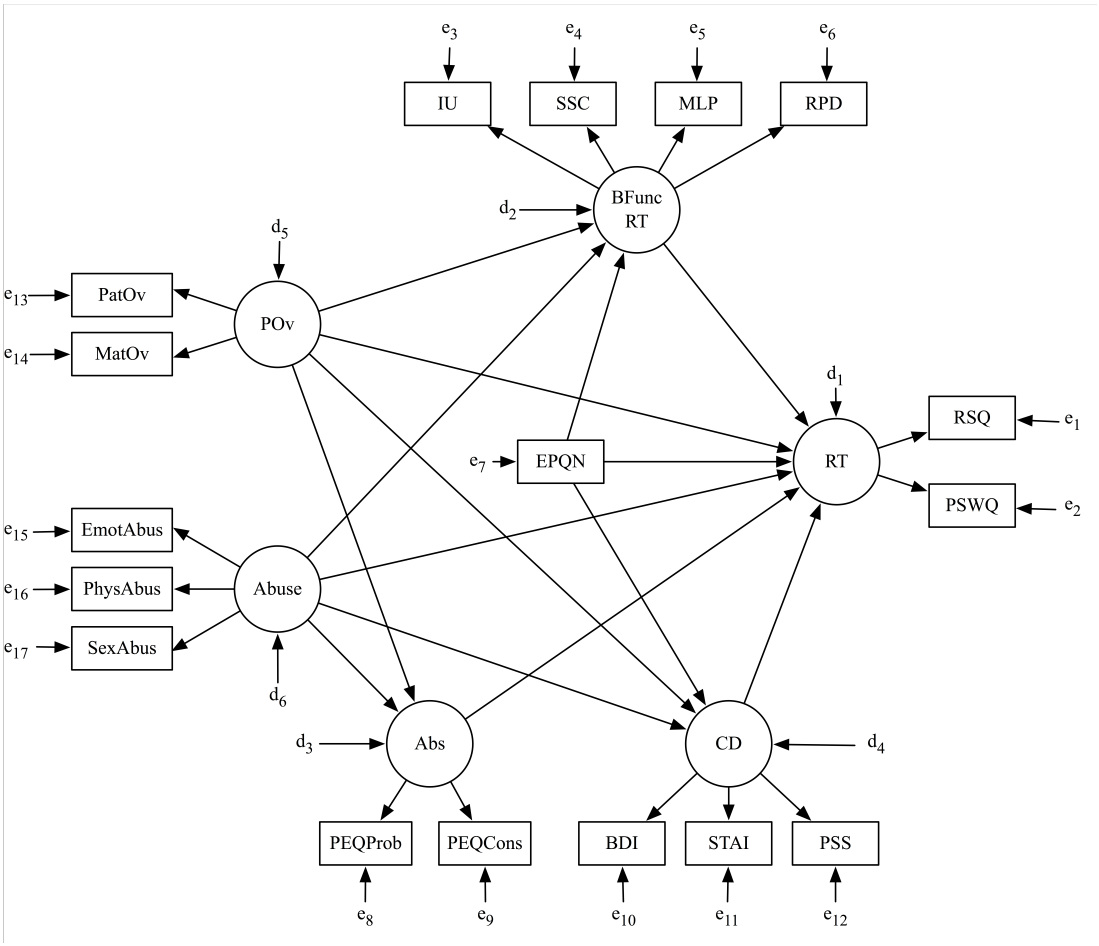

Figure 2.1. First hypothesised model of the relationship between RNT and potential vulnerability factors.

Note. RNT: Repetitive Negative Thought; CD: Current Distress; Abs: Abstraction; Abuse: Childhood Abuse or Maltreatment; POv: Perceived Parental Overcontrol; PFuncRT: Perceived Function of Repetitive Thought; RSQ: Response Styles Questionnaire; PSWQ: Penn State Worry Questionnaire; BDI: Beck Depression Inventory-II; STAI: State-Trait Anxiety Inventory (state subscale); PSS: Perceived Stress Scale; MatOv: CRPBI Maternal Overcontrol subscale; PatOv: CRPBI Paternal Overcontrol subscale; EmotAbuse: LEQ Emotional Abuse subscale; PhysAbus: LEQ Physical Abuse subscale; SexAbus: LEQ Sexual Abuse subscale; N: Eysenck Personality Questionnaire – Revised - Short Form Neuroticism subscale; PEQProb: PEQ Problem Description score; PEQCons: PEQ Consequence Description score; IU: Why Ruminate RT for Instrumental Understanding subscale; SSC: Why Ruminate RT for Self and Social Control subscale; MLP: Why Ruminate RT for Motivation, Learning and Problem Solving subscale; RPD: Why Ruminate RT for Reducing Past Distress subscale.

As described in the Introduction, a model was devised to illustrate the hypothesised relationships between the different vulnerability factors and RNT (Figure 2.1). The original model included six latent variables, two of which were removed after preliminary measurement model analyses. The Repetitive Negative

Thought latent variable was created with the RSQ and PSWQ as measured indicators. The Parental Overcontrol latent variable was created with the two subscales from the CRPBI-30 that measured child self-reported maternal and paternal psychological overcontrol. The Abuse latent variable was composed of the three LEQ subscales, measuring emotional, physical, and sexual abuse in childhood. The Abstraction latent variable was composed of the two scores from the PEQ, measuring the extent to which current problems and their potential consequences are described in an abstract (versus concrete) way. The Perceived Function of RT latent variable was comprised of four subscales from the Why Ruminate scale, which represent endorsement of functional reasons for engaging in RT. Finally, the Current Distress latent variable was composed of the BDI-II, state subscale of the STAI, and PSS, and thus reflects current level of psychological distress.

Disturbance terms were added to each of the latent variables in the model, in order to represent the variance in the latent variables that was unmeasured and not accounted for by the indicators specified in the model. In order to evaluate how well the hypothesised model fitted the data, a number of different statistical tests were used. The maximum likelihood chi-square statistic (χ^2) should be nonsignificant if the model provides a good fit. However, χ^2 is very sensitive to sample size, as larger samples may provide significant χ^2 values even if the difference between the data and the model is slight, which may incorrectly imply that the model is a poor fit (Schumacker & Lomax, 2004). Therefore, a series of additional fit indices were inspected in order to evaluate model fit: the normed fit index (NFI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). In order to judge the fit of the model, the following criteria were used: for the NFI and CFI, values of .90 - .95 indicated acceptable fit, values of greater than .95 indicated good

fit, and values of less than .90 were unacceptable (Bentler & Bonnet, 1980; Hu & Bentler, 1999); for the RMSEA, values of .00 - .05 indicated close fit, values of .05 - .08 indicated fair fit, values of .08 - .10 indicated mediocre fit, and values of greater than .10 indicated poor fit (Browne & Cudeck, 1993; MacCallum, Browne, & Sugawara, 1996). The Akaike information criterion (AIC) was used to compare alternative models, with smaller AIC values indicating better fit.

2.5. Results

2.5.1. Preliminary Analyses

Correlations, means, standard deviations and reliabilities for the measured variables are displayed in Table 2.1. Despite being robust to violations of normality, the maximum likelihood method of estimation in SEM assumes normally distributed data (McDonald & Ho, 2002), and therefore, univariate analyses of normality were conducted. The analyses revealed that a number of variables had significant skew and kurtosis. Therefore, all variables were subjected to square root transformations, which improved the normality of the distributions, and all but two of the transformed variables were retained for subsequent analyses. Despite the transformations, the physical abuse and sexual abuse subscales from the LEQ had distributions which were still substantially non-normal: There were a very limited range of scores on these subscales, since few participants reported having experienced sexual or physical abuse or maltreatment (see Table 2.1). As a result of this insufficient reporting range, these two variables were excluded from the subsequent SEM analysis, with only the emotional abuse variable being retained. Thus, it was not possible to fully examine Hypothesis 2 (b), or to provide any comment as to the nature of the relationship

between physical and sexual abuse and the other variables included in the model, given the low levels of participant report.

Table 2.1. Correlations, means, standard deviations and reliabilities for the observed variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. RSQ	1																
2. PSWQ	.65***	1															
3. BDI	.70***	.58***	1														
4. STAI	.64***	.68***	.79***	1													
5. PSS	.67***	.71***	.77***	.83***	1												
6. EPQ-R-SF-N	.66***	.77***	.60***	.67***	.66***	1											
7. Emotional abuse	.32***	.27***	.44***	.37***	.37***	.28***	1										
8. Physical abuse	.15***	.08	.24***	.24***	.24***	.07	.62***	1									
9. Sexual abuse	.12***	.06	.17***	.12*	.11*	.09	.36***	.32***	1								
10. Maternal overcontrol	.26***	.17***	.31***	.23***	.26***	.20***	.47***	.26***	-.17***	1							
11. Paternal overcontrol	.21***	.19***	.25***	.18***	.25***	.16***	.47***	.24***	.08	.37***	1						
12. RT for IU	.45***	.36***	.25***	.29***	.33***	.28***	.21***	.14***	-.03	.15***	.08	1					
13. RT for SSC	.48***	.40***	.35***	.37***	.40***	.40***	.25***	.15***	.03	.21***	.17***	.71***	1				
14. RT for MLP	.19***	.08	-.02	.01	.06	.03	.10*	.08	-.04	.12***	.03	.66***	.53***	1			
15. RT for RPD	.30***	.24***	.15***	.20***	.27***	.22***	.15***	.14***	-.01	.13***	.07	.70***	.60***	.48***	1		
16. PEQ-problem	-.29***	-.20***	-.27***	-.21***	-.22***	-.24***	-.09	-.04	-.04	-.09	-.04	-.21***	-.21***	-.10*	-.09*	1	
17. PEQ-consequence	-.27***	-.23***	-.22***	-.23***	-.25***	-.27***	-.12*	-.06	-.08	-.06	-.07	-.18***	-.22	-.10*	-.04	.78***	1
Mean	54.60	53.31	15.81	48.83	20.33	6.81	6.42	1.10	.91	15.64	14.81	45.28	30.47	22.28	15.32	2.72	2.32
SD	15.39	14.64	12.39	14.02	7.76	3.37	5.31	1.62	2.24	4.82	4.69	11.70	9.25	5.38	5.14	.94	.82
α	.93	.94	.94	.95	.87	.83	.88	.73	.86	.86	.87	.92	.90	.84	.83	.65	.67

Note. RSQ-RRS: Response Styles Questionnaire – Ruminative Response Scale; PSWQ: Penn State Worry Questionnaire; BDI: Beck Depression Inventory; STAI: State-Trait Anxiety Inventory (state subscale); PSS: Perceived Stress Scale; EPQR-SF-N: Eysenck Personality Questionnaire Revised Short Form (neuroticism subscale); RT for IU: RT for Instrumental Understanding (Why Ruminate subscale); RT for SSC: RT for Self Control and Social Control (Why Ruminate subscale); RT for MLP: RT for Motivation, Learning and Problem Solving (Why Ruminate subscale); RT for RPD: RT for Reducing Past Distress (Why Ruminate subscale); PEQ-problem: Problem Elaboration Questionnaire mean problem abstraction rating; PEQ-consequence: Problem Elaboration Questionnaire mean consequence abstraction rating.
* $p < .05$, *** $p < .001$.

2.5.2. Measurement Model Analyses

Preliminary measurement analyses were conducted in order to see whether the measured variables loaded well onto their respective latent variables. Figure 2 displays the loadings of the measured variables onto their respective latent variables, demonstrating that the latent variables fit the data well (sr range = .66 - .98). Therefore, Hypothesis 1 was supported, since having a latent variable representing RNT with two measured variables of rumination (RSQ) and worry (PSWQ) provided a good fit to the data, and is consistent with the theoretical conceptualisation of RNT. However, measurement model analyses revealed that one latent variable did not fit the data well: For the Parental Overcontrol latent variable, although both of the measured variables representing paternal and maternal overcontrol were significantly associated with the latent variable, the loadings were not as high as the measured variable loadings found in the other analyses (sr = .57 and .60, respectively). As such, the initial model was modified such that the latent variable representing Parental Overcontrol was removed, and instead, the paternal overcontrol and maternal overcontrol variables were represented in the model as distinct observed variables.

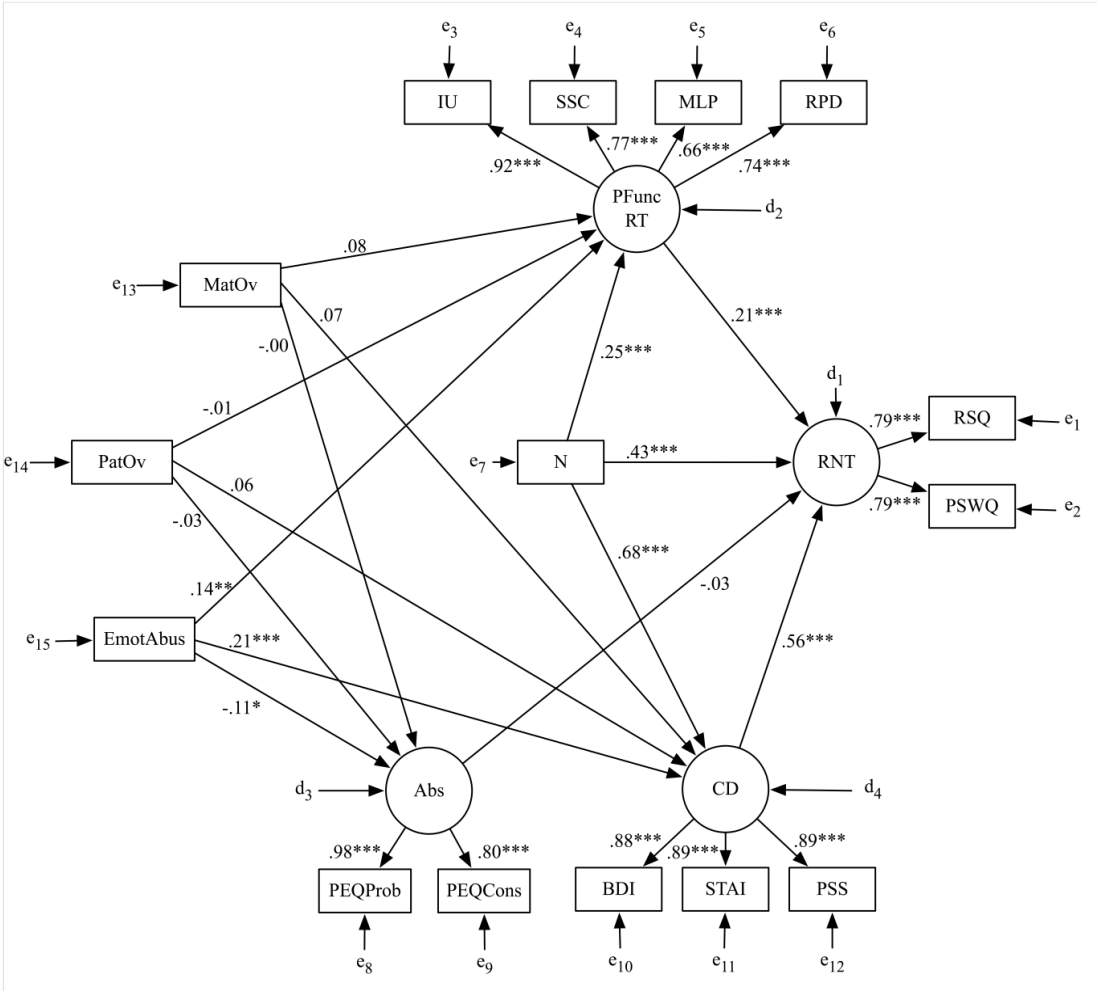

Figure 2.2. First hypothesised model of the relationship between RNT and potential vulnerability factors, with the Parental Overcontrol latent variable and Sexual/Physical Abuse measured variables removed after preliminary measurement model analyses.

Note. RNT: Repetitive Negative Thought; CD: Current Distress; Abs: Abstraction; PFuncRT: Perceived Function of Repetitive Thought; RSQ: Response Styles Questionnaire; PSWQ: Penn State Worry Questionnaire; BDI: Beck Depression Inventory-II; STAI: State-Trait Anxiety Inventory (state subscale); PSS: Perceived Stress Scale; MatOv: CRPBI Maternal Overcontrol subscale; PatOv: CRPBI Paternal Overcontrol subscale; EmotAbuse: LEQ Emotional Abuse subscale; N: Eysenck Personality Questionnaire – Revised - Short Form Neuroticism subscale; PEQProb: PEQ Problem Description score; PEQCons: PEQ Consequence Description score; IU: Why Ruminate RT for Instrumental Understanding subscale; SSC: Why Ruminate RT for Self and Social Control subscale; MLP: Why Ruminate RT for Motivation, Learning and Problem Solving subscale; RPD: Why Ruminate RT for Reducing Past Distress subscale.
*$p < .05$, **$p < .01$, ***$p < .001$.

2.5.3. Structural Model Analyses

Figure 2.2 displays the factor loadings of each latent variable onto its measured variables, as well as the regression weights for the paths between each of the variables. Analysis of the hypothesised model indicates that it did not provide an acceptable fit to the data (χ^2 (79, n = 506) = 578.77, p < .001, NFI = .872, CFI = .887, RMSEA = .112, AIC = 690.772).

In particular, contrary to initial hypotheses, Paternal and Maternal Overcontrol did not have a significant indirect effect on RNT (Hypothesis 2(a)). They were not significantly associated with Abstraction and Perceived Function of RT, which were originally hypothesised to be mediators of the relationship between perceived parental overcontrol and RNT.[2] Moreover, when examining the direct relationships between the proximal cognitive factors and RNT, Abstraction was not a significant predictor of RNT, contrary to prediction (Hypothesis 3(a)).

Although a number of specific hypotheses were supported or partially supported (Hypothesis 2(b); Hypothesis 3(b); Hypotheses 4 (a) and (b); Hypothesis 5), because the overall model did not provide an acceptable fit to the data, and several of the original hypotheses were not supported, attempts were made to improve the model in light of this, and a second model was tested with the following modifications. First,

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[2] A further SEM model was tested which was identical to the first model (Figure 2.2), except as well as testing the indirect, mediated relationships, it also tested the direct relationships between the early experience variables and RNT. As such, the model had three additional pathways which lead directly from the Maternal Overcontrol, Paternal Overcontrol and Emotional Abuse variables to the RNT latent variable. However, despite there being significant correlations between these variables and RNT (Table 2.1), none of the direct pathways between these factors and RNT were significant when other strong predictors of RNT were included in the model.

the Maternal and Paternal Overcontrol measured variables were removed from the model, since the hypothesis that they would be related to RNT via association with the intrapersonal cognitive variables was not supported. Second, as the analysis revealed that the Abstraction latent variable was not a significant predictor of RNT, the pathway between the two variables was removed. In light of this prediction not being supported by the data, an alternative hypothesis was considered: that abstract processing may have an indirect relationship with RNT via emotional reactivity. There is experimental evidence which demonstrates how abstract, evaluative thinking leads to greater emotional responses to negative events (Moberly & Watkins, 2006; Watkins, 2004; Watkins, Moberly, & Moulds, 2008), and evidence from an experience sampling study which shows an association between abstract thinking and concurrent negative affect (Takano & Tanno, 2010). As such, abstract thinking may be one of the mechanisms underpinning emotional reactivity, a key part of the neuroticism construct. Therefore, to test this alternative hypothesis and to see whether neuroticism mediates the relationship between abstraction and RNT, a pathway was added to the model from Abstraction to Neuroticism.

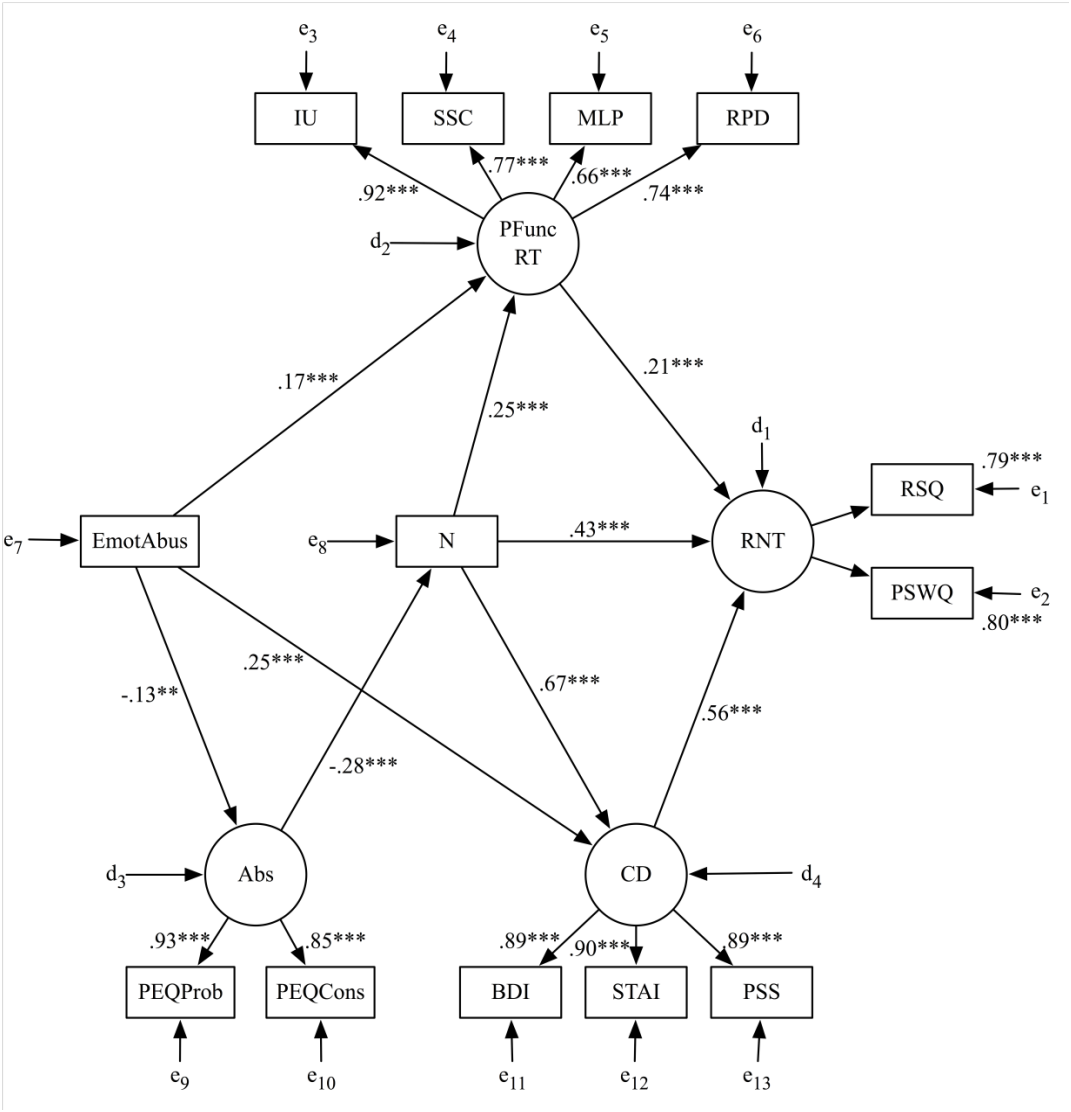

Figure 2.3. Second hypothesised model of the relationship between RNT and potential vulnerability factors.

Note. RNT: Repetitive Negative Thought; CD: Current Distress; Abs: Abstraction; PFuncRT: Perceived Function of Repetitive Thought; RSQ: Response Styles Questionnaire; PSWQ: Penn State Worry Questionnaire; BDI: Beck Depression Inventory-II; STAI: State-Trait Anxiety Inventory (state subscale); PSS: Perceived Stress Scale; EmotAbuse: LEQ Emotional Abuse subscale; N: Eysenck Personality Questionnaire – Revised - Short Form Neuroticism subscale; PEQProb: PEQ Problem Description score; PEQCons: PEQ Consequence Description score; IU: Why Ruminate RT for Instrumental Understanding subscale; SSC: Why Ruminate RT for Self and Social Control subscale; MLP: Why Ruminate RT for Motivation, Learning and Problem Solving subscale; RPD: Why Ruminate RT for Reducing Past Distress subscale.
*$p < .05$, **$p < .01$, ***$p < .001$.

The second model is displayed in Figure 2.3. Analysis of this revised model indicates that it provided an acceptable fit to the data (χ^2 (58, n = 506) = 279.63, p < .001, NFI = .934, CFI = .947, RMSEA = .087, AIC = 371.63). This second model

provided a significantly better fit to the data than the first model (χ^2_{diff} (21, n = 506) = 299.15, p < .001; Δ AIC = -.299.15).

The hypotheses that were supported or partially supported in the first model were also supported in the second model. Specifically, although it was not possible to fully test the hypothesis relating to childhood maltreatment as a result of insufficient reporting of physical and sexual abuse (Hypothesis 2(b)), Emotional Abuse had a significant indirect effect on RNT (standardised indirect effect = .14, p <. 001) through its relationship with Perceived Function of RT. In order to test the significance of this meditational pathway, a Sobel test was performed (Sobel, 1982). This test was significant (z = 2.78, p < .01), supporting the hypothesis that the proximal factor of perceived function of RT mediates the relationship between the distal factor of emotional abuse and RNT. Moreover, Perceived Function of RT significantly predicted RNT (sr = .21, p < .001; Hypothesis 3(b)). In addition, the hypothesis that Neuroticism would act as an indirect (distal) and direct (proximal) predictor were supported (Hypotheses 4(a), (b)). Neuroticism was a direct predictor of RNT (sr = .43, p < .001), as well an indirect predictor through its effects on Perceived Function of RNT and Current Distress (standardised indirect effect = .44, p < .001). Two further Sobel tests were conducted to test the significance of these meditational pathways (Sobel, 1982). Both Perceived Function of RT (z = 4.30, p < .001) and Current Distress significantly mediated the relationship between Neuroticism (z = 10.32, p < .001) and RNT. Finally, as predicted, Current Distress was a significant predictor of RNT (sr = .56, p < .001; Hypothesis 5). All of the above hypotheses were supported in both the first and second models.

With regards to the additional pathway which was added in to the second model, Abstraction had a significant indirect effect on RNT (standardised indirect

effect = -.233, $p < .001$) through its effects on Neuroticism. A Sobel test indicated that this meditational pathway was significant ($z = -5.19$, $p < .001$), suggesting that neuroticism mediates the relationship between abstract processing and RNT.

A third and final version of the theoretical model was tested, which made a single modification to the second model. Since the original model revealed that Emotional Abuse was a significant predictor of Abstraction, and the second model revealed that Abstraction was a significant predictor of Neuroticism, we wanted to test whether Emotional Abuse had a direct effect on Neuroticism. Therefore, we added a single path to the model, leading from Emotional Abuse to Neuroticism (see Figure 2.4). Theoretical justification for the addition of this pathway comes from the extant literature which suggests that a number of social and environmental factors, including aversive early experiences, have been implicated in the development of neuroticism, since genetic heritability tends to account for less than half of the variance in this trait (Goldberg, 2000). As such, it has been hypothesised that events like abuse and maltreatment early in development may contribute to the development of neuroticism (e.g., Goldberg, 2000; Lahey, 2009; Roy, 2002). Like the other proximal variables included in the theoretical model, neuroticism may act as a mediator of the relationship between emotional abuse and RNT, such that individuals who have experienced emotional maltreatment in childhood may develop the trait of neuroticism, and as a result of this tendency to experience negative mood states, may be more prone to developing a tendency towards pathological RNT.

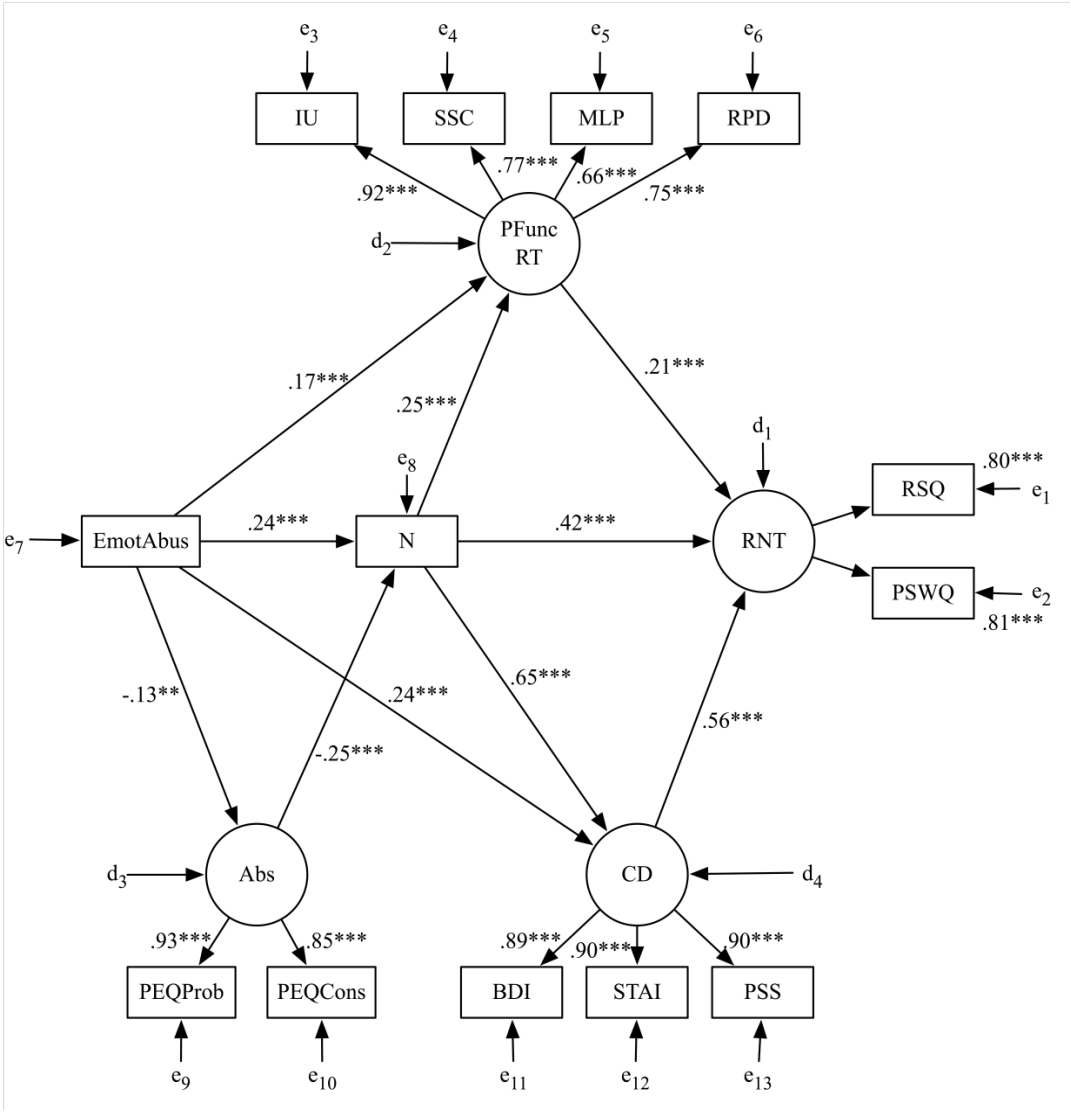

Figure 2.4. Third hypothesised model of the relationship between RNT and potential vulnerability factors.

Note. RNT: Repetitive Negative Thought; CD: Current Distress; Abs: Abstraction; PFuncRT: Perceived Function of Repetitive Thought; RSQ: Response Styles Questionnaire; PSWQ: Penn State Worry Questionnaire; BDI: Beck Depression Inventory-II; STAI: State-Trait Anxiety Inventory (state subscale); PSS: Perceived Stress Scale; EmotAbuse: LEQ Emotional Abuse subscale; N: Eysenck Personality Questionnaire – Revised - Short Form Neuroticism subscale; PEQProb: PEQ Problem Description score; PEQCons: PEQ Consequence Description score; IU: Why Ruminate RT for Instrumental Understanding subscale; SSC: Why Ruminate RT for Self and Social Control subscale; MLP: Why Ruminate RT for Motivation, Learning and Problem Solving subscale; RPD: Why Ruminate RT for Reducing Past Distress subscale.
*$p < .05$, **$p < .01$, ***$p < .001$.

Analysis of this third model indicates that it provided a good statistical fit to the data χ^2 (57, n = 506) = 251.81, $p < .001$, NFI = .941, CFI = .953, RMSEA = .082, AIC = 345.81). This third model provided a significantly better fit to the data than the

second model (χ^2_{diff} (1, n = 506) = 27.82, p < .001; Δ AIC = -.25.14). With regards to the modification that was made, the pathway between Emotional Abuse and Neuroticism was statistically significant, such that Emotional Abuse was a significant predictor of Neuroticism (sr = .24, p < .001). All of the hypotheses supported in the first and second models remained supported in the third model.

2.6. Discussion

The purpose of the current study was to provide a cross-sectional examination of factors implicated in the aetiology of rumination and worry, by testing a new integrative model of RNT. Using SEM to examine the concurrent relationships between the variables, the final model demonstrates that several proximal and distal factors are associated with RNT.

The study examined a series of specific hypotheses. First, the hypothesis that rumination and worry would form a latent variable representing RNT was supported, providing further evidence for the commonality between these forms of RNT. Second, the hypothesis that distal vulnerability factors would be associated with RNT via their relationships with proximal cognitive factors was partially supported. Whilst insufficient reporting on our measure of childhood maltreatment precluded further examination of physical and sexual abuse in the SEM model, emotional abuse was found to be a significant distal predictor of RNT via its association with perceptions of the function of RT, neuroticism, abstraction, and current distress. However, perceived overcontrolling parenting was not found to be a significant distal predictor of RNT either directly, or through the proposed mediators, and therefore was omitted from the final model. Third, the hypothesis that proximal cognitive factors would be directly associated with RNT was partially supported. Whilst perceived function of RT had a significant direct association with RNT, abstract processing did not.

However, in the second model, the addition of a significant pathway leading from abstraction to neuroticism suggests that the relationship between abstraction and RNT may be mediated by neuroticism. Fourth, the hypothesis that neuroticism would act as an intermediate factor with both proximal and distal qualities was supported, as it had both a direct effect on RNT, as well as an indirect effect on RNT where the relationship was mediated by perceptions of the function of RT and current distress. Finally, the hypothesis that current distress would be associated with increased RNT was supported, as was the hypothesis that other factors would still have a relationship with RNT over and above the effects of current distress. Therefore, the data provide broad support for the hypothesised integrative model, with the exception of the specific relationships predicted for abstraction and overcontrolling parenting.

More specifically, the results support the hypothesis that there are distal and proximal risk factors associated with RNT, with the former's relationship with RNT mediated by the latter, consistent with Nolen-Hoeksema and Watkins' (2011) theoretical account. Therefore, this study demonstrates that there are several factors which are associated with individual differences in RNT, and that these vulnerability factors are diverse, relating to an individual's early experiences in life, their personality, and current intrapersonal and cognitive characteristics.

One specific aim was to examine a previous finding that found that retrospective reports of perceived overcontrolling parenting and abuse were associated with increased RNT (Spasojević & Alloy, 2002). The current study did not replicate these previous findings: Retrospective reports of overcontrolling parenting did not have a significant direct or indirect association with RNT when examined alongside other proximal predictors. However, in our preliminary correlational analysis, we did find small but statistically significant positive correlations between

the paternal overcontrol variables and measures of RNT (Table 2.1). As such, it is reasonable to suggest that because our SEM analyses involved the inclusion of other measures of proximal risk factors, it may be that distal early experience factors no longer have a significant relationship with RNT when examined alongside more powerful proximal cognitive and intrapersonal predictors. Additionally, a different pattern of findings may have resulted from different recruitment strategies: We recruited all participants interested in completing a study on worry and rumination, whereas Spasojević and Alloy (2002) utilised a sample selected on the basis of high and low scores on measures of attributional style and dysfunctional attitudes. However, it is worth noting that both the current study and the study by Spasojević and Alloy (2002) only examined adult retrospective reports of perceived overcontrolling parenting, and so to establish the relationship between parenting style and RNT, studies utilising alternative measures should be conducted (e.g., observation of parent-child interactions; child and parent self-report).

This study also examined the prediction that, consistent with previous research, abstraction would be associated with increased RNT; however, this prediction was not supported. One explanation for this may be due to differences in the way that RNT is characterised and measured across studies: There is a difference between a "bout" of rumination or worry captured by state measures, and an ongoing tendency to engage in rumination or worry, captured by trait measures. All previous studies examining the effects of abstract processing have shown an effect on state rather than trait rumination in experimental studies (i.e., bouts of rumination and their consequences). It is therefore possible that the tendency towards abstraction may impact more on state bouts of RNT, rather than an individual's trait tendency to engage in RNT, as measured in the current study. A further explanation for these different findings

concerns the measurement of abstract processing: The current measure (PEQ) assesses an individual's abstract or concrete response to two specific problems they have identified. However, this may not generalise to reflect the individual's processing style in response to situations other than those described. As such, abstraction assessed using this measure may be less likely to be associated with trait measures of RNT, which assess the tendency to engage in RNT across all situations, and not just the situations identified in the PEQ.

The role of perceived function of RT in predicting RNT is noteworthy: Alongside neuroticism and current distress, perceived function of RT was a strong direct predictor of RNT, with greater perceptions that RT is functional associated with increased RNT. It also mediated the relationship between neuroticism and RNT, and emotional abuse and RNT. Since perceived function of RT remained a significant predictor of RNT when controlling for well-established predictors of RNT (current distress, neuroticism), future studies should attempt to examine the causal direction of the relationship between RNT and perceived function of RT in experimental and longitudinal studies.

There were a number of strengths to the current study, including examining both rumination and worry together under the conceptualisation of RNT; examining a large number of potential vulnerability factors concurrently in a single integrative model, in contrast to studies examining factors in relative isolation; and using a large sample size, allowing SEM to be used effectively. However, there were several limitations including the fact that it was a cross-sectional, correlational study, precluding us from establishing the causal relationships between variables; the limited statistical power of the data collected on physical and sexual abuse in childhood and an insufficient range on these variables for statistical analysis; and a reliance on

retrospective self-report measures, in which participants may have been unwilling to disclose highly personal information (e.g., experiences of abuse), and which have been critiqued as potentially suffering from mood-dependent biases and poor agreement with parent reports (Bögels & Brechman-Toussaint, 2006). Relationships between variables may exist in the opposite direction to what is depicted in the structural model (or the relationships may be bidirectional), and/or the associations between variables may be caused by a mutual association with an unmeasured additional variable. For example, the model depicts symptoms of depression leading to RNT, when a bidirectional relationship between RNT and symptoms of depression may exist (e.g., Moberly & Watkins, 2008). In order to establish the causal relationships, a prospective longitudinal study could be used to assess which variables predict subsequent RNT, and experimental studies could be used to examine whether manipulation of putative vulnerability factors, such as beliefs about the function of RT, influences RNT. Nonetheless, although the current study is not sufficient to establish causality, it provides a necessary first step in identifying the cross-sectional relationships that exist between factors that influence individual differences in RNT.

Furthermore, future studies exploring this area may benefit from targeting populations in which greater reports of abuse may be more likely, and from including relevant observational and independently assessed measures. Whilst there is typically good agreement between self-report and clinician-assessed measures (e.g., the BDI-II is highly correlated with clinician-assessed symptoms; Sprinkle et al., 2002), conclusions could be drawn more confidently if self-report measures were further corroborated by independent evaluations. Future studies examining RNT would benefit from the inclusion of independent assessments of internalising symptoms. There is also the possibility that the title used to advertise the research study

("Understanding worry and rumination") led to a self-selected sample of individuals particularly prone to RNT, consistent with the elevated rates of depression. Although increasing the potential relevance of the findings for clinical populations, this possibility raises questions about the generalisability of the findings. Although the study did not select on the basis of (or assess) clinical diagnosis, the BDI-II scores suggest that a significant proportion of the sample were experiencing at least moderate levels of depression. Nonetheless, future research should test this model in clinical populations to examine whether the model fits the data equally well, including patients diagnosed with major depression and individuals diagnosed with autism spectrum disorders, both of whom display elevated repetitive thought.

Finally, it is important to acknowledge that the vulnerability factors examined in the current study may only represent some of the variables involved in individual differences in RNT. Although we sought to examine the majority of the factors which have been repeatedly associated with RNT in the theoretical and research literature, as a result of practical constraints, such as reducing participant burden, it was not possible for every relevant factor to be examined. For instance, deficiencies in executive functioning abilities (e.g., attention inhibition, effortful control) are hypothesised to lead to RNT, since difficulties in switching attention, inhibiting, and disengaging from negative thoughts may lead to persistent RNT (e.g., Joormann, 2006; Linville, 1996). However, this factor was not measured, as it was judged difficult to assess it reliably via the online self-report method adopted for this study. As such, it would be useful to develop and test this model with reference to other potential vulnerability factors not examined in the current study, such as executive functioning, effortful control and the related temperamental construct of conscientiousness (e.g., Jensen-Campbell et al., 2002).

If the patterns arising from the current correlational study can be extended into longitudinal studies, which show that the aforementioned factors prospectively predict increases in RNT, then there may be clinical implications arising from the research. For example, individuals who hold strong beliefs about the functional properties of RNT may benefit from psychoeducation interventions that aim to inform individuals about the ways in which rumination and worry can be unhelpful. Additionally, prevention strategies designed to decrease the likelihood of individuals developing a tendency towards RNT could be aimed at young people known to be from environments that may be conducive to the development of RNT. Finally, because RNT is a transdiagnostic process and the current study has examined both rumination and worry, these preliminary findings, relating to the identification of possible proximal and distal vulnerability factors, are relevant to mental health problems where both rumination and/or worry are key features (e.g., depression, generalised anxiety disorder).

In conclusion, the findings from the current study provide support for an integrative aetiological model of RNT, in which a variety of proximal and distal vulnerability factors, namely childhood emotional abuse, abstraction, perceived function of RT, neuroticism, and current distress, interact and are associated, directly and/or indirectly, with increased levels of worry and rumination.

2.7. Appendix A: Further Analysis of Overcontrolling Parenting Findings

One of the specific aims of Study 1 was to attempt to replicate the finding that retrospective reports of parenting are associated with increased RNT (Spasojević & Alloy, 2002). However, in the SEM analysis, overcontrolling parenting was neither directly associated with RNT, nor indirectly associated with RNT (via relationships with perceived function of RT, abstract thinking styles, or current distress). In the Discussion (Section 2.6) several possible explanations for this finding were noted, in particular, the different sampling techniques (this study used an unselected undergraduate sample; Spasojević & Alloy used a selected sample based on attributional style and high/low levels of dysfunctional attitudes), and the other factors concurrently examined alongside overcontrolling parenting (this study examined the effects of overcontrolling parenting on RNT alongside other powerful predictors; Spasojević & Alloy examined the effect of overcontrolling parenting on RNT both as a sole predictor, and after controlling for depression symptoms).

However, when examining basic correlations between maternal overcontrol and paternal overcontrol and rumination, significant positive correlations were found (Table 2.1). As such, to explore whether the finding observed in the SEM analysis may have been due to the presence of other more powerful predictors, regression analyses were repeated exactly as performed by Spasojević and Alloy (2002). The same measures of rumination (RSQ-RRS; Nolen-Hoeksema & Morrow, 1991) and overcontrolling parenting (CRPBI-30; Schludermann & Schludermann, 1988) were used, with the only difference being that when controlling for depression, this study used the BDI-II (Beck et al., 1996) to measure depression symptoms, whereas Spasojević and Alloy used the original BDI (Beck, Rush, Shaw, & Emery, 1979).

Spasojević and Alloy initially demonstrated that mothers' and fathers' overcontrolling parenting was significantly associated with their child's trait rumination. When attempting the same regression analyses on this data by entering RSQ-RRS as the dependent variable and parental overcontrol (CRPBI30; mother or father overcontrol) as the predictor variable, the finding was replicated for both maternal overcontrol ($t(494) = 6.03$, $p < .001$, $\beta = .26$) and paternal overcontrol ($t(480) = 4.70$, $p < .001$, $\beta = .21$).

However, Spasojević and Alloy then went on to demonstrate that the relationship between parental overcontrol and rumination remained significant after controlling for depression symptoms. When attempting the same hierarchal regression analysis by entering RSQ-RRS as the dependent variable, BDI-II score as a predictor in Step 1, and parental overcontrol (CRPBI30; mother or father overcontrol) as a predictor in Step 2, it was not possible to replicate this finding: after controlling for BDI-II score, maternal overcontrol ($t(464) = 1.71$, $p = .089$, $\beta = .06$) and paternal overcontrol ($t(452) = .82$, $p = .411$, $\beta = .03$) were not significantly associated with rumination.

As such, this demonstrates that the failure to replicate the finding that overcontrolling parenting predicts rumination after controlling for depression was not simply due to the presence of other more powerful proximal predictors in the SEM model, since when examining maternal or paternal overcontrol variables individually, after controlling for current depression symptoms, the relationship between paternal overcontrol and rumination did not remain significant.

2.8. Appendix B: Further Analysis of Abstract Processing Findings

A further aim of the study was to examine the control theory and processing mode predictions that more abstract processing of information would be associated with RNT (Martin & Tesser, 1996; Watkins, 2008). Characterising abstract processing as a proximal, within-person current factor (Nolen-Hoeksema & Watkins, 2011), according to Martin and Tesser's (1996) model, it was predicted to have a direct effect on trait RNT.

There are several possible explanations offered as to why abstract processing was not directly associated with RNT in this study. First, as outlined in the Discussion (Section 2.6), abstract processing may have more of an influence on state rumination (i.e., individual "bouts" of rumination), rather than trait RNT (i.e., the relatively stable tendency to engage in RNT), which was being measured in the study. This is consistent with Watkins' (2008) processing mode account, which predicts that abstract processing influences state rumination, as abstract processing is hypothesised to lead to ineffective episodes of rumination with unconstructive consequences, which is likely to cause these episodes to become prolonged.

Second, the failure to find a direct association between abstract processing and RNT could be due to the way in which abstract processing was operationalised. By using the Problem Elaboration Questionnaire (PEQ; Stöber & Borkovec, 2002), the study may have inadvertently been capturing participants' tendencies to be abstract only in response to the specific events identified in the PEQ, rather than assessing their more generalised tendency to construe information in an abstract manner. As such, the level of abstraction demonstrated in the PEQ may not generalise across all situations and as such may be an inadequate measure of the more global tendency towards abstract processing.

Finally, it is also possible that abstract processing may have a direct effect on trait RNT, but when the relationship was considered alongside other powerful predictors in a SEM analysis, the relationship no longer remained significant. This is a possibility since examining basic correlations indicates that abstract processing was significantly associated with rumination and worry (Table 2.1).

To explore this possibility, further regression analyses were conducted to see whether when considered on its own, abstract processing (PEQ) would be significantly associated with rumination (RSQ-RRS) and worry (PSWQ), and whether the associations would remain significant after controlling for depression (BDI-II) and anxiety (STAI-state) symptoms. In a regression analysis with either rumination (RSQ-RRS) and worry (PSWQ) as the dependent variable and abstract processing (mean PEQ score) as the predictor, abstract processing was a significant predictor of rumination ($t(493) = -7.06$, $p < .001$, $\beta = -.30$) and worry ($t(493) = -5.22$, $p < .001$, $\beta = -.23$).

In order to see whether the relationships remained significant after controlling for depression and anxiety symptoms, further hierarchical regression analyses were conducted with either rumination (RSQ-RRS) or worry (PSWQ) as the dependent variable, and then depression (BDI-II) and anxiety (STAI-state) as predictors in Step 1, and abstract processing (mean PEQ score) as the predictor in Step 2. Abstract processing remained a significant predictor of rumination ($t(444) = -3.62$, $p < .001$, $\beta = -.12$), however, the result did not remain statistically significant for worry ($t(444) = -1.88$, $p = .060$, $\beta = -.07$).

As such, it appears that whilst abstract processing may be significantly associated with trait RNT, and remain associated with rumination after controlling for current symptoms of depression and anxiety, when considering it alongside other

more powerful proximal predictors, it may cease to be a significant predictor. This suggests that the variance in RNT is accounted for by other factors.

2.9. Appendix C: Excluded Measures and Unmeasured Constructs: Effortful Control and Intolerance of Uncertainty

The following section comprises discussion of two constructs that were identified as potential vulnerability factors for RNT in Chapter 1 that were either measured but not reported in the published paper, or not measured at all in the study.

One measure that was administered but not reported in the published article was the 24-item Effortful Control Scale (EC scale; Lonigan & Phillips, 2001). The measure assesses the construct of effortful control, which is a self-regulatory ability that concerns individual differences in the ability to exert control over emotional and behavioural responses. In particular, effortful control refers to the ability to inhibit and activate responses when necessary, and to voluntarily shift attention as required (Rothbart, 1989). Previous studies examining effortful control have demonstrated cross-sectional associations with rumination (Hilt et al., 2012; Verstraeten et al., 2009, 2011). However, rather than being characterised as a vulnerability factor that independently contributes towards vulnerability to RNT, effortful control has been hypothesised to moderate the relationship between rumination and depression (Verstraeten et al., 2009). It has also been hypothesised to interact with early negative life events, such as overcontrolling parenting, to contribute to RNT (Hilt et al., 2012).

The EC scale was included as it is self-report measure that could be administered online which would tap into some concepts identified in the cognitive control theories of RNT (cf. Hertel, 2007; Linville, 1996). The EC scale has two subscales: Impulsivity, and Persistence / Low Distractibility. Prior to performing the main SEM analysis, preliminary correlations were examined between the two subscales of the EC scale and the RSQ-RRS and PSWQ. The Impulsivity subscale had no significant relationship with either the RSQ-RRS (r = -.047, p = .294) or the

PSWQ (r = .051, p = .257), whereas the Persistence / Low Distractability subscale was moderately correlated with the RSQ-RRS (r = -.480, p < .001) and PSWQ (r = -.364, p < .001).

Next, further analyses were conducted to examine whether effortful control (the persistence/low distractibility subscale) would act as a moderator of the relationship between early experiences (abuse and overcontrolling parenting) and RNT. The findings were inconsistent: considering the relationship with rumination, effortful control did moderate the relationship between rumination and emotional abuse (t(445) = -2.31, p = 021., β = -.10) and physical abuse (t(492) = -3.04, p = .003, β = -.12), but it did not moderate the relationship between rumination and maternal overcontrol (t(497) = -1.07, p = .287, β = -.04), paternal overcontrol (t(483) = -1.15, p = .251, β = -.05), or sexual abuse (t(446) = -1.27, p = .204, β = -.06).

Considering the relationship with worry, effortful control did moderate the relationship between worry and emotional abuse (t(445) = -2.41, p = .016, β = -.11), but it did not moderate the relationship between maternal overcontrol (t(497) = -1.22, p = .220, β = -.05), paternal overcontrol (t(483) = -1.36, p = .175, β = -.06), physical abuse (t(492) = -1.70, p = .090, β = -.07), or sexual abuse (t(446) = -.27, p = .785, β = -.01). However, it is important to note that it would be unlikely to observe a significant finding for physical and sexual abuse due to low levels of participant report.

Given the slightly irregular pattern of findings, it was difficult to include the low persistence/distractibility subscale of the EC scale in the SEM model whilst also achieving good fit indices. Moreover, the measure was only tapping in to a small component of the more global construct of cognitive inhibition and control that has been implicated in vulnerability to RNT. On reflection, it is possible that self-report

measures of these sorts of executive function constructs are not the optimum way of assessing these tendencies. Given the online methodology adopted for this study it was not possible to use anything other than self-report questionnaires, but it would nonetheless be useful to attempt to explore the relationship between effortful control and other components of the broader cognitive inhibition/control construct using laboratory-based measures in future studies.

The construct of intolerance of uncertainty was identified as a potential vulnerability factor from the literature review, but was not measured in the current study. Due to practical constraints – specifically, the time taken to complete the battery of measures – it was not practical to include measures of every construct. Since intolerance of uncertainty has been most widely studied with respect to symptoms of anxiety, rather than RNT specifically (see Chapter 1, Section 1.3.3.2), it was less of a priority to include a measure of this construct when compared with other vulnerability factors more directly associated with RNT. As such, it would be interesting and useful to conduct a modified version of this study using a measure such as the Intolerance of Uncertainty Scale (IUS; Buhr & Dugas, 2002).

2.10. Appendix D: Normality Statistics Pre- and Post-Data Transformations

Study 1 reported the use of square root transformed data due to the data, as expressed in its original form, not being normally distributed. Due to the nature of the variables being measured (e.g., depression score), one would not expect to observe a normal distribution. Whilst the square root transformations do not completely rectify the skewness and kurtosis within the data (i.e., Shapiro-Wilk and Kolmogorov-Smirnov tests still give significant values post-transformation), transformation does substantially improve the normality of the distributions. To demonstrate this, Table 2.2 displays skew and kurtosis statistics for all variables pre- and post-transformation. Note that a skew or kurtosis value of 0 indicates that the data perfectly matches the normal distribution, and a value "between plus or minus one is considered excellent for most psychometric purposes, but a value between plus or minus two is in many cases also acceptable" (George & Mallery, 2003, p. 99).

Table 2.2. Study 1 data skew and kurtosis statistics pre- and post-square root transformation

Measure	Pre-Transformation		Post-Transformation	
	Skew	Kurtosis	Skew	Kurtosis
RSQ-RRS	.19	-.74	-.07	-.78
PSWQ	-.24	-.70	.35	-.50
BDI-II	1.02	.38	.30	-.56
STAI	.03	-.79	-.25	-.67
PSS	-.05	-.50	.44	-.07
EPQR-SF-N	-.26	-.85	.15	-.90
LEQ Emotional Abuse	1.00	.87	.24	-.61
LEQ Physical Abuse	2.12	5.53	1.33	1.41
LEQ Sexual Abuse	4.14	21.47	2.70	8.34
CRPBI-30 Father Psych. Overcontrol	1.05	.28	.83	-.26
CRPBI-30 Father Psych. Overcontrol	.90	.01	.68	-.45
PEQ Problem Mean	.07	-.37	-.24	-.36
PEQ Consequence Mean	.40	.07	.08	-.29
WR: Instrumental Understanding	-.34	-.18	.39	.28
WR: Self and Social Control	-.12	-.66	.32	-.24
WR: Motivation, Learning, Goal-Setting	-.41	-.16	.11	-.05
WR: Reduce Past Distress	.23	-.45	-.13	-.56

Note. RSQ-RRS: Response Styles Questionnaire – Ruminative Response Scale; PSWQ: Penn State Worry Questionnaire; BDI-II: Beck Depression Inventory-II; STAI: State-Trait Anxiety Inventory (state subscale); PSS: Perceived Stress Scale; EPQR-SF-N: Eysenck Personality Questionnaire Revised Short Form (neuroticism subscale); LEQ: Life Events Questionnaire; CRPBI-30: Children's Report of Parental Behaviour Inventory (30-item version); PEQ: Problem Elaboration Questionnaire mean abstraction rating; WR: Why Ruminate scale.

2.11. Appendix E: Discussion of Online Data Collection Approach

As this study adopted an online method of data collection, it is important to consider the strengths and weaknesses of such an approach, and whether different findings would have occurred has the study been conducted in person. One limitation of the online approach is that it is not possible to control the environment in which the questionnaires are being completed. For example, participants may be doing other activities at the same time whilst completing the measures (e.g., concurrently browsing the internet and filling out the online questionnaires), or participants may be in the company of other people who may be able to observe their responses, rather than on their own. A further limitation with online research is that the researcher is not physically present to provide immediate answers to questions. This could be particularly problematic in the event of participants perceiving information to be ambiguous (e.g., confusion over the wording of instructions, or questionnaire items).

However, due to the aims of the study necessitating the measurement of a large number of variables, a large sample was required. It would not have been within the practical scope of the PhD project to test such a large sample (over 500 participants) in the laboratory with a questionnaire battery taking a minimum of 45 minutes to complete. Whilst it is important to acknowledge the limitations of online research, in an evaluation of six online studies, Gosling, Vazire, Srivastava, and John (2004) concluded that internet findings generalise across presentation formats and are consistent with findings from traditional methods. As such, there is no serious reason to believe that responses to measures would have been significantly different if completed in the laboratory under supervision. Moreover, great care and attention was given to the wording of all instructional materials, to minimise the chances of participants finding materials confusing or ambiguous. The online questionnaires

were pilot tested in the laboratory using several pilot participants who were blind to the aims of the study and unfamiliar with the research area. This ensured that the materials were clearly and unambiguously presented, and modifications were made to any instructional materials judged to be ambiguous by the pilot participants.

CHAPTER 3: Study 2 - A Prospective Examination of Risk Factors for Repetitive Negative Thought

3.1. Preface

Having examined the cross-sectional relationships between RNT and putative vulnerability factors (Chapter 2, Study 1), this chapter reports a longitudinal study designed to examine the prospective relationships between rumination and worry, conceptualised as the transdiagnostic process of RNT, and a wide range of vulnerability factors. This study is a longitudinal extension of the cross-sectional study described in the previous chapter, with Time 2 data being collected 6-8 weeks after the Time 1 data. A paper reporting this study is currently under review:

Kingston, R. E. F., Watkins, E. R., & O'Mahen, H. A. (under review). A prospective examination of risk factors for repetitive negative thought.

Referring to the research objectives of the PhD, this study aimed to contribute to the literature by examining rumination and worry together, alongside a range of vulnerability factors, to see which factors prospectively predicted change in RNT after controlling for symptoms of depression and anxiety, and perceived stress.

The prospective design builds upon the study reported in the previous chapter by testing which of the factors measured in Study 1 temporally precede changes in RNT. As such, this study provides a necessary but not sufficient step in establishing the causal relationships between vulnerability factors and RNT by demonstrating temporal precedence. Whilst the prospective design alone cannot establish causality, by demonstrating which factors may prospectively predict change in RNT, it affords identification of vulnerability factors that it may be useful to examine more closely using subsequent experimental studies where vulnerability factors are manipulated and the effect on subsequent RNT is examined.

As with Study 1, reported in the previous chapter, the prospective study reported in this chapter considered rumination and worry together, as the transdiagnostic process of RNT. As outlined in Chapter 1 (Section 1.4.1), studying rumination and worry together as the common process of RNT is justified by (i) their high degree of correlation and difficulties making meaningful distinctions between the qualities of the two processes; (ii) their similarities in terms of negative consequences for mood and psychopathology; and (iii) the considerable overlap between theoretical accounts of rumination and worry (Ehring & Watkins, 2008; Nolen-Hoeksema & Watkins, 2011; Watkins, 2008). Moreover, the cross-sectional analyses reported in Chapter 2 found that worry and rumination formed a single latent variable, further validating the use of a combined measure. As such, this study aims to contribute to the transdiagnostic literature by examining which factors prospectively predict change in RNT.

This study also aimed to test some specific hypotheses relating to the classification of vulnerability factors as either proximal or distal (Nolen-Hoeksema & Watkins, 2011). In Chapter 1 (Section 1.6), the conceptual framework proposed by Nolen-Hoeksema and Watkins (2011) was outlined, in which vulnerability factors for RNT can be classified according to their causal distance to rumination and worry. Specifically, distal factors refer to "environmental and congenital biological variables relatively distal to observable symptoms of disorders", whereas proximal factors refer to "within-person variables that are more proximal to symptoms of disorders" (Nolen-Hoeksema & Watkins, 2011, p. 593). Distal factors are not hypothesised to have a direct influence on symptoms such as RNT, but they are hypothesised to influence symptoms such as RNT via mediating proximal factors, which are hypothesised to have a direct effect.

Within this conceptualisation, the current study classified the vulnerability studies that were measured as either proximal or distal factors: overcontrolling parenting and childhood abuse were classified as distal factors, whereas abstract processing and beliefs about the function of RT were characterised as proximal factors. The personality trait of neuroticism is more of an intermediate factor that is less easy to classify as either proximal or distal since it has qualities that span both dimensions. Proximal and distal factors do not necessarily refer to definitive categories into which each vulnerability factor must neatly fit; instead, there may be a continuum between proximal and distal factors such that certain factors – such as neuroticism – share both proximal and distal qualities. Specifically, neuroticism's distal qualities stem from its aetiology: in part, it is a heritable trait with genetic origins, but its development is also influenced by early environmental experiences (Goldberg, 2000; Laceulle et al., 2013). On the other hand, neuroticism's proximal qualities stem from its tendency to influence experiences in the present: unlike other distal factors, it is a within-person temperamental factor that has a direct influence on how individuals respond in the here-and-now. Neuroticism is associated with a range of cognitive, emotional and behavioural responses, including influencing emotional reactivity to stimuli, encoding and recall of information, and judgments and decision-making (Augustine et al., 2013). For instance, neuroticism is associated with biased recall of negative trait words (Martin et al., 1983; Young & Martin, 1981), more negative perceptions of exchanges with others (McNulty, 2008), and increased interpersonal self-focus (Fetterman & Robinson, 2012).

A Prospective Examination of Risk Factors for Repetitive Negative Thought

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3.2. Abstract

The current study examines which proximal and distal factors are prospectively associated with changes in repetitive negative thought (RNT) in a large, non-clinical adult sample. Proximal factors (beliefs about the function of repetitive thought, neuroticism) were hypothesised to predict change in RNT, whereas distal factors (parental overcontrol, childhood maltreatment) were not. At Time 1, measures of RNT (rumination, worry), symptoms (depression, anxiety, stress), parental overcontrol, childhood maltreatment, neuroticism, abstraction, and beliefs about the function of repetitive thought were administered. Six to eight weeks later, at Time 2, RNT was measured again. The hypotheses were broadly supported: only neuroticism and the belief that repetitive thought aids instrumental understanding prospectively predicted change in RNT after controlling for symptoms.

3.3. Introduction

Repetitive thought (RT) refers to the process of "thinking attentively, repetitively or frequently about one's self and one's world" (Segerstrom, Stanton, Alden, & Shortridge, 2003, p. 909). Whilst most psychologically healthy individuals engage in RT from time to time, and RT can be constructive, RT also prospectively predicts mental health problems such as depression and anxiety (Watkins, 2008). Rumination and worry are two of the most widely studied forms of such unconstructive RT.

Whilst rumination and worry are often examined separately, they can be conceptualised within the broader process of repetitive negative thought (RNT; Segerstrom, Tsao, Alden, & Craske, 2000). Both are (i) repetitive; (ii) focused on negative content; (iii) experienced as passive and relatively uncontrollable; (iv) abstract in processing style, with a focus on generalised meanings and implications of events (Ehring & Watkins, 2008). Previous empirical research emphasises the commonality between worry and rumination (e.g., Watkins, Moulds, & Mackintosh, 2005; Watkins, 2008). Moreover, RNT has been proposed as a transdiagnostic process that is common to and causally contributes to a large number of mental health problems (Ehring & Watkins, 2008; Harvey, Watkins, Mansell, & Shafran, 2004).

To date, research has predominantly focused on the negative consequences of RNT, rather than its causes. Given its negative outcomes, there is much to be gained from a more parsimonious and integrated theoretical understanding of the factors associated with individual differences in RNT to inform assessment, treatment, and prevention.

Overcontrolling parenting (Spasojević & Alloy, 2002), childhood maltreatment or abuse (Conway, Mendelson, Giannopolous, Csank, & Holm, 2004; Raes & Hermans, 2008), neuroticism (e.g., Nolen-Hoeksema, Parker, & Larson, 1994), beliefs about the function of RT (e.g., Papageorgiou & Wells, 2003; Watkins & Baracaia, 2001), and having an abstract processing style (e.g., Stöber & Borkovec, 2002; Watkins, 2008) are all factors theoretically predicted to influence RNT and found to be associated with individual differences in RNT. These factors can be categorised according to their hypothesised causal distance from RNT (Nolen-Hoeksema & Watkins, 2011): proximal factors refer to current within-person variables that may be closely associated with RNT (e.g., cognitive factors increasing

likelihood of RNT), whereas distal factors refer to environmental or congenital variables which may not be directly associated with RNT (e.g., overcontrolling parenting, childhood maltreatment), but rather influence RNT via mediating proximal factors. Some factors are harder to classify: Neuroticism can be characterised as having both proximal and distal qualities, because it is proposed to have genetic and environmental origins (Goldberg, 2000), but it is also a temperamental characteristic involving direct influence on cognitive processing (e.g., Martin, Ward, & Clark, 1983).

A recent cross-sectional study that examined all of the above factors using structural equation modelling found that the proximal factors of perceived function of RT and neuroticism were directly associated with RNT, over and above the effects of current distress (Kingston, Watkins, & O'Mahen, 2013a). Whilst emotional abuse and abstract processing style had significant indirect effects on RNT, the relationships between these variables and RNT were fully mediated by the perceived function of RT and neuroticism.

However, much of the extant literature examining such risk factors is correlational, these factors tend to be studied in isolation, and there is a lack of prospective and causal evidence. The current study sought to advance our knowledge of the role of these factors on the maintenance of RNT by using a longitudinal prospective design including multiple factors: If a factor is hypothesised to cause RNT, then a necessary (although not sufficient to establish causality) prediction arising from that hypothesis is that the identified factor will prospectively predict RNT at a later time point, after controlling for initial RNT.

The theoretical categorisation of vulnerability factors according to their proximal or distal qualities generates testable predictions about the ways in which

these variables may or may not prospectively influence the maintenance of RNT. First, we hypothesised that distal factors (overcontrolling parenting, childhood maltreatment) would not predict short-term maintenance or increase in RNT over 6-8 weeks after controlling for symptoms (depression, anxiety, stress), even though these factors may be significantly associated with baseline levels of RNT. Distal factors were hypothesised to have limited influence over short-term maintenance of RNT because (i) they were temporally distant from these potential changes, unlike proximal factors; (ii) their effects tend to be indirect and dependent on proximal factors to exert their effects; (iii) over the short-term period examined in the current study distal factors were presumably unchanged over time, and unlikely to influence short-term changes in RNT. Second, we hypothesised that proximal factors (beliefs about the function of RT, abstract processing, neuroticism) would predict short-term change in RNT, after controlling for both symptoms and distal factors, because they are current rather than historic factors, and because of their potential to influence how an individual responds to situations and feelings in the moment.

We utilised a longitudinal prospective design to test which factors predicted changes in RNT over 6-8 weeks, after controlling for baseline levels of RNT, depression, anxiety, and stress.

3.4. Method

3.4.1. Participants

Participants were recruited via e-mails sent to undergraduate students at UK university departments, inviting them to complete a series of online questionnaires for a study examining worry and rumination. For full details of Time 1 recruitment methods, see Kingston et al. (2013a). At Time 1, 506 participants completed the

online questionnaires (85% female, 15% male; age range 18-57, M = 22.15 years, SD = 5.79; 83.79% identified themselves as British, 10.28% as non-British European, 3.16% as Asian, 2.37% as North American, 0.40% as Australian). Although not selected on the basis of symptoms, 147 participants (29.05%) scored 20 or more (indicating moderate or severe depression symptoms) on the Beck Depression Inventory-II (Beck, Steer, & Brown, 1996).

Six weeks later, at Time 2, all 506 participants were e-mailed with the follow-up questionnaires, and 401 participants completed them (85.5% female, 14.5% male; age range 18–57, M = 22.35, SD = 5.88). The data analysed comes from these 401 participants with Time 1 and Time 2 data.

3.4.2. Measures

3.4.2.1. Repetitive negative thought.

Response Styles Questionnaire – Ruminative Response Scale (RSQ-RRS, Nolen-Hoeksema & Morrow, 1991*)*. The RSQ-RRS is a 22-item questionnaire that assesses ruminative responses focused on the self, symptoms, and possible causes and consequences of low mood. Total scores range from 22-88, with higher scores indicating greater trait rumination. It has acceptable convergent validity and high internal consistency (α = .89; Nolen-Hoeksema & Morrow, 1991).

Penn State Worry Questionnaire (PSWQ, Meyer, Miller, Metzger, & Borkovec, 1990). The PSWQ is a 16-item measure of trait worry, assessing the tendency to engage in excessive, uncontrollable and generalised worry. Scores range from 16-80, with higher scores indicating greater trait worry. It has good internal consistency and construct validity (Molina & Borkovec, 1994).

3.4.2.2. Symptoms and current stress.

Beck Depression Inventory – II (BDI-II, Beck, et al., 1996*)*. The BDI-II is a widely used 21-item questionnaire designed to measure the intensity of somatic and affective symptoms of depression, with good psychometric properties (α = .91; Dozois, Dobson, & Ahnberg, 1998). Scores range from 0-63, with higher scores indicating greater depression.

State-Trait Anxiety Inventory – State subscale (STAI, Spielberger, 1989*)*. The "state" subscale of the STAI is a 20-item measure of state anxiety, with high internal consistency (Barnes, Harp, & Jung, 2002). Respondents rate statements (e.g., "I feel nervous") on a 4-point scale ranging from "not at all" to "very much", to indicate their feelings over the past two weeks, giving scores from 20-80 (higher scores indicating greater state anxiety).

Perceived Stress Scale (PSS; 10-item version, Cohen & Williamson, 1988*)*. The PSS is a 10-item questionnaire measuring the degree to which respondents appraise their current situation as stressful, uncontrollable, and unpredictable, with adequate internal consistency and construct validity. Scores range from 0-40, with higher scores indicating greater levels of perceived stress.

3.4.2.3. Early experiences.

Children's Report of Parental Behaviour Inventory (30-item version, CRPBI-30, Schludermann & Schludermann, 1988*)*. The CRPBI-30 is designed to measure parenting behaviours of the respondents' mothers and fathers. Three dimensions of parenting behaviours were examined and rated, with good internal consistency in our sample: acceptance versus rejection (Mother α = .93; Father α = .94); firm versus lax behavioural control (Mother α = 86, Father α = .86); psychological autonomy versus psychological control (Mother α = 86, Father α = .87). Scores range from 10-30 on

each dimension, with higher scores representing greater acceptance, greater firm behavioural control, and greater psychological control, respectively.

*Life Events Questionnaire (*LEQ, Gibb et al., 2001). The LEQ is an 82-item measure which assesses previous experiences of emotional abuse (range 0-28), physical abuse (range 0-10), sexual abuse (range 0-26) in childhood by asking participants to respond with "yes", "no", or "not sure", to indicate whether they experienced particular maltreatment events. We only administered the abuse subscales and participants were asked about events occurring before 16 years old. The LEQ demonstrates good internal consistency (α = .89, Gibb et al., 2001).

3.4.2.4. Cognitive and personality factors.

Beliefs about the Function of RT - Why Ruminate scale. The Why Ruminate scale (WR, Watkins & Baracaia, 2001) is a 46-item questionnaire measuring perceived benefits and functions of rumination, with participants indicating their agreement with each item on a scale from 1 ("not true at all") to 5 ("completely true") . There are four subscales: (1) instrumental understanding (e.g., "I ruminate because I need to know the reasons for why things happen"; range 14-70; internal consistency α = .93), (2) self and social control (e.g., "I ruminate to have better control over my life"; range 11-55; α = .90), (3) motivation, learning, and goal-setting (e.g., "I ruminate to try and maintain my standards"; range 7-35; α = .84), and (4) reducing past distress (e.g., "I ruminate to remove the pain of upsetting memories and images"; range 6-30; α = .83).

*Abstract thinking styles - Problem Elaboration Questionnaire (*PEQ, Stöber & Borkovec, 2002). This adapted PEQ instructs participants to identify two significant current problems about which they are currently repeatedly thinking (see Watkins & Moulds, 2007, for detailed instructions), and then provide a description and three

possible consequences of each problem. Responses were blindly rated on a 5-point scale: 1 (abstract, defined as "indistinct, cross-situational, equivocal, unclear, aggregated"), 2 (somewhat abstract), 3 (neither-nor), 4 (somewhat concrete), 5 (concrete, defined as "distinct, situationally specific, unequivocal, clear, singular"), giving each participant two mean scores (problem description rating; consequence description rating). Inter-rater reliability was good (mean Cohen's kappa = .76).

Neuroticism - Revised Eysenck Personality Questionnaire – Short Form (Neuroticism subscale; EPQR-SF-N; Eysenck, Eysenck, & Barratt, 1985). The EPQR-SF-N measures the personality trait of neuroticism, with high internal consistency (α = .80 – 84). Participants indicate their response to each of 12 items (e.g., "does your mood often go up and down?") by endorsing "yes" or "no".

3.4.3. Procedure

On visiting the study website, participants were given information about the study, completed informed consent, and completed all of the questionnaires online (Time 1). At Time 2, 6-8 weeks later, participants were individually e-mailed and asked to complete the RSQ and PSWQ online. For participants who did not respond to the initial follow-up communication, up to two reminder e-mails were sent at weekly intervals to encourage follow-up response (at seven and eight weeks post-baseline). The mean interval between completion of baseline measures and follow-up measures was 47.53 days (SD = 7.42).

3.5. Results

3.5.1. Preliminary Analyses

All variables were examined for skew and kurtosis. Since some variables were not normally distributed, all variables were subjected to square root transformations,

which improved the normality of the distributions for all variables. Physical and sexual abuse variables were excluded from subsequent analyses as a result of insufficient reporting range. In addition, all independent variables were screened for multicollinearity by examining VIF and tolerance statistics. Since no tolerance values were less than .1 and no VIF values were greater than 10 (Myers, 1990), problematic multicollinearity was not detected. Descriptive statistics (means and standard deviations) are displayed in Table 3.1.

Table 3.1. Means (and standard deviations) for Time 1 and Time 2 variables

Variables	Time 1	Time 2
RSQ-RRS	54.60 (15.39)	50.62 (14.38)
PSWQ	53.31 (14.64)	51.67 (15.01)
BDI-II	15.81 (12.39)	
STAI	48.83 (14.02)	
PSS	20.33 (7.76)	
LEQ Emotional Abuse	6.42 (5.31)	
CRPBI-30 Maternal Overcontrol	15.64 (4.82)	
CRPBI-30 Paternal Overcontrol	14.81 (4.69)	
EPQR-SF-N	6.81 (3.37)	
PEQ	5.04 (1.67)	
WR: Instrumental Understanding	45.28 (11.70)	
WR: Self and Social Control	30.47 (9.25)	
WR: Motivation, Learning and Goal-Setting	22.28 (5.38)	
WR: Reduce Past Distress	15.32 (5.14)	

Note. RSQ-RRS: Response Styles Questionnaire – Ruminative Response Scale; PSWQ: Penn State Worry Questionnaire; BDI-II: Beck Depression Inventory-II; STAI: State-Trait Anxiety Inventory (state subscale); PSS: Perceived Stress Scale; LEQ Emotional Abuse: Life Events Questionnaire (emotional abuse subscale); CRPBI-30: Children's Report of Parental Behaviour Inventory (30-item version); EPQR-SF-N: Eysenck Personality Questionnaire Revised Short Form (neuroticism subscale); PEQ: Problem Elaboration Questionnaire mean abstraction rating; WR: Why Ruminate scale.

After this data screening, a composite variable was created to represent RNT, based on the theoretical model of a common process. Furthermore, PSWQ and RSQ were significantly correlated ($r = .66$, $p < .001$). The square root transformed RSQ and PSWQ scores were converted into z-scores to standardise the scorings. The standardised variables were then added together, creating a total composite score for RNT.

Table 3.2. Regression analysis examining the effects of Time 1 variables on Time 2 RNT

Time 1 Variables	Step 1			Step 2			Step 3			Step 4			Step 5		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
RNT	.82	.03	.84***	.75	.04	.77***	.75	.04	.77***	.65	.05	.67***	.60	.05	.61***
BDI-II				.06	.06	.05	.05	.06	.04	.03	.06	.03	.04	.06	.03
STAI				-.01	.01	-.01	-.02	.09	-.01	-.07	.09	-.04	-.08	.09	-.05
PSS				.13	.10	.06	.14	.10	.07	.15	.10	.07	.15	.10	.07
LEQ Emotional Abuse							.08	.06	.04	.09	.06	.04	.06	.06	.03
CRPBI-30 Maternal Overcontrol							.09	.10	.03	.10	.10	.03	.10	.10	.03
CRPBI-30 Paternal Overcontrol							-.18	.10	-.06	-.16	.10	-.05	-.16	.10	-.05
EPQR-SF-N										.43	.12	.16***	.46	.12	.17***
PEQ													-.12	.11	-.03
WR: Instrumental Understanding													.19	.07	.13**
WR: Self and Social Control													.08	.08	.04
WR: Motivation, Learning and Goal-Setting													-.11	.09	-.05
WR: Reduce Past Distress													-.17	.10	-.06
R^2		.71			.71			.72			.73			.74	
Adjusted R^2		.71			.71			.71			.72			.73	
R^2 *Change*		.71			.00			.00			.01			.01	
F for change in R^2		973.26***			1.94			1.59			14.02***			2.71*	

Note. RNT: Repetitive negative thought composite variable; BDI-II: Beck Depression Inventory-II; STAI: State-Trait Anxiety Inventory (state subscale); PSS: Perceived Stress Scale; LEQ Emotional Abuse: Life Events Questionnaire (emotional abuse subscale); CRPBI-30: Children's Report of Parental Behaviour Inventory (30-item version); EPQR-SF-N: Eysenck Personality Questionnaire Revised Short Form (neuroticism subscale); PEQ: Problem Elaboration Questionnaire mean abstraction rating; WR: Why Ruminate scale.
*$p < .05$, **$p < .01$, ***$p < .001$.

3.5.2. Regression Analysis

In order to examine which factors prospectively predicted changes in RNT from Time 1 to Time 2, a hierarchical multiple regression analysis was conducted, with variables simultaneously entered into each step of the hierarchy. Time 2 RNT was entered as the dependent variable. Time 1 RNT was entered in Step 1 and symptom measures (BDI-II, PSWQ, PSS) were entered in Step 2, thus examining whether subsequently entered independent variables predicted variance in Time 2 RNT once Time 1 RNT and symptoms were controlled. Early experience factors were entered in Step 3, neuroticism was entered in Step 4, and cognitive factors were entered in Step 5, since distal variables reflecting experiences early in life have temporal priority over current proximal factors. The results of this analysis are reported in Table 3.2.

The results are consistent with the hypothesis that neuroticism would prospectively predict changes in RNT (i.e., RNT at Time 2 regressed on RNT at Time 1) after controlling for symptoms: greater neuroticism at Time 1 predicted increases in RNT at Time 2.

The hypothesis that beliefs about the function of RT would prospectively predict changes in RNT was partially supported: The belief that RT facilitates instrumental understanding predicted changes in RNT after controlling for symptoms, whereas the other types of belief about the function of RT did not predict changes in RNT. Inconsistent with our hypothesis, abstract processing did not predict changes in RNT.

Notably and unsurprisingly the strongest predictor of Time 2 RNT was Time 1 RNT. Symptoms of depression, anxiety, and stress did not predict changes in RNT once Time 1 RNT was statistically controlled. As hypothesised, overcontrolling

parenting and childhood maltreatment did not predict change in RNT when controlling for symptoms.

3.6. Discussion

The current study aimed to identify factors that may be involved in the medium-term maintenance of RNT by examining which early experience, cognitive, and personality factors influenced change in RNT over 6-8 weeks, once symptoms of depression, anxiety, and stress were statistically controlled. Our hypotheses were broadly supported: the only variables that prospectively predicted changes in RNT after controlling for baseline RNT and symptoms were neuroticism and the belief that RT facilitates instrumental understanding.

Whilst distal factors may be important in establishing the tendency towards RNT, we hypothesised that proximal factors would be more important in predicting the maintenance of RNT over a medium-time period (changes in RNT over 6–8 weeks). These prospective findings are consistent with this hypothesis that proximal factors causally contribute to RNT.

One variable that predicted RNT above and beyond all other factors is the perception that RT aids instrumental understanding: Participants who strongly endorsed this function for RT reported greater subsequent engagement in RNT. This finding is consistent with suggestions that RNT may be driven by its perceived functional effects and/or by positive metacognitive beliefs (e.g., Borkovec, 1994; Papageorgiou & Wells, 2003; Watkins et al., 2007). However, only the perceived function of instrumental understanding was predictive of changes in RNT. Interestingly, other reported functions for RT including increasing self and social control, enhancing motivation and learning, and reducing past distress, were not predictive of subsequent changes in RNT. If replicated, this finding would indicate a

more specific relationship between the perceived function of rumination and increased RNT than prior meta-cognitive accounts (Papageorgiou & Wells, 2003), advancing our understanding of its maintenance. The unique role of perceived instrumental understanding is consistent with prior associations between rumination and increased understanding (Lyubomirsky & Nolen-Hoeksema, 1993; Watkins & Baracaia, 2001). Because the need to understand meanings and make sense of thoughts, feelings, and events is an important and common need (e.g., Heine, Proulx, & Vohs, 2006), it may be that if RT is perceived to facilitate such understanding, motivation to engage in RT will be strong. We speculate that people perceive that gaining understanding and insight is something which can only be achieved through conceptual analysis and prolonged thinking about an issue (i.e., RT), whereas other potential functions of RT can be achieved through alternative activities (e.g., distraction to reduce distress).

Neuroticism also prospectively predicted changes in RNT, after controlling for symptoms. We hypothesised that neuroticism has both proximal and distal qualities, and that the proximal qualities of neuroticism enable it to have an influence on the medium-term maintenance of RNT. One proximal quality of neuroticism is the way it involves selective information processing such as increasing accessibility of negative self-referent material in memory (Martin et al., 1983). Neuroticism may influence engagement in RNT over time by predisposing individuals to attend selectively to negative material, and to recall more self-related negative information (e.g., past mistakes and shortcomings), which in turn, increases the likelihood of individuals dwelling on negative material about themselves.

Contrary to our hypothesis, abstract processing did not predict change in RNT. One explanation for this finding may be that abstraction influences the duration of

state RNT (i.e., "episodes" of RNT, e.g., Watkins, 2008), rather than trait RNT, as examined in this study.

Level of distress (anxiety, depression, stress) was not predictive of Time 2 RNT after accounting for Time 1 RNT. Although RNT has been characterised as both a cause and consequence of low mood, this suggests that symptoms may not directly influence the medium-term maintenance of RNT. If replicated in a clinical sample, this would suggest that interventions designed to only tackle mood, stress, or anxiety without focus on RNT itself may not be successful at reducing RNT.

These findings have potential clinical implications. First, we found factors that are temporal antecedents of change in RNT. This is of potential clinical value since clinicians can assess factors such as neuroticism and perceived function for RT in instrumental understanding to identify individuals at increased risk for RNT. Clinicians can then target these factors, for example by challenging perceived functions, as a putative means to reduce or prevent RNT. One successful intervention for rumination – rumination-focused CBT – includes a focus on analysing and then replacing the potential functions of rumination for patients (Watkins et al., 2007; Watkins, Mullan, et al., 2011).

The current study has several strengths. First, it examined rumination and worry together, thus contributing to a more parsimonious theoretical account of the transdiagnostic process of RNT. Second, the sample size was relatively large (n=401). Third, the study examined a broad and integrated range of factors, rather than examining specific factors in isolation. Thus, we could evaluate which of these factors are particularly important in predicting RNT when considered alongside other factors. Fourth, the prospective longitudinal methodology enables examination of the ways in which variables influence changes in RNT over time. This is a necessary (but not

sufficient) step in establishing the causal relationships between the variables, and builds upon previous cross-sectional research (Kingston et al., 2013a), which demonstrated a concurrent association between these variables. Finally, whilst the study did not utilise a clinical sample, nearly 30% of the sample scored over 20 on the BDI-II, indicating that they were experiencing at least moderate levels of depression symptoms. Findings may be tentatively generalised to clinical populations, although replication in a clinical sample is required.

There were limitations to the study. First, the study relied on retrospective self-report measures, which are highly subjective, and measures of past life events may be subject to inaccurate or biased recall. Future studies would benefit from using additional measures (e.g., using parental-report measures of overcontrol in addition to child-report measures). Second, due to low levels of participant report, it was not possible to examine the prospective relationships between sexual and physical abuse in childhood and RNT. It may be helpful to target populations in which experience of abuse is more prevalent.

It would be beneficial to have further prospective studies using longer and multiple follow-up periods, to see if the effects observed in this initial study remain beyond 8 weeks. Critically, experimental studies are needed to establish the causal relationships between these factors and RNT. Studies that bidirectionally manipulate factors (e.g., enhancing or diminishing the perception that RT aids instrumental understanding) whilst measuring subsequent RNT would establish the causal relationship between the variables.

Engagement in pathological RNT has serious implications for mental health, and thus an understanding of the vulnerability factors that influence ongoing engagement in RNT is important in informing treatment and prevention. Building

upon previous correlational research, the current study demonstrates that two factors are significant predictors of medium-term changes in RNT: neuroticism and the specific perception that RT aids instrumental understanding.

3.7. Appendix A: Regression Analysis Using Separate Rumination and Worry Variables

The main regression analysis examining the prospective relationships between putative vulnerability factors and RNT used a composite variable representing RNT, made up of the RSQ-RRS and the PSWQ. In order to test whether the same predictors would be found for rumination and worry when considered separately, the regression analyses were repeated to examine the RSQ-RRS and PSWQ variables individually. The results from the regressions examining rumination and worry are displayed in Table 3.3 and Table 3.4, respectively.

Generally, the same pattern of results is observed: the early experience factors (emotional abuse and overcontrolling parenting) do not predict change in rumination or worry. Similarly, abstract processing does not predict change in either rumination or worry.

However, there are some differences observed between the analyses. First, in the main analysis with the RNT composite variable (Table 3.2), neuroticism prospectively predicted change in RNT. Whilst worry continues to be predicted by neuroticism (Table 3.4), when examining rumination alone, neuroticism did not significantly predict change in rumination after accounting for the effect of symptoms and early life experiences (Table 3.3). However, on closer examination of the results it is important to note that the relationship between neuroticism and change in rumination is at the trend level, and the 95% confidence intervals pass through zero (p = .063, 95% CI for B [-.01, .29]). As such, it is not possible to confidently conclude that neuroticism is not prospectively associated with rumination.

Second, there were some differences observed between the predictive relationships between beliefs about the function of RT and rumination/worry. In the

original analysis using the composite score, the belief that RT aided instrumental understanding was a significant predictor of RNT (Table 3.2). This result is replicated when analysing the rumination variable by itself (Table 3.3). However, when examining the worry variable by itself, the belief that RT aids instrumental understanding did not prospectively predict worry, and instead, the belief that RT reduces past distress was negatively associated with change in worry. In other words, people who are less likely to endorse the belief that RT reduces past distress are more likely to experience increased worry. However, it is worth noting that whilst significant, the magnitude of the relationship was relatively small (β = -.08, p = .028, 95% CI for B [-.35, -.02]). Nonetheless, it is interesting to note there may be differences between the type of metacognitive beliefs that predict rumination and RNT more generally, and the type of metacognitive beliefs that specifically influence engagement in worry.

Considering the theoretical interpretation of this finding for worry, it seems consistent with the metacognitive model of worry (Wells, 1995), in which meta-worry (i.e., worry about worry) is hypothesised to lead to unconstructive engagement in worry. Essentially, having the negative metacognitive belief that worrying will not help to relieve unpleasant feelings of distress about the past can be conceptualised as form of meta-worry. This meta-worry predicts future worry, consistent with this theoretical account.

Finally, there was a small difference observed in symptoms that predicted RNT. In the composite RNT analysis (Table 3.2), and in the analysis examining worry (Table 3.4), neither depression, nor anxiety, nor current stress predicted change in RNT or worry. However, in the rumination analysis (Table 3.3), depressive symptoms prospectively predicted change in rumination.

Table 3.3. Regression analysis examining the effects of Time 1 variables on Time 2 rumination

Time 1 Variables	Step 1			Step 2			Step 3			Step 4			Step 5		
	B	*SE B*	*β*	*B*	*SE B*	*B*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
RSQ-RRS	.69	.03	.71***	.57	.05	.59***	.56	.05	.58***	.53	.05	.55***	.47	.05	.49***
BDI-II				.11	.04	.16**	.10	.04	.14*	.09	.04	.13*	.10	.04	.15
STAI				-.05	.06	-.04	-.05	.06	-.05	-.07	.07	-.07	-.08	.06	-.08
PSS				.09	.07	.07	.09	.07	.08	.08	.07	.07	.06	.07	.05
LEQ Emotional Abuse							.07	.05	.06	.07	.05	.07	.05	.05	.05
CRPBI-30 Maternal Overcontrol							.10	.07	.08	.10	.07	.06	.11	.07	.06
CRPBI-30 Paternal Overcontrol							-.12	.07	-.06	-.11	.07	-.06	-.10	.07	-.06
EPQR-SF-N										.14	.08	.09	.15	.07	.09
PEQ													-.13	.08	-.06
WR: Instrumental Understanding													.14	.05	.16**
WR: Self and Social Control													.01	.06	.01
WR: Motivation, Learning and Goal-Setting													-.06	.06	-.04
WR: Reduce Past Distress													-.04	.08	-.02
R^2		.51			.53			.54			.54			.56	
Adjusted R^2		.51			.53			.53			.53			.55	
R^2 *Change*		.51			.02			.01			.00			.02	
F for change in R^2		416.12***			5.55**			2.13			3.47			3.14**	

Note. RSQ-RRS: Response Styles Questionnaire – Ruminative Response Scale; BDI-II: Beck Depression Inventory-II; STAI: State-Trait Anxiety Inventory (state subscale); PSS: Perceived Stress Scale; LEQ Emotional Abuse: Life Events Questionnaire (emotional abuse subscale); CRPBI-30: Children's Report of Parental Behaviour Inventory (30-item version); EPQR-SF-N: Eysenck Personality Questionnaire Revised Short Form (neuroticism subscale); PEQ: Problem Elaboration Questionnaire mean abstraction rating; WR: Why Ruminate scale.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 3.4. Regression analysis examining the effects of Time 1 variables on Time 2 worry

Time 1 Variables	Step 1			Step 2			Step 3			Step 4			Step 5		
	B	*SE B*	*β*	*B*	*SE B*	*B*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
PSWQ	.89	.03	.86***	.84	.04	.82***	.84	.04	.82	.74	.04	.72***	.72	.04	.71***
BDI-II				-.04	.05	-.04	-.04	.05	-.04	-.07	.05	-.07	-.08	.05	-.08
STAI				.09	.07	.06	.08	.07	.05	.02	.07	.02	.01	.07	.01
PSS				.07	.08	.04	.08	.08	.04	.09	.08	.05	.11	.08	.06
LEQ Emotional Abuse							.02	.05	.01	.03	.05	.02	.01	.05	.01
CRPBI-30 Maternal Overcontrol							.03	.08	.01	.01	.08	.01	.02	.08	.01
CRPBI-30 Paternal Overcontrol							-.10	.08	-.04	-.07	.08	-.03	-.09	.08	-.03
EPQR-SF-N										.42	.09	.18***	.42	.10	.18***
PEQ													-.01	.09	-.00
WR: Instrumental Understanding													.07	.06	.06
WR: Self and Social Control													.10	.06	.06
WR: Motivation, Learning and Goal-Setting													-.06	.07	-.03
WR: Reduce Past Distress													-.18	.08	-.08*
R^2		.74			.75			.75			.76			.76	
Adjusted R^2		.74			.74			.74			.74			.76	
R^2 *Change*		.74			.00			.00			.01			.01	
F for change in R^2		1151.254***			1.26			.56			20.07***			1.43	

Note. PSWQ: Penn State Worry Questionnaire; BDI-II: Beck Depression Inventory-II; STAI: State-Trait Anxiety Inventory (state subscale); PSS: Perceived Stress Scale; LEQ Emotional Abuse: Life Events Questionnaire (emotional abuse subscale); CRPBI-30: Children's Report of Parental Behaviour Inventory (30-item version); EPQR-SF-N: Eysenck Personality Questionnaire Revised Short Form (neuroticism subscale); PEQ: Problem Elaboration Questionnaire mean abstraction rating; WR: Why Ruminate scale.
*$p < .05$, **$p < .01$, ***$p < .001$.

3.8. Appendix B: Discussion of Data Analytic Strategy and Additional Structural Equation Modelling Analysis

In the previous study, SEM was used to test the cross-sectional relationships between vulnerability factors and RNT. For this prospective study, multiple regression was selected as the method of data analysis for several reasons. Using multiple regression allowed for identification of factors that prospectively predicted RNT after baseline levels of RNT and symptoms were statistically controlled. Moreover, by adopting a hierarchical approach to the regression analysis, it was possible to see whether the effects of proximal factors remained once the effects of temporally preceding distal factors were accounted for.

Had vulnerability factors been measured at multiple time points, then a theoretical model could have been constructed and tested with SEM to examine whether distal factors prospectively influence RNT through their effect on mediating proximal factors (i.e., demonstrating that a distal vulnerability factor measured at an earlier time point prospectively predicts change in a vulnerability factor measured at a later time point). As outlined by Kraemer et al. (2001), it is necessary to measure vulnerability factors at multiple time points to examine whether any vulnerability factors act as mediators, since the mediator needs to temporally precede the outcome variable (i.e., RNT), but temporally succeed the variable that it mediates.

However, the benefit of the SEM analysis used in Study 1 was that it afforded construction of a latent variable representing RNT, with measured indicators of rumination (RSQ-RRS) and worry (PSWQ), and as such, it was not necessary to rely on a composite variable representing RNT. To see whether the composite variable calculated to represent RNT in the prospective study would have the same pattern of

predictors as a latent variable representing RNT, an additional SEM analysis was performed.

In the SEM analysis, a latent variable representing Time 1 RNT (with measured indicators of Time 1 RSQ-RRS and Time 1 PSWQ) was created, with a pathway leading to a latent variable representing Time 2 RNT (with measured indicators of Time 2 RSQ-RRS and Time 2 PSWQ). The addition of this pathway had the effect of statistically controlling for Time 1 RNT, such that the relationships between Time 2 RNT and the other variables in the model could be examined after the effects of Time 1 RNT had been accounted for. It was not possible to test for mediation (i.e., whether proximal factors mediated the relationship between distal factors and RNT) because all measures of vulnerability factors were taken at a single time point.

Figure 3.1 displays the factor loadings of each latent variable onto its measured variables, as well as the regression weights for the paths between each of the variables. Analysis of the hypothesised model indicates that it did not provide an acceptable fit to the data (χ^2 (104, n = 401) = 3030.246, p < .001, NFI = .244, CFI = .247, RMSEA = .265, AIC = 3126.246).

It is unsurprising that the model did not provide a good fit to the data because it was not predicted that distal factors would predict Time 2 RNT after controlling for Time 1 RNT. As such, these distal variables diminished the goodness of fit for the overall model. On examining the predictors of Time 2 RNT and comparing it with the pattern of predictors found in the hierarchical regression analysis (Table 3.2), a broadly similar pattern was found. The strongest predictors were neuroticism and the belief that RT aids instrumental understanding.

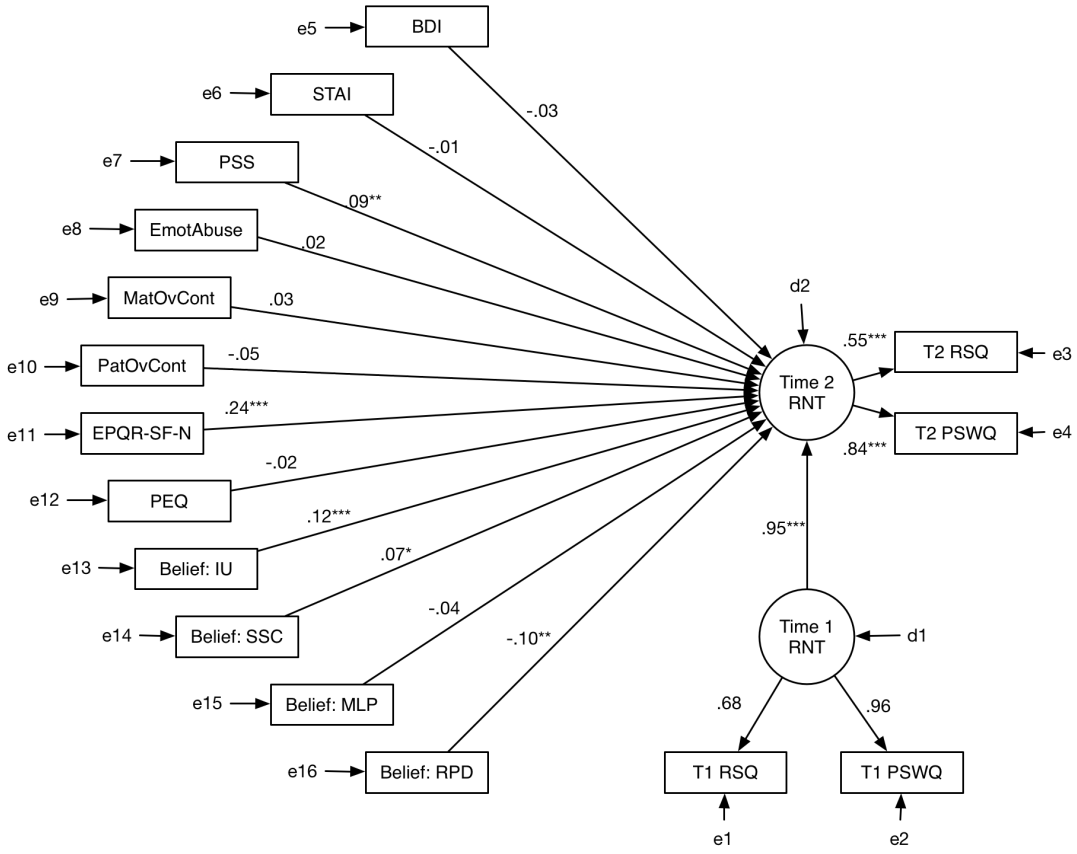

Figure 3.1. Relationship between Time 2 RNT and vulnerability factors measured at Time 1 after controlling for Time 1 RNT.

Note. RNT: Repetitive Negative Thought; RSQ: Response Styles Questionnaire; PSWQ: Penn State Worry Questionnaire; BDI: Beck Depression Inventory-II; STAI: State-Trait Anxiety Inventory (state subscale); PSS: Perceived Stress Scale; EmotAbuse: Life Events Questionnaire emotional abuse subscale; CRBPI-30 Maternal Psychological Control subscale; PatOv: CRBPI-30 Maternal Psychological Control subscale; EPQR-SF-N: Eysenck Personality Questionnaire Revised (Short form neuroticism subscale); PEQ: Problem Elaboration Questionnaire mean abstraction score; Belief IU: Why Ruminate RT for Instrumental Understanding subscale; Belief SSC: Why Ruminate RT for Self and Social Control subscale; Belief MLP: Why Ruminate RT for Motivation, Learning and Problem Solving subscale; Belief RPD: Why Ruminate RT for Reducing Past Distress subscale.
*$p < .05$, **$p < .01$, ***$p < .001$.

However, there were some differences: First, perceived stress at Time 1 significantly predicted Time 2 RNT, which it did not do in the hierarchical regression model. In addition, the Why Ruminate subscale representing the belief that RT reduces past distress was a negative predictor of Time 2 RNT. Whilst this was not a significant predictor in the regression analysis using the composite variable, this finding is consistent with the additional regression analysis in which worry (PSWQ)

was examined separately (see Appendix A, Table 3.4). Finally, the Why Ruminate subscale representing the belief that RT aids self and social control was a positive predictor of RNT. Whilst it had a relatively weak relationship with Time 2 RNT compared to the other significant predictors, this finding indicates that other positive metacognitive beliefs may influence engagement in RNT, even if the belief that RT aids instrumental understanding is a more powerful predictor.

In order to examine whether the fit of the model would be improved by removing some of the vulnerability factors with poor loadings onto Time 2 RNT, a second model was tested. Figure 3.2 displays the factor loadings of each latent variable onto its measured variables, as well as the regression weights for the paths between each of the variables. Analysis of the hypothesised model indicates that it did not provide an acceptable fit to the data (χ^2 (54, n = 401) = 2690.214, p < .001, NFI = .266, CFI = .267, RMSEA = .349, AIC = 2762.214), although the fit was improved from the previous model as a result of removing some of the vulnerability factor variables with non-significant pathways to Time 2 RNT (i.e., abstract processing, maternal overcontrol, paternal overcontrol, and emotional abuse). However, it was necessary to retain some variables that did not have a significant relationship with Time 2 RNT – the symptom measures of depression, anxiety, and stress – such that it was possible to examine the relationship between the other vulnerability factors and Time 2 RNT after symptoms were statistically controlled. As such, the retention of these pathways will have diminished the overall fit of the model.

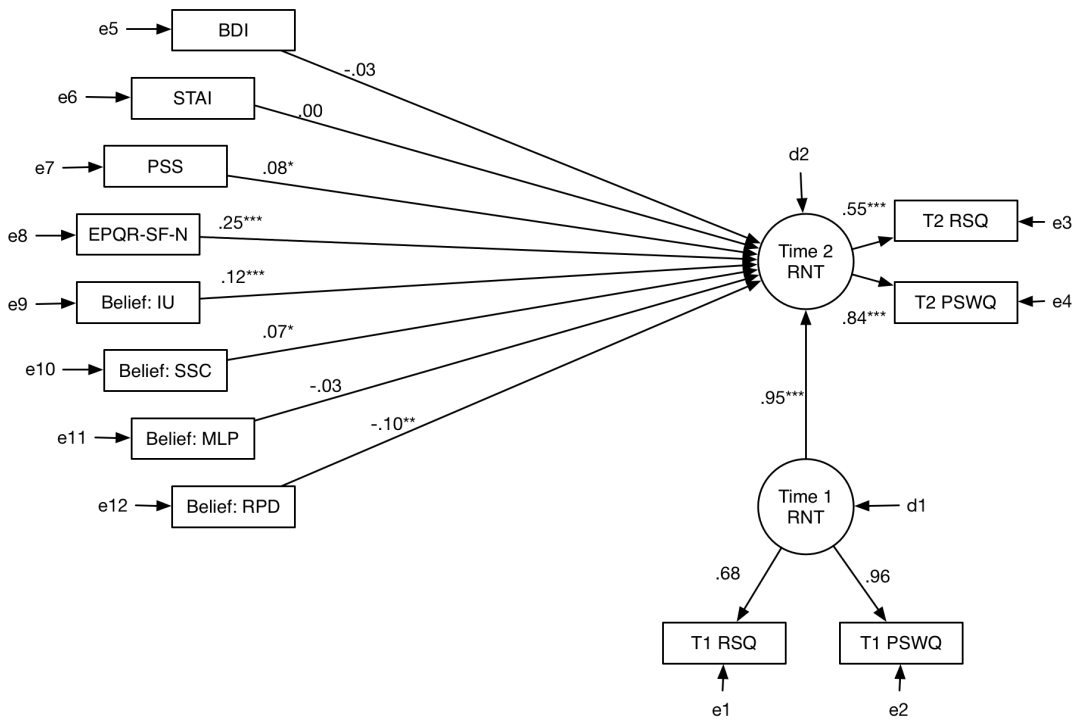

Figure 3.2. Relationship between Time 2 RNT, Time 1 neuroticism, and Time 1 beliefs about the function of RT, after controlling for Time 1 RNT.

Note. RNT: Repetitive Negative Thought; RSQ: Response Styles Questionnaire; PSWQ: Penn State Worry Questionnaire; BDI: Beck Depression Inventory-II; STAI: State-Trait Anxiety Inventory (state subscale); PSS: Perceived Stress Scale; EPQR-SF-N: Eysenck Personality Questionnaire Revised (Short form neuroticism subscale); Belief IU: Why Ruminate RT for Instrumental Understanding subscale; Belief SSC: Why Ruminate RT for Self and Social Control subscale; Belief MLP: Why Ruminate RT for Motivation, Learning and Problem Solving subscale; Belief RPD: Why Ruminate RT for Reducing Past Distress subscale.
*$p < .05$, **$p < .01$, ***$p < .001$.

3.9. Appendix C: Pattern of Change in RNT Over Time

On examining the change in mean score for rumination and worry from Time 1 to Time 2, it is noteworthy that on average, rumination and worry were actually decreasing over time in this sample (Table 3.1). On examining the scores at Time 2, scores for rumination and worry were lower, but not significantly lower, than at Time 1 (i.e., the scores at Time 2 are less than one standard deviation lower than they were at Time 1). As such, some participants' scores may be going down, other participants' scores may be going up, and this mean score just represents the average trend. It is possible that neuroticism and the belief that RT aids instrumental understanding are predicting increase in scores, but that this is not visible from the data.

To explore this further, a series of figures were created with the standardised residuals for Time 1 RNT regressed onto Time 2 RNT on the *y* axis. Figure 3.3 illustrates the association between the Time 1 belief that RT aids instrumental understanding (Why Ruminate subscale) and Time 1 RNT regressed onto Time 2 RNT. Figure 3.4 illustrates the association between Time 1 neuroticism score (EPQR-SF-N) and Time 1 RNT regressed onto Time 2 RNT. Figure 3.5 illustrates the slopes of the two previous graphs on a single figure, demonstrating the association between standardised scores for neuroticism and belief that RT aids instrumental understanding at Time 1, and Time 1 RNT regressed onto Time 2 RNT. As the slope of these graphs are positive, this indicates that both neuroticism and the belief that RT aids instrumental understanding are predicting increases in RNT over time, even if the overall mean RNT scores within the sample decrease.

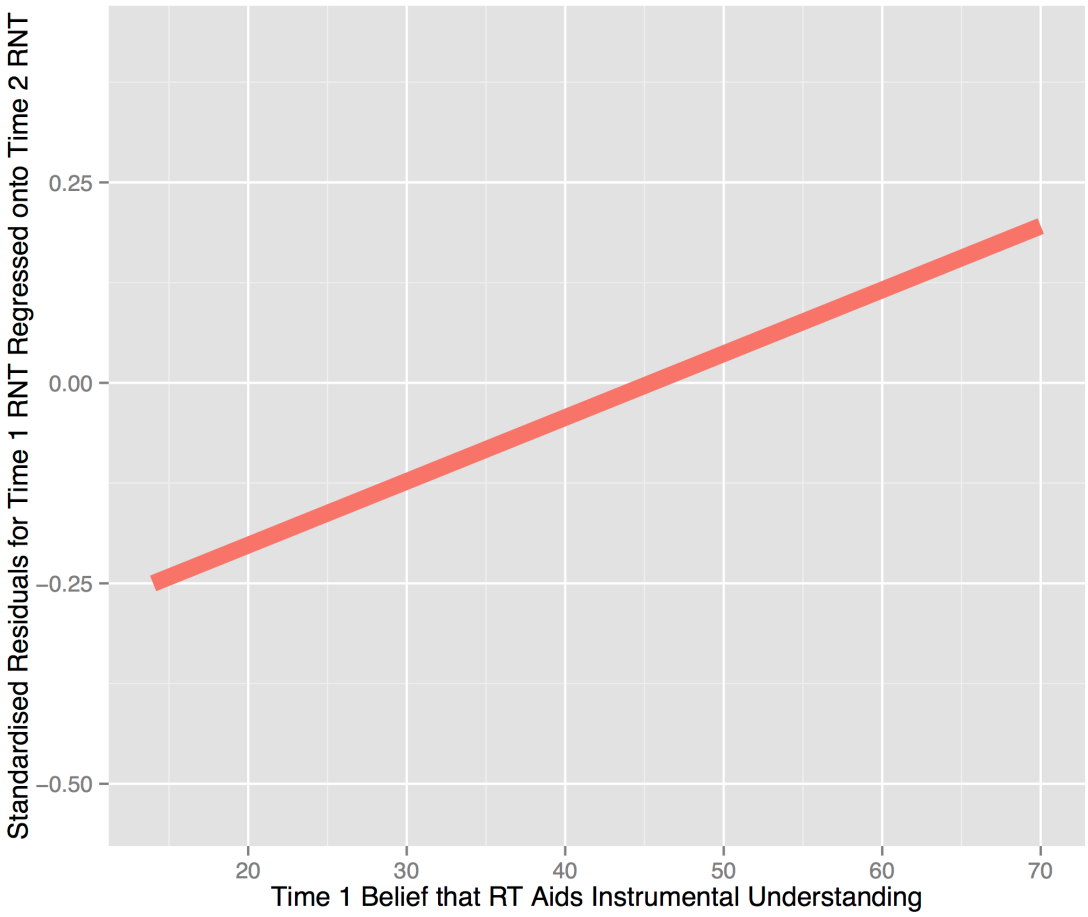

Figure 3.3. Association between the Time 1 belief that RT aids instrumental understanding and Time 1 RNT regressed onto Time 2 RNT.

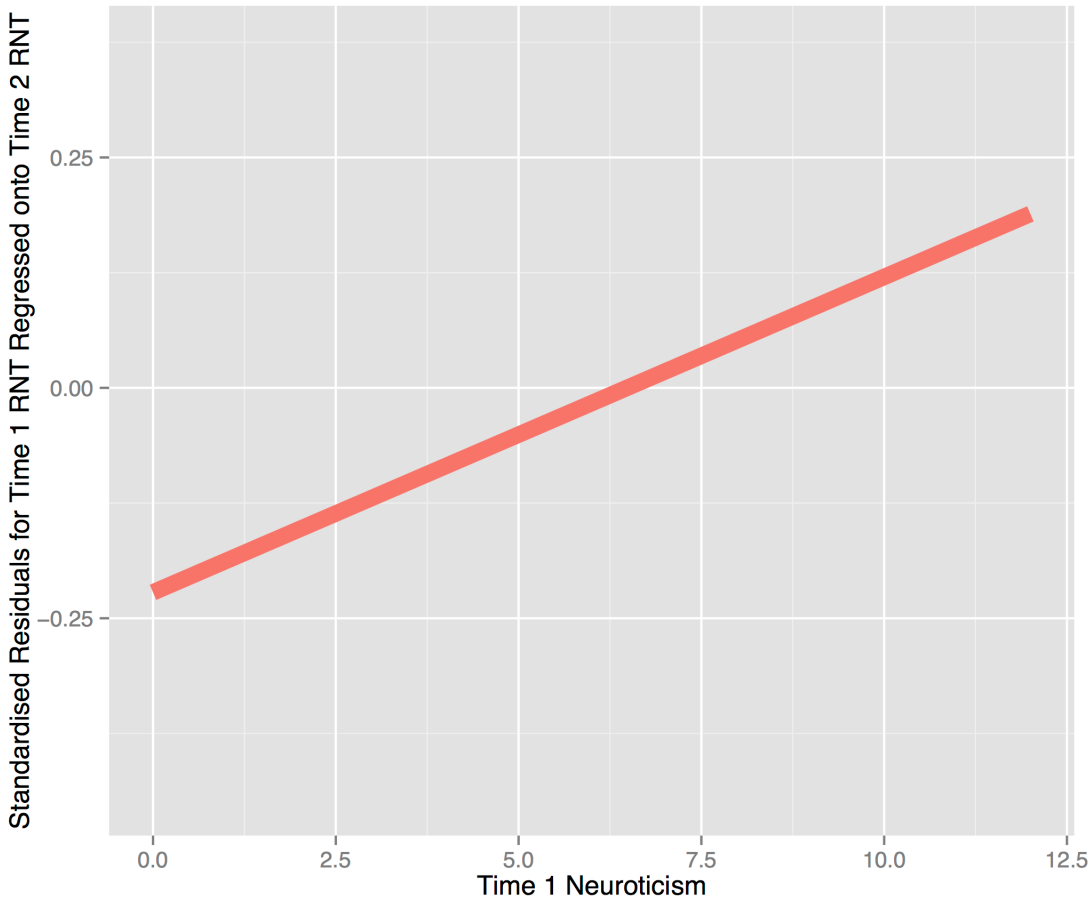

Figure 3.4. Association between Time 1 neuroticism and Time 1 RNT regressed onto Time 2 RNT.

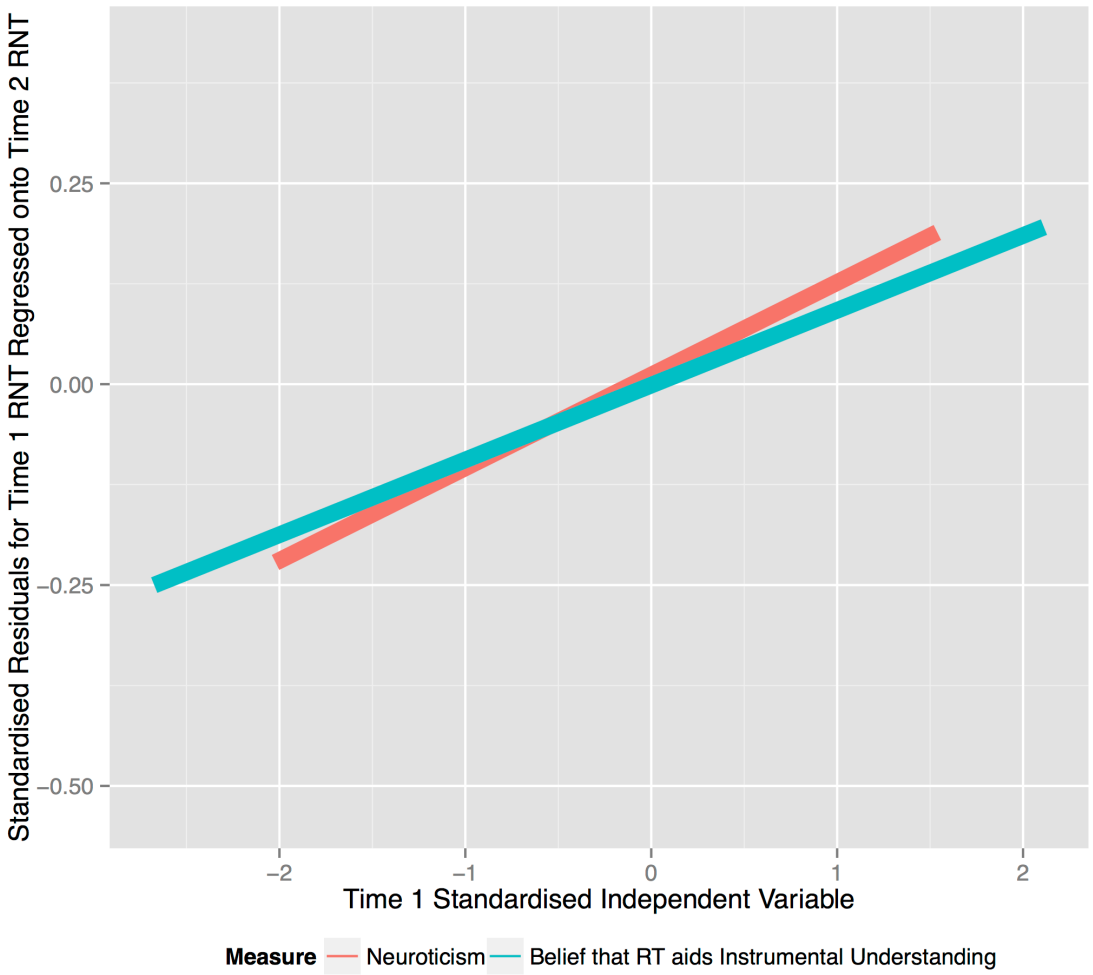

Figure 3.5. Associations between the Time 1 belief that RT aids instrumental understanding, Time 1 neuroticism, and Time 1 RNT regressed onto Time 2 RNT.

3.10. Appendix D: Comparison Between Completers and Non-Completers of the Longitudinal Study

Of the 506 participants that fully completed the cross-sectional study reported in Chapter 1, 401 of these participants also responded to the follow-up questionnaires for the longitudinal study reported in this chapter, such that 79% of the sample was retained. As such, it was important to examine whether there were any differences between the 401 participants who completed assessments at both time points, and the 105 participants who only completed the initial assessments and did not respond to the follow-up questionnaires.

The analyses reported in Table 3.5 indicate that there was no significant difference on measures taken at Time 1 for people who completed both parts of the experiment, and for people who only completed measures at the first time point.

Table 3.5. Means (and standard deviations) comparing longitudinal study completers and non-completers.

Measure	Completers	Non-Completers	Difference
RSQ-RRS	56.27 (16.30)	56.11 (16.24)	$t(504) = -1.14$, $p = .256$
PSWQ	54.97 (14.51)	54.78 (14.47)	$t(504) = -1.16$, $p = .249$
BDI-II	17.52 (13.30)	17.46 (13.20)	$t(473) = -1.50$, $p = .134$
STAI-State	49.19 (15.10)	49.28 (14.92)	$t(484) = -.362$, $p = .717$
PSS	21.27 (8.10)	21.20 (8.05)	$t(504) = -1.29$, $p = .196$
Age (years)	21.41 (5.46)	21.37 (5.41)	$t(504) = 1.55$, $p = .122$
Gender	85.5% female	83.8% female	χ^2 (1, n =506) = .20, $p = .658$

Note. RSQ-RRS: Response Styles Questionnaire – Ruminative Response Scale; PSWQ: Penn State Worry Questionnaire; BDI-II: Beck Depression Inventory-II; STAI: State-Trait Anxiety Inventory (state subscale); PSS: Perceived Stress Scale.

CHAPTER 4: Study 3 - Experimentally Manipulating Beliefs about RNT and Examining the Effects on State RNT

4.1. Introduction

As reported in Study 1 (Chapter 2), beliefs about RNT were directly associated with trait RNT after controlling for other well-established predictors (neuroticism, and symptoms of depression, anxiety, and stress). Furthermore, in Study 2 (Chapter 3), specific beliefs about RNT prospectively predicted RNT 6-8 weeks later. Whilst this cross-sectional and prospective evidence does not establish causality, these findings are consistent with the hypothesis that people may persist in RNT because, despite its disadvantageous consequences, they appraise RNT to have useful functions and outcomes, which reinforces their continued use of RNT (Nolen-Hoeksema et al., 2008; Watkins & Baracaia, 2001).

This *perception-of-benefit* account hypothesises that the appraisal that RNT has advantages and benefits (whether accurate or not) causes RNT (Watkins & Baracaia, 2001). A specific operationalisation of this hypothesis is in terms of metacognitive beliefs, which refer to "beliefs and appraisals about one's thinking and the ability to monitor and regulate cognition" (Papageorgiou & Wells, 2001b, p. 160). For example, positive metacognitive beliefs about RNT reflect beliefs about the advantages of RNT as a coping strategy.

Despite considerable interest in and investigation of the perception-of-benefit and positive metacognitive belief approach to RNT, the key hypothesis that appraising RNT as beneficial causally maintains or increases RNT has not been directly tested. Cross-sectional studies conducted in depressed and nondepressed samples have found associations between self-reported positive beliefs about RNT and trait RNT (Papageorgiou & Wells, 2001a, 2003; Roelofs, Huibers, Peeters, Arntz,

& van Os, 2010; Roelofs, Papageorgiou, Gerber, Huibers, Peeters, & Arntz, 2007, Watkins & Baracaia, 2001; Watkins & Moulds, 2005). Similarly, in a quasi-experiment, Moulds, Yap, Kerr, Williams, and Kandris (2010) exposed individuals with high versus low levels of positive beliefs about rumination to an unsolvable anagram task, and assessed subsequent self-reported rumination. Regardless of whether participants received positive, negative, or neutral feedback about anagram performance, participants with higher endorsement of positive beliefs about rumination reported more state rumination than participants with lower levels of positive beliefs. However, all of these studies are correlational, leaving the causal direction of this relationship unresolved.

In an experimental study, Lyubomirsky and Nolen-Hoeksema (1993) examined the effects of rumination versus distraction manipulations on perceived level of insight in dysphoric and nondysphoric students. All participants reported greater levels of insight following the rumination induction relative to the distraction induction, with the authors noting that rumination made participants "sadder but wiser" (p. 346). This study suggests that repeated thinking about the self and feelings increases perceived insight relative to not thinking about the self (i.e., distraction), but it did not test whether perception-of-benefit influences rumination.

Two prospective longitudinal studies have examined whether perceived benefits of rumination predict future rumination. Weber and Exner (2013) found that in a nondepressed student sample, positive metacognitive beliefs about rumination predicted changes in rumination two months later. Moreover, in Study 2 (Chapter 3), a study was reported that used a similar design whilst incorporating a range of putative vulnerability factors for RNT (e.g., parenting style, stress, neuroticism), and found that only neuroticism and the belief that repetitive thinking increases insight

and understanding predicted increases in RNT over six to eight weeks. Notably, within a range of metacognitive beliefs (e.g., perceiving RNT to aid self-control and social control), only this specific metacognitive belief predicted increases in RNT in the main hierarchical regression analysis.

Although these prospective studies suggest that it is unlikely that the observed relationship is due to RNT causing positive appraisals because the assessment of positive metacognitive beliefs temporally precedes increases in RNT, they cannot rule out the role of possible third factors. The definitive way to infer causality is by bi-directionally manipulating the independent variable of interest (i.e., perception-of-benefit) and investigating its influence on the dependent variable (i.e., state RNT). However, there have been no experimental studies that directly test the perception-of-benefit and positive metacognitive belief hypotheses in rumination, and only one study that has tested these hypotheses with worry (Prados, 2011).

The current study aimed to address this critical gap in the literature by testing this hypothesis: Participants were manipulated to view RNT as helpful versus unhelpful to test how this would influence RNT following exposure to a situation that may afford RNT. In the prospective study described in Chapter 3, only specific types of belief about RNT predicted change in RNT. Specifically, believing that RNT improves sense of understanding and insight was the strongest predictor of change in RNT. However, other types of belief (e.g., believing that RNT aids self and social control) did not predict change in RNT. As such, in the current study, only the appraisal that RNT increases sense of understanding and insight was manipulated.

Unlike Study 1 and Study 2, this study specifically examined state RNT rather than trait RNT. The experiment was designed to examine the short-term impact of a manipulation of beliefs in a single experimental session. As such, within-experiment

change in beliefs is hypothesised to impact on state RNT, rather than trait RNT. This is also of theoretical interest, since much of the RNT literature has focused on trait RNT, often measured by self-report questionnaires, rather than state RNT. Moreover, the extant literature has tended to focus on the outcomes and consequences of RNT, and there has been less examination of what influences the maintenance of RNT itself. One advantage of the experimental design utilised in this study is that it affords examination of factors that may influence state RNT, which is an understudied and important process that is strongly associated with the trait tendency towards RNT. For example, in studies that have examined both trait rumination and state rumination, the two processes are highly correlated (e.g., Key, Campbell, Bacon, & Gerin, 2008; Puterman, Delongis, & Pomaki, 2010). It can be argued that trait RNT represents the tendency to engage in repeated bouts of state RNT, and as such, understanding factors that contribute towards bouts of state RNT is informative in increasing understanding about factors that may be involved in the development of the trait tendency towards RNT.

The basic structure of this experiment can be conceptualised as having three sequential steps or phases: phase A, phase B, phase C (an "ABC" design). In phase A, the variable hypothesised to influence RNT is manipulated (in this case, the variable is the belief that RNT increases insight and understanding). In phase B, participants complete a task that affords the opportunity for RNT in some, but not all people (i.e., avoiding floor or ceiling effects). In phase C, RNT is then assessed. This ABC paradigm is valuable as it allows for precise experimental manipulation of putative vulnerability factors to see how they may causally influence engagement in RNT. It also differs from existing experimental approaches to studying RNT, which tend to focus on directly manipulating rumination to examine its consequences (cf.

rumination versus distraction manipulations, Lyubomirsky & Nolen-Hoeksema, 1995). In phase B, the aim is to have RNT occur naturally, without deliberate instruction, such that it is activated in response to events, consistent with how it would occur in daily life. As such, this is a more ecologically valid approach relative to instructed periods of RNT. Moreover, this approach is necessary when the aim is to examine what influences the extent of RNT itself. To examine this, it is not feasible to instruct people to ruminate as has been done in previous studies (e.g., Lyubomirsky & Nolen-Hoeksema, 1995; Morrow & Nolen-Hoeksema, 1990), as it is not possible to use instructed RNT to examine what causes naturally occurring RNT. As such, this sort of ABC design affords a way of experimentally examining individual factors that might influence spontaneously occurring RNT. The development of the individual tasks comprising the ABC paradigm for this experiment will now be discussed.

For the purposes of the experiment, it was necessary to develop a task that would put participants in a situation conducive to RNT, without prompting all participants to engage in RNT (i.e., phase B in the ABC paradigm), since the aim of the study was to measure differences in RNT across experimental conditions. As such, it was not possible to ask participants to voluntarily engage in RNT, as is common to many rumination or worry studies (e.g., Lyubomirsky & Nolen-Hoeksema, 1993; McLaughlin et al., 2007), because the purpose of the study was to try and observe variations in state RNT in response to different manipulations of beliefs. Asking participants to engage in RNT in this way would be likely to result in a ceiling effect whereby all participants engage in RNT regardless of experimental condition. Conversely, it was necessary to use a task that would result in some RNT to avoid a floor effect where no participants engage in RNT, eliminating the possibility to

observe a difference between experimental conditions as a result of the belief manipulation.

There are several different options for tasks that could be used to potentially afford engagement in RNT, including (i) presentation of concerning or worrisome messages; (ii) failure feedback tasks; and (iii) priming unresolved goals. These various methods will now be discussed in further detail and evaluated.

Considering the first option, in the only the only study to attempt to experimentally manipulate positive, negative or neutral beliefs about the utility of worry, Prados (2011) reported two experiments where different worry-provoking scenarios were used. In the first experiment, after manipulating appraisals of worry, participants were exposed to a "worrisome message" about the disappearance of an indigenous Amazonian culture. Subsequently, no differences were found in worry between the positive, negative and neutral consequences of worry group. One limitation of this "worrisome message" approach is that the messages, whilst worrisome, are not personally relevant to participants because they are not personalised to each individual. This may have resulted in floor effects such that it may have been insufficiently powerful to prompt engagement in worry for any participants, regardless of experimental condition. In Prados' (2011) second experiment, the task was altered with the stated aim of making it more personally relevant to participants: Unemployed participants were instructed to worry for five minutes about failing an important exam that would have ramifications for their future employment. In this experiment, no differences were found between the positive and neutral consequences of worry group (a negative consequences group was not used). However, this sort of task where participants are instructed to engage in RNT would not be suitable for the current study for the reasons outlined above (i.e., it is not

possible to examine naturally-occurring RNT by instructing participants to engage in RNT, as this is not ecologically valid, and would be likely to result in ceiling effects such that differences are not observed in level of RNT across conditions).

Considering the second option, some studies have used failure feedback tasks as a means of examining responses to negative events and eliciting RNT. For example, Watkins et al. (2008) used a task that involved giving participants a list of anagrams that they were instructed to unscramble into real words within a timed period of three minutes. Unbeknownst to the participants, half of these anagrams were not solvable, and most participants only correctly solved one or two anagrams. Prior to beginning the task, participants were given unrealistically high expectations of performance as the experimenter explained that they were expected to solve five or six anagrams. Failure feedback was delivered after the task to the effect that performance was well below average. This anagram failure task has successfully been used to elicit engagement in rumination in previous studies (Moulds et al., 2010). Moreover, whilst failure feedback tasks have been used much more broadly in studies not directly assessing RNT, these sorts of task generally appear to be successful at inducing negative mood states, which could prime people towards RNT (e.g., mental arithmetic exercise failure, Dedovic et al., 2005; interpersonal sensitivity task failure, Shrauger & Rosenberg, 1970).

Considering the third option, based on goal discrepancy models of rumination (Martin & Tesser, 1996), tasks that prime discrepancies in personal goals may generate RNT, without causing ceiling effects that might occur if participants were explicitly instructed to engage in RNT. Within Martin and Tesser's (1996) theoretical account, problematic progress towards personal goals is hypothesised to drive rumination. Rumination is characterised as an instrumental process, with rumination

being focused on the unresolved goals. Higher level, abstract goals that are tied in to a person's sense of self are hypothesised to lead to persistent rumination because such goals are more difficult to achieve, and harder to abandon. Consistent with this, there is experimental evidence demonstrating that focusing on unresolved personal goals results in increased state rumination (Roberts, Watkins, & Wills, 2013). Moreover, several studies have used similar self-discrepancy tasks as a means of inducing state rumination, even though state rumination was not always directly assessed (e.g., Schoofs, Hermans, Griffith, & Raes, 2013; Smets, Griffith, Wessel, Walschaerts, & Raes, 2013). For instance, Schoofs et al. (2013) and Smets et al. (2013) used a task in which participants had to rate a series of 50 positive characteristics (e.g., serene, active, funny) according to the extent to which they wanted to possess the characteristic (i.e., ideal self) as well as the extent to which they currently possessed the characteristic (i.e., actual self), as a means of inducing self-discrepancy.

As such, for the current study, a questionnaire exploring self-discrepancy (i.e., the differences between the "ideal self" and the "actual self") was selected, as an implicit means of exposing participants to a situation that might prompt RNT, without explicitly instructing participants to dwell on the task. Moreover, this task would be personally relevant, and so potentially more likely to afford RNT than less personalised tasks (e.g., the "worrisome message" task used by Prados, 2011). In this task, participants generated brief lists of personal qualities or traits that they wanted to have, or felt they ought to have (e.g., forgiving, generous), as well as some undesirable traits that they did not want to have (e.g., jealous, impatient). They were then asked to focus in on desirable traits that they felt they lacked, as well as undesirable traits that they possessed, and briefly write about the ways in which they wanted to be different in light of these traits (e.g., a participant might write that they

were prone to jealousy, but wanted to be less jealous as a means of improving their own wellbeing, reducing relationship conflict, etc.).

Corresponding to phase A of the ABC paradigm, it was necessary to develop a task to manipulate people's appraisals about the usefulness of RNT in increasing understanding and insight. In Prados' (2011) study experimentally manipulating beliefs about the utility of worry, participants listened to recorded persuasive messages about the positive, negative, or neutral consequences of worry (e.g., "According to prestigious scientists, worry has positive consequences. For example, worry seems to be useful in order to be more prepared for negative events", p. 218). Despite a manipulation check revealing more positive appraisals of worry in the positive consequences of worry group, no differences were found in worrisome thoughts between the positive, negative, and neutral groups. However, there are several potentially complementary possibilities for why this pattern of findings may occur.

First, it is possible that the effect observed in the manipulation check was not a genuine effect of the manipulation, but rather a response to demand effects. Since Prados utilised a relatively overt manipulation of the utility of worry, in which participants were explicitly told from an authoritative viewpoint that worry had either positive or negative consequences, they may have felt pressurised to respond to the manipulation check in a manner concordant with the message that they had received. Second, in Prados' first study outlined previously, floor effects may have been observed such that this task prompted insufficient levels of worry to elicit an observable difference between conditions. Third, in Prados' second study, by explicitly instructing participants to worry, there may have been ceiling effects such that all participants were engaging in high levels of worry, and as a consequence, it

was not possible to observe a difference between conditions. Finally, the manipulation messages may have been insufficiently persuasive to have an impact on actual worry behaviour. As such, it is possible that any or all of these reasons may account for the observed pattern of findings.

In an attempt to create an experimental manipulation of appraisals about RNT with greater power, an alternative manipulation was developed for the current study. In this manipulation, participants were asked to recall occasions when they had engaged in RNT, and either found the experience helpful or unhelpful. By building on genuine personal experiences, the manipulation may be stronger and more persuasive. Moreover, by asking participants to recall and answer questions about their experiential memories of RNT, it may be slightly less apparent to participants that they are being manipulated to view RNT in a favourable or unfavourable light, relative to a scenario where they are simply passive recipients of generic information about the positive/negative aspects of RNT. Whilst participants would undoubtedly be aware that they are being asked to consider favourable or unfavourable aspects of RNT, they may not be aware that this is a manipulation – instead, they may instead believe that the aim is to explore the kind of memories they have about RNT, or the type of problems that they dwell on and the consequences that it had.

Finally, it is important to consider phase C of the ABC paradigm, in which RNT is assessed. The most widely used self-report measures of rumination and worry (e.g., the Response Styles Questionnaire, Nolen-Hoeksema & Morrow, 1991; the Penn State Worry Questionnaire, Meyer et al., 1990) assess trait rumination and worry, and therefore would not be suitable for this study since the intention was to observe changes in RNT over a short time period in response to the experimental tasks (i.e., state RNT). As such, RNT was assessed using an adapted version of a

"breathing focus task", originally designed to measure worry (Borkovec et al., 1983; Hirsch, Hayes, & Matthews, 2009; Ruscio & Borkovec, 2004). The Borkovec et al. (1983) version of this task used fewer thought probes and did not assess content or type of thought, only whether the thought was positive or negative. The Ruscio and Borkovec (2004) version of the task did assess some of the qualities of the thoughts experienced during the breathing exercise, but used fewer thought probes (four probes). Previous studies using this type of task indicate that it is a sensitive measure of state worry that allows for differences in state worry to be detected across groups (Hirsch et al., 2009; Ruscio & Borkovec, 2004). However, it is important to note that these studies looked at the effect of instructed worry periods using this task, rather than naturally-occurring RNT as in the current study.

The version used in the current study was closest to the task used by Hirsch et al. (2009), in which participants were asked to focus on their natural breathing for five minutes, during which they responded to a series of 12 computer-generated tones by indicating where their attention was focused when the tone sounded. The task was modified for this experiment such that after the five-minute exercise, participants rated any thoughts they had on five dimensions that assessed qualities particularly characteristic of RNT (frequency, duration, distress, repetitiveness, and uncontrollability). Assessing the thoughts on these five qualities allows for more nuanced identification of thoughts that can be classified as characteristic of RNT. If thoughts were only rated according to their positive, neutral or negative valence, it would not be possible to conclude as to whether the manipulation specifically influenced RNT per se, rather than negative thinking.

It was predicted that there would be an increase in state RNT for all participants following the self-discrepancy task (i.e., a main effect of Time), but

critically, the perception-of-benefit hypothesis predicts that participants manipulated to view RNT as helpful would show a greater increase in state RNT relative to those manipulated to view RNT as unhelpful (i.e., a Condition X Time interaction). It was predicted that this difference in state RNT between experimental conditions would be observed only in response to a situation that affords RNT (i.e., after the self-discrepancy task), but not as a direct effect of the experimental manipulation of perceived benefit (i.e., no differential effect across condition after the appraisal manipulation).

4.2. Method

4.2.1. Design

This was an experimental study in which participants were randomly allocated to two conditions (*RNT-as-Helpful* versus *RNT-as-Unhelpful*) using a blocked design, to ensure that each condition contained equal numbers of participants. The independent variable (IV) to be manipulated was perceived helpfulness of RNT, and the dependent variables (DVs) were state RNT and mood.

4.2.2. Participants

Sixty student participants (age range 18 – 29 years, M = 19.92, SD = 2.70; 86.7% female; 70.0% white British, 13.3% other white background, 8.3% Chinese, 6.7% mixed ethnic groups, 1.7% other Asian background) from the University of Exeter were recruited to the study by e-mail, electronic newsletter and posters advertising the study, which was described as "examining personality and thinking styles". Participants gave informed consent to participate in the study, were fully debriefed afterwards, and received either £5 cash or course credits for participating.

4.2.3. Measures

Response Styles Questionnaire – Ruminative Response Scale (RSQ-RRS, Nolen-Hoeksema & Morrow, 1991). The RSQ-RRS is a 22-item questionnaire that assesses ruminative responses focused on the self, symptoms, and possible causes and consequences of low mood. Total scores range from 22-88, with higher scores indicating greater trait rumination. It has acceptable convergent validity and high internal consistency (α = .89; Nolen-Hoeksema & Morrow, 1991).

Penn State Worry Questionnaire (PSWQ, Meyer, Miller, Metzger, & Borkovec, 1990). The PSWQ is a 16-item measure of trait worry, assessing the tendency to engage in excessive, uncontrollable and generalised worry. Scores range from 16-80, with higher scores indicating greater trait worry. It has good internal consistency and construct validity (Molina & Borkovec, 1994).

Patient Health Questionnaire (PHQ-9, Kroenke, Spitzer, & Williams, 2001). The PHQ-9 is a nine-item measure designed to assess the severity of depression symptoms over the past two weeks. Scores range from 0 to 27, with greater scores indicating more severe symptoms of depression. It has good internal reliability and construct validity (Kroenke et al., 2001).

State-Trait Anxiety Inventory – State subscale (STAI, Spielberger, 1989). The "state" subscale of the STAI is a 20-item measure of state anxiety, with high internal consistency (Barnes, Harp, & Jung, 2002). Respondents rate statements (e.g., "I feel nervous") on a 4-point scale ranging from "not at all" to "very much", to indicate their feelings over the past two weeks, giving scores from 20-80 (higher scores indicating greater state anxiety).

Why Ruminate scale (WR, Watkins & Baracaia, 2001). The WR scale is a 46-item questionnaire measuring perceived benefits and functions of rumination, with

participants indicating their agreement with each item on a scale from 1 ("not true at all") to 5 ("completely true"). Scores range from 46 – 230, with higher scores indicating more perceived benefits and functions of rumination. The scale has high internal consistency and criterion validity (Watkins & Baracaia, 2001).

Mood ratings. Participants rated their mood on the following two dimensions: Sadness and Anxiety. Ratings were made using computerised 100-point visual analogue scales, which were scaled from 0 to 100 (0 = Happy / Confident, 100 = Sad / Anxious), with higher scores indicating greater sadness and anxiety. Similar visual analogue scales have demonstrated good validity and reliability (e.g., Stern, Arruda, Hooper, Wolfner, & Morey, 1997).

Appraisals of the usefulness of RNT. A two-item measure was created to assess participants' appraisals of the usefulness of RNT for two purposes: (i) to ensure that there was no baseline difference on this measure across conditions, and (ii) to serve as a manipulation check, assessing whether participants in the RNT-as-Helpful versus RNT-as-Unhelpful conditions differentially appraised the usefulness of RNT. The first item was "Right now, how helpful or unhelpful do you think it is to repeatedly think through problems or difficulties, and repeatedly think about their causes, meanings, and implications?", which was rated on a 7-point Likert scale, ranging from 1 ("very unhelpful") to 7 ("very helpful"). The second item was "At this moment, how much do you think that repeatedly dwelling on problems and difficulties, and thinking about their causes, meanings and implications, influences your sense of understanding and insight?", also rated on a 7-point Likert scale, ranging from 1 ("it greatly decreases my sense of understanding and insight") to 7 ("it greatly increases my sense of understanding and insight"). A mean score of these two

items was calculated to represent judgements about the usefulness of RNT, with higher scores indicating more favourable judgements ($\alpha = .64$).

4.2.4. Procedure

The experiment involved two key phases: first, a manipulation of beliefs about RNT (involving recall of experiences when RNT was experienced as helpful or unhelpful), and second, exposure to a situation that would highlight personal self-discrepancy (completing the self-discrepancy task). State RNT and mood were measured three times during the experiment: at Baseline, Post-Appraisal-Manipulation, and Post-Self-Discrepancy. State RNT was assessed using thought probes during a five-minute breathing exercise.

Before the experiment, participants completed an online battery of questionnaires containing the RSQ-RRS, PSWQ, PHQ-9, STAI (state subscale), and appraisals about the usefulness of RNT. The experiment began with the first assessment of state RNT and mood (Baseline), followed by the appraisal manipulation task. Next, there was a second assessment of the perceived usefulness of RNT, state rumination and mood (Post-Appraisal-Manipulation), followed by the self-discrepancy task. Finally, there was the third assessment of state RNT and mood (Post-Self-Discrepancy), after which the Why Ruminate scale was completed.

After the experiment, participants were asked to briefly write down what they thought the study was about, before being fully debriefed about the nature of the study.

4.2.5. Tasks

4.2.5.1. Assessment of state repetitive negative thought.

State RNT was assessed using an adaptation of a "breathing focus task" (Hirsch, Hayes, & Mathews, 2009). Each assessment involved a five-minute period in

which spontaneously occurring thoughts were measured using thought probes. The task was explained to participants as a "breathing exercise" in which they told to "close their eyes, and focus their attention on their natural breathing". Twelve tones were presented at randomised intervals between 20-30 seconds apart, and in response to each tone, participants indicated whether their attention was focused on "breathing" or "any other thought". If "any other thought" was selected, participants indicated whether the thought was positive, negative, or neutral, and provided a brief written description of the thought.

Immediately after each five minute period, participants provided fuller written descriptions of all "any other thoughts", as well as rating any negative thoughts on five criteria assessing RNT qualities during the five minutes: thought frequency (rated from 0 "only once" to 4 "more than 4 times"), duration (0 "only for an instant" to 6 "nearly all the time"), distress (rated 0 "not at all" to 4 "extremely"), repetitiveness ("When thinking about this subject, how much did your thoughts keep coming back to the same or similar ideas again and again?", rated 0 "not at all" to 4 "a great deal"), and uncontrollability ("How difficult did you find it to stop this thought coming or to move on to other thoughts?", rated 0 "not at all" to 4 "extremely").

For each assessment period, there were 12 thought probes, and five ratings of RNT qualities for each of these probes, giving a total of 60 ratings. Ratings were zero if in response to the thought probe, participants were (i) focusing on their breathing, (ii) having positive or neutral thoughts, or (iii) having negative thoughts that were rated as having no RNT qualities on the above five dimensions. Engagement in RNT was indexed by taking the mean of the 60 ratings for each exercise, generating one state RNT score for each participant at each of the three assessment periods (minimum 0, maximum 4.4).

4.2.5.2. Manipulation of perceived benefit of repetitive negative thought.

Beliefs about RNT were manipulated with a writing exercise exploring participant-generated examples of times when they had engaged in RNT. Participants were asked to identify "two occasions when repeated thinking about a problem over and over again" was either helpful (RNT-as-Helpful condition) or unhelpful (RNT-as-Helpful condition). They were told to "spend a moment getting a vivid sense of the problem and the way thinking about it was helpful/unhelpful".

In the RNT-as-Helpful condition, participants were then prompted to write about the way repetitive thinking about the problem was helpful, and they were asked to cover three questions that explored this in their answer (e.g., "In what way did repetitive thinking improve your understanding and insight?", "In what way did dwelling on the problem help you know what to do about it?").

In contrast, in the RNT-as-Unhelpful condition, participants were prompted to write about the way repetitive thinking about the problem was unhelpful, also covering three questions exploring this (e.g., "In what way did repetitive thinking about the problem seem unhelpful or unconstructive?", "In what way did dwelling on the problem have a negative impact on your mood?").

After completing the exercise with reference to the first memory, they repeated the task with reference to a second memory, so as to make participants consider RNT as something helpful or unhelpful in more than one context.

4.2.5.3. Self-discrepancy task.

As an indirect and covert way of exposing participants to a situation that may prompt RNT, participants completed a modified version of the Integrated Self-Discrepancy Index (ISDI; Hardin & Lakin, 2009), which is a measure designed to explore self-discrepancy. Participants were asked to list five traits for each of the

following types of self: “ideal self”, “should self”, and “undesired self”. For example, for ideal or should self, participants might list positive traits such as “thoughtful” or “kind”; for undesired self, participants might list negative traits such as “intolerant” or “jealous”. Then, each of the traits were rated on a 5-point Likert scale reflecting how much they believed the trait accurately described them at that moment (1 = “Does not describe me at all”, 5 = “Completely describes me”). Two modifications were made: First, the original ISDI contains questions about the ideal, should and undesired selves from the perspective of others (i.e., the participant is asked to generate characteristics that they think other people may find important for the ideal, should, and undesired selves), and these questions were removed so as to concentrate the focus on self-discrepancies from the participants’ perspectives.

Second, as a means of increasing the salience and awareness of self-discrepancy (i.e., to shift the task from being a measure of self-discrepancy to being a means of inducing a sense of self-discrepancy), some additional questions were asked. Following the ideal/should self items, participants were asked, “Of the five words you listed, which is the ideal/should self trait that you feel *least* describes you?”, and following the undesired self items, participants were asked, “Of the five words you listed, which is the undesired self trait that you feel *most* describes you?”. Participants then elaborated on these questions in response to the following open-ended questions: “In a few sentences, please can say more about this ideal/should/undesired self trait, and describe how you would like to be different”. These alterations to the task were designed to highlight any existing self-discrepancies and focus the participant’s attention on self-discrepancy to increase the likelihood of inducing rumination.

In order to control for the degree to which the task made self-discrepancy salient, a mean score of the ratings for the ideal self, should self, and undesired self

(reverse scored) was calculated, with lower scores indicating greater perceived self-discrepancy, and higher scores indicating less perceived self-discrepancy (range 1 – 5).

4.3. Results

4.3.1. Data Preparation and Preliminary Analyses

All of the variables were screened for skew and kurtosis. Since significant Kolmogorov-Smirnov and Shapiro-Wilk tests indicated that the variables were not normally distributed, all variables were subject to square root transformations. Whilst these statistical tests indicated that the variables were still not normally distributed after transformation (which is not surprising because one would not expect the data collected in this study to adhere to a normal distribution), visual examination of histograms indicated that the square root transformation had improved the normality of the distributions.

4.3.1.1. Baseline differences.

Independent samples *t* tests revealed that there were no significant differences between conditions on any of the baseline measures of RNT (RSQ-RRS, $t(1, 58) = -.23$, $p = .818$; PSWQ, $t(1, 58) = .46$, $p = .650$), depression and anxiety symptoms (PHQ-9, $t(1, 58) = .71$, $p = .481$; STAI state subscale, $t(1, 58) = .81$, $p = .420$), beliefs about rumination (WR, $t(1, 58) = .001$, $p = .999$), or judgements about usefulness of RNT ($t(1, 58) = -.62$, $p = .540$); see Table 4.1 for means and standard deviations.

Table 4.1. Means (and standard deviations) for the variables measured at baseline by experimental condition, prior to square root transformations

	RNT-as-Helpful (n = 30)	RNT-as-Unhelpful (n = 30)
RSQ-RRS	38.17 (10.52)	39.40 (14.88)
PSWQ	45.23 (13.55)	43.73 (14.70)
PHQ-9	2.97 (2.55)	2.53 (3.43)
STAI (State Subscale)	34.63 (8.82)	32.90 (9.01)
Why Ruminate scale	130.53 (30.68)	131.17 (35.47)
Appraisals of the usefulness of RNT	4.50 (1.45)	4.68 (1.26)

Note. RSQ-RRS: Response Styles Questionnaire – Ruminative Response Scale; PSWQ: Penn State Worry Questionnaire; PHQ-9: Patient Health Questionnaire; STAI: State-Trait Anxiety Inventory.

4.3.1.2. Manipulation check.

A 2 (Condition: RNT-as-Helpful versus RNT-as-Unhelpful) by 2 (Time: Baseline versus Post-Manipulation) repeated measures Analysis of Variance (ANOVA) was conducted to examine appraisals about the usefulness of RNT at Baseline and Post-Appraisal Manipulation. As expected, there was no main effect of Time ($F(1, 58) = .23$, $p = .632$), but there was a main effect of Condition ($F(1, 58) = 5.61$, $p = .021$), which was secondary to a significant Condition X Time interaction ($F(1, 58) = 18.74$, $p < .001$), reflecting an increase in perceptions of RNT as helpful in the RNT-as-Helpful condition relative to the RNT-as-Unhelpful condition (see Table 4.2 for means and standard deviations), confirming the success of the manipulation.

Table 4.2. Means (and standard deviations) for the dependent variables by experimental condition, prior to square root transformations

	RNT-as-Helpful (n = 30)			RNT-as-Unhelpful (n = 30)		
	Baseline	Post-Appraisal-Manipulation	Post-Discrepancy-Salience	Baseline	Post-Appraisal-Manipulation	Post-Discrepancy-Salience
Appraisals of the Usefulness of RNT	4.50 (1.45)	5.07 (1.33)		4.68 (1.26)	3.41 (1.26)	
State RNT	0.54 (.77)	0.56 (.72)	0.60 (.85)	0.45 (.69)	0.85 (.85)	0.69 (1.00)
Sadness	25.13 (16.26)	25.50 (12.53)	31.83 (15.77)	22.40 (11.95)	29.13 (14.29)	29.47 (13.97)
Anxiety	34.57 (21.31)	31.30 (17.25)	35.17 (17.46)	30.03 (18.79)	36.30 (20.09)	34.73 (18.57)

4.3.2. Main analyses

4.3.2.1. Change in state RNT and mood from Baseline to Post-Appraisal-Manipulation.

A 2 (Condition: RNT-as-Helpful versus RNT-as-Unhelpful) by 2 (Time: Baseline versus Post-Appraisal-Manipulation) repeated measures ANOVA was used to examine the changes in the DVs from Baseline to Post-Appraisal-Manipulation. As predicted, there was no effect of Time ($F(1, 58) = 3.18$, $p = .080$), Condition ($F(1, 58) = .25$, $p = .621$), or Condition X Time ($F(1, 58) = 1.85$, $p = .180$) on state RNT. There was no main effect of Condition on Sadness ($F(1, 58) = .03$, $p = .867$), but there was a significant main effect of Time on Sadness ($F(1, 58) = 9.66$, $p = .003$), which was secondary to a significant interaction effect of Condition X Time ($F(1, 58) = 4.84$, $p = .032$): Contrary to expectation, Participants in the RNT-as-Unhelpful condition became sadder than participants in the RNT-as-Helpful condition (see Table 4.2). Finally, there was no main effect of Time ($F(1, 58) = 1.95$, $p = .168$) or Condition ($F(1, 58) = .03$, $p = .872$) on Anxiety, but there was a significant interaction effect of Condition X Time on Anxiety ($F(1, 58) = 9.46$, $p = .003$): Participants in the RNT-as-Unhelpful condition became more anxious relative to participants in the RNT-as-Helpful condition.

4.3.2.2. Change in state RNT and mood from Post-Appraisal-Manipulation to Post-Self-Discrepancy.

A 2 (Condition: RNT-as-Helpful versus RNT-as-Unhelpful) by 2 (Time: Post-Appraisal-Manipulation versus Post-Self-Discrepancy) repeated measures ANOVA was used to examine the changes in the DVs from Post-Appraisal-Manipulation to Post-Self-Discrepancy. Contrary to the prediction, there was no significant effect of

Time ($F(1, 58) = .64$, $p = .427$), Condition ($F(1, 58) = .55$, $p = .460$), or Condition X Time on state RNT ($F(1, 58) = 1.04$, $p = .313$). There was no main effect of Condition on Sadness ($F(1, 58) = .03$, $p = .860$), but there was a main effect of Time ($F(1, 58) = 8.68$, $p = .005$), which was secondary to a significant interaction effect of Condition X Time on Sadness ($F(1, 58) = 5.59$, $p = .021$): Participants in the RNT-as-Helpful condition became sadder relative to participants in the RNT-as-Unhelpful condition. Finally, there was no main effect of Time ($F(1, 58) = .98$, $p = .326$) or Condition ($F(1, 58) = .33$, $p = .570$) on Anxiety, but there was a significant interaction of Condition X Time on Anxiety ($F(1, 58) = 4.04$, $p = .049$): Participants in the RNT-as-Helpful condition became more anxious relative to participants in the RNT-as-Unhelpful condition.

4.3.2.3. Self-discrepancy task.

In order to test whether the self-discrepancy task was effective at inducing self-discrepancy and to determine whether this was different across conditions, an independent samples *t* test was conducted and found that there was no significant difference between conditions on the level of perceived self-discrepancy ($t(1,58) = -.71$, $p = .481$, RNT-as-Helpful mean perceived discrepancy = 3.31, SD = .46, RNT-as-Unhelpful mean perceived discrepancy = 3.39, SD = .49). As such, the findings cannot be explained by the conditions differentially perceiving self-discrepancy. Moreover, examination of these self-discrepancy scores indicates that participants did not generally perceive high levels of self-discrepancy, since a score of 5 indicates no self-discrepancy, and a score of 1 indicates high levels of self-discrepancy.

In addition, to examine whether participants were having thoughts about the self-discrepancy task in the breathing exercise that immediately followed that task, the number of thoughts that each participant had that related to the task were counted.

Thoughts were counted as relating to the self-discrepancy task if the participant either explicitly stated that they were thinking about that task (e.g., "I was thinking about the traits I had described in the previous exercise"), or if the thoughts were about one of the self-discrepancies identified in the task (e.g., the undesired trait of "selfish" is identified, and then participant has a thought of "I should be there more for friends and family"). A proportion score was calculated for each participant, representing the percentage of thoughts that were about the self-discrepancy task (i.e., total number of thoughts about the self-discrepancy task ÷ total number of thoughts). On average, 19.56% of thoughts were about the self-discrepancy task (SD = 27.22). As such, just over 80% of thoughts reported during the breathing exercise that immediately followed the self-discrepancy task were not about self-discrepancy, indicating that participants were not generally dwelling a lot on the task.

Finally, to examine whether the appraisal manipulation might have more of an impact on state RNT in people who perceived self-discrepancy more strongly, a hierarchical multiple regression analysis was conducted in which Post-Self-Discrepancy state RNT was the dependent variable, with Post-Appraisal-Manipulation state RNT at Step 1, Condition at Step 2, Perceived Self-Discrepancy at Step 3 and a Perceived Self-Discrepancy X Condition interaction at Step 4 (Table 4.3). The interaction of Perceived Self-Discrepancy X Condition was not significant, indicating that the effect of the appraisal manipulation was not influenced by perceived self-discrepancy.

Table 4.3. Regression analysis examining the effects of Condition, Self-Discrepancy, and Condition X Self-Discrepancy on Post-Self Discrepancy state RNT

Measure	Step 1			Step 2			Step 3			Step 4		
	B	*SE B*	*B*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Post-Appraisal State RNT	.32	.13	.32*	.34	.13	.33*	.31	.14	.30*	.31	.14	.31*
Condition				-.06	.15	-.05	-.05	.16	-.04	-.05	.16	-.04
Self-Discrepancy							-.38	.57	-.09	-.59	.86	-.13
Self-Discrepancy X Condition										.36	1.13	.06
R^2		.10			.10			.11			.11	
Adjusted R^2		.09			.07			.06			.05	
R^2 *Change*		.10			.00			.01			.00	
F for change in R^2		6.58*			.16			.45			.10	

Note. *$p < .05$

4.3.2.4. Appraisal manipulation task.

Whilst the manipulation check indicated that the appraisal manipulation was successful, it is possible that a potential confound may have been introduced by participants writing answers of varying lengths across conditions: Some participants may have written more lengthy answers in response to the manipulation questions (e.g., "In what way did repetitive thinking improve your understanding and insight?"), whereas other participants may have written less.

To investigate this, the number of words written during the writing exercise was examined. There was considerable variation in the length of answers provided (mean number of words = 225.63, SD = 106.58, range = 48 - 498). An independent samples *t* test also revealed a difference between conditions on the number of words written, with participants in the RNT-as-Helpful condition writing significantly more (RNT-as-Helpful mean number of words = 260.63, SD = 95.95; RNT-as-Unhelpful mean number of words = 190.63, SD = 106.63; $t(1, 58) = 2.67$, $p = .010$). As such, this difference in words written between conditions is a potential confound, although it seems unlikely that on its own it would produce any differential effects between conditions.

4.4. Discussion

This study sought to contribute to an understanding of one of the vulnerability factors for RNT by examining the causal relationship between beliefs about the helpfulness of RNT and engagement in state RNT. Specifically, building upon prior correlational and prospective evidence, this study experimentally manipulated beliefs about the helpfulness of RNT in increasing sense of understanding and insight, and examined the effect on subsequent state RNT.

The manipulation check indicated that the appraisal manipulation was successful, as participants in the RNT-as-Helpful condition had more favourable appraisals of RNT relative to participants in the RNT-as-Unhelpful condition. Immediately after the manipulation, there was no difference between conditions on state RNT, which was consistent with the prediction that there would be no difference between conditions until after the self-discrepancy task. However, contrary to predictions, after exposure to the self-discrepancy task, state RNT did not increase for all participants (i.e., no main effect of Time), and there was no difference between conditions on state RNT (i.e., no Condition X Time interaction). The self-discrepancy task did not seem to be successful at affording engagement in RNT, as it did not elicit increases in RNT in either condition. Closer examination of the self-discrepancies indicated that the average self-discrepancy was small, which could explain why this task did not induce RNT, because there was insufficient perceived self-discrepancy in this undergraduate population to induce RNT (i.e., on average, the undergraduates were feeling good about themselves).

Regarding the observed effects on mood, participants in the RNT-as-Unhelpful condition reported more sadness and anxiety immediately after the manipulation. One possible explanation for this observation is that focusing on times when RNT had been unhelpful and unconstructive has a negative effect on mood: In this task, participants may have been focusing on unresolved and potentially still active negative situations that may have aroused negative emotions. After the discrepancy salience task, participants in the RNT-as-Helpful condition became sadder and more anxious. One possible explanation for this finding is a regression to the mean effect: Participants in the RNT-as-Helpful condition may have had low levels of sadness and anxiety straight after the appraisal manipulation, such that when

sadness and anxiety were measured again after the self-discrepancy task, they had regressed to the mean.

A number of methodological issues may be responsible for the observed pattern of results. First, at the beginning of the experiment, there were higher than expected levels of RNT. One possible explanation for this is that the RNT occurring during the baseline assessment may have resulted from administration of the PHQ-9 and the STAI at the beginning of the experiment. Asking participants to respond to questions about low mood and anxious feelings immediately prior to the first breathing exercise may have inadvertently acted as a minor RNT induction. Since participants began the experiment with elevated levels of RNT, this may have diminished the opportunity to observe subsequent increases in RNT generated by the tasks experienced later in the experiment.

Second, the elevated levels of state RNT may have been maintained across both conditions as a result of the manipulation task in which all participants wrote about their previous experiences of RNT. In this task, the instructions did not specify that these memories of RNT had to be about resolved issues, and as such, the examples generated could have related to situations that are ongoing and unresolved, which could trigger lower mood, and potentially, increased levels of RNT. In the RNT-as-Unhelpful condition, increased levels of RNT could have been maintained as a consequence of focusing on unconstructive experiences RNT about potentially ongoing negative events. In the RNT-as-Helpful condition, increased RNT could have been maintained as a consequence of thinking about a potentially unresolved issue that it has been helpful to think about, thus potentially motivating participants to continue engaging in RNT about that unresolved situation. As such, whilst the increased levels of RNT may have been maintained for slightly different reasons

across experimental conditions, these explanations may account for why this task may have maintained the elevated levels of RNT observed at baseline, thus leading to a possible ceiling effect whereby state RNT did not further increase after the discrepancy salience task.

Third, due to the writing exercise format of the manipulation task, it was difficult to control for the amount written by each participant. Whilst participants were instructed to respond to specific questions in their written responses, and the task instructions indicated the approximate length of answer expected, there was considerable variation between participants on the length of written answers provided. Specifically, participants in the RNT-as-Helpful condition wrote significantly more than participants in the RNT-as-Unhelpful condition. As such, whilst the manipulation check indicated that the manipulation was successful, a difference in the length of answers written across conditions could potentially introduce a confound (e.g., difference in extent of elaboration of reasoning behind written answers across conditions).

Fourth, and most critically, it appears that the discrepancy salience task may have been insufficiently powerful to prompt engagement in RNT. When descriptions of the thoughts generated during the breathing exercise immediately after the discrepancy salience task were examined, relatively few thoughts were related to self-discrepancy (mean percentage of thoughts about self-discrepancy as a proportion of all thoughts reported = 19.56%). Moreover, examination of the mean self-discrepancy scores indicated that participants did not generally perceive high levels of self-discrepancy during this task.

In conclusion, whilst a manipulation check revealed that the manipulation of the perceived benefits of RNT was successful, contrary to predictions, no difference

in state RNT was observed between conditions following the self-discrepancy task. Given that there was no main effect of Time and no interaction effect of Condition X Time on state RNT following exposure to the self-discrepancy task, it suggests that this task was not successful in prompting participants to engage in RNT.

4.5. Appendix A: Analyses Examining the Effect of a Condition X Rumination and a Condition X Worry Interaction on State RNT

To examine whether the findings remained consistent across varying levels of trait rumination and worry, two regression analyses were conducted to examine the effect of Condition X Rumination and Condition X Worry interaction terms on Post-Discrepancy-Salience state RNT. The interaction term was not a significant predictor of state RNT, indicating that the effect of the experimental manipulation did not vary as a result of trait rumination or trait worry (see Table 4.4 and Table 4.5).

Table 4.4. Regression analysis examining the effects of Rumination, Condition, and Condition X Rumination on Post-Discrepancy-Salience state RNT

Measure	Step 1			Step 2			Step 3			Step 4		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Post-Appraisal-Manipulation State RNT	.33	.13	.32*	.30	.13	.30*	.31	.13	.30*	.34	.14	.33*
Rumination				.09	.08	.14	.09	.08	.14	.23	.13	.36
Condition							-.06	.15	-.05	-.07	.15	-.06
Condition X Rumination interaction										-.22	.17	-.29
R^2		.10			.12			.12			.15	
Adjusted R^2		.09			.09			.08			.09	
R^2 *Change*		.10			.02			.00			.03	
F for change in R^2		6.58*			1.15			.15			1.83	

Note. *$p < .05$

Table 4.5. Regression analysis examining the effects of Worry, Condition, and Condition X Worry on Post-Discrepancy-Salience state RNT

Measure	Step 1			Step 2			Step 3			Step 4		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Post-Appraisal-Manipulation State RNT	.33	.13	.32*	.30	.13	.30*	.31	.13	.30*	.33	.14	.32*
Worry				.12	.07	.20	.12	.07	.20	.15	.11	.25
Condition							-.04	.15	-.03	-.04	.15	-.04
Condition X Worry interaction										-.07	.15	-.08
R^2		.10			.14			.14			.15	
Adjusted R^2		.09			.11			.10			.08	
R^2 *Change*		.10			.04			.00			.00	
F for change in R^2		6.58*			2.56			.07			.19	

Note. $*p < .05$

4.6. Appendix B: Normality Statistics Pre- and Post-Data Transformations

Study 3 reported the use of square root transformed data due to the data, as expressed in its original form, not being normally distributed. Due to the nature of the variables being measured (e.g., depression score), one would not expect to observe a normal distribution. Whilst the square root transformations do not completely rectify the skewness and kurtosis within the data (i.e., Shapiro-Wilk and Kolmogorov-Smirnov tests still give significant values post-transformation), transformation does substantially improve the normality of the distributions. To demonstrate this, Table 4.4 displays skew and kurtosis statistics for all variables pre- and post-transformation.

Table 4.4. Study 3 skew and kurtosis statistics pre- and post-square root transformation

Measure	Pre-Transformation		Post-Transformation	
	Skew	Kurtosis	Skew	Kurtosis
RSQ-RRS	1.23	.98	.96	.15
PSWQ	.53	-.25	.20	-.48
PHQ-9	2.37	7.91	1.85	4.78
STAI	1.49	2.24	1.17	1.32
Why Ruminate	-.55	-.77	-.75	-.51
ISDI Discrepancy Score	-1.52	3.63	-1.93	5.45
Time 1 State RNT	1.40	1.42	.70	-1.16
Time 2 State RNT	.75	-.79	.17	-1.64
Time 3 State RNT	1.50	1.38	.65	-.98
Time 1 Sadness	.79	.53	-.49	1.05
Time 2 Sadness	.45	.66	-1.03	2.63
Time 3 Sadness	.56	.08	-.10	-.17
Time 1 Anxiety	.84	.37	-.18	.35
Time 2 Anxiety	.85	1.09	-.35	1.13
Time 3 Anxiety	.61	1.22	-.64	1.45

Note. RSQ-RRS: Response Styles Questionnaire – Ruminative Response Scale; PSWQ: Penn State Worry Questionnaire; PHQ-9: Patient Health Questionnaire; STAI: State-Trait Anxiety Inventory (state subscale); ISDI: Integrated Self-Discrepancy Inventory mean discrepancy score.

CHAPTER 5: Study 4 - Believing That Repetitive Thought is Helpful Increases Repetitive Negative Thought in Response to Stress

5.1. Preface

This chapter reports a further experimental study examining the effects of manipulating the perceived helpfulness of RNT and examining the effect on subsequent engagement in RNT. A paper reporting this study is currently under review:

Kingston, R. E. F., and Watkins, E. R. (under review). Believing that repetitive thought is helpful increases repetitive negative thought in response to stress.

The study described in this chapter reports a replication of the study described in Chapter 4, but with a number of key methodological modifications that address the concerns identified in the Discussion (Chapter 4, Section 4.4).

First, to address the concern about the higher than expected levels of RNT observed at the beginning of the experiment, the format of the session was modified such that participants did not complete the PHQ-9 (Kroenke et al., 2001) and the STAI state subscale (Spielberger, 1989) at the beginning of the session. Instead, these measures were completed online, at the time of the experiment booking, so that there would be a gap between the completion of measures that may prompt engagement in RNT, and the beginning of the experimental session.

Second, to address the concern that the manipulation task may have been too emotionally arousing and may prompt engagement in RNT, the instructions to this task were modified such that participants were required to recall memories of helpful/unhelpful RNT about problems that were resolved and in the past. Preventing participants from focusing on current unresolved problems would hopefully reduce emotional arousal and motivation to engage in RNT at this stage of the experiment,

making the interpretation of any findings cleaner. In the previous experiment, it was not possible to discern whether the effect on mood was as a result of condition (i.e., RNT-as-Helpful or RNT-as-Unhelpful), or whether as a result of thinking about a resolved versus an unresolved issue, and so by making this modification to the experiment to ensure that everyone was remembering occasions of RNT about resolved situations (whether helpful or unhelpful), this possible confound was removed.

Third, to address the concern about the differential levels of elaboration across conditions during the manipulation task when writing about memories of helpful/unhelpful RNT, the format of the task was switched from a written exercise to a verbal interview. When conducting the manipulation exercise in a written format as reported in the previous chapter, there was significant variation in the degree to which participants elaborated in response to the task (i.e., some participants wrote a lot and explored in more detail the ways in which rumination was helpful/unhelpful, whereas other participants wrote significantly less). As such, by switching to an interview format, it was easier to ensure that participants elaborated adequately and to a similar degree, since for brief and unelaborated answers, participants could be immediately prompted to provide further information before proceeding. As such, the interview format was designed to ensure more detailed and consistent elaboration in response to the appraisal manipulation across participants, and greater control over the manipulation of appraisals. In addition, the interview format also enabled better monitoring of the examples of helpful/unhelpful RNT, such that it was possible to ensure the comparability of the examples given across conditions. For instance, it was possible to check that participants in both conditions were recalling examples of RNT, rather than other types of thinking about an issue, avoiding this potential confound.

Finally, to address the most critical methodological concern about the self-discrepancy task being insufficiently powerful to prompt engagement in RNT, this task was changed. Instead, an insolvable anagram task incorporating failure feedback was used as a potential task to induce RNT (cf. Moulds et al., 2010; Watkins et al., 2008). This task has been successfully used in previous studies, with evidence that it is powerful enough to prompt involuntary rumination, but not so powerful that it would not be possible to differentiate level of state RNT between conditions. It is important to note that this task (anagram failure) may be more likely to elicit ruminative thought content, rather than worry thought content (although it may still induce some worry), and in previous studies it has been used to afford rumination. As previously outlined, most tasks designed to afford engagement in RNT tend to concentrate on either eliciting rumination or worry, and as such, in order to use a well-validated approach, it was necessary to use a task that might elicit rumination, as an exemplar for RNT.

Believing That Repetitive Thought is Helpful Increases Repetitive Negative Thought in Response to Stress

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5.2. Abstract

The perception-of-benefit hypothesis proposes that appraising repetitive negative thought (RNT) to be helpful causes RNT. Consistent with this, positive metacognitive beliefs about RNT are correlated with and prospectively predict RNT. However, the causal hypothesis has not been directly tested by manipulating such appraisals. This experiment tested the hypothesis that perception-of-benefit causes RNT by manipulating perceived helpfulness of RNT. Participants were randomly allocated to perceive RNT as either helpful or unhelpful by means of an interview exploring participant-generated examples of constructive versus unconstructive outcomes of RNT. Participants were then exposed to a stressful insolvable anagram task. Participants in the RNT-as-Helpful condition engaged in more RNT after the stressor relative to participants in the RNT-as-Unhelpful condition. This effect cannot be explained by a differential mood response to the task because there was no difference in post-stressor anxiety and sadness across conditions. This finding provides the first direct experimental evidence that metacognitive beliefs cause RNT.

5.3. Introduction

Depressive rumination, the process of repeatedly thinking about negative moods, problems and difficulties, and their possible causes and consequences (Nolen-Hoeksema, 1991), is implicated in the development and maintenance of depression

and anxiety (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Watkins, 2008). Worry, defined as a chain of uncontrollable negative thoughts and images concerning uncertainty and potential negative outcomes (Borkovec, Robinson, Pruzinsky, & DePree, 1983), is also associated with depression and anxiety (Segerstrom, Tsao, Alden, & Craske, 2000; Watkins, 2008).

Rumination and worry can be conceptualised as representing a common process of repetitive negative thought (RNT; Ehring & Watkins, 2008): both are (i) repetitive; (ii) focused on negative content; (iii) experienced as passive and relatively uncontrollable; and (iv) abstract in processing style. Previous empirical research has emphasised the commonality between rumination and worry (Watkins, Moulds, & Mackintosh, 2005; Watkins, 2008). Moreover, RNT has been proposed as a transdiagnostic process that is common to and causally contributes to a large number of mental health problems (Ehring & Watkins, 2008; Harvey, Watkins, Mansell, & Shafran, 2004).

Paradoxically, despite pathological consequences for mood and mental health, a subset of individuals demonstrates a tendency towards frequent and persistent RNT. This raises the following important theoretical and clinical question: Despite these negative outcomes, why do these people continue to ruminate and worry?

A wide range of potential vulnerability factors for RNT have been identified (Kingston, Watkins, & O'Mahen, 2013a; Nolen-Hoeksema & Watkins, 2011). One explanation for why people might persist in RNT is that despite its disadvantageous consequences, they appraise RNT to have useful functions that result in beneficial outcomes, which reinforces their continued use of RNT (Nolen-Hoeksema et al., 2008, Watkins & Baracaia, 2001). This *perception-of-benefit* account hypothesises that the appraisal that RNT has advantages and benefits (whether accurate or not) causes RNT

(Watkins & Baracaia, 2001). A specific operationalisation of this hypothesis is in terms of metacognitive beliefs, which refer to "beliefs and appraisals about one's thinking and the ability to monitor and regulate cognition" (Papageorgiou & Wells, 2001b, p. 160). For example, positive metacognitive beliefs about RNT reflect beliefs about the advantages of RNT as a coping strategy.

Despite considerable interest in and investigation of the perception-of-benefit and positive metacognitive belief approach to RNT, the key hypothesis that appraising RNT as beneficial causally increases RNT has not been directly tested. Cross-sectional studies conducted in depressed and nondepressed samples have found associations between self-reported positive beliefs about rumination and trait rumination (Kingston, Watkins, & O'Mahen, 2013a; Papageorgiou & Wells, 2001a; Papageorgiou and Wells, 2003; Roelofs, Huibers, Peeters, Arntz, & van Os, 2010; Roelofs, Papageorgiou, Gerber, Huibers, Peeters, & Arntz, 2007, Watkins & Baracaia, 2001; Watkins & Moulds, 2005). Similarly, in a quasi-experiment, Moulds, Yap, Kerr, Williams, and Kandris (2010) exposed individuals with high versus low levels of positive beliefs about rumination to an unsolvable anagram task, and assessed subsequent self-reported rumination. Regardless of whether participants received positive, negative, or neutral feedback about anagram performance, participants with higher endorsement of positive beliefs about rumination reported more state rumination than participants with lower levels of positive beliefs.

Cross-sectional studies examining worry also demonstrate an association between having metacognitive beliefs about the utility of worry, and engagement in worry (Bacow, Pincus, Ehrenreich, & Brody, 2009; Cartwright-Hatton & Wells, 1997; Davis & Valentiner, 2000; de Jong-Meyer, Beck, & Riede, 2009; Irak & Tosun, 2008; Nuevo, Montorio, & Borkovec, 2004; Wells, 2005; Wells & Cartwright-Hatton,

2004; Wells & Papageorgiou, 1998; Yilmaz, Gençöz, & Wells, 2008). However, all of these studies are correlational, leaving the causal direction of this relationship unresolved.

In an experimental study, Lyubomirsky and Nolen-Hoeksema (1993) examined the effects of rumination versus distraction manipulations on perceived level of insight in dysphoric and nondysphoric students. All participants reported greater levels of insight following the rumination induction relative to the distraction induction, with the authors noting that rumination made participants "sadder but wiser" (p. 346). This study suggests that repeated thinking about the self and feelings increases perceived insight relative to not thinking about the self (i.e., distraction), but it did not test whether perception-of-benefit influences rumination.

A small number of prospective longitudinal studies have examined whether perceived benefits of RNT predict future RNT. Weber and Exner (2013) found that in a nondepressed student sample, positive metacognitive beliefs about rumination predicted changes in rumination two months later. Sica, Steketee, Ghisi, Chiri, and Franceschini (2007) found that positive and negative metacognitive beliefs about worry predicted subsequent level of worry after four months. In a prospective study examining the relationships between stressful events, positive beliefs about worry and engagement in worry, Iijima and Tanno (2013) found that positive beliefs about worry significantly moderated the relationship between stressful events and worry, with stressful events leading to greater levels of worry in individuals with high positive beliefs about worry. Examining rumination and worry as a common process of RNT in a prospective study incorporating a range of putative vulnerability factors (e.g., parenting style, stress, neuroticism), Kingston, Watkins, and O'Mahen (2013b) found that only neuroticism and the belief that repetitive thinking increases insight and

understanding predicted increases in RNT over six to eight weeks. Notably, within a range of metacognitive beliefs (e.g., perceiving rumination to aid self-control and social control), only this specific metacognitive belief predicted increases in RNT.

Although these prospective studies suggest that it is unlikely that the observed relationship is due to RNT causing positive appraisals because the assessment of positive metacognitive beliefs temporally precedes increases in RNT, they cannot rule out the role of possible third factors. The definitive way to infer causality is by bi-directionally manipulating the independent variable of interest (i.e., perception-of-benefit) and investigating its influence on the dependent variable (i.e., state RNT). However, to our knowledge, there have been no experimental studies that directly test the perception-of-benefit/positive metacognitive belief hypothesis to examine the effects on rumination or RNT. The only experimental study to manipulate beliefs about the utility of worry did not find an effect on post-manipulation worry (Prados, 2011). However, this study had a number of methodological limitations, particularly relating to the tasks used to prompt engagement in worry.

The current study aimed to address this critical gap in the literature by testing the perception-of-benefit/positive metacognitive beliefs hypothesis: Participants were manipulated to view RNT as helpful versus unhelpful to test how this would influence state RNT, assessed by thought probes, following a subsequent stressful event. We manipulated appraisals of whether RNT improves understanding and insight, because only this particular perception was found to be important in the prospective study by Kingston et al. (2013b).

We expected that there would be an increase in state RNT for all participants following the stressful event (i.e., a main effect of Time), but critically, the perception-of-benefit hypothesis predicts that participants manipulated to view RNT

as helpful would show a greater increase in state RNT relative to those manipulated to view RNT as unhelpful (i.e., a Condition X Time interaction). We expected to observe this difference in state RNT between experimental conditions only in response to a stressor that affords RNT (i.e., from post-appraisal-manipulation to post-anagram-stressor), but not as a direct effect of the experimental manipulation of perceived benefit (i.e., no effect from baseline to post-appraisal-manipulation).

5.4. Method

5.4.1. Design

This was an experimental study in which participants were randomly allocated to two conditions (*RNT-as-Helpful* versus *RNT-as-Unhelpful*) using a blocked design, to ensure that each condition contained equal numbers of participants. The independent variable (IV) to be manipulated was perceived helpfulness of RNT, and the dependent variables (DVs) were state RNT and mood.

5.4.2. Participants

Sixty participants (age range 18 – 57 years, mean = 25.32, SD = 9.56; 83.3% female; 83.3% white British, 10.0% other white background, 5.0% Chinese, 1.7% mixed ethnic groups; socioeconomic data not collected) from staff and students at the University of Exeter were recruited to the study by e-mail, electronic newsletter and posters advertising the study, which was described as "examining cognitive abilities and thinking styles". Participants gave informed consent to participate in the study, were fully debriefed afterwards, and received either £5 cash or course credits for participating.

5.4.3. Procedure

The experiment involved two key phases: first, a manipulation of beliefs about RNT (involving recall of experiences when RNT was experienced as helpful or unhelpful), and second, exposure to a stressor (an insolvable anagram task). State RNT and mood were measured three times during the experiment: at Baseline, Post-Appraisal-Manipulation, and Post-Anagram-Stressor. State RNT was assessed using thought probes during a five-minute breathing exercise.

Before the experiment, participants completed an online battery of questionnaires containing the RSQ-RRS, PSWQ, PHQ-9, STAI (state subscale), and appraisals about the usefulness of RNT. The mean number of days between completion of the online battery of questionnaires and participation in the experiment was 9.25 days (SD = 7.38). The experiment began with the first assessment of state RNT and mood (Baseline), followed by the manipulation task. Next, there was a second assessment of the perceived usefulness of RNT, state RNT and mood (Post-Appraisal-Manipulation), followed by the stressor task. Finally, there was the third assessment of state RNT and mood (Post-Anagram-Stressor), after which the Why Ruminate scale was completed.

After the experiment, participants were asked to briefly write down what they thought the study was about, before being debriefed about the nature of the study. The anagram task was explained such that participants understood that half of the anagrams were insolvable and their performance was normal.

5.4.4. Measures

Response Styles Questionnaire – Ruminative Response Scale (RSQ-RRS, Nolen-Hoeksema & Morrow, 1991*)*. The RSQ-RRS is a 22-item questionnaire that assesses ruminative responses focused on the self, symptoms, and possible causes and

consequences of low mood. Total scores range from 22-88, with higher scores indicating greater trait rumination. It has acceptable convergent validity and high internal consistency (α = .89; Nolen-Hoeksema & Morrow, 1991).

Penn State Worry Questionnaire (PSWQ, Meyer, Miller, Metzger, & Borkovec, 1990). The PSWQ is a 16-item measure of trait worry, assessing the tendency to engage in excessive, uncontrollable and generalised worry. Scores range from 16-80, with higher scores indicating greater trait worry. It has good internal consistency and construct validity (Molina & Borkovec, 1994).

Patient Health Questionnaire (*PHQ-9*, Kroenke, Spitzer, & Williams, 2001). The PHQ-9 is a nine-item measure designed to assess the severity of depression symptoms over the past two weeks. Scores range from 0 to 27, with greater scores indicating more severe symptoms of depression. It has good internal reliability and construct validity (Kroenke et al., 2001).

State-Trait Anxiety Inventory – State subscale (STAI, Spielberger, 1989*)*. The "state" subscale of the STAI is a 20-item measure of state anxiety, with high internal consistency (Barnes, Harp, & Jung, 2002). Respondents rate statements (e.g., "I feel nervous") on a 4-point scale ranging from "not at all" to "very much", to indicate their feelings over the past two weeks, giving scores from 20-80 (higher scores indicating greater state anxiety).

Why Ruminate scale. The Why Ruminate scale (WR, Watkins & Baracaia, 2001) is a 46-item questionnaire measuring perceived benefits and functions of rumination, with participants indicating their agreement with each item on a scale from 1 ("not true at all") to 5 ("completely true"). Scores range from 46–230, with higher scores indicating more perceived benefits and functions of rumination. The scale has high internal consistency and criterion validity (Watkins & Baracaia, 2001).

Mood ratings. Participants rated their mood on the following two dimensions: Sadness and Anxiety. Ratings were made using computerised 100-point visual analogue scales, which were scaled from 0 to 100 (0 = Happy / Confident, 100 = Sad / Anxious), with higher scores indicating greater sadness and anxiety. Similar visual analogue scales have demonstrated good validity and reliability (e.g., Stern, Arruda, Hooper, Wolfner, & Morey, 1997).

Appraisals of the usefulness of RNT. A two-item measure was created to assess participants' appraisals of the usefulness of RNT for two purposes: (i) to ensure that there was no baseline difference on this measure across conditions, and (ii) to serve as a manipulation check, assessing whether participants in the RNT-as-Helpful versus RNT-as-Unhelpful conditions differentially appraised the usefulness of RNT. The two items were "Right now, how helpful or unhelpful do you think it is to repeatedly think through problems or difficulties, and repeatedly think about their causes, meanings, and implications?", and "At this moment, how much do you think that repeatedly dwelling on problems and difficulties, and thinking about their causes, meanings and implications, influences your sense of understanding and insight?", each rated on 7-point Likert scales, respectively ranging from 1 ("very unhelpful") to 7 ("very helpful") and 1 ("it greatly decreases my sense of understanding and insight") to 7 ("it greatly increases my sense of understanding and insight"). A mean score of these two items was calculated to represent appraisals about the usefulness of rumination, with higher scores indicating more favourable appraisals ($\alpha = .64$).

5.4.5. Tasks

5.4.5.1. Assessment of state RNT.

State RNT was assessed using an adaptation of a "breathing focus task", originally designed to measure worry (Hirsch, Hayes, & Mathews, 2009). Each assessment involved a five-minute period in which spontaneously occurring thoughts were measured using thought probes. The task was explained to participants as a "breathing exercise" in which they told to "close their eyes, and focus their attention on their natural breathing". Twelve tones were presented at randomised intervals between 20-30 seconds apart, and in response to each tone, participants indicated whether their attention was focused on "breathing" or "any other thought". If "any other thought" was selected, participants indicated whether the thought was positive, negative, or neutral, and provided a brief written description of the thought.

Immediately after each five minute period, participants provided fuller written descriptions of all "any other thoughts", as well as rating any negative thoughts on five criteria assessing RNT qualities during the five minutes: thought frequency (rated 0 "only once" to 4 "more than 4 times"), duration (0 "only for an instant" to 6 "nearly all the time"), distress (rated 0 "not at all" to 4 "extremely"), repetitiveness ("When thinking about this subject, how much did your thoughts keep coming back to the same or similar ideas again and again?", rated 0 "not at all" to 4 "a great deal"), and uncontrollability ("How difficult did you find it to stop this thought coming or to move on to other thoughts?", rated 0 "not at all" to 4 "extremely").

For each assessment period, there were 12 thought probes, and five ratings of RNT qualities for each of these probes, giving a total of 60 ratings. Ratings were zero if in response to the thought probe, participants were (i) focusing on their breathing, (ii) having positive or neutral thoughts, or (iii) having negative thoughts that were

rated as having no RNT qualities on the above five dimensions. Engagement in RNT was indexed by taking the mean of the 60 ratings for each exercise, generating one state RNT score for each participant at each of the three assessment periods (minimum 0, maximum 4.4).

There was a significant correlation between Post-Anagram-Stressor state RNT and trait RNT, as measured by the RSQ-RRS (r = .40, p = .002) and PSWQ (r = .35, p = .006), indicating that the measure of state RNT has good convergent validity.

5.4.5.2. Manipulation of perceived benefit of RNT.

Beliefs about RNT were manipulated by way of a detailed structured interview exploring participant-generated examples of when they had engaged in RNT. Participants were asked to identify "two occasions when repeated thinking about a problem over and over again" was either helpful (RNT-as-Helpful condition) or unhelpful (RNT-as-Unhelpful condition).

In order to minimise emotional arousal, participants were asked to only recall RNT about resolved issues (rather than current unresolved problems). After the problems were identified, the experimenter verified that participant found the RNT helpful/unhelpful as per their experimental condition.

In the RNT-as-Helpful condition, the interview contained three questions that explored the ways in which RNT was helpful, with particular reference to improving understanding and insight (e.g., "In what way did repetitive thinking about the problem improve your understanding and insight?"). In contrast, the RNT-as-Unhelpful manipulation interview contained three questions exploring the ways in which RNT was unconstructive in each situation (e.g., "In what way did repetitive thinking about the problem seem unhelpful or unconstructive?").

Participants were asked to spend approximately one minute answering each question aloud, with the experimenter using standardised prompts for unelaborated answers. The interview was conducted with reference to two distinct memories, to make participants consider RNT as something helpful or unhelpful in more than one context.

5.4.5.3. Anagram stressor task.

The stressor comprised a difficult anagram task and subsequent false failure feedback that has been successfully used in a number of studies to induce rumination (e.g., Moulds et al., 2010, Watkins, Moberly, & Moulds, 2008). Participants were presented with a list of 30 five-letter anagrams, without being made aware that 15 were unsolvable. They had three minutes to solve as many as possible, and were told to work quickly and accurately. False high expectations of performance were established: Participants were told that based on previous participants' performance, they were expected to solve five or six anagrams. However, on average, participants solved just one. They were also falsely informed that their performance was a reliable and valid indicator of future academic success.

After the task was complete, all participants were given failure feedback. To try to ensure that participants believed that all anagrams were solvable, the experimenter then highlighted several solvable anagrams that the participant had missed.

5.5. Results

5.5.1. Data Preparation and Preliminary Analyses

All of the variables were screened for skew and kurtosis. Since significant Kolmogorov-Smirnov and Shapiro-Wilk tests indicated that the variables were not

normally distributed, all variables were subject to square root transformations, which substantially improved the normality of the distributions.

5.5.1.1. Baseline differences.

Independent samples *t* tests revealed that there were no significant differences between conditions on any of the baseline measures of RNT (RSQ-RRS, $t(1, 58) = -1.20$, $p = .234$; PSWQ, $t(1,58) = -1.20$, $p = .234$), depression and anxiety symptoms (PHQ-9, $t(1, 58) = -1.24$, $p = .220$; STAI state subscale, $t(1, 58) = -.944$, $p = .444$), beliefs about rumination (WR, $t(1, 58) = -.192$, $p = .848$), or appraisals about usefulness of RNT ($t(1, 58) = -.409$, $p = .684$); see Table 5.1 for means and standard deviations.

Table 5.1. Means (and standard deviations) for the variables measured at baseline by experimental condition, prior to square root transformations

	RNT-as-Helpful (n = 30)	RNT-as-Unhelpful (n = 30)
RSQ-RRS	40.57 (13.10)	44.50 (12.20)
PSWQ	48.97 (13.20)	51.03 (13.84)
PHQ-9	3.53 (4.10)	4.90 (4.43)
STAI (State Subscale)	41.57 (12.65)	44.53 (11.68)
Why Ruminate scale	138.23 (26.31)	139.73 (33.62)
Appraisals of the usefulness of RNT	4.58 (1.25)	4.73 (1.57)

Note. RSQ-RRS: Response Styles Questionnaire – Ruminative Response Scale; PHQ-9 = Patient Health Questionnaire; STAI = State-Trait Anxiety Inventory.

5.5.1.2. Manipulation check.

A 2 (Condition: RNT-as-Helpful versus RNT-as-Unhelpful) by 2 (Time: Baseline versus Post-Appraisal-Manipulation) repeated measures Analysis of Variance (ANOVA) examined appraisals about the usefulness of RNT. As expected, there was no main effect of Time (F(1, 58) = .23, p = .632, d = .07, 95% CI for d [-.44, .58]), but there was a main effect of Condition (F(1, 58) = 5.61, p = .021, d = .59, 95% CI[.53, .66]), which was secondary to a significant Condition X Time interaction (F(1, 58) = 18.74, p < .001, d = 1.16, 95% CI[1.05, 1.25]), reflecting an increase in appraisals of RNT as helpful in the RNT-as-Helpful condition relative to the RNT-as-Unhelpful condition (see Table 5.2 for means and standard deviations), confirming the success of the manipulation.

Table 5.2. Means (and standard deviations) for the dependent variables by experimental condition, prior to square root transformations

	RNT-as-Helpful (n = 30)			RNT-as-Unhelpful (n = 30)		
	Baseline	Post-Appraisal-Manipulation	Post-Anagram-Stressor	Baseline	Post-Appraisal-Manipulation	Post-Anagram-Stressor
Appraisals of the Usefulness of RNT	4.58 (1.25)	5.32 (1.02)		4.73 (1.57)	3.82 (1.40)	
State RNT	0.16 (.18)	0.17 (.25)	0.56 (.60)	0.14 (.17)	0.29 (.33)	0.46 (.89)
Sadness	30.00 (19.14)	30.30 (17.90)	41.30 (20.42)	28.37 (13.37)	35.70 (19.00)	41.07 (20.17)
Anxiety	41.27 (20.97)	38.37 (19.22)	51.37 (22.20)	38.77 (21.91)	41.70 (22.21)	48.33 (23.36)

5.5.2. Main Analyses

5.5.2.1. Change in state RNT and mood from Baseline to Post-Appraisal-Manipulation.

A 2 (Condition: RNT-as-Helpful versus RNT-as-Unhelpful) by 2 (Time: Baseline versus Post-Appraisal-Manipulation) repeated measures ANOVA examined the changes in the DVs from Baseline to Post-Appraisal-Manipulation. As predicted, there was no effect of Time ($F(1, 58) = 1.66$, $p = .203$, $d = .23$, 95% CI [.11, .32]), Condition ($F(1, 58) = .89$, $p = .350$, $d = -.25$, 95% CI [-.32, -.17]), or Condition X Time ($F(1, 58) = 1.82$, $p = .182$, $d = -.35$, 95% CI [-.50, -.21]) on state RNT. There was no main effect of Condition on Sadness ($F(1, 58) = .14$, $p = .715$, $d = .10$, 95% CI[-.32, .44]), but there was a significant main effect of Time on Sadness ($F(1, 58) = 7.11$, $p = .010$, $d = .23$, 95% CI[-.14, .66]), which was secondary to a significant interaction effect of Condition X Time ($F(1, 58) = 6.75$, $p = .012$, $d = .68$, 95% CI[.48, .99]): Participants in the RNT-as-Unhelpful condition became sadder than participants in the RNT-as-Helpful condition (see Table 5.2). Finally, there was no main effect of Time ($F(1, 58) = .01$, $p = .938$, $d = .01$, 95% CI[-.50, .53]) or Condition ($F(1, 58) = .02$, $p = .884$, $d = .04$, 95% CI[-.49, .56]) on Anxiety, but there was a significant interaction effect of Condition X Time on Anxiety ($F(1, 58) = 4.71$, $p = .034$, $d = .57$, 95% CI[.27, .83]): participants in the RNT-as-Unhelpful condition became more anxious relative to participants in the RNT-as-Helpful condition .

5.5.2.2. Change in state RNT and mood from Post-Appraisal-Manipulation to Post-Anagram-Stressor.

A 2 (Condition: RNT-as-Helpful versus RNT-as-Unhelpful) by 2 (Time: Post-Appraisal-Manipulation versus Post-Anagram-Stressor) repeated measures ANOVA

examined the changes in the DVs from Post-Appraisal-Manipulation to Post-Anagram-Stressor. As predicted, there was no significant main effect of Condition on state RNT ($F(1, 58) = .00$, $p = .961$, $d = .01$, 95% CI[-.10, .14]), but there was a significant main effect of Time ($F(1, 58) = 10.85$, $p = .002$, $d = .48$, 95% CI[.32, .60]), which was secondary to a significant interaction effect of Condition X Time on state RNT ($F(1, 58) = 4.79$, $p = .033$, $d = .58$, 95% CI[.41, .74]): All participants engaged in more RNT after the stressor, but participants in the RNT-as-Helpful condition showed a greater increase in state RNT relative to participants in the RNT-as-Unhelpful condition (see Table 5.2). There was a significant effect of Time on Sadness ($F(1, 58) = 12.63$, $p = .001$, $d = .44$, 95% CI[.01, .93]) and Anxiety ($F(1, 58) = 18.37$, $p < .001$, $d = .48$, 95% CI[-.02, 1.11]): All participants became more sad and anxious post-stressor. There was no effect of Condition ($F(1, 58) = .34$, $p = .562$, $d = .15$, 95% CI[-.25, .57]) or Condition X Time ($F(1, 58) = 1.27$, $p = .264$, $d = -.30$, 95% CI[-.69, .17]) on Sadness, and no effect of Condition ($F(1, 58) = .04$, $p = .852$, $d = .05$, 95% CI[-.41, .62]) or Condition X Time ($F(1, 58) = 1.31$, $p = .257$, $d = -.30$, 95% CI[-.74, .23]) on Anxiety.

5.5.2.3. Anagram task performance.

In order to establish that group differences in state RNT were not accounted for by differential performance on the anagram task, we examined the number of anagrams solved across the two conditions. There was no significant difference between conditions on the number of anagrams solved during the stressor task ($t(1,58) = 1.33$, $p = .187$, $d = .36$, 95% CI[-.02, .67], RNT-as-Helpful mean = 1.17, SD = 1.05, RNT-as-Unhelpful mean = .83, SD = .87), suggesting that the observed group differences could not be explained by differential anagram task performance.

5.6. Discussion

To the best of our knowledge, the current study provides the first experimental test of the hypothesis that appraising RNT as beneficial causally contributes to state RNT. Participants manipulated to appraise RNT as helpful had greater levels of state RNT after subsequent exposure to a stressor than participants manipulated to perceive RNT as unhelpful. Consistent with the perception-of-benefit hypothesis (Watkins & Baracaia, 2001), this finding suggests that beliefs about RNT can cause increased RNT.

These findings are consistent with perception-of-benefit and positive metacognitive belief accounts of RNT, which hypothesise that appraising RNT as having advantages and benefits causes RNT (Papageorgiou & Wells, 2001a; Watkins & Baracaia, 2001). These results suggest that people may continue to engage in RNT despite its unhelpful consequences because they perceive it to be beneficial in increasing their sense of understanding and insight. This experimental evidence of causality is convergent with evidence that individuals who engage in high levels of RNT report more positive beliefs about RNT (e.g., Kingston et al., 2013a): together these findings suggest that such beliefs may influence level of RNT in the real world. If these findings are replicated in clinical populations, they suggest that identifying and challenging such beliefs in a therapeutic context may be an effective means to reduce state RNT.

We note that this study only demonstrated an effect on state RNT. It is not known whether manipulating beliefs and appraisals would influence trait RNT. Because trait RNT reflects the tendency to repeatedly engage in state RNT, we hypothesise that factors that consistently increase engagement in state RNT, such as long-term elevation of these metacognitive beliefs, would influence trait RNT. It is

important to therefore test whether repeatedly challenging beliefs about RNT reduces RNT in the long term.

The experimental manipulation and exposure to the stressor also influenced mood. Immediately after the appraisal manipulation, participants in the RNT-as-Unhelpful condition became more sad and anxious relative to participants in the RNT-as-Helpful condition. This is unsurprising because the RNT-as-Unhelpful condition involved focus on a situation that was negative and difficult to resolve. After exposure to the anagram stressor, regardless of condition, all participants became more sad and anxious. Importantly, despite engaging in more RNT, participants in the RNT-as-Helpful condition did not show increased levels of sadness or anxiety relative to those in the RNT-as-Unhelpful condition, suggesting that the difference in state RNT between the two groups post-stressor is not due to differential mood reactions to the task.

The study had a number of strengths. First, it is the first study to test the hypothesis that beliefs about RNT cause engagement in RNT by manipulating experimental conditions to establish causality. Second, the random allocation of participants to experimental conditions reduces the likelihood that the effects are due to sampling bias or unassessed confounds. Third, we used a dynamic real-time thought probe measure of RNT, providing better ecological validity and reducing concerns about retrospective reporting bias common to questionnaire measures, repeated three times throughout the study.

There were some limitations to the study. First, there was no control condition in which metacognitive beliefs were not manipulated. We are therefore unable to assess the default response that individuals would make in the absence of the manipulation, and whether the differential effect of the two conditions was a result of

the RNT-as-Helpful condition actively increasing RNT, the RNT-as-Unhelpful condition actively reducing RNT, or both. Second, the possibility of demand effects influencing responses to the tasks cannot be definitively ruled out. However, this seems unlikely, given that the effect of the manipulation on state RNT was only observed in response to the anagram stressor, and was not observed immediately after the manipulation. Moreover, no participants identified that the experiment was designed to manipulate appraisals of RNT. Third, as this study was conducted with a nonclinical sample, it is not possible to generalise the results to clinical populations. Whilst we have no theoretical reason to believe that perceptions-of-benefit would differentially impact RNT in depressed versus nondepressed individuals, we need to replicate these findings with participants who are currently depressed, to see whether the causal relationships remain robust.

An important area for future research is to establish whether the perception that RNT increases insightfulness is accurate or not. The current study demonstrated that this perception causally influences RNT, but the question of whether RNT does lead to improved understanding and insight was not tested. In summary, we found that experimentally manipulating appraisals about the usefulness of RNT influenced subsequent engagement in state RNT in response to a stressor, consistent with metacognitive accounts of RNT.

5.7. Appendix A: Analyses Examining the Effect of a Condition X Rumination and a Condition X Worry Interaction on State RNT

To examine whether the findings remained consistent across varying levels of trait rumination and worry, two regression analyses were conducted to examine the effect of Condition X Rumination and Condition X Worry interaction terms on Post-Anagram-Stressor state RNT. The interaction term was not a significant predictor of state RNT, indicating that the effect of the experimental manipulation did not vary as a result of trait rumination or trait worry (see Table 5.3 and Table 5.4).

Table 5.3. Regression analysis examining the effects of Rumination, Condition, and Condition X Rumination on Post-Anagram-Stressor state RNT

Measure	Step 1			Step 2			Step 3			Step 4		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Post-Appraisal-Manipulation State RNT	.50	.17	.36**	.27	.18	.19	.32	.18	.23	.33	.18	.23
Rumination				.17	.06	.36**	.18	.06	.38**	.19	.08	.40*
Condition							-.23	.11	-.25*	-.23	.10	-.25*
Condition X Rumination interaction										-.02	.11	-.03
R^2		.13			.23			.29			.29	
Adjusted R^2		.11			.20			.25			.24	
R^2 *Change*		.13			.10			.06			.00	
F for change in R^2		8.34**			7.56**			4.65*			.03	

Note. *$p < .05$, **$p < .01$

Table 5.4. Regression analysis examining the effects of Worry, Condition, and Condition X Worry on Post-Anagram-Stressor state RNT

Measure	Step 1			Step 2			Step 3			Step 4		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Post-Appraisal-Manipulation State RNT	.50	.17	.36**	.39	.17	.28*	.45	.17	.32*	.53	.18	.38**
Worry				.13	.06	.28*	.13	.06	.28*	.22	.08	.47**
Condition							-.21	.11	-.22	-.22	.11	-.23
Condition X Worry interaction										-.18	.11	-.28
R^2		.13			.20			.24			.28	
Adjusted R^2		.11			.17			.20			.23	
R^2 *Change*		.13			.07			.05			.03	
F for change in R^2		8.34**			4.99*			3.54			2.56	

Note. *$p < .05$, **$p < .01$

5.8. Appendix B: Examining the Effect of the Anagram Task on Thoughts

In the previous chapter, the self-discrepancy task that was used to expose participants to a situation that would afford RNT was judged to be unsuccessful because it did not elicit any increases in RNT. Moreover, in the breathing exercise that immediately followed the self-discrepancy exercise, a relatively small proportion of thoughts were about self-discrepancy, indicating that participants were not generally dwelling much on the task (see Chapter 4, Section 4.2.5.3).

To examine whether the anagram task was more successful at eliciting dwelling about task performance in the breathing exercise immediately after anagram failure, the number of thoughts that each participant had relating to the anagrams were counted. Thoughts were counted as relating to the anagram task if the participant either explicitly stated that they were thinking about that task (e.g., "Not getting any of the anagrams in the previous task"), or if the thoughts directly considered the implications of failing the anagram task (e.g. "I feel incapable and stupid because I'm normally good with words").

A proportion score was calculated for each participant, representing the percentage of thoughts that were about the anagram task (i.e., total number of thoughts about the anagram task ÷ total number of thoughts). On average, 37.92% of thoughts were about the anagram task (SD = 30.51). Compared to the self-discrepancy task, after which 19.56% of the thoughts were about self-discrepancy, a *t* test indicated that there were a significantly greater proportion of thoughts about the anagram task than the self-discrepancy task ($t(118) = -3.48$, $p = .001$). As such, it can be concluded that the anagram task was more successful at eliciting dwelling and putting participants in a situation conducive to RNT.

However, whilst the anagram task was successful at eliciting RNT, the levels of RNT reported were still very low (see Table 5.2). Nonetheless, an effect on state RNT was still observed, demonstrating proof-of-principle. There are several potential explanations for the low levels of RNT.

First, the scoring system utilised to assess state RNT was extremely conservative (see Section 5.4.5.1). To recap on the scoring system, for each assessment period of RNT, there were a total of 12 thought probes, and five ratings of RNT qualities for each of those probes (e.g., repetitiveness, uncontrollability, etc.), giving a total of 60 ratings for each exercise. Ratings were zero if participants were (i) focusing on their breathing in response to the thought probe, (ii) having positive or neutral thoughts; or (iii) having negative thoughts that were rated as not having any qualities of RNT (e.g., if in response to the question about repetitiveness, "How difficult did you find it to stop this thought coming or to move on to other thoughts?", the participant answered "Not at all", it would be scored zero). A mean state RNT score was calculated by taking the mean of the 60 ratings for each exercise. This represents a very conservative way of scoring the exercise because many of the ratings would be zero (e.g., if the participant was focusing a lot on their breathing or having many neutral thoughts), thus considerably lowering the overall mean score.

A second explanation for the observed low levels of RNT is that the anagram stressor task was still a relatively mild task for eliciting RNT. As such, one would not expect to see very high levels of RNT after a relatively mild stressor. Whilst the choice of task may have diminished the opportunity to observe high levels of RNT, it was necessary to select a task to elicit RNT that was relatively mild such that it did not lead to ceiling effects for state RNT, preventing observation of a difference in RNT between conditions.

A third explanation is that the study utilised a non-clinical sample who did not report high levels of trait RNT or elevated level of symptoms of depression and anxiety (see Table 5.1). In clinical samples, it is possible that higher levels of RNT would be observed in response to the tasks in this experiment.

5.9. Appendix C: Normality Statistics Pre- and Post-Data Transformations

Study 4 reported the use of square root transformed data due to the data, as expressed in its original form, not being normally distributed. Due to the nature of the variables being measured (e.g., depression score), one would not expect to observe a normal distribution. Whilst the square root transformations do not completely rectify the skewness and kurtosis within the data (i.e., Shapiro-Wilk and Kolmogorov-Smirnov tests still give significant values post-transformation), transformation does substantially improve the normality of the distributions. To demonstrate this, Table 4.4 displays skew and kurtosis statistics for all variables pre- and post-transformation.

Table 5.5. Study 4 skew and kurtosis statistics pre- and post-square root transformation

Measure	Pre-Transformation		Post-Transformation	
	Skew	Kurtosis	Skew	Kurtosis
RSQ-RRS	.29	-.57	.02	-.84
PSWQ	-.28	.04	-.71	.55
PHQ-9	1.81	3.79	.14	-.01
STAI	-.14	-.77	-.42	-.57
Why Ruminate	-.26	-.14	-.57	.15
Time 1 State RNT	1.09	.15	.25	-1.31
Time 2 State RNT	1.24	.59	.43	-1.15
T3 State RNT	2.77	10.66	.67	.34
Time 1 Sadness	.68	.00	-.30	.65
Time 2 Sadness	.42	-.64	-.67	1.03
Time 3 Sadness	-.00	-.79	-.87	1.01
Time 1 Anxiety	.10	-.74	-.98	1.26
Time 2 Anxiety	.01	-.51	-1.20	1.81
Time 3 Anxiety	-.38	-.34	-1.61	3.11

Note. RSQ-RRS: Response Styles Questionnaire – Ruminative Response Scale; PSWQ: Penn State Worry Questionnaire; PHQ-9: Patient Health Questionnaire; STAI: State-Trait Anxiety Inventory (state subscale).

5.10. Appendix D: Examining Participants' Perceptions of the Aim of the Study

In order to assess whether demand effects could have influenced the observed responses, immediately after the experiment, participants were asked to respond to the following open-ended question: "What do you think the overall purpose of this study might be?"

Of the 60 participants tested, 15 participants correctly guessed that the anagram component of the task involved investigating responses to a challenging task. A sample of these responses are given below:

- "Anagram was some kind of manipulation to ruminate or induce a particular state. The breathing exercise was to assess my rumination levels or areas of focus. It measured my rumination and reactivity levels to problem solving."
- "Something to do with the effect of particular tasks (anagram/discussing difficult times in one's life and talking it through in retrospect) has on our thought processes"
- "To study how I reflect on a problem I cannot solve."
- "To look at how people respond to difficult problems and how those problems are then thought about for a time after."

A total of 3 participants guessed that the experiment had something to do with attitudes or beliefs about RNT:

- "Testing beliefs about rumination and ability to control it."
- "See the positives behind rumination, which is often seen as a negative thing."
- "Whether people dwell on problems and whether they think this is helpful and why."

However, no participants identified the true aim of the study, and critically, no participants indicated that they were aware of the experimental manipulation of appraisals of RNT, or indicated an awareness of the different experimental conditions. As such, it is unlikely that demand effects can account for the observed difference between experimental conditions.

CHAPTER 6: Study 5 - Investigating the Reinforcing Functions of Depressive Rumination

6.1. Preface

This chapter describes an experimental study examining the effects of a processing mode manipulation (abstract rumination versus concrete thinking) on a range of outcomes that may potentially reinforce rumination. A paper reporting this study is currently under review:

Kingston, R. E. F., Watkins, E. R., & Nolen-Hoeksema, S. (under review). Investigating the reinforcing functions of depressive rumination.

Study 2 in Chapter 3 demonstrated that beliefs about RNT increasing instrumental understanding prospectively predicted maintenance of RNT. Study 4 reported in Chapter 5 demonstrated that experimentally manipulating these appraisals causally influenced the level of state RNT. Therefore, there is convergent evidence indicating that beliefs that RNT increases understanding influences level of RNT. However, it remains unresolved as to whether these beliefs are accurate or not, that is, whether RNT actually increases insightfulness.

Therefore, this study aimed to examine whether rumination has consequences that may maintain and potentially reinforce the ruminative process. Specifically, the study examined whether rumination increases sense of insightfulness and confidence/control (cf. Lyubomirsky & Nolen-Hoeksema, 1993; Watkins & Baracaia, 2001), and whether it affords justification for avoidance (cf. Ferster, 1973; Nolen-Hoeksema et al., 2008). Referring back to the theoretical model presented in Chapter 1 (Figure 1.1), these potentially reinforcing outcomes of rumination have not been illustrated because the model depicts temporally preceding causes, rather than consequences of RNT. Considering where these factors would fit in such a model, it

is hypothesised that they might follow rumination, but also lead to further rumination, such that in the model there would be a pathway from rumination to these outcomes, and a pathway from these outcomes to rumination. The study reported in this chapter intends to test the first of those pathways (i.e., whether rumination leads to these outcomes).

This study will focus on rumination as a specific exemplar of RNT for three reasons. First, focusing on rumination affords better experimental parsimony and simplicity, and it allows for adaptation of existing paradigms. Most manipulations have tended to focus on either rumination or worry, rather than both, and so in order to manipulate both together, it would have been necessary to use a completely novel and unvalidated task. By focusing solely on rumination, as an exemplar of RNT, allows the use or adaptation of well-validated approaches. However, it is worth noting that whilst the manipulation focused on manipulating rumination rather than RNT, as rumination is an exemplar of RNT, the manipulation did involve manipulating processes common to other forms of RNT, including worry.

Second, focusing on manipulating rumination alone afforded better experimental control and homogeneity within the manipulation task itself, since the manipulation could be highly focused and controlled so as to minimise the introduction of potential confounds. Third, the range of potential outcomes of rumination and worry suggested by the theoretical literature is very broad, and as such, to include measures of all of these potential outcomes for rumination and worry in a single design could be overly complex and lead to difficulties with participant burden. For example, additional potential outcomes of worry that are not measured in the current study include worry as a form of coping preparation, and worry as a motivating device (Borkovec, 1994). By restricting the paradigm to examination of

rumination and its consequences, fewer outcomes need to be measured, this creating a less complex and burdensome experimental design.

Considering the theoretical background and what outcomes rumination might have that could potentially reinforce its use, there are two main themes that arise from the literature: First, that rumination increases sense of insightfulness, and second, that rumination affords avoidance. The notion that rumination may increase sense of insightfulness has been suggested by a number of researchers (Lyubomirsky & Nolen-Hoeksema, 1993; Watkins & Baracaia, 2001), who have hypothesised that ruminators believe that this sort of thinking helps them to gain insight and understanding into the meanings of feelings and problems, and give them a better sense of why things happen. A parallel and potentially complementary account is that ruminating may give people justification for avoiding taking action with threatening situations (Martell et al., 2001; Nolen-Hoeksema et al., 2008): Whilst rumination itself may be experienced as aversive, individuals may be motivated to engage in rumination if it allows them to develop justifications for avoiding taking action with something even more aversive. As such, it was necessary to develop a paradigm for the current study that would explore these hypotheses relating to insightfulness and avoidance.

The study reported in the following paper describes a paradigm that was specifically developed for this experiment. An overview of the experimental structure is as follows. First, participants were exposed to a threatening situation typical of those that people may ruminate about (in this case, having to be assertive with a close person about a difficult issue). Then, participants were randomly allocated to think in detail about the threatening situation either in a manner analogous to depressive rumination (abstract rumination), or in a manner phenomenologically inconsistent with rumination (concrete thinking) (Watkins et al., 2008). A range of outcomes

relating to the insightfulness and avoidance hypotheses were measured, to assess the impact of abstract rumination versus concrete thinking. Specifically, measures were taken on multiple occasions to assess sense of insightfulness, sense of confidence/control, justification for avoidance, self-efficacy relating to addressing the feared situation, and anxiety.

For the first portion of the experiment, it was necessary to develop a task that involved focusing on a situation that had ecological validity for rumination, such that the situation would be typical of experiences that are ruminated about. The task also needed to be meaningful and motivating for the potential functions under test to be used (e.g., participants would not need to use rumination for avoidance if there was nothing sufficiently aversive to avoid). However, in order for participants to be able to complete the experimental tasks successfully, the problem also needed to be one that would be commonly encountered, such that all participants would be able to think of a relevant example of that sort of problem with relative ease.

In an attempt to fulfil these criteria, the task developed for the experiment involved participants having to focus on being assertive with a close person about an interpersonal difficulty or conflict (i.e., wanting to confront somebody about something that they had or hadn't done). For many people, the idea of confrontation and being assertive about a difficult interpersonal problem can be quite uncomfortable and provoke anxiety, and as such, this would be a context in which it would be meaningful to want to avoid taking action, affording examination of the avoidance hypothesis.

It was also necessary to create a task that manipulated processing mode, such that participants were either exposed to an experimental analogue of rumination about threat, or were made to think in detail about the threatening problem in a way

uncharacteristic of rumination. Comparing rumination with an appropriate thinking control meant that it was possible to establish whether any observed effects were due to the ruminative qualities of the thinking, whereas studies that have used non-thinking control groups (e.g., rumination versus distraction) cannot rule out that any observed effects are simply due to thinking versus not thinking about a problem (e.g., Lyubomirsky & Nolen-Hoeksema, 2001). To ensure that the abstract rumination condition was analogous to depressive rumination, participants were asked "why"-type questions that explored the meanings and implications of the problem, which would also be relevant to the outcomes under test (i.e., it would be expected to increase insight and understanding, because the focus of the thinking is on exploring the meanings of the issue). As with Study 4 (Chapter 5), an interview format was selected for the manipulation, such that it was possible to ensure that all participants were responding to questions and considering the assertiveness issue in the appropriate processing mode for their condition, as well as ensuring that participants elaborated in response to the manipulation questions to approximately the same extent.

Investigating the Reinforcing Functions of Depressive Rumination

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6.2. Abstract

It remains unresolved why people keep ruminating even though it confers vulnerability to depression. It has been hypothesised that rumination is reinforced by (i) increasing insight and understanding into difficulties and/or (ii) providing a rationale for avoiding taking action, thereby avoiding aversive situations. To test this, we used an experimental analogue to rumination about threat: Participants were confronted with being assertive about a difficult interpersonal issue, and randomly allocated to repetitively think about this in an abstract style characteristic of depressive rumination ("Why?") or a concrete style inconsistent with depressive rumination ("How?"). Relative to abstract rumination, concrete thinking significantly enhanced sense of confidence, control, and assertiveness self-efficacy, but not insight and understanding. In contrast, rumination increased justification for avoidance relative to concrete thinking. These findings suggest that rumination does not increase insight relative to other problem-focused thinking, but it may be reinforced by providing evidence that supports inactivity and avoidance.

6.3. Introduction

Depressive rumination refers to a passive and repetitive way of responding to low mood, which involves focusing on feelings of distress and the possible causes and consequences of those feelings (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Depressive rumination has robustly been found to contribute to the development and

maintenance of depression and anxiety disorders (Nolen-Hoeksema et al., 2008; Watkins, 2008), indicating the importance of understanding its underlying processes, and identifying which factors contribute to individual differences in rumination. One potential paradox is that a subset of individuals (high ruminators) continues to ruminate frequently and persistently, despite its negative consequences. A key question in understanding its underlying mechanisms is therefore: "What makes it so difficult to break free of rumination once it has begun?" (Nolen-Hoeksema et al., 2008, p. 418).

One hypothesis is that rumination may have functions that lead to outcomes that reinforce its further use. Rumination may be maintained for two reasons: (i) because of its perceived functions (i.e., conscious beliefs that it is helpful, which may be accurate or inaccurate), and/or (ii) because of actual reinforcement and procedural learning.

There is some evidence supporting the notion that rumination may be maintained because of its perceived beneficial functions. People report beliefs that rumination helps them to gain insight into the meanings of their feelings and problems, and discern the reasons why things happen to them (Watkins & Baracaia, 2001; Kingston, Watkins, & O'Mahen, 2013a). However, only one study has examined the effects of experimentally manipulating rumination on subjective sense of insight and understanding. Lyubomirsky and Nolen-Hoeksema (1993) found that relative to a distraction induction, dysphoric and nondysphoric participants undergoing a rumination induction rated themselves as more insightful. Based on this finding, Lyubomirsky and Nolen-Hoeksema (1993, p.347) hypothesised that "the perception that one possesses insight (and not actual insight per se) may lead some dysphorics to continue ruminating" (p. 347).

However, this study was limited in that it did not examine the effect of rumination on a real-world problem. Furthermore, perceived insight was only assessed post-manipulation, so it was not possible to examine the change in perceived insightfulness resulting from rumination. Critically, this study only compared rumination to distraction, such that thinking about the self, feelings and problems (i.e., rumination) was compared with not thinking about feelings and problems. As such, it cannot be concluded that any observed differential effects are specific to rumination rather than the general benefit of thinking about and focusing on the problem, versus not thinking about the problem.

One goal of the current study was to provide a more robust test of this insight hypothesis, by examining whether rumination specifically enhances feelings of insight relative to other ways of thinking about problems, as opposed to distraction. To address this, the current study ensured that all participants thought in detail about a personal problem, but with one condition thinking in a style analogous to depressive rumination (abstract processing), whereas the other condition involved thinking in a style phenomenologically inconsistent with rumination (concrete processing, see Watkins, 2008; Watkins, Moberly, & Moulds, 2008). Depressive rumination is characterised by abstract and evaluative processing, focused on analysing the causes, meanings, and implications of feelings and negative events (Watkins, 2008). In contrast, concrete thinking refers to a mode of processing which is experiential and focused on the contextual and specific details of a situation, which is uncharacteristic of naturally occurring depressive rumination, and found to have distinct constructive effects in contrast to rumination in experimental studies (Watkins, 2008; Watkins et al., 2008). Since both groups were matched for thinking about problems, any

observed effects cannot be explained by the effect of thinking versus not thinking about a problem.

A parallel account is that rumination is negatively reinforced because it is a passive behaviour that allows individuals to avoid directly engaging with their aversive environment (Ferster, 1973). Martell, Addis, and Jacobson (2001, p. 121) hypothesise that "although the rumination may be experienced as aversive to the individual, it is possible that it is maintained by the avoidance of even more aversive conditions". Correlational evidence for this relationship comes from Giorgio et al. (2010), who found that trait rumination was significantly correlated with greater self-reported avoidance. Nolen-Hoeksema et al. (2008, p. 408) hypothesised that "rumination is reinforced by the reductions in distress that come from withdrawing from aversive situations, from being relieved of responsibility, and from a sense of certainty about one's conclusions". Hence, rumination may be maintained by acting as a means of avoiding aversive situations and responsibility. More specifically, Nolen-Hoeksema et al. (2008, p. 407) hypothesised that "rumination serves to build a case that the individual is facing a hopelessly uncontrollable situation and so he or she is not able to take action to overcome the situation". If this avoidance hypothesis is correct, rumination would be predicted to increase the generation of reasons for not taking action and lead to negative predictions about the effectiveness of action, thereby reducing the likelihood of engaging in personally challenging or threatening behaviours. More speculatively, it may potentially avoid the increases in anxiety associated with such behaviours.

Previous attempts to examine the putative avoidant functions of rumination (e.g., Giorgio et al., 2010) did not involve exposing participants to a challenging or threatening situation, which would afford the opportunity or necessity to avoid. In the

absence of a situation that may motivate individuals towards avoidance, it is difficult to assess whether any behaviour functions as avoidance. To address this, the current study exposed participants to a potentially threatening situation, typical of those that trigger rumination: having to be assertive about an interpersonal problem. This approach therefore tested whether abstract rumination afforded more justification for avoiding assertiveness relative to concrete thinking.

If the insight hypothesis is correct, then participants in the abstract condition (analogous to depressive rumination) will report greater sense of understanding and insight relative to those in the concrete thinking condition. If the insight hypothesis is correct, we predict that this enhanced sense of insightfulness would also lead to greater sense of confidence and control for participants in the abstract rumination condition relative to those in the concrete thinking condition. In contrast, the processing mode theory (Watkins, 2008), which hypothesises that adopting concrete processing of difficulties is more constructive than abstract processing, predicts that sense of confidence and control will be greater for participants in the concrete condition relative to the abstract condition.

If the avoidance hypothesis is correct, then participants in the abstract rumination condition are predicted to (a) generate more justifications for avoidance and (b) report less assertiveness self-efficacy, relative to participants in the concrete thinking condition. We also explored whether abstract rumination may also make the problem seem less proximal and thus reduce the activation of anxiety associated with confronting a problem, relative to concrete thinking.

6.4. Method

6.4.1. Design

This was an experimental study with participants randomly allocated to one of two conditions: *Abstract Rumination* versus *Concrete Thinking*, manipulating the independent variable (IV) of processing mode. The five dependent variables (DVs) were: (i) sense of understanding and insight, (ii) sense of confidence and control, (iii) assertiveness self-efficacy, (iv) justification for avoidance, and (v) state anxiety.

6.4.2. Participants

The sample consisted of 95 undergraduate students (84.2% female; age range 18 – 42, M = 20.17, SD = 4.40; 91.58% identified as White; 4.26% identified as Asian; 4.21% identified as Mixed Ethnicity).

6.4.3. Tasks

6.4.3.1. Exposure to threatening situation: Confrontation with assertiveness task.

Participants were asked to identify and describe an issue that they wanted to be assertive about with someone close to them. The issue had to be unresolved, personally significant rather than trivial, and something not previously raised. To ensure a clear focus on the assertiveness issue and to make the idea of confronting the issue seem more real and threatening, participants were told to focus on what they would like to express to the close person, in order to make them more ready to be assertive. They were left alone in the room to do this for two minutes.

6.4.3.2. Manipulation of processing mode: Abstract rumination / concrete thinking interview.

Processing mode was manipulated by means of a detailed structured interview about the assertiveness issue. We adopted an interview method so that the experimenter could ensure that participants were using the appropriate processing mode for their condition. Participants in the Abstract Rumination condition, designed to be an analogue of depressive rumination, were interviewed with questions that were abstract and focused on the "why" of the situation, with a focus on the meanings, causes, and implications of the issue (e.g., "why is this issue important to you?", "what consequences does this issue have on your relationship with this close person?"). Participants in the Concrete Thinking condition, designed to be uncharacteristic of depressive rumination, were interviewed with questions that were focused on the contextual, sensory, and sequential details of "how" the situation may occur (e.g., "what exactly do you want to say?", "where will you discuss this?"). Each interview contained seven questions delivered in the same order for all participants. Participants were asked to try and spend approximately one minute responding to each question. If answers were brief or unelaborated, set prompts were used (e.g., "can you tell me more about that?"). Critically, both sets of interviews equally focused on the assertiveness concern and did not differ in emotional content.

6.4.4. Measures

Response Styles Questionnaire – Ruminative Response Scale (RSQ-RRS, Nolen-Hoeksema & Morrow, 1991). The RSQ-RRS is a 22-item questionnaire that assesses ruminative responses focused on the self, symptoms, and possible causes and consequences of low mood. Total scores range from 22-88, with higher scores

indicating greater trait rumination. It has acceptable convergent validity and high internal consistency (α = .89; Nolen-Hoeksema & Morrow, 1991).

Patient Health Questionnaire (PHQ-9, Kroenke, Spitzer, & Williams, 2001). The PHQ-9 is a nine-item measure designed to assess the severity of depression symptoms over the past two weeks. Scores range from 0 to 27, with greater scores indicating more severe symptoms of depression. It has good internal consistency and construct validity (Kroenke et al., 2001).

Sense of understanding and insight. A 16-item measure was created for this study, adapted from Lyubomirsky and Nolen-Hoeksema (1993), to assess current perceived understanding and insight (e.g., "Right now, how much do you understand yourself?", "Right now, how much insight do you have into other people?"). Responses for each item were given on a scale from 1 ("Very slightly or not at all") to 5 ("Very strongly"). A mean score was calculated, with scores ranging from 1 to 5, with higher scores indicating a greater sense of understanding and insight. Internal consistency was good (α = .86).

Sense of confidence and control. A 9-item measure was created for this study to assess current perceived control and confidence (e.g., "Right now, how much do you feel that you are in control of your life?", "Right now, how confident do you feel about your ability to handle your personal problems?"). Responses for each item were given on a scale from 1 ("Very slightly or not at all") to 5 ("Very strongly"). A mean score was calculated, with scores ranging from 1 to 5, with higher scores indicating a greater sense of confidence and control. Internal consistency was good (α = .82).

Assertiveness self-efficacy. A 6-item measure was created to assess participants' self-efficacy regarding being assertive (e.g., "Right now, how confident are you that it would go well if you were to be assertive?", "Right now, how risky

does being assertive feel to you?"). Responses for each item were given on a scale from 1 ("Very slightly or not at all") to 5 ("Very strongly"). A mean score was calculated, with scores ranging from 1 to 5, with higher scores indicating greater assertiveness self-efficacy. Internal consistency was acceptable (α = .77).

State anxiety. State anxiety was assessed by using the 4 items from the "activated unpleasant" subscale of the Circumplex Measure of Affect (Larsen & Diener, 1992; Russell, 1980). The whole measure was delivered so as to conceal our interest in the anxiety items. A mean score was calculated, with scores ranging from 1 to 5, with higher scores indicating greater trait anxiety. Internal consistency in our sample for this scale was acceptable (α = .76).

Justification for avoidance. Degree of justification for avoidance was assessed by coding of interview transcripts by a rater blind to participant condition. A coding scheme was developed for the current study where three types of avoidance were coded: (i) avoidance because of perceived lack of control (i.e., avoiding the issue because of a perceived certainty that efforts will be fruitless, that individual has no control over the problem, and that nothing he/she could do would work); (ii) avoidance because of a reduced sense of responsibility (i.e., avoiding the issue because of a perception that he/she is not responsible for the situation itself or for resolving the situation), and (iii) avoidance because of a wish to avoid distress (i.e., avoiding the issue because he/she wants to avoid a negative, unpleasant or uncomfortable outcome, either in terms of his/her own emotions or the emotions of others). Each of these three dimensions were rated on a scale ranging from 1 ("not demonstrated at all") to 4 ("demonstrated a lot"), giving each participant three scores for avoidance, with higher scores indicating greater justification for avoidance. Inter-

rater reliability between two raters for 10% of the items was moderate to good (mean Cohen's kappa = .67).

Interview coding of abstract / concreteness. Interview transcripts were coded by a rater blind to the aims of the experiment and the participant condition, as a means of assessing whether the manipulation was successful (i.e., whether participants in the Abstract Rumination condition were more abstract than those in the Concrete Thinking condition). Ratings were made using the abstract and concreteness rating scale outlined in Stöber and Borkovec (2002), which comprises a 5-point scale: 1 (abstract, defined as "indistinct, cross-situational, equivocal, unclear, aggregated"), 2 (somewhat abstract), 3 (neither-nor), 4 (somewhat concrete), 5 (concrete, defined as "distinct, situationally specific, unequivocal, clear, singular"). Inter-rater reliability was moderate to good (mean Cohen's kappa = .61).

Importance of understanding and insight. Two single-item measures were created for the current study to assess the perceived importance of having insight into the self and others ("How important to you is it to understand and have insight into yourself?", "How important to you is it to understand and have insight into other people?"). Responses to each item were made on a scale from 1 ("Not at all") to 10 ("Extremely").

6.4.5. Procedure

Prior to the experiment, participants completed the RSQ-RRS and PHQ-9 online. The experiment comprised three phases. In Phase 1, participants were given a false cover story stating that the study was examining assertiveness and whether certain ways of thinking about interpersonal problems can encourage assertiveness. They were told that they would be asked to identify an important current interpersonal problem that they wanted to be assertive about, and that they would be followed up in

two weeks to see if they had been assertive, and were further told, "whilst you are free to decide what to do, we are very keen for you to try and be assertive about this issue, and would strongly encourage you to speak to the other person about your concern". Participants then completed the importance of understanding and insight measure, as well as a battery of state measures (Baseline) comprising sense of understanding and insight, sense of confidence and control, assertiveness self-efficacy, and state anxiety.

Next, participants were exposed to the threatening situation by completing the confrontation with assertiveness task. Afterwards, participants completed the battery of state measures again (Post-Threat).

In Phase 2, processing mode was manipulated by giving participants either the Abstract Rumination or the Concrete Thinking interview, which was audio recorded.

In Phase 3, participants completed the battery of state questionnaires for a third time (Post-Manipulation). Participants were debriefed and told that they would not be followed up after the session to check whether they had been assertive.

6.5. Results

6.5.1. Preliminary Analyses

No outliers were detected in the sample on any variables, and thus all participants' data were retained. Moreover, no problematic multicollinearity was detected in the sample after examining VIF and tolerance statistics (no tolerance values were less than .1 and no VIF values were greater than 10; Myers, 1990). Independent samples *t* tests revealed that there were no differences between the conditions on any of the baseline measures of rumination ($t(93) = -.20$, $p = .839$), depression ($t(93) = -.10$, $p = .918$), understanding and insight ($t(93) = -.60$, $p = .551$), confidence and control ($t(93) = -.49$, $p = .626$), assertiveness self-efficacy ($t(93) = .19$,

p = .850), and state anxiety (t(93) = .65, p = .515); see Table 6.1 for means and standard deviations.

6.5.1.1. Interview manipulation check.

A t test was conducted to see whether the two conditions differed on level of concreteness. There was a significant difference between the groups, indicating that the manipulation was successful, as interview responses from participants in the abstract rumination condition were rated as more abstract (M = 2.39, SD = .34) than those in the concrete thinking condition (M = 2.81, SD = .29), t(93) = 6.397, p < .001).

Table 6.1. Means (and standard deviations) for the dependent variables across time and condition

	Abstract Rumination (*n* = 48)			Concrete Thinking (*n* = 47)		
	Baseline	Post-Threat	Post-Manipulation	Baseline	Post-Threat	Post-Manipulation
RRS-RSQ	37.98 (10.15)			37.53 (11.23)		
PHQ-9	3.90 (2.95)			3.83 (3.28)		
Sense of Understanding and Insight	3.24 (.50)	3.21 (.61)	3.37 (.60)	3.18 (.47)	3.17 (.46)	3.45 (.48)
Sense of Confidence and Control	3.15 (.54)	3.14 (.63)	3.21 (.64)	3.09 (.57)	3.08 (.65)	3.43 (.61)
Assertiveness Self-Efficacy	2.92 (.68)	2.97 (.72)	3.17 (.73)	2.95 (.69)	2.93 (.71)	3.45 (.61)
State anxiety	1.72 (.60)	2.09 (.72)	1.84 (.75)	1.81 (.74)	2.04 (.83)	1.79 (.83)
Avoidance: No Control			1.73 (.84)			1.17 (.48)
Avoidance: Not Responsible			1.42 (.08)			1.13 (.05)
Avoidance: Avoid Distress			2.17 (.12)			1.11 (.05)

Note. RSQ-RRS: Response Styles Questionnaire – Ruminative Response Scale; PHQ-9 = Patient Health Questionnaire.

6.5.2. Main Analyses

In order to examine the differential effects of rumination versus concrete thinking on our dependent variables of interest, a series of two-way repeated measures Analyses of Variance (ANOVAs) and independent samples *t* tests were conducted (see Table 6.1 for means and standard deviations).

6.5.2.1. Post-threat analyses.

We did not expect any differential effect of exposing participants to the assertiveness threat prior to the manipulations of rumination versus concrete processing. We conducted 2 (Condition: Abstract Rumination versus Concrete Thinking) by 2 (Time: Baseline versus Post-Threat) ANOVAs respectively on the dependent variables of understanding and insight, confidence and control, assertiveness self-efficacy, and anxiety. There was a main effect of Time on anxiety ($F(1, 93) = 29.06$, $p < .001$): all participants became more anxious after exposure to the threatening situation. There were no other main effects of Time (F range .06 – .23, p range .63 - .81), and as predicted, there were no main effects of Condition (F range .01 – .26, p range .61 - .94) or interaction effects of Time X Condition (F range .00 – 1.66, p range .20 - .96) on any of the dependent variables (see Table 6.1).

6.5.2.2. Post-manipulation analyses.

Further ANOVAs were conducted to examine the effect of Condition (Abstract Rumination versus Concrete Thinking) and Time (Post-Threat to Post-Manipulation) on the dependent variables identified above. There was a main effect of Time ($F(1, 93) = 35.25$, $p < .001$) on understanding and insight: All participants reported a greater sense of understanding and insight after the manipulation. However, there was no main effect of Condition ($F(1, 93) = .05$, $p = .833$) or interaction of Time

X Condition ($F(1, 93) = 2.52$, $p = .116$) on understanding and insight, inconsistent with the insight hypothesis: Participants in the Abstract Rumination condition did not have a greater increase in understanding and insight than participants in the Concrete Thinking condition (see Table 6.1).

There was a significant main effect of Time ($F(1, 93) = 26.52$, $p < .001$) but not Condition ($F(1, 93) = .426$, $p = .516$) on sense of confidence and control, which was secondary to a significant interaction effect of Time X Condition ($F(1, 93) = 11.67$, $p = .001$): participants in the Concrete Thinking condition reported a significantly greater increase in sense of confidence and control relative to participants in the Abstract Rumination condition (see Table 6.1).

Consistent with the avoidance hypothesis, there was a significant effect of Time ($F(1, 93) = 40.41$, $p < .001$) but not Condition ($F(1, 93) = .826$, $p = .366$) on assertiveness self-efficacy, which was secondary to a significant interaction effect of Time X Condition ($F(1, 93) = 1.30$, $p = .005$): Participants in the Abstract Rumination condition reported less increase in assertiveness self-efficacy after the manipulation relative to participants in the Concrete Thinking condition (see Table 6.1).

There was a main effect of Time ($F(1, 93) = 21.96$, $p < .001$) on state anxiety: All participants became less anxious after the manipulation. However, there was no main effect of Condition ($F(1, 93) = .113$, $p = .737$) or interaction of Time X Condition ($F(1, 93) = .00$, $p = 1.00$) on anxiety: Participants in the Abstract Rumination condition did not show a greater decrease in anxiety relative to participants in the Concrete Thinking condition.

Three independent samples *t* tests were conducted to examine the effect of condition on the three types of justification for avoidance. Consistent with the

avoidance hypothesis, participants in the Abstract Rumination condition were significantly more likely than those in the Concrete Thinking condition to report that they were avoiding assertiveness because they perceived that they had no control over outcomes ($t(93) = -4.00$, $p < .001$), that they were not responsible for resolving the situation ($t(93) = -2.97$, $p = .004$), and because they wanted to avoid distress ($t(93) = -8.41$, $p < .001$). Abstract Rumination therefore afforded more justification for avoiding a threatening situation relative to Concrete Thinking about being assertive (see Table 6.1).

6.5.2.3. Relationship with trait rumination.

To investigate whether these findings were consistent across different levels of trait rumination (e.g., do high ruminators find abstract rumination more useful than low ruminators?), a series of four hierarchical multiple regression analyses were conducted, with the dependent variable measured at Post-Manipulation, and the dependent variable at Post-Threat entered at Step 1, trait rumination at Step 2, Condition at Step 3, and Condition X trait rumination interaction at Step 4. There was no significant effect of Condition X trait rumination in any of the analyses (β range = -.04 to -.09, p range = .336 to .655), indicating that the observed effects are consistent across the whole spectrum of trait rumination.

Lastly, we examined whether our sample replicated previous findings that rumination is seen to be helpful and important by individuals high on trait rumination (Watkins & Baracaia, 2001). Consistent with previous research, there was a positive correlation between trait rumination and participants reporting that it is important to have insight into the self ($r(93) = .263$, $p = .010$) and other people ($r(93) = .238$, $p = .020$). There was also a negative correlation between trait rumination and baseline sense of understanding and insight ($r(93) = -.327$, $p = .001$). As such, participants

high on trait rumination believed that it was more important to be insightful, but at the same time, reported feeling less insightful than those lower on trait rumination.

6.6. Discussion

Because individuals persist in rumination despite it being detrimental to wellbeing, the current study sought to understand why people continue to ruminate, by assessing whether rumination has any beneficial outcomes that might be reinforcing. One hypothesis was that depressive rumination, by focusing on meanings and implications, increases sense of insight into problems (the insight hypothesis). Another hypothesis is that rumination serves as a form of avoidance by allowing people to generate reasons for not taking action (the avoidance hypothesis). To test these hypotheses, we conducted the first experimental study to compare rumination focusing on meanings and implications versus thinking focused on concrete behaviour in the context of a situation that afforded avoidance – being confronted with being assertive.

Inconsistent with the insight hypothesis, abstract rumination, analogous to depressive rumination, about a challenging assertiveness concern did not differ from concrete thinking in terms of increasing sense of understanding and insight. Moreover, concrete thinking led to an increased sense of confidence and control relative to abstract rumination, at odds with the insight hypothesis, but consistent with processing mode theory (Watkins, 2008), which hypotheses that concrete processing of difficulties leads to more constructive outcomes than abstract processing.

However, our results are broadly consistent with the avoidance hypothesis: abstract rumination lead to greater justification for avoiding taking action (e.g., because of the perception of having no control over the situation), relative to concrete thinking. Moreover, abstract rumination lead to significantly less assertiveness self-

efficacy relative to concrete thinking. However, there were no differences between conditions on anxiety, contrary to the speculative prediction that abstract rumination may reduce anxiety. Finally, through examining the interaction between condition and trait rumination, we found that these effects were maintained at all levels of trait rumination.

Our findings indicate that when applied to a real-world situation and compared with an appropriate control matched for thinking about a problem, rumination does not differentially increase self-reported insight and understanding. When we used this more ecologically valid control and assessed change in sense of insight over time, we did not replicate the findings of Lyubomirsky and Nolen-Hoeksema (1993). We interpret this pattern of findings as indicating that rumination does not genuinely lead to enhanced feelings of insight, relative to any other form of thinking, even though the abstract rumination involved a focus on meanings and implications. We suggest that the Lyubomirsky and Nolen-Hoeksema (1993) finding may be a consequence of the methodological design that compared thinking versus not thinking (i.e., the process of thinking caused the increased sense of insight, rather than ruminative thinking per se). Our findings suggest that beliefs that rumination differentially increases insight and understanding (e.g., Kingston et al., 2013a; Papageorgiou & Wells, 2003) are misplaced. Despite involving a focus on meanings and implications, depressive rumination does not specifically increase sense of insight. We note that there has been some debate as to whether rumination leads to actual or perceived insight. For example, Lyubomirsky & Nolen-Hoeksema, 1993, (p. 347) noted that "given that dysphoric people who ruminate appear to be less successful at interpersonal problem solving … rumination may lead to enhanced feelings of insightfulness but to less

actual insight". Our findings suggest that this debate may be moot, as rumination does not differentially increase subjective insight relative to an appropriate control.

We found that rumination was significantly less helpful than concrete thinking for sense of confidence and control: Thinking concretely about a difficulty led to significantly greater improvements in confidence and control, relative to rumination. This is consistent with processing mode theory (Watkins, 2008). Processing mode theory has demonstrated the benefits of concrete processing on actual problem-solving behaviour and emotional reactivity relative to abstract processing (e.g., Watkins et al., 2008; Watkins & Moulds, 2005). This study provides confirmatory evidence that processing style also has benefits in terms of subjective confidence and control.

Regarding the avoidance hypothesis, our findings suggest that rumination provides reasons for avoiding confronting a threatening situation by reducing assertiveness self-efficacy, and by affording the accumulation of evidence against taking action. However, it is not known whether this avoidance directly reinforces rumination. The wider model proposed by Nolen-Hoeksema et al. (2008) predicts that rumination leads to avoidance by generating reasons not to take action. In turn, this is negatively reinforced because it avoids negative emotions, thereby reinforcing and maintaining rumination. This study examined the first part of this model by demonstrating that rumination gives people reasons not to take action with threatening situations, by making negative predictions about the effectiveness of action. Whilst this is consistent with the possibility that rumination may have an avoidant function, this study did not test the second part of the model relating to reinforcement because we did not measure whether avoidance behaviour actually reinforces rumination. Whilst the reasons people give for avoiding taking action are likely to be a good

proxy for actual avoidance behaviour, the next step is to test the second part of the model by manipulating or assessing avoidance post-rumination, and measuring the effects on subsequent rumination. This would make it possible to draw conclusions about whether rumination is maintained because it is being reinforced.

We explored whether the abstract processing mode adopted in the rumination condition might lead to the assertiveness issue appearing more distal, thus temporarily reducing anxiety. However, this was not found. We speculate that the combination of avoiding the actual situation (which may reduce anxiety) and dwelling on the situation (which may increase anxiety) might result in the effects on overall anxiety being balanced out, explaining the observed pattern of findings.

The study had a number of strengths. To the best of our knowledge, it is the first experimental study to examine the consequences of abstract rumination about a threatening situation relative to another form of thinking uncharacteristic of rumination. Since both conditions involved thinking in detail about the threatening issue, it is possible to conclude that any observed differences between conditions are due to the mode of thinking (i.e., abstract rumination or concrete thinking), whereas in previous studies that have used non-thinking control groups (e.g., distraction), this has not been possible. Second, we examined the avoidance hypothesis with reference to an example of a threatening situation that each participant might want to avoid. This enhanced ecological validity, and also allowed us to examine the consequences of rumination in response to a genuinely threatening personal problem, rather than an artificial threatening situation created in the laboratory.

The study had a number of limitations. Since the sample was limited to undergraduate students, we cannot be sure that findings would generalise to clinical populations. Whilst we did test for an interaction between condition and rumination to

check that the effects were present across the whole range of trait rumination scores, it is important to conduct this experiment in a clinical sample, to see whether the observed effects are maintained. A further limitation is the reliance on self-report measures, although we note that certain constructs (e.g., sense of insight, sense of confidence) are inherently subjective and require self-report assessment. Moreover, with respect to the question of what maintains rumination, subjective sense of insight or confidence and control would be potentially sufficient to maintain rumination. Nonetheless, future research would benefit from behavioural and observational assessments, particularly of avoidance. Lastly, there was a difference between conditions on temporal focus, which may act as a potential confound. Specifically, the "why" questions in the Abstract Rumination condition were focused on the past, present, and future, whereas the "how" questions in the Concrete Thinking condition were entirely focused on the future. The sense of having better anticipated and considered future events in the latter condition could partially account for the observed difference in change in confidence between conditions.

Whilst it is important to attempt to replicate these findings in participants with clinical levels of depression and rumination, these findings have some potential clinical implications. First, we demonstrated that metacognitive beliefs that rumination increases insightfulness are inaccurate, because rumination did not increase understanding and insight relative to concrete thinking. It may be important for such beliefs about the utility of rumination to be tackled therapeutically, with therapists challenging the accuracy of these beliefs, as a means to reduce motivation to engage in rumination. Second, the study demonstrates the advantages of thinking in a concrete, rather than abstract ruminative way, when faced with difficulties, since concrete thinking lead to a greater sense of confidence, control, and assertiveness self-

efficacy. Psychoeducation interventions for people at risk for rumination could emphasise the advantages of this way of thinking, rather than informing individuals not to dwell on problems at all, and to instead think about the situation in a more constructive, solution-focused way (see Watkins, Mullan, et al., 2011; Watkins et al., 2012).

In sum, because of rumination's deleterious outcomes for mood and mental health, it is important to have a clearer understanding of the factors that cause people to ruminate. This study demonstrates that beliefs about the utility of rumination may not be accurate, since it does not have advantageous outcomes relating to insightfulness, and confidence and control, relative to other non-ruminative ways of thinking about a problem. However, the findings suggest that rumination may have an avoidant function as it allows people to generate justifications for not taking action.

6.7. Appendix A: Analyses Examining the Effect of a Condition X Rumination Interaction on the Outcome Variables

To examine whether the findings remained consistent across varying levels of trait rumination, a series of four regression analyses were conducted to examine the effect of a Condition X Rumination interaction term on the outcome variables (see Section 6.5.2.3). The interaction term was not a significant predictor of any of the outcome variables, indicating that the effect of the experimental manipulation did not vary as a result of trait rumination (see Table 6.2, Table 6.3, Table 6.4, and Table 6.5).

Table 6.2. Regression analysis examining the effects of Rumination, Condition, and Condition X Rumination on Post-Manipulation understanding and insight

Measure	Step 1			Step 2			Step 3			Step 4		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Post-Threat Understanding and Insight	.77	.07	.77***	.78	.07	.78***	.78	.07	.78***	.79	.07	.79***
Rumination				.00	.00	.06	.00	.00	.06	.01	.01	.11
Condition							-.11	.07	-.10	-.11	.07	-.10
Condition X Rumination interaction										-.01	.01	-.07
R^2		.60			.60			.61			.61	
Adjusted R^2		.60			.60			.60			.60	
R^2 *Change*		.60			.00			.01			.00	
F for change in R^2		136.37***			.86			2.49			.55	

Note. ***$p < .001$

Table 6.3. Regression analysis examining the effects of Rumination, Condition, and Condition X Rumination on Post-Manipulation confidence and control

Measure	Step 1			Step 2			Step 3			Step 4		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Post-Threat Confidence and Control	.77	.07	.78***	.75	.07	.76	.76	.07	.77***	.78	.07	.79***
Rumination				-.00	.00	-.05	-.00	.00	-.04	.00	.01	.06
Condition							-.27	.08	-.21**	-.27	.08	-.21**
Condition X Rumination interaction										-.01	.01	-.13
R^2		.60			.60			.65			.66	
Adjusted R^2		.60			.65			.64			.64	
R^2 *Change*		.60			.00			.05			.01	
F for change in R^2		140.68***			.50			11.69**			2.44	

Note. $^{**}p < .01$, $^{***}p < .001$

Table 6.4. Regression analysis examining the effects of Rumination, Condition, and Condition X Rumination on Post-Manipulation assertiveness self-efficacy

Measure	Step 1			Step 2			Step 3			Step 4		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Post-Threat Assertiveness Self-Efficacy	.63	.08	.66***	.64	.08	.67***	.65	.07	.68***	.66	.08	.68***
Rumination				.01	.01	.07	.01	.01	.08	.01	.01	.10
Condition							-.32	.10	-.23**	-.32	.10	-.23**
Condition X Rumination interaction										-.00	.01	-.04
R^2		.43			.44			.49			.49	
Adjusted R^2		.43			.42			.47			.47	
R^2 *Change*		.43			.01			.05			.00	
F for change in R^2		70.61***			.78			9.62**			.12	

Note. $^{**}p < .01$, $^{***}p < .001$

Table 6.5. Regression analysis examining the effects of Rumination, Condition, and Condition X Rumination on Post-Manipulation anxiety

Measure	Step 1			Step 2			Step 3			Step 4		
	B	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*	*B*	*SE B*	*β*
Post-Threat Anxiety	.80	.07	.78***	.78	.07	.77***	.78	.07	.77***	.78	.07	.76***
Rumination				.00	.01	.05	.00	.01	.05	.01	.01	.08
Condition							.01	.10	.01	.01	.10	.01
Condition X Rumination interaction										-.00	.01	-.04
R^2		.61			.61			.61			.62	
Adjusted R^2		.61			.61			.60			.60	
R^2 *Change*		.61			.00			.00			.00	
F for change in R^2		146.49***			.53			.01			.20	

Note. ***$p < .001$

CHAPTER 7:General Discussion

This final discussion section is organised into five sections. First, the findings from the studies reported in this thesis will be reviewed (Section 7.1), followed by a discussion of their theoretical and clinical implications (Section 7.2). Then, the strengths and limitations of the research will be considered (Section 7.3), which will lead into a discussion of the next steps for future research studies (Section 7.4). The chapter will finish with a final concluding summary (Section 7.5).

7.1. Summary of Thesis Findings

Study 1 (Chapter 2) examined the cross-sectional relationship between a variety of putative vulnerability factors and rumination and worry, examined together as the transdiagnostic process of RNT. Based on a review of the vulnerability factors for RNT (Chapter 1), an integrative theoretical model was developed and tested in a large, nonclinical sample of adults. The key predictions and findings are outlined in Table 7.1.

Table 7.1. Summary of predictions and findings from Study 1

Predictions	Findings
1. Rumination and worry will form a valid latent variable representing RNT.	Hypothesis supported. A SEM model in which RSQ-RRS and PSWQ were used as measured indicators for a latent variable representing RNT provided a good fit to the data.
2. Distal vulnerability factors will be indirectly associated with RNT via their relationship with proximal vulnerability factors.	Hypothesis partially supported. Emotional abuse had an indirect association with RNT via perceived function of RT, neuroticism, abstract processing, and current distress. Low levels of participant report precluded examination of physical/sexual abuse variables. Overcontrolling parenting was not indirectly or directly associated with RNT.
3. Proximal vulnerability factors will be directly associated with RNT.	Hypothesis partially supported. Perceived function of RT was directly associated with RNT. Abstract processing was not directly associated with RNT, but was indirectly associated with RNT via neuroticism.
4. Neuroticism will act as an intermediate factor with both proximal and distal qualities, and will have both a direct effect on RNT as well as an indirect effect on RNT through its effect on beliefs about the function of RT and current distress.	Hypothesis supported.
5. Current distress will be directly associated with RNT, but proximal vulnerability factors will have an association with RNT over and above the effects of current distress.	Hypothesis supported.

Study 2 (Chapter 3) examined the prospective relationships between rumination and worry, examined together as a common and shared process of RNT, and a range of vulnerability factors. Specifically, the study used hierarchical multiple regression to examine which factors contributed to change in RNT over 6-8 weeks after controlling for symptoms of depression, anxiety, and current stress. The key predictions and findings are outlined in Table 7.2.

Table 7.2. Summary of predictions and findings from Study 2

Predictions	Findings
1. Distal factors will not prospectively predict change in RNT after controlling for symptoms.	Hypothesis supported. Emotional abuse and overcontrolling parenting did not predict change in RNT after controlling for symptoms of depression, anxiety and stress. Low levels of participant report precluded examination of physical/sexual abuse variables.
2. Proximal factors will prospectively predict change in RNT after controlling for distal factors and symptoms.	Hypothesis partially supported. Neuroticism and the perception that RT aids instrumental understanding predicted change in RNT after controlling for distal factors and symptoms of depression, anxiety and stress. Other types of belief about RNT (e.g., the belief that RT aids self and social control) did not predict change in RNT.

Building on the finding from Study 2 that beliefs about RT aiding instrumental understanding prospectively predicted change in RNT, Study 3 (Chapter 4) sought to examine causality by experimentally manipulating perceived helpfulness of RNT and

examining the effect on state RNT. Specifically, participants were randomly allocated to a manipulation in which they were either manipulated to appraise RNT as helpful for increasing understanding and insight, or appraise RNT as unhelpful and unconstructive. They were then exposed to a task that may prompt engagement in RNT (a task highlighting self-discrepancy), so that the effect of the manipulation on state RNT could be measured. The key predictions and findings are outlined in Table 7.3.

Table 7.3. Summary of predictions and findings from Study 3

Predictions	Findings
1. There will be no difference in state RNT between conditions (manipulated to appraise RNT as helpful vs. unhelpful) immediately after the experimental manipulation, before the self-discrepancy task.	The experimental manipulation itself did not result in a difference between conditions on state RNT.
2. After exposure to the self-discrepancy task, state RNT will increase for all participants, but participants manipulated to appraise RNT as helpful will show a greater increase in state RNT than participants manipulated to appraise RNT as unhelpful.	Hypothesis not supported. After the self-discrepancy task, there was no increase in state RNT for all participants, and there was no difference in change in state RNT between conditions.

Building upon Study 3, Study 4 (Chapter 5) aimed to rectify some of the methodological issues encountered in Study 3 that could potentially have accounted for a failure to observe changes in state RNT. Three changes were made: (i) measures of depression and anxiety were taken online rather than immediately before the experiment to avoid inducing RNT at baseline; (ii) the appraisal manipulation was

switched from written to interview format and participants were asked to only focus on resolved problems to minimise emotional arousal and to ensure increased homogeneity within responses to the manipulation; and (iii) the task to afford engagement in RNT was switched from the self-discrepancy task to an insolvable anagram task which may be better at eliciting RNT. As such, Study 4 examined whether experimentally manipulating beliefs about the helpfulness of RNT using an interview task influenced engagement in state RNT following exposure to a stressful insolvable anagram task. The key predictions and findings are outlined in Table 7.4.

Table 7.4. Summary of predictions and findings from Study 4

Predictions	Findings
1. There will be no difference in state RNT between conditions (manipulated to appraise RNT as helpful vs. unhelpful) immediately after the experimental manipulation, before exposure to the stressor.	The experimental manipulation itself did not result in a difference between conditions on state RNT.
2. After exposure to the stressor, state RNT will increase for all participants, but participants manipulated to appraise RNT as helpful will show a greater increase in state RNT than participants manipulated to appraise RNT as unhelpful.	Hypothesis supported. After the stressor, state RNT increased for all participants, but participants manipulated to appraise RNT as helpful showed a greater increase in RNT relative to participants manipulated to appraise RNT as unhelpful.

Following on from Study 4, which demonstrated that manipulating beliefs about the helpfulness of RNT influenced state RNT, Study 5 (Chapter 6) aimed to test whether rumination actually has any helpful consequences, such as increasing insightfulness, that could potentially reinforce and maintain the ruminative process. In

addition to rumination potentially increasing insight, it has also been hypothesised that rumination may be maintained because of its avoidance functions (e.g., giving individuals justification for avoiding taking action with a feared situation; Nolen-Hoeksema et al., 2008).

Therefore, Study 5 was an experimental study in which the putative insight and avoidance functions of rumination were tested. Participants were exposed to a threatening situation – being assertive about a difficult issue with a close person – as a means of making the putative functions salient (i.e., participants may want to avoid being assertive). Processing mode was then manipulated by making participants think in detail about the assertiveness situation in a ruminative or non-ruminative manner. This meant that it was possible to examine the consequences of thinking about threat in a manner analogous to depressive rumination (abstract rumination), relative to thinking in a manner phenomenologically inconsistent with depressive rumination (concrete thinking). A range of potentially reinforcing outcomes relating to insight and avoidance were measured before and after the processing mode manipulation: sense of insightfulness, sense of confidence and control, justification for avoidance, assertiveness self-efficacy, and anxiety. The key predictions and findings are outlined in Table 7.5.

Table 7.5. Summary of predictions and findings from Study 5

Predictions	Findings
1. There are two alternative predictions relating to insightfulness and confidence/control arising from opposing theoretical models: (a) The prediction arising from the insight hypothesis is that participants receiving an abstract rumination manipulation will report a greater sense of insightfulness and confidence/control relative to participants receiving a concrete thinking manipulation. (b) The prediction arising from the processing mode hypothesis is that participants receiving a concrete thinking manipulation will report a greater sense of confidence and control relative to participants receiving an abstract rumination manipulation.	Processing mode hypothesis supported, insight hypothesis not supported: Rumination did not differ from concrete thinking on increasing understanding and insight. Concrete thinking lead to a greater sense of confidence/control relative to rumination.
2. Participants receiving an abstract rumination manipulation will report more justification for avoidance and less assertiveness self-efficacy relative to participants receiving a concrete thinking manipulation.	Hypothesis supported. Rumination led to more justification for avoidance and less assertiveness-self efficacy than concrete thinking.
3. Participants receiving an abstract rumination manipulation will report less state anxiety relative to participants receiving a concrete thinking manipulation.	Hypothesis not supported. Rumination did not differ from concrete thinking in its effects on state anxiety.

Taking the findings from these studies together, there is convergent evidence from cross-sectional, prospective, and experimental studies that the perception that RNT is helpful for increasing insight and understanding contributes to maintenance of RNT. In contrast, experimental evidence suggests that rumination does not actually increase insightfulness, at least relative to alternative ways of thinking in detail about a difficulty. However, rumination may be maintained because it allows people to generate justifications for avoidance.

7.2. Theoretical and Clinical Implications

In the following section, there will be discussion of the implications of the findings for theoretical accounts of RNT outlined in the literature review (Chapter 1), as well as discussion of the clinical implications arising from this research.

7.2.1. Implications for the Transdiagnostic Conceptualisation of Repetitive Negative Thought

In Chapter 1 (Section 1.4), the theoretical argument for considering rumination and worry together as a transdiagnostic common process of RNT was outlined and evidence was presented to justify the transdiagnostic approach. Three primary justifications were proposed for the transdiagnostic approach (Ehring & Watkins, 2008; Harvey et al., 2004; Nolen-Hoeksema & Watkins, 2011): (i) that rumination and worry are highly correlated and there is considerable commonality between their qualities (e.g., Fresco et al., 2002; Hong, 2007; Segerstrom et al., 2000; Watkins, Moulds, & Mackintosh, 2005); (ii) that there is considerable overlap between their consequences and the disorders that rumination and worry predict, for example, both predict depression and anxiety (e.g., Aldao, Nolen-Hoeksema, & Schweizer, 2010; Ehring & Watkins, 2008; Harvey et al., 2004; Nolen-Hoeksema & Watkins, 2011;

Watkins, 2008); and (iii) that there is considerable theoretical overlap between models of rumination and worry.

With respect to the first justification, Ehring and Watkins (2008) argued that whilst rumination and worry may differ in terms of specific content (e.g., rumination focused on loss, worry focused on threat), there are four qualities common to the processes involved in rumination and worry, as they are both (i) repetitive, (ii) passive and/or relatively uncontrollable, (iii) characterised by an abstract style of processing, and (iv) focused on negative content. This argument is supported by studies that have demonstrated strong associations and little disparity between rumination and worry (e.g., Fresco et al., 2002; Hong, 2007; Segerstrom et al., 2000; Watkins et al., 2005).

Considering the second justification, there is evidence demonstrating that there is considerable overlap between the disorders predicted by rumination and worry, and evidence that experimental manipulations of worry and rumination both influence symptoms of anxiety and depression (e.g., Blagden & Craske, 1996; Calmes & Roberts, 2007; Ciesla & Roberts, 2007; Hong, 2007; McLaughlin et al., 2007; Morrow & Nolen-Hoeksema, 1990; Schwartz & Koenig, 1996; Watkins, 2008; see Section 1.4.1.2 for a review). Finally, considering the overlap between theoretical models of rumination and worry, in reviewing theoretical accounts, it becomes clear that many common mechanisms have been hypothesised to underpin vulnerability rumination and worry (see Section 1.4.1.3 for a full review).

Study 1 (Chapter 2) provides further support for this transdiagnostic conceptualisation in which rumination and worry reflect a common process of RNT. In Study 1, using SEM, a model in which measured indicators of rumination (measured by the RSQ-RRS) and worry (measured by PSWQ) loaded onto a latent variable representing RNT provided a good fit to the data. When considering the

relationship between the most widely used measures of rumination and worry, they provide a good quantitative fit when being considered together as indicators of the single latent construct of RNT. One of the advantages of using SEM, rather than just examining correlations, is that SEM allows the construction of latent variables. Latent variables can thus be examined as unobserved, hypothetical constructs that can explain covariation in behaviour, such that they represent an underlying cause of multiple observed behaviours (Kline, 1998). Thus, the use of SEM allows for examination of whether rumination and worry both represent good indicators of the hypothesised underlying construct of RNT.

Study 2 also examined rumination and worry together, using a composite variable of RNT, and the findings from this study also provide some support for the transdiagnostic conceptualisation, with some caveats. There are several reasons as to why a hierarchical regression analysis was conducted using a composite variable representing RNT (for a full justification of this approach, see Chapter 3, Appendix C). In summary, multiple regression afforded the opportunity to enter variables in a hierarchical order into the analysis according to their temporal distance to RNT. Moreover, the previous analysis in Study 1 demonstrated that a latent variable representing RNT gave a good fit to the data, lending support to a theoretically identical conceptualisation of an aggregated variable representing both rumination and worry.

In the main analysis using the composite variable of RNT, early experience factors (abuse and overcontrolling parenting) and abstract processing styles did not predict change in RNT. However, RNT was predicted by neuroticism and the specific belief that RT aids instrumental understanding. When repeating these analyses examining rumination and worry separately (see Chapter 3, Appendix A), the overall

pattern of predictors was similar: neither rumination nor worry were predicted by abuse, overcontrolling parenting, or abstract processing styles. However, there were some differences relating to neuroticism and beliefs about RT. Neuroticism was a significant prospective predictor of worry and a predictor of rumination at the trend level, suggesting that this may be common across worry and rumination. Moreover, whilst the belief that RT aids instrumental understanding prospectively predicted rumination, this particular belief did not predict worry. Instead, the belief that RT reduces past distress had a negative prospective relationship with worry. Since this study demonstrated that an identical range of vulnerability factors did not predict rumination and worry, this result may reflect the distinction between rumination and worry that relates to their content, rather than processes (Ehring & Watkins, 2008). Specifically, the transdiagnostic approach to RNT (Ehring & Watkins, 2008) emphasises that whilst rumination and worry share common processes, they can differ in content (e.g., temporal orientation). Therefore, the differential association of particular metacognitive beliefs with worry and rumination may reflect differences in RNT content.

7.2.2. Implications for Metacognitive Models of Repetitive Negative Thought

Perceived function and metacognitive accounts of RNT propose that RNT can be initiated by positive beliefs about its utility (Lyubomirsky & Nolen-Hoeksema, 1993; Papageorgiou & Wells, 2003; Watkins & Baracaia, 2001; Wells, 1995). Similarly, the avoidance theory of worry (Borkovec, 1994) proposes that worry is reinforced as it can be perceived to have positive consequences (e.g., believing that worry affords better coping with future negative events).

In Study 1 (Chapter 2), using SEM, a latent variable representing a range of beliefs about the function of RT (believing that RT aids instrumental understanding;

aids self and social control; reduces past distress; and aids motivation, learning and problem-solving) remained directly associated with trait RNT after taking into account the effects of other powerful predictors, namely neuroticism and current distress (symptoms of depression, anxiety, and stress). This is consistent with metacognitive models of RNT, and models which emphasise the importance of perceptions about the function of RNT (Borkovec, 1994; Papageorgiou & Wells, 2003; Wells, 1995).

Moreover, in Study 1, perceived function of RT mediated the relationship between neuroticism and RNT, and emotional abuse and RNT. Whilst the SEM model utilised correlational data (the causal relationship may occur in the opposite direction to what is predicted in the model, or the relationship may be bidirectional), the study highlighted the relationship between perceptions of the function of RT and other vulnerability factors for RNT. It would be of theoretical interest to explore how metacognitive beliefs or beliefs about RT being functional develop and are maintained, since such beliefs seem to be powerfully associated with engagement in trait RNT. One possibility is that metacognitive beliefs may develop as a result of early life experiences: Wells (1995) hypothesised that various developmental experiences may result in the development of metacognitive beliefs. Specifically, parental modelling of RNT may result in children developing beliefs about its utility, and/or the experience of aversive, uncontrollable environments may lead to beliefs about RNT buffering against the impact of unexpected negative events. To test these hypotheses would require prospective longitudinal studies in children, in which parenting behaviours and home environments are assessed alongside measures of metacognitive beliefs about RT.

Moreover, it is worth exploring the finding that perceived function of RT mediated the relationship between neuroticism and RT. One possible explanation for this finding is that individuals prone to negative emotional experiences that are frequent and intense may be particularly likely to have a strong desire to try to understand and make sense of their emotional reactions. Consistent with this is the hypothesis that people are motivated towards "meaning-making" in response to stressful events (see Park, 2010, for a review and evidence). It is possible that people high on trait neuroticism may be particularly likely to view RNT as a potential means of gaining understanding and insight into their negative feelings, moods and emotional reactions. In contrast, individuals low on trait neuroticism may not have a particularly strong desire to understand and make sense of negative feelings if they are troubled by them less frequently and less intensely, and therefore they may not develop beliefs about the helpfulness of rumination in achieving this.

In Study 2 (Chapter 3), the specific belief that RT aids instrumental understanding prospectively predicted change in RNT after 6-8 weeks, when controlling for other vulnerability factors and symptoms of depression, anxiety, and stress. Notably, other perceived functions of RT (self and social control, reducing past distress, and aiding motivation, learning and problem-solving) did not predict change in RNT. This study is therefore strong evidence consistent with a metacognitive account as it finds that beliefs about the utility of RT predict future RNT. Moreover, this study was the first to demonstrate the potential specificity of beliefs that influence change in RNT, since previous theoretical accounts have tended to focus on beliefs and perceptions of function more generally (Papageorgiou & Wells, 2003; Wells; 1995; Borkovec, 1994). If this finding was replicated, there would be implications for these accounts of RNT since only certain types of belief or perception may be

associated with vulnerability to RNT, and models would need to be revised to take into account the specificity of the beliefs. However, this finding is consistent with previous research that has demonstrated the association between rumination and increased sense of insightfulness (Lyubomirsky & Nolen-Hoeksema, 1993; Watkins & Baracaia, 2001).

The perception that RT aids understanding and insight may be a particularly powerful predictor of RNT for two reasons. First, the need to understand and make sense of feelings and experiences is an important and common need (e.g., Heine et al., 2006). Second, people may perceive prolonged dwelling and mental analysis of an issue to be the only way of achieving that need. In contrast, other putative functions for RNT (such as it helping to reduce feelings of past distress) could be achieved by other activities, such as distraction. It would be interesting to explore these hypotheses through further studies examining higher-level personal needs, such as the needs for understanding and insight, and the various strategies that people employ as a means of attempting to meet these needs. For example, one study could involve giving participants a list of putative functions for RNT (e.g., to gain understanding and insight, to feel in control of one's life, to make sense of unhappy events, etc.), and then ask them to generate lists of strategies that they personally use to try to achieve these things (e.g., in response to "how to feel in control of life", participants might generate responses such as "repeatedly think about my problems", "write lists to help me feel more organised", "talk to friends and ask for advice", "deal with problems immediately rather than putting them off", etc.).

To the best of my knowledge, Study 3 and Study 4 reported the first experimental tests of the perceived function and metacognitive accounts of RNT, by experimentally manipulating perceived helpfulness of RNT at increasing

understanding and insight, and examining subsequent engagement in state RNT. Due to methodological issues, Study 3 was not able to successfully test this hypothesis, but Study 4 provides experimental evidence consistent with this theoretical account. Specifically, participants experimentally manipulated to appraise RNT as useful for increasing understanding and insight engaged in more state RNT in response to a stressor relative to participants manipulated to appraise RNT as unhelpful. This experimental evidence builds upon previous correlational and prospective evidence (see Chapter 5, Section 5.3 for a summary) by providing causal evidence that appraisals of the utility of RNT causally influence engagement in state RNT. However, it is important to note that in this study, only the specific appraisal that RNT increases sense of understanding and insight (following on from the findings of Study 2) was manipulated. As such, this study cannot provide experimental support for the broader perceived function and metacognitive belief accounts that emphasise the role of positive beliefs more generally.

Finally, whilst Study 5 (Chapter 6) did not actually test metacognitive models of RNT that make predictions about the way perceived beneficial consequences of RNT influence RNT, the study examined whether rumination resulted in actual beneficial consequences. The study demonstrated that abstract rumination did not confer advantages for sense of insightfulness relative to concrete thinking. Relating this to metacognitive accounts of RNT, this suggests that beliefs that rumination increases sense of understanding and insight may be misplaced, since despite an increased focus on meanings and implications, rumination did not lead to increased insightfulness relative to thinking in an alternative, non-ruminative manner.

However, it is also important to acknowledge that the studies in this thesis have only explored the influence of positive metacognitive beliefs in the maintenance

of RNT. Both metacognitive accounts of rumination (Papageorgiou & Wells, 2003) and worry (Wells, 1995) hypothesise that negative metacognitive beliefs are also implicated in vulnerability to RNT. In the metacognitive model of rumination (Papageorgiou & Wells, 2003), whilst negative metacognitive beliefs do not directly influence rumination (instead, rumination is initiated by positive metacognitive beliefs), they are hypothesised to influence depressive symptoms (e.g., "I can't stop myself from ruminating"). As such, negative metacognitive beliefs are hypothesised to maintain the positive beliefs, which relate to the need to ruminate to help cope with difficulties. In the metacognitive model of worry (Wells, 1995), negative metacognitive beliefs about worry are hypothesised to have a direct impact on engagement in worry, such that negative metacognitive beliefs (e.g., about the uncontrollability of worry) are hypothesised to lead to worrying about worry itself (i.e., meta-worry). As such, it would be beneficial to explore the causal role of negative metacognitive beliefs in the maintenance of RNT.

In sum, these studies provide convergent evidence that strongly supports the metacognitive and perceived function accounts of RNT. However, the studies also suggest that these accounts may need to be refined and nuanced as only particular sets of beliefs and functions may be strongly linked to RNT.

7.2.3. Implications for Control Theory and Processing Mode Accounts of Repetitive Negative Thought

Control theory (Martin & Tesser, 1996) proposes that problematic progress with the attainment of personal goals drives RT, with the prediction that abstract goals are likely to cause problematic goal progress due to being difficult to achieve or abandon. Elaborating on this account, processing mode theory (Watkins, 2008) proposes that construing goals at an abstract level can have negative impact on

problem solving and self-regulation, and can lead to negative overgeneralisations. Similarly, the reduced concreteness theory of worry (Stöber & Borkovec, 2002) hypothesises that worrying about problems in an abstract manner diminishes the likelihood of finding concrete solutions to the problems, thus allowing them to remain unresolved so the worrying continues.

Taken together, these approaches make some specific predictions about the relationship between abstract processing and RNT. Martin and Tesser (1996) proposed that a tendency towards overly abstract processing will cause more unresolved goals to be linked to higher-level personal goals, resulting in more activation of RT, which leads to an increased frequency of rumination (i.e., more trait rumination). Watkins (2008) proposes that abstract processing leads to ineffective episodes of rumination with unconstructive consequences, which is likely to cause these episodes to become prolonged (i.e., more extended state rumination). However, it is important to be aware that these approaches conceptualise rumination in a slightly different way to trait rumination as conceptualised in response styles theory (Nolen-Hoeksema et al., 1993). Martin and Tesser (1996) argue that linking concrete goals to higher-order, abstract goals increases the frequency of persistent, unconstructive rumination, but this sort of rumination may not be the same sort as the habitual trait rumination identified in the response styles theory.

In Study 1 (Chapter 2), the prediction that abstract processing would be directly associated with trait RNT was not supported in the SEM analysis. However, in supplementary analyses examining abstract processing on its own without other vulnerability factors (Chapter 2, Appendix 2), after controlling for depression and anxiety symptoms, abstract processing was a significant predictor of rumination, but not worry. This indicates that abstraction is related to trait rumination, but that this

relationship is lost once accounting for other more powerful predictors, such as neuroticism. In Study 2 (Chapter 3), the prospective follow-up to Study 1, the prediction that abstract processing, characterised as a proximal vulnerability factor (cf. Nolen-Hoeksema & Watkins, 2011), would influence change in RNT over 6-8 weeks was not supported.

There are several possible explanations for these findings. As briefly outlined previously, a distinction can be drawn between goal-driven rumination identified in control theory accounts of RT (Martin & Tesser, 1996; Watkins, 2008) and the more habitual rumination identified in response styles theory (e.g., Nolen-Hoeksema et al., 1993). One interpretation of these results is that habitual RNT, as assessed by the RSQ-RRS and the PSWQ used in Study 1 and Study 2, is not influenced by abstract processing of goals, but it is influenced by neuroticism and metacognitive beliefs, which may be two potentially complementary pathways to RNT. Instead, in line with Martin and Tesser's (1996) control account, abstract processing may have more of an influence on state RNT (i.e., individual "bouts" of rumination and worry), rather than the generalised habitual tendency to engage in RNT as captured by the RSQ-RRS and PSWQ. Moreover, whilst Watkins' (2008) processing mode account proposes that abstract processing leads to more unconstructive outcomes of rumination (e.g., Watkins, 2004; Watkins & Moulds, 2007; Watkins & Teasdale, 2001), it does not predict that abstract processing necessarily leads to trait rumination. However, ineffective rumination could influence the duration of episodes of rumination and lead to repeated bouts of rumination, thus potentially influencing rumination at the trait level.

A further explanation for the observed pattern of findings may arise from methodological issues. First, it is possible that abstract processing of goals may have a

direct influence on trait rumination, but this may not be detected by measures such as the RSQ-RRS and the PSWQ, because these measures are not sensitive to RNT about personal goals. Second, it is possible that observed patterns of findings may have arisen as a consequence of the way abstract processing was operationalised. In Study 1 and Study 2, abstract processing style was assessed with the Problem Elaboration Questionnaire (PEQ; Stöber & Borkovec, 2002), which examined abstract processing of problems with reference to two specific examples, rather than the more generalised tendency to process in an abstract fashion. Moreover, the measures did not assess the tendency to be abstract in response to feelings, emotions and moods, which is a critical component of RNT. As such, if the PEQ is not a valid measure of the more generalised tendency towards abstract processing, it is not possible to draw clear conclusions from these studies about the effect of more generalised abstract processing of moods and problems on RNT.

Moreover, in Study 1, SEM analysis of a hypothesised theoretical model indicated that the relationship between abstract processing and RNT was fully mediated by neuroticism. This is consistent with previous experimental research demonstrating that abstract processing leads to greater emotional responses to negative events (Moberly & Watkins, 2006; Watkins, 2004; Watkins et al., 2008), and experience sampling data associating negative affectivity with abstract thinking (Takano & Tanno, 2010). Whilst emotional reactivity and neuroticism are not synonymous constructs, conceptualising neuroticism as an increased susceptibility to negative emotional states (Watson & Clark, 1984), it makes theoretical sense that individuals high on trait neuroticism would display increased emotional reactivity and more negative responses to difficulties. However, whilst SEM allows the researcher to hypothesise the causal directions of the relationships in structural models, this SEM

analysis with cross-sectional data cannot establish the causal relationships between these variables.

As such, it is important to consider the meaning of the finding that neuroticism mediates the relationship between abstract processing and RNT. It suggests that abstract processing is associated with neuroticism, and that neuroticism accounts for the relationship with RNT. However, this could be because neuroticism causes abstract processing, or because abstract processing causally contributes to neuroticism, or because they are both related to a common third factor that was not assessed. For instance, both abstract processing and neuroticism might influence emotional reactivity, but neuroticism might have a bigger impact on the overall variance within emotional reactivity.

It is important to explore these alternative options, and the implications that they would have. There is some evidence that abstract processing may increase the tendency towards negative emotional responses, and this may be one of the mechanisms underpinning neuroticism. As previously outlined, there is experimental evidence from studies manipulating processing mode indicating that abstract processing causally contributes to greater emotional reactivity to negative events (Moberly & Watkins, 2006; Watkins, 2004a; Watkins et al., 2008). There is also evidence from a variety of laboratory and non-laboratory settings that this emotional reactivity is strongly associated with neuroticism (Augustine et al., 2013). For instance, in the lab, individuals high on neuroticism demonstrate greater negative emotional reactivity to false performance feedback (Larsen & Ketelaar, 1989) and to affective images and films (e.g., Augustine & Larsen, 2011; Hemenover, 2003). Outside of the lab, individuals high on neuroticism demonstrate greater emotional reactivity to negative interpersonal events (Suls et al., 1998), and more negative

appraisals of daily stressors (Gunthert et al., 1999). As such, whilst the correlational nature of this data prevents conclusions from being drawn about the nature of the relationship between emotional reactivity and neuroticism, it is possible that emotional reactivity is an underpinning component of neuroticism. Therefore, if abstract processing causally contributes to increased emotional reactivity to negative events, this is a possible mechanism by which abstract processing could contribute to neuroticism.

Considering the opposite relationship, there is also some indirect evidence that could be consistent with the alternative hypothesis that neuroticism may influence the tendency towards abstract processing. There is a broad range of evidence that neuroticism influences cognitive style (e.g., Shapiro, 1965), and evidence that people higher on neuroticism show diminished cognitive control (Moriya & Tanno, 2008), such that they are poorer at flexibly responding and inhibiting dominant responses. Relating this to abstract processing, Watkins (2008) argued that the adoption of abstract processing might reflect a dysregulation of the ability to shift processing style in response to situational demands. Dysregulation in ability to shift level of construal may make people more susceptible to persisting with abstract processing, regardless of situational circumstances, when shifting to a more concrete level of construal may be more adaptive. Watkins (2011, p. 265) proposed that "if a negative mood signals a problematic situation, then a shift to a concrete level of goal/action identification would be adaptive because it provides more contextual detail about the specific means and alternatives by which to proceed". Consistent with this *level-of-construal dysregulation* hypothesis, Watkins, Moberly, and Moulds (2011) found that currently depressed participants were impaired at shifting level of construal in response to changes in mood, relative to never-depressed participants. As such, this is consistent

with the hypothesis that negative affectivity and neuroticism may interfere with adaptive regulation of processing mode in response to situational demands.

Considering these alternative accounts of the relationship between neuroticism and abstract processing, the current evidence indicates that the relationship between neuroticism and abstract processing may be bidirectional, such that abstract processing contributes to neuroticism, and neuroticism contributes to abstract processing. Further studies would be required to test this hypothesis (see Section 7.4).

Study 5 (Chapter 6) also examined a prediction of the processing mode account of RNT (Watkins, 2008), by examining the consequences of abstract rumination relative to concrete thinking. Specifically, the study demonstrated that relative to abstract rumination, concrete thinking about being assertive on a difficult interpersonal issue resulted in a greater sense of confidence and control. This is consistent with the processing mode prediction by Watkins (2008) that concrete processing of difficulties leads to more constructive outcomes than abstract processing, particularly in contexts where abstract processing might lead to unconstructive outcomes for self-regulation.

In summary, whilst the current findings are consistent with the hypothesis that abstract processing may lead to unhelpful episodes of RNT, the current findings do not fit the hypothesis that abstract processing is directly associated with or predicts trait RNT. Any relationship between abstract processing and trait RNT is mediated by neuroticism, which accounts for a greater share of the variance in RNT. However, methodological limitations (e.g., the operationalisation of abstract processing) prevent firm conclusions from being drawn as to the nature of the relationship between abstract processing and trait RNT, so some caution is merited. Nonetheless, on the basis of Study 1 and 2, whilst existing data (see Watkins, 2008) indicates that control

theory and processing mode theory provide a good account of (a) goal discrepancy driven state rumination, and (b) the consequences of rumination, it appears that they do not provide a good account of trait rumination. The current data suggests that different processes (neuroticism, beliefs about RT) may be more important in habitual trait rumination as assessed by the measures used in this thesis. In conclusion, there may be theoretical value in making a distinction between state rumination, which can be driven by goal discrepancy, and more habitual trait rumination, which is an automatic tendency to ruminate in the context of negative moods (consistent with the conceptualisation of Nolen-Hoeksema, 1991).

7.2.4. Implications for Response Styles Theory

Response styles theory (Nolen-Hoeksema, 1991) proposes that rumination is a consistent and enduring habitual response style which can contribute to prolonging symptoms of depression, through (i) exacerbating negative thinking, (ii) reducing instrumental behaviour, and (iii) impairing social problem solving. In this section, there will be detailed discussion of the extent to which three specific hypotheses, developed by Nolen-Hoeksema within the response styles theory perspective, are supported by the studies in this thesis. Specifically, this section will discussion the following hypotheses: (i) that rumination develops as a result of certain negative early life experiences (Nolen-Hoeksema, 1991); (ii) that rumination is a cognitive manifestation of neuroticism (Nolen-Hoeksema et al., 1994); and (iii) that rumination is maintained because it affords justification for avoidance (Nolen-Hoeksema et al., 2008).

7.2.4.1. RNT and negative early life experiences.

Nolen-Hoeksema (1991) proposed that a ruminative response style could develop as a result of particular parenting experiences and early environments. Specifically, Nolen-Hoeksema (1991) hypothesised that parental modelling and overcontrol could contribute to the development of rumination, as well as the experience of being in an environment in which adaptive ways of responding to difficulties are not taught (e.g., abusive or neglectful environments).

In the SEM analysis reported in Study 1, maternal and paternal overcontrol were not associated with RNT when taking into account other predictors included in the model. However, there were small correlations between maternal and paternal overcontrol and measures of rumination (RSQ-RRS) and worry (PSWQ). Examining the effect of an abusive environment, SEM analyses indicated that emotional abuse was indirectly associated with RNT via its association with beliefs about the function of RT, abstract processing, neuroticism, and current distress. Whilst low levels of participant report precluded further examination of the physical and sexual abuse variables in the structural model, there were small but significant correlations between sexual and physical abuse and rumination (RSQ-RRS) and worry (PSWQ). Considering the theoretical implications of these findings, this suggests that in adulthood, other proximal vulnerability factors may have a greater impact on the tendency to engage in RNT than early life experiences.

In Study 2 (Chapter 3), early experience factors (overcontrolling parenting and emotional abuse; sexual and physical abuse not examined) did not predict change in RNT over 6-8 weeks, when controlling for symptoms of depression, anxiety and stress. One interpretation of these findings is that when considered in the context of other powerful proximal predictors of RNT in a model to be tested with SEM, early

experiences of overcontrolling parenting and abuse are insufficiently powerful to remain significantly associated with RNT. When examining the correlations between these variables and RNT without taking into the account the effect of other variables, a significant relationship is observed. As such, the finding that early experience factors are no longer associated with RNT when other vulnerability factors are included suggests either (i) that the effect is mediated by these other variables (i.e., there is shared variance between these variables), or (ii) that the effect is harder to detect as there is less statistical power when more variables are entered into the analysis.

Moreover, Nolen-Hoeksema's (1991) hypothesis about early experiences specifically concerns their involvement in the initial development, rather than maintenance, of a ruminative response style. Since the studies reported in this thesis are concerned with factors that maintain RNT, rather than factors associated with the onset of RNT, the data cannot establish whether any of the factors measured would influence initial development of a ruminative response style. As such, further developmental studies measuring these factors in children and adolescents are required in order to satisfactorily test this hypothesis. Considering the implications of these findings for response styles theory, the current data suggest that these negative early experiences are less important for short-term maintenance of RNT, suggesting that they may play a less important role in the response styles theory model, relative to other vulnerability factors implicated by this account.

7.2.4.2. RNT and neuroticism.

Nolen-Hoeksema et al. (1994) also hypothesise that rumination is a cognitive manifestation of the personality trait of neuroticism, stating that "ruminative coping may be one mechanism by which global traits such as neuroticism and private self-

consciousness are related to depression … although ruminative coping is related to neuroticism and private self-consciousness, it is a better predictor of changes in depression over time than those global variables, and may mediate the relationship between neuroticism and private self-consciousness and depression" (p. 93). There is a considerable body of correlational evidence (e.g., Kuyken et al., 2006; Muris et al., 2005), and to a lesser extent prospective evidence (e.g., Barnhofer & Chittka, 2010), associating neuroticism and rumination (see Chapter 1, Section 1.2.3.7 for a full summary). There is evidence that people high on neuroticism are more prone to rumination (e.g., Hankin, Fraley, & Abela, 2005; Roberts et al., 1998).

In Study 1 and Study 2, neuroticism was characterised as a variable with both proximal and distal qualities, because as with other proximal variables, neuroticism is a within-person characteristic that could directly influence the way a person responds in the here-and-now (Augustine et al., 2013), but like other distal variables, neuroticism has genetic and environmental origins (e.g., Loehlin, 1992). In the SEM analysis for Study 1, neuroticism had both a direct effect on RNT, consistent with the hypothesis of Nolen-Hoeksema et al. (1994), and an indirect effect, as the relationship between neuroticism and RNT was significantly mediated by both current distress, and beliefs about the function of RT. Moreover, neuroticism was a significant mediator of the relationship between emotional abuse and RNT, and abstract processing and RNT.

In the previous section (Section 7.2.3), the relationship between neuroticism and abstract processing was considered. It is also important to consider the relationship between neuroticism and emotional abuse. Several studies have demonstrated an association between childhood trauma (including physical, sexual, and emotional abuse) and neuroticism (e.g., Gamble et al., 2006; Lyasker, Meyer,

Evans, Clements, & Marks, 2001; Talley, Boyce, & Jones, 1998; Roy, 2002; Schwandt, Heilig, Hommer, George, & Ramchandani, 2013). Studies have tended to examine sexual or physical abuse, with possible reasons for this being that sexual and physical abuse are seen to be more prevalent, more damaging to physical and mental health, and more salient to the victim (Schwandt et al., 2013). Alternatively, it could be because unlike sexual or physical abuse, emotional abuse is not considered a criminal act (Thompson & Kaplan, 1996), or because emotional abuse is more difficult to define (Rees, 2010). The mechanism by which emotional abuse could contribute to neuroticism could concern the parent-child attachment relationship. Specifically, emotional maltreatment is hypothesised to lead to insecure attachment styles (Bowlby, 1969), and insecure attachment styles have been associated with neuroticism (e.g., Eggert, Levendosky, & Klump, 2007; Hagekull & Bohlin, 2003). Thus, insecure attachment styles may underpin the observed relationship between emotional abuse and neuroticism. In order to test this in future studies, it would be necessary to conduct a prospective study in which attachment styles are assessed in young children (e.g., using the Strange Situation procedure; Ainsworth, Blehar, Waters, & Wall, 1978) to see how attachment styles influence the development of trait neuroticism.

In Study 2, neuroticism and beliefs about the function of RT were the only prospective predictors of change in RNT over 6-8 weeks, after symptoms of depression, anxiety, and stress were statistically controlled. Neuroticism remained a significant predictor of change in RNT even after taking into account the effect of other vulnerability factors included in the regression analysis (overcontrolling parenting; physical, sexual, and emotional abuse; beliefs about the function of RT; abstract processing). However, whilst this thesis contains cross-sectional and

prospective evidence consistent with personality models of RNT, this data alone cannot establish causality and further experimental studies are required to elucidate the causal nature of the relationship between the factors.

It is helpful to attempt to understand exactly what qualities or components of the neuroticism trait may be important in the relationship with RNT. A simple interpretation of the relationship concerns the way response styles theory conceptualises rumination: If rumination is conceptualised as a habitual response to sad moods, if an individual is more likely to experience sad moods as a result of being high on trait neuroticism, they may be more likely to ruminate, because they will experience more of the contextual cues (low mood) that trigger the ruminative habit.

A slightly more complex account concerns the cognitive components of neuroticism and how they may influence RNT. Referring to the qualities of neuroticism stated by Eysenck and Eysenck (1991, p. 4), people high on neuroticism are "overly emotional, reacting too strongly to all sorts of stimuli, and finds it difficult to get back on an even keel after each emotionally arousing experience". Being prone to negative emotionality may confer vulnerability to persistent RNT because people who are more prone to strong negative emotional responses may be particularly motivated to engage in RNT as a means to understand and make sense of their negative moods and feelings. In contrast, people who are less prone to negative emotional states and who less frequently experience strong negative emotional reactions have less of a need to use RNT as a means of understanding and making sense if their emotional state is usually relatively stable.

It is also important to consider the underlying cognitive mechanisms by which neuroticism could contribute to RNT. One hypothesis outlined by Augustine et al. (2013) is that individuals high on neuroticism are also prone to some specific

cognitive biases. For example, neurotic individuals are more prone to self-focused attention (Field et al., 2010), the tendency to report an increased number of negative events (Suls & Martin, 2005), and poorer attentional control (Moriya & Tanno, 2008). This combination of negative cognitive biases may lead to neurotic individuals engaging in more RNT about negative events: Individuals who report an increased frequency of negative experiences, who are prone to focus their attention internally and who also have difficulties flexibly shifting attention may find themselves particularly prone to persistent RNT. Further studies are required to examine whether the combination of these components of neuroticism predict the tendency towards RNT.

However, it is also important to consider whether overlaps in the measures of RNT and neuroticism may account for some of the association between the two variables. The RSQ-RRS (Nolen-Hoeksema & Morrow, 1991), PSWQ (Meyer et al., 1990), and the EPQ-N-SF (Eysenck et al., 1985) – measures that are used in this thesis and that are three of the most widely used measures of rumination, worry, and neuroticism – contain some items that seem conceptually similar. Some examples of this include: the RSQ-RRS item "Think about how alone you feel", and the EPQ-N-SF item "Do you often feel lonely?"; the RSQ-RRS item "Think about how sad you feel", and the EPQ-N-SF item "Do you ever feel just miserable for no reason?"; and the PSWQ item "I've been a worrier all my life", and the EPQ-N-SF "Are you a worrier?". This similarity between the popular self-report measurement tools of these constructs could introduce bias through conceptually overlapping measurement items: Criterion contamination could be occurring as these measures may be assessing components that are not part of the pure criterion construct (Messick 1989).

In conclusion, considering the theoretical implications of these findings, the current data suggest that neuroticism plays an important role in the maintenance of RNT, in support of the account proposed in response styles theory. The data also suggest that neuroticism may mediate the relationships between more distal vulnerability factors (e.g., emotional abuse) and RNT.

7.2.4.3. RNT and avoidance.

Finally, a number of theoretical accounts propose that RNT may be maintained because it has functional properties that may reinforce the process of RNT, such as its passive nature avoiding the exacerbation of negative situations, and RNT affording justification for avoiding taking action that may be seen as aversive (Borkovec, 1994; Ferster, 1973; Nolen-Hoeksema et al., 2008). In Study 5 (Chapter 6), the aim of the experiment was to see whether rumination had functions that might potentially reinforce its further use, with participants thinking about a threatening situation (being assertive about an interpersonal problem) in either an abstract ruminative mode (analogous to depressive rumination) or a concrete mode (inconsistent with depressive rumination). It is important to note that whilst this study did not test the reinforcement hypothesis directly (i.e., it did not measure whether the outcomes of rumination lead to greater use of rumination), it did test the first part of this hypothesis by examining whether rumination had any beneficial outcomes that might maintain the process of rumination. As such, the findings of this study have theoretical implications for functional models of RNT.

Of most theoretical interest is the finding that relative to concrete thinking, rumination resulted in significantly more justification for avoidance, and a lower sense of assertiveness self-efficacy. This is consistent with the hypothesis proposed by

Nolen-Hoeksema et al. (2008) that rumination affords justification for avoiding taking action with feared situations.

Within this account, Nolen-Hoeksema et al. (2008) proposed a detailed avoidant function or rumination, hypothesising that "rumination is reinforced by the reductions in distress that come from withdrawing from aversive situations, from being relieved of responsibility, and from a sense of certainty about one's conclusions" (p. 404). Rather than rumination simply serving as a form of cognitive avoidance of aversive situations (Ferster, 1973; Martell et al., 2001), rumination is hypothesised to "provide depressed individuals with the evidentiary base to justify withdrawal and inactivity" (Nolen-Hoeksema et al., 2008, p. 407). Specifically, rumination is hypothesised to aid the accumulation of evidence that any efforts at active problem solving will be fruitless, with this sense of certainty reinforcing the ruminative process. Rumination is also hypothesised to aid the development of rationalisations for avoiding taking action or responsibility, and this inactivity is then reinforced because it avoids exposure to aversive situations. It is noteworthy that the effect observed on avoidance in Study 5 was found in nonclinical, nondysphoric participants matched for level of rumination and depression, simply as a result of manipulating the nature of repetitive thinking about a threatening issue to match the type of thinking found in depressive rumination. As such, this provides strong evidence that abstract rumination does increase avoidance relative to concrete thinking.

One possible criticism of Study 5 is that the threatening task used – an assertiveness situation – may be a task that is more suited for eliciting anxiety and possible avoidance than one that is suitable for eliciting a sense of understanding. This could potentially explain why an effect was found for avoidance, but not sense of understanding and insight. Nonetheless, understanding is still arguably an important

component of considering assertiveness, as it involves making sense of another's behaviour. However, it is worth considering suitable alternative tasks that could be used if this experiment were to be repeated. Possible alternative tasks could involve being faced with a difficult to understand situation, such as an unexpected behaviour from a close person, or a betrayal.

As this study is a preliminary experimental test of the avoidance hypothesis, it is important to note that not all potential avoidant functions were examined in the study. Specifically, in this study, only three types of justification for avoidance were measured: avoidance because of a perceived lack of control, avoidance because of a reduced sense of responsibility, and avoidance because of a wish to avoid distress. Sense of assertiveness self-efficacy was also measured (i.e., how confident participants felt about taking action with the assertiveness issue, their perceived likelihood of success). Although this study was only examining rumination, other putative avoidant functions of RNT suggested by Borkovec (1994) in the avoidance theory of worry (e.g., RNT as a form of avoidance of deeper emotional topics) were not examined. As such, whilst the findings of this study are consistent with the hypothesis outlined by Nolen-Hoeksema et al. (2008), it is not known if it applies to other forms of avoidance.

In summary, the convergent findings are consistent with predictions within response styles theory, particularly regarding neuroticism and avoidance. More specifically, these findings give greater salience and importance to neuroticism than previously discussed in the original theoretical account. In particular, it is important for future studies to assess the cognitive substrates of neuroticism (Augustine et al., 2013) and the means by which these may influence engagement in RNT.

7.2.5. Implications for an Integrative Theoretical Model

To conclude the discussion of the theoretical implications of these findings, it is worth revisiting the integrative theoretical model hypothesised at the end of Chapter 1 (Section 1.6). This original model was designed to illustrate hypothetical relationships that may exist between the putative vulnerability factors for RNT. After reviewing the findings from the thesis and the theoretical implications arising from these, it is possible to make some revisions and propose an alternative theoretical model in light of the findings relating to neuroticism, metacognitive beliefs, and avoidance, and the way that these factors may maintain habitual trait RNT. This revised and simplified model is outlined in Figure 7.1.

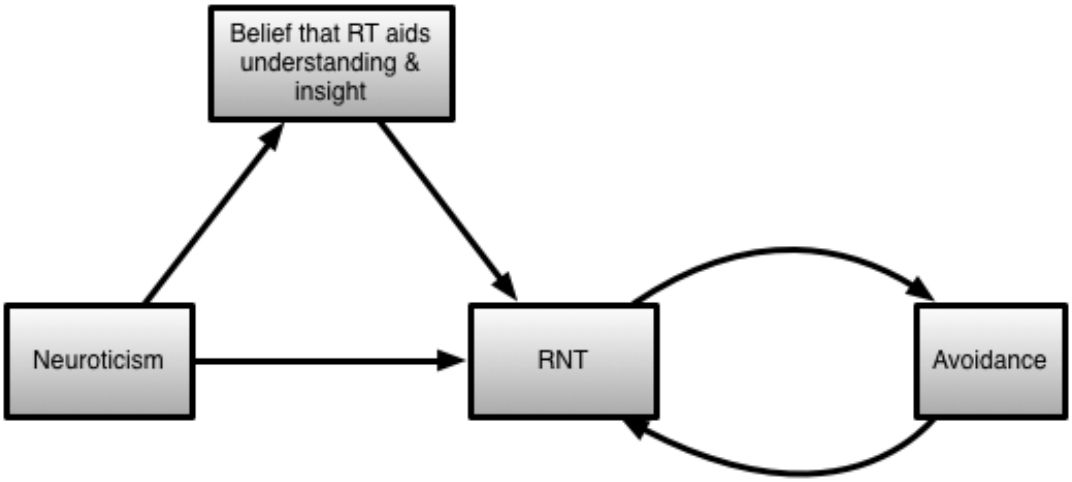

Figure 7.1. Revised theoretical model demonstrating the hypothesised causal relationships between neuroticism, the belief that RT aids understanding and insight, avoidance, and RNT.

In summary, as demonstrated in Study 1, the belief that RT aids understanding and insight mediated the relationship between neuroticism and RNT (see Section 7.2.2 for a discussion of this relationship). In Study 2, neuroticism and the belief that

RT aids instrumental understanding both prospectively predicted change in RNT. In Study 4, experimentally manipulating the belief that RT aids understanding and insight influenced engagement in state RNT. In Study 5, relative to concrete thinking, rumination led to increased avoidance.

It is important to highlight three of the predicted relationships displayed in this model that have not yet been directly tested with experimental studies. First, whilst the belief that RT aids understanding and insight mediated the relationship between neuroticism and RNT in the SEM analysis conducted in Study 1, this analysis utilised cross-sectional data. It is predicted that neuroticism would lead to an individual developing beliefs about the need to understand and make sense (see Section 7.2.2), but the causal relationship has yet to be directly tested.

Second, the prediction that avoidance may lead to RNT has not been directly tested (see Section 7.2.4.3). It is predicted that avoidance may reinforce the process of RNT (Nolen-Hoeksema et al., 2008), but further studies are required to examine whether avoidance resulting from RNT leads to the continued use of RNT (i.e., whether avoidance reinforces RNT).

Finally, whilst neuroticism was cross-sectionally and prospectively associated with RNT, and it is predicted that neuroticism causes increased RNT, the causal relationship has not yet been tested with experimental studies (see Section 7.2.4.2). Whilst neuroticism is not a variable that appears to be obviously tractable to experimental manipulation, it is possible that studies could manipulate cognitive components of neuroticism to examine the effect on subsequent RNT.

7.2.6. Clinical Implications

There is considerable clinical benefit to an understanding of the vulnerability factors for RNT. Understanding the factors that are associated with onset of RNT in

childhood and adolescence affords identification of those at risk for developing pathological RNT, as well as informing prevention interventions. However, this thesis has focused on examining the factors that may maintain RNT. Understanding the factors that maintain RNT in adulthood can inform the focus of therapeutic work, such that maintaining factors can be tackled clinically. In addition, identifying factors that might reinforce RNT is also of clinical use such that the motivation to engage in RNT can be addressed therapeutically.

The findings from this thesis suggest that proximal vulnerability factors may be more important in the maintenance of RNT in adulthood. This finding is of clinical relevance as it suggests that whilst distal factors may be important in establishing an individual's baseline tendency towards RNT, proximal factors may have more of an impact on adult engagement in RNT. As such, if these findings were replicated in clinical populations, it may be of therapeutic utility to focus on these distal vulnerability factors in treatment and prevention interventions.

One specific factor demonstrated to have a significant relationship with RNT is the specific metacognitive belief that RNT aids insight and understanding. This belief was associated with RNT in cross-sectional, prospective, and experimental studies. A further factor, neuroticism, was demonstrated to have both a cross-sectional and a prospective association with RNT. This is of potential clinical value, since clinicians can assess these factors to identify individuals at increased risk for RNT. It is then possible for clinicians to target these factors in therapeutic settings – for example, by challenging the belief that RNT aids insight and understanding – as a putative means to prevent or reduce RNT. One successful intervention for rumination, rumination-focused CBT, includes a focus on analysing and then replacing the

potential functions of rumination for patients (Watkins et al., 2007; Watkins, Mullan, et al., 2011). The findings from this thesis lend support to that clinical approach.

In addition to demonstrating the role of specific metacognitive beliefs in causing engagement in rumination, Study 5 also demonstrated that the metacognitive belief that RT increases insightfulness is inaccurate, because rumination did not increase understanding and insight relative to concrete thinking. In addressing this metacognitive belief in a therapeutic setting, therapists may wish to challenge the accuracy of these beliefs, as a means to reduce the motivation to engage in rumination. This study also demonstrated the advantages of thinking in a concrete, rather than abstract ruminative way, when faced with difficulties, since concrete thinking lead to a greater sense of confidence, control, and self-efficacy. Psychoeducation interventions for people at risk for rumination could emphasise the advantages of this way of thinking, rather than informing individuals not to dwell on problems at all, and to instead think about the situation in a more constructive, solution-focused way (see Watkins, 2009; Watkins, Mullan, et al., 2011; Watkins et al., 2012). Naturally, these findings require replication in clinical populations before definitive clinical recommendations can be made.

7.3. Strengths and Limitations of the Research

In this section, the strengths and limitations of the research reported in this thesis will be discussed, with particular reference to the aims of the research outlined in Chapter 1.

7.3.1. Strengths of the Research

Considering the strengths of the research, first, the correlational and prospective studies reported in Chapter 2 and Chapter 3 provide a robust test of the

transdiagnostic approach by examining rumination and worry together as a common process of RNT. By examining rumination and worry together, they contribute to a growing evidence base that suggests that these processes may be more common than they are different. Moreover, to the best of my knowledge, these are the first studies to be conducted that examine RNT alongside a wide range of putative vulnerability factors. Examining multiple vulnerability factors together in a single analysis affords identification of stronger or weaker predictors of RNT, and it allows for exploration of the relationship between vulnerability factors. This enhances the ecological validity of the approach, since in the real world, multiple vulnerability factors may be at play and the effect of any single vulnerability factors is not exerted in a vacuum. As such, whilst studies that explore individual vulnerability factors in detail are undoubtedly of value, it is also important to consider the interplay between the various factors that may influence vulnerability to RNT. Not only is this of theoretical interest, because it helps to identify factors that may be particularly strong predictors of vulnerability to RNT, it also is of clinical use: Identifying factors that seem to be most important in maintaining RNT means that these factors can be tackled in therapeutic or prevention interventions, and clinical work is not concentrated on factors that may have less of an influence on RNT.

Second, by adopting an online methodology for the correlational and prospective studies reported in Chapter 2 and Chapter 3 and recruiting participants from all around the UK, data were collected from a large and geographically diverse sample (n = 506). As such, it was possible to test a range of vulnerability factors, and have greater confidence in the generalisability of the findings across nonclinical populations.

Third, the experimental studies reported in Chapter 4 and Chapter 5 were the first studies to be conducted that directly tested metacognitive models of RNT: thus far, no other studies have experimentally manipulated beliefs about RNT and measured the effects on subsequent engagement in RNT. Whilst the experimental study reported in Chapter 4 had some methodological problems, it was helpful in developing the paradigm that was successfully used in the experimental study reported in Chapter 5. As such, these studies provide a valuable contribution to the literature by providing the first experimental test of a prominent theory of RNT.

Finally, the study reported in Chapter 6 also filled a gap in the literature by being the first study to test a range of potential outcomes of ruminative thinking (e.g., sense of insightfulness, justification for avoidance) relative to other forms of thinking. Previous studies have tended to examine rumination against a non-thinking control group (e.g., distraction), and as such, this study was able to provide evidence that demonstrates the specific outcomes of abstract ruminative thinking.

7.3.2. Limitations of the Research

There were also a number of limitations to the research reported in this thesis. First, whilst Chapter 1 identified a weakness of the vulnerability RNT literature by demonstrating that previous studies had heavily relied on the use of self-report measures, undoubtedly, a number of studies reported in this thesis can be subject to the same criticism. Study 1 and Study 2 adopted a method that necessitated all factors being measured by self-report, and in the experimental studies (Study 3, Study 4 and Study 5), there was also some use of self-report measures. For Study 1 and Study 2, if alternative measures were used (e.g., observation, other-report), the trade-off would be a reduction in sample size, which would have potentially resulted in problematic statistical power since such a wide range of vulnerability factors were being assessed.

As such, self-report measures were selected in order to benefit from a large and geographically diverse sample. Moreover, in all of the studies, self-report measures are necessary to assess particular constructs due to their personal and highly subjective nature (e.g., beliefs about the function of RT as measured in Study 1 and Study 2; subjective sense of understanding and insight as measured in Study 3 and Study 5, etc.). Whilst some factors can be measured in alternative ways (e.g., using a clinician-assessed measure of symptoms of depression anxiety such as the SCID; using a retrospective parent-report of parenting styles), many factors examined in this thesis are necessarily assessed with self-report techniques.

Second, a number of important vulnerability factors identified in the literature review (Chapter 1) were not examined in more detail in the studies reported in this thesis. As such, this thesis cannot claim to be a fully comprehensive analysis of the wide-ranging factors that may contribute to maintenance of RNT. However, Study 1 and Study 2 involved the measurement of as many vulnerability factors as possible, and there were practical reasons for not measuring all factors. Specifically, there was no measure of attention inhibition or cognitive control, but this was because it would have been not possible to measure this adequately using a self-report measure administered remotely, over the internet. As such, since this construct may be best measured in a laboratory setting, this factor was not measured. In addition, intolerance of uncertainty was also not assessed. Whilst this factor is undoubtedly of relevance to vulnerability to RNT and there is a good self-report measure of this construct available, constraints relating to participant burden precluded inclusion of a measure of this construct. The extant measures included in Study 1 took approximately between 45 – 55 minutes for participants to complete, which can be argued as already representing significant participant burden. As such, whilst there were additional

measures that it would have been useful to include, it would have been unwise to increase the time requirements for participants. However, this did mean that it was not possible to measure all theoretically relevant constructs.

Third, in Study 2, the longitudinal study, the follow-up assessments only occurred 6-8 weeks after the baseline assessments. As such, the prospective findings are limited in only being able to demonstrate what factors are implicated in the maintenance of rumination in the short to medium term. Longer-term follow-ups would afford identification of factors associated with long-term maintenance of RNT. Moreover, in this study, measures were only administered at two timepoints, with all of the vulnerability factors being measured at a single timepoint, at baseline. Prospective studies utilising multiple timepoints for follow-ups would afford a more robust analysis, and it would allow for mediating factors to be examined prospectively (e.g., to examine whether distal factors prospectively predict proximal factors, which in turn prospectively predict RNT). Specifically, Kraemer et al. (2001, p. 850) highlight that "the conceptual definition of 'B mediates A' … suggests that B explains how and why A works to produce O. If so, logically A must temporally precede B in order that B mediate A. The very term 'mediator' suggests that the mediator stands between that which it mediates and the outcome". As such, it is important to examine vulnerability factors at multiple time points such that any mediating factors can be identified.

Fourth, these studies have focused on the maintenance of rumination within adult and predominantly undergraduate student samples. As such, the retrospective approach and the use of adult participants in these studies preclude drawing conclusions about whether the distal factors measured influence initial onset of RNT in childhood and adolescence. In order to study the onset of RNT, a developmental

follow-up study using a younger sample would be required, in which a range of proximal and distal vulnerability factors are measured in child and adolescent participants in a prospective longitudinal or cohort study. However this was beyond the scope of this PhD project. Ideally, baseline measures of RNT and putative vulnerability factors should be taken from children at just before the age that rumination and worry emerge, at approximately 8 years old (Vasey & Daeleiden, 1994), and then children should be followed up until mid- to late-adolescence, such that a clear developmental picture can be created of the factors that are associated with initial onset versus ongoing maintenance of RNT.

Finally, the studies reported in this thesis were conducted with nonclinical participants. Whilst the experimental studies tested for an interaction between experimental condition and trait rumination and found that the effects were maintained across the whole spectrum of trait rumination within these samples, it is important to attempt to replicate these findings in clinical samples to test whether they generalise beyond nonclinical populations.

7.4. Future Research Directions

There are several additional research studies that it would be beneficial to conduct as a means of increasing understanding of vulnerability to RNT. First, it would be useful to see if any of these findings can be replicated in clinical samples. Whilst there may not be an obvious theoretical reason as to why different processes may maintain RNT in depressed or anxious participants, it is unwise to assume that these findings would generalise to participants experiencing higher levels of psychopathological symptoms. As such, it would be useful to repeat these studies with participants who are currently depressed and/or anxious such that the hypotheses can be tested in clinical populations.

Second, it would be interesting to repeat a version of Study 4 with appropriate modifications such that the task used to prompt engagement in RNT elicited more worrisome thoughts, rather than ruminative thoughts. Whilst the study measured state RNT after manipulating appraisals about the helpfulness of RNT, the task used to prompt RNT – the insolvable anagram task – is arguably more likely to elicit thoughts with ruminative content, rather than worrisome content. Specifically, whilst rumination and worry share common processes, the content can differ (Ehring & Watkins, 2008), and in this case, the anagram task arguably makes people focus on content more typical of rumination (i.e., dwelling on past performance, and the experience of failing the task). As such, it would be useful to repeat the experiment with an alternative task to see whether the results are maintained when a task used to elicit worry is used instead. It would be important to select a task that is likely to afford the opportunity for worry, without explicitly instructing people to worry. Standard worry induction tasks, such as the task developed by McLaughlin et al. (2007), generally involve participants being asked to list their most worrisome topics, and then they are instructed to select the most worrisome topic and close their eyes and worry as intensely as possible for a period of five minutes. This sort of task would not be appropriate as it involves instructed worry: It is not possible to instruct people to worry/ruminate in a task designed to examine the effects of a manipulation on naturally-occurring worry/rumination.

One possibility of a task to elicit worry that has been successfully used in other studies is a speech preparation task, where participants are asked to prepare for delivering a speech on a difficult topic, which will be video recorded. For example, Phillips and Giancola (2008) told participants that their "thinking style" would be assessed by examining the way they prepared and delivered a speech to camera. The

topic of the speech concerned body image, and participants were told that they would have 6 minutes to prepare for a 3-minute speech discussing the things that they liked and disliked about their bodies whilst standing directly in front of a video camera (unbeknownst to participants, they never actually have to deliver the speech). Such a speech performance task, albeit with varying topics for the speech itself, has been used successfully to elicit anxiety and worrisome thoughts in numerous studies (e.g., Kirschbaum, Pirke, & Hellhammer, 1993; Sayette, Martin, Perrott, Wertz, & Hufford, 2001; Ullrich, Lutgendorf, & Kreder, 2007). This task may be more likely to elicit worry because it focuses on a future threat, which is more typical of the content of worrisome thoughts.

Third, to test the hypothesis that manipulating positive metacognitive beliefs can impact trait as well as state RNT, it would be beneficial to conduct a study that moved from a single-session manipulation of beliefs, to repeated, longer-term manipulation of beliefs, such that the effect on trait RNT could be examined. The manipulation delivered in Study 4 was not designed to manipulate long-term appraisals of RNT, and as such, it would be interesting to examine the effects of alternative manipulations of appraisals over a longer time period to explore the effects on trait RNT. Given the previous theoretical and empirical work, it is predicted that longer-term modification of metacognitive beliefs would influence engagement in trait RNT.

To explore the longer-term impact of modifying positive metacognitive beliefs, participants selected on the basis of reporting high levels of positive metacognitive beliefs about RNT could receive regular therapeutic information (e.g., through a computerised therapeutic programme to be completed weekly over a period of 6-8 weeks) that either contains information that is designed to challenge and reduce these

beliefs in addition to other therapeutic materials, or a programme that does not contain any information challenging metacognitive beliefs but contains otherwise identical materials. By regularly measuring engagement in RNT, this trial design would help to elucidate whether longer-term manipulation of beliefs about RNT have any impact on trait RNT beyond a brief experimental setting.

Fourth, to further test the hypothesis that positive metacognitive beliefs about RT result in increased RNT, it would be useful to repeat a version of Study 4 with the addition of a control condition in which metacognitive beliefs are not manipulated. Study 4 did not have a control condition, and instead compared a manipulation of RNT-as-Helpful with a manipulation of RNT-as-Unhelpful (i.e., there was no condition in which participants were not exposed to any information about the helpfulness or unhelpfulness or RNT). The use of a control condition would allow for examination of what the "default" response would be in the absence of any manipulation. A possible control condition might involve making participants simply describe a past problem in factual terms (e.g., "How long ago did this problem occur?", "Who else was involved in the problem?"), so that the conditions are matched for thinking about a resolved problem. Using a control condition would be informative is it would allow conclusions to be drawn about the nature of the effects arising from the manipulation (i.e., Does the RNT-as-Helpful manipulation lead to increases in RNT, relative to the control condition? Or does the RNT-as-Unhelpful condition lead to decreases in RNT, relative to the control? Or are both of these effects observed?).

Considering the RNT-as-Helpful condition, it would be predicted that state RNT would increase for participants in this condition, relative to the control condition. Considering the RNT-as-Unhelpful condition, it is less easy to make a single

prediction based on existing theoretical accounts: The metacognitive model of rumination (Papageorgiou & Wells, 2003) proposes that whilst negative metacognitive beliefs do not directly influence rumination (unlike positive metacognitive beliefs, which initiate rumination), they are hypothesised to influence depressive symptoms. Negative metacognitive beliefs (e.g., "It's impossible not to ruminate") are hypothesised to maintain the positive beliefs, which relate to the need to ruminate to help cope with difficulties. On the other hand, the metacognitive model of worry (Wells, 1995) predicts that specific negative metacognitive beliefs contribute to increased engagement in worry, but this is only for specific negative metacognitive beliefs (i.e., the belief that worry is uncontrollable). As such, the RNT-as-Unhelpful condition may lead to increased state RNT if participants specifically consider the belief that RNT is uncontrollable in the manipulation task, but otherwise, it is less clear how this condition may influence state RNT.

Fifth, one limitation of Study 5 was that it involved examining the consequences of a manipulation of rumination, rather than RNT, and as such, it is necessary to test the generalisability of these findings to worry. As such, it would be beneficial to repeat a version of Study 5 with appropriate modifications such that it manipulates worry relative to a non-worrisome form of thinking, and measures a range of potential outcomes of worry that could be reinforcing the worry process. For example, considering potential functions for worry (Borkovec, 1994), the study could examine whether relative to an alternative, non-worrisome form of thinking, worry does actually make people feel more motivated to address difficulties, or whether it does actually confer a better sense of feeling prepared for upcoming negative events. This sort of study would help to reveal factors that may maintain worrisome thinking.

Considering the differences between rumination and worry in content (Ehring & Watkins, 2008), with worry generally concerning future threatening events, it would be necessary to develop a task that might motivate people to engage in worry. One possibility is that participation could be restricted to final-year undergraduate students who have not yet secured their plans for after graduation (i.e., they do not have a job offer or a place on a further course of study), with the cover story of the experiment being that the study is designed to investigate personal thoughts and feelings about the future after university. The "worrisome situation" would then involve participants focusing on this future uncertainty and potential negative future outcomes. Keeping the interview structure of the experiment the same as Study 5, half of the participants could be assigned to the "concrete thinking" condition, in which they think in detail in a non-worrisome manner about how to prepare for dealing with the future after university (e.g., "What are some of the exact steps you need to take in order to find a suitable job?"). The other participants could be assigned to the "worrisome thinking" condition in which they are manipulated to think in a worrisome manner about the same topic (e.g., "What could happen if you are not able to secure a job or place on a course after you graduate?"). The outcomes to be measured could be modified from Study 5 such that they reflect the possible outcomes of worry as outlined by Borkovec (1994). For instance, a measure could be developed to tap into feeling motivated to address difficulties (e.g., "Right now, I feel motivated to do something to improve my future prospects") and feeling prepared for upcoming negative events (e.g., "Right now, I feel prepared for what could happen in the future").

Sixth, a key study following on from Study 5 would involve testing the hypothesis that rumination may be maintained by outcomes that are perceived to be

beneficial. Specifically, Study 5 demonstrated that whilst rumination led to increased justification for avoidance, it did not test whether this avoidance was reinforcing the rumination. As such, further studies could test whether outcomes of rumination that may be perceived as beneficial actually lead to increased engagement in rumination, thus directly examining the hypothesis relating to reinforcement (Nolen-Hoeksema et al., 2008).

A possible study to test whether the outcomes of rumination actually reinforce rumination could involve experimentally manipulating potential outcomes of rumination and then measuring the subsequent effects on state rumination. For example, participants could be asked to complete a difficult and emotionally arousing task (e.g., difficult anagrams), and then they could be instructed to ruminate about the task to try and understand what happened. After this, participants could then be either randomly exposed to a harder (more aversive, condition A) or easier (less aversive, condition B) version of the same task, which are identical in presentation to participants, and the impact of this task could be examined on a subsequent period of naturally-occurring rumination. This design thus ensures that the experience of participants in condition B is that ruminating about the task leads to better performance the second time (i.e., potentially reinforcing the rumination), whereas in condition A, ruminating about the task does not lead to better performance. If the hypothesis that positive outcomes of rumination increase rumination is correct, then rumination post-task will be greater in condition B than condition A.

Seventh, to further explore the relationships between abstract processing, RNT, and neuroticism, it is necessary to test the possible bi-directional relationship that may exist between neuroticism and abstract processing (see Section 7.2.3). To test the prediction that abstract processing influences neuroticism, a study might involve

examining whether repeated concreteness training (Watkins, Mullan, et al., 2011; Watkins et al., 2012), which has been demonstrated to reduce abstract processing and reduce symptoms of depression, also has an impact over time on self-reported trait neuroticism and/or neurotic responding as assessed by experience sampling methods (e.g., Jacobs et al., 2011).

To test the prediction that neuroticism influences abstract processing, a study adopting a quasi-experimental design could test to see if trait neuroticism impacts the shift in processing mode found to mood inductions in a similar way to depression, by adapting the study by Watkins, Moberly, et al. (2011), in which currently-depressed participants were impaired at shifting level of construal (abstract versus concrete) in response to changes in mood. If neuroticism influences abstract processing, it is predicted that participants selected on the basis of being high on trait neuroticism would show impairments at shifting level of construal relative to participants low on trait neuroticism.

Adopting the method used in the Watkins, Moberly, et al. (2011) study to assess how neuroticism influences abstract processing would also resolve the issue noted in Study 1 and Study 2, concerning the measurement of abstract processing. Watkins, Moberly, et al. (2011) used the Behavioural Identification Form (BIF; Vallacher & Wegner, 1989) to assess processing style. This measure involves participants being provided with a form containing a wide range of behaviours (e.g., "eating"), and they then select the description, out of a choice of two, that they believe best matches the behaviour. Processing style is assessed by examining whether an abstract (e.g., "getting nutrition") or a concrete (e.g., "chewing and swallowing") description is selected. The advantage of this measure of abstract processing over the Problem Elaboration Questionnaire (PEQ; Stöber & Borkovec, 2002) is that it

assesses processing style in a broader range of contexts (rather than just with reference to two specific problems), and thus it may be a more suitable measure of the broader tendency towards abstract processing.

Finally, in order to learn more about factors associated with onset of RNT, it would be highly beneficial to conduct a prospective longitudinal study with children and adolescents, such that it is possible to identify vulnerability factors directly associated with the onset of RNT at that early age. It would be beneficial to measure the full range of factors identified in Study 1, in addition to including measures of intolerance of uncertainty and cognitive control, and follow up children from before the period that trait RNT seems to emerge (from approximately age 8 years old) until mid- to late-adolescence, to see which factors predict initial onset of trait RNT, and which factors contribute to its maintenance. There are several advantages to this sort of study. First, adopting a prospective approach would reduce problems associated with retrospective adult report of childhood events, and it would also afford clear identification of when and how particular vulnerability factors emerge and contribute towards RNT. Second, using a prospective design which involves the researcher meeting face-to-face with child and adolescent participants and their parents allows for alternative measurements of key constructs, as one of the weaknesses of Study 1 and Study 2 was their reliance on self-report measures. In a longitudinal study with children, a range of methods to measure constructs could be used. For instance, rather than relying on retrospective reports of overcontrolling parenting, parenting behaviours could be assessed by observing parent-child interactions (e.g., Nolen-Hoeksema et al., 1995). Cognitive control and inhibitory abilities could be assessed using computer-based cognitive tasks. Symptoms of depression and anxiety could be assessed with clinician-administered interviews, which could also complement parent-

and child-report of symptoms. It is predicted that factors such as overcontrolling parenting and maltreatment would predict initial onset of RNT, but that these factors would not contribute towards longer-term maintenance of RNT. Instead, intrapersonal cognitive and personality factors, such as beliefs about the function of RT and neuroticism, are predicted to contribute more towards the maintenance of RNT during adolescence.

7.5. Final Summary and Conclusions

Taking the findings of these studies together, four key concluding points can be made. First, the construct of RNT seems to be a valid way of conceptualising rumination and worry. Future studies would benefit from looking at the broader transdiagnostic process in addition to examining specific iterations of RNT. The transdiagnostic perspective affords more parsimonious theoretical accounts and empirical investigations, contributes to knowledge that can benefit identification of individuals at risk for psychopathology, and affords more efficient treatment and prevention interventions by targeting fundamental process rather than disorder-specific processes in individuals who may have multiple comorbid diagnoses.

Second, it appears that distal vulnerability factors (abuse and parenting) may be less important than proximal factors in maintaining RNT in adulthood. As such, whilst prevention and therapeutic intervention may be targeted towards young people at risk for RNT as a result of these vulnerability factors, it is perhaps less useful to focus therapeutically on these factors in adults who have already developed a tendency towards RNT. As such, it may be of greater clinical utility to focus on more proximal mechanisms, such as beliefs about the function of RT, which are more tractable to therapeutic change. However, it is important to note that the pattern of

findings relating to proximal and distal predictors of RNT would need to be replicated in a clinical sample.

Third, experimental evidence reveals that the specific belief that RT aids instrumental understanding causally influences engagement in RNT. In addition to providing causal evidence in support of metacognitive accounts of RNT, this finding has potential clinical utility in the sense that it suggests that modifying favourable beliefs about RNT may assist in disrupting the maintenance of RNT when faced with difficulties. However, this finding would need to be replicated in clinical samples, and further studies would need to be conducted to examine the longevity of the effect on RNT after appraisals of RNT are manipulated.

Finally, rather than just considering the aetiology of rumination and worry, it is important to consider the factors that keep people ruminating and worrying once they have already started. The findings from this thesis suggest that avoidant functions may keep people engaged in RNT, but as outlined previously, further studies are required to test whether avoidance reinforces rumination.

In conclusion, this thesis contributes towards a better understanding of rumination and worry, two common processes associated with the development and maintenance of various psychological disorders, by exploring through correlational, prospective, and experimental means, the factors that may maintain and exacerbate this sort of repetitive negative thinking. Continuing this work by means of further prospective and experimental studies would help to further develop knowledge of the important transdiagnostic process of RNT, a better understanding of which can improve treatment and prevention interventions for people currently experiencing, or at risk of experiencing, mental health problems.

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Appendix 1: Declaration of Candidate's Contribution to Co-Authored Papers

Chapter 2

The candidate designed the study, obtained ethical approval, collected and analysed the data, and wrote the paper with supervisory support from Prof. Edward Watkins and Dr. Heather O'Mahen.

Chapter 3

The candidate designed the study, obtained ethical approval, collected and analysed the data, and wrote the paper with supervisory support from Prof. Edward Watkins and Dr. Heather O'Mahen.

Chapter 5

The candidate designed the study, obtained ethical approval, collected and analysed the data, and wrote the paper with supervisory support from Prof. Edward Watkins.

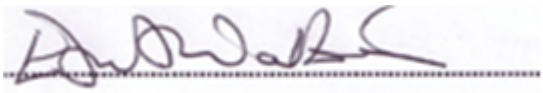
Chapter 6

The candidate designed the study, obtained ethical approval, collected and analysed the data, and wrote the paper with supervisory support from Prof. Edward Watkins. Prof. Edward Warkins and Prof. Susan Nolen-Hoeksema contributed to the development of the study design.

Supervisor's Declaration

The undersigned certifies that:

1. The above declarations correctly reflect the nature and extent of the candidate's contribution to the work, and the nature of the contribution of each of the co-authors.
2. The candidate meets the criteria for first author on each paper in that they have participated in the conception, execution, and interpretation of the manuscript.
3. There are no other authors of the publications according to these criteria.
4. There were no conflicts of interest.

Signed:  Date: 30th October 2013

Professor Edward Watkins

Appendix 2: Participant Information Sheets and Consent Forms

Study 1 and Study 2

Understanding Worry and Rumination Study

Principal Investigator: Rosie Kingston, PhD Student
Address: Mood Disorders Centre, University of Exeter, School of Psychology, Washington Singer Laboratories, Perry Road, Exeter, EX4 4QG
E-mail: refk201@exeter.ac.uk
Tel: (01392) 724003
Supervisors: Prof. Edward Watkins (e.r.watkins@exeter.ac.uk)
Dr. Heather O'Mahen (h.o'mahen@exeter.ac.uk)

Purpose of this study

The purpose of this study is to examine individual differences in the tendency for people to engage in negative repetitive thought, such as worry and rumination.

Worry is the tendency to repetitively think about problems and possible risks and threats, wondering about what could go wrong. Rumination is repetitive thinking focused on self, mood, and difficulties, and about the meanings and implications of self, mood, and difficulties.

We know that there are large individual differences in the tendency to worry and ruminate, such that some people are prone to high levels of worry and rumination, whereas other people hardly worry or ruminate at all. Moreover, previous research indicates that excessive rumination and worry contribute to the development of depression and anxiety. Thus, understanding what might influence individual differences in rumination and worry may lead to developments in psychological treatments which can help prevent mental health problems associated with these forms of thought. Therefore, this research will explore a range of factors that have been proposed to explain individual differences in the tendency to worry and ruminate.

Procedure

Participating in this study will require the completion of a series of online questionnaires on two separate occasions: one initial series of questionnaires, and then a shorter series of follow-up questionnaires, to be completed 6 – 8 weeks later.

In part one of the study, you will be asked to complete a series of questionnaires which will assess the following:

- Your current mood
- Your tendency to engage in rumination and worry

- Your current levels of stress
- Problems or issues you are currently worrying about
- Whether you experienced any physical, emotional and sexual abuse before the age of 16
- Your relationship with your parents when you were younger
- Aspects of your personality
- How you prefer to describe certain emotional situations
- Brief demographic and contact details (e.g., age, occupation, gender, and e-mail address)

Each of these questionnaires assesses different factors that have been considered to influence worry and rumination – we will investigate how these factors are correlated with worry and rumination concurrently at the first occasion, and then investigate which of these factors predict worry and rumination 6 - 8 weeks later at the second occasion of assessment.

It is important to note that these questionnaires will be kept private and confidential and will be recorded and saved in a database that is anonymised (i.e., no e-mail addresses will be linked to the questionnaire scores – instead an identification code will be used). The only people to have access to this information will be the principal investigator and her supervisors.

It is also important to note that these questionnaires are designed to capture a wide range of human experience – for most people, only some of the items will be relevant. Nonetheless, it is still very useful to have your responses to all items even if it is to report "not present" on the questionnaires.

In part two of the study, which will take place 6 - 8 weeks after the first set of questionnaires, you will be asked to complete a much shorter series of questionnaires, repeating some of the measures you completed previously. You will be asked questions on the following topics:

- Your mood, and your tendency to engage in rumination and worry
- Your current levels of stress

To take part in the first part of this study, after reading the information and giving your informed consent, you can answer the questionnaires online by following the link at the bottom of this page. For the second part of the study, you will receive an e-mail invitation approximately 6 – 8 weeks after you participate in part one of the study. The e-mail will contain a web link, which you can follow to complete the second set of questionnaires online.

The first series of questionnaires will take approximately 45 - 55 minutes to complete. The second series of questionnaires will take approximately 15 - 20 minutes to complete.

Remuneration

Part One: All participants completing part one of the study will be entered into a prize draw, where a winner will be randomly selected to win an Amazon.co.uk voucher worth £75.

Part Two: All participants completing part two, the follow-up questionnaires, will be entered into a prize draw, where winners will be randomly selected to win an Amazon.co.uk voucher worth £125. All participants who complete both parts of the study will be entered into both prize draws. Prize winners will receive their vouchers via e-mail.
Course credits: Undergraduate students studying for the Psychology BA/BSc at the University of Exeter can also receive course credits for the PSY1206 module for their participation, as well as being entered into the above prize draw. For completion of part one, students can receive 1 course credit. For completion of part two, students can receive 0.5 course credits. After participating in each part of the study, please e-mail Rosie Kingston (refk201@exeter.ac.uk), if you are an undergraduate student at Exeter and wish to receive course credits for your participation in this study.

Potential risks and ethical considerations
We note that there some of the questionnaires ask about personal information, negative moods and past upsetting events relating to childhood experiences and abuse, and there is a chance that some participants may find reporting on these experiences upsetting. You do not have to respond to questions which you do not feel comfortable answering, and if at any point you do not wish to continue, you can stop answering the questions at any time. We note that the questionnaires will ask you to report on whether or not particular types of difficult events occurred, but will not ask you to provide specific details, or explore the events in depth. The following link provides some sources of support should you require help with any of the issues that this study may raise: [see Sources of Help document]. Should you need any further assistance, please contact the principal investigator, Rosie Kingston (refk201@exeter.ac.uk), or her supervisors, who are qualified clinical psychologists, for further advice and guidance.

One of the questionnaires is designed to measure symptoms of depression. A high score on this questionnaire may indicate that you are currently experiencing clinical depression. If you score highly on this questionnaire, or if you report a high level of suicidal thinking, the principal investigator will send you an e-mail with some more information about depression, and about where to seek help. The aim of the e-mail is to provide you with some information and resources that you may find helpful, should you not already be managing or seeking help for your symptoms. This does not affect your participation in this study in any way, and if you receive this e-mail, you may proceed to participate in the second part of the study as described above.

Confidentiality
The information that you give in response to the questionnaires will be kept strictly confidential, except as may be required by law or the ethical professional guidelines that govern psychologists. Your responses to the questionnaires will not be personally identifiable; all information will be identified by an identification code, and not your name or e-mail address. Your e-mail address is required for prize draw entry, and to link your response data from part one and part two of the study. Your e-mail address will be stored separately from the questionnaire response data. This, and any

other personally identifying information, will never be associated with any research publications that report the results of the questionnaires. Should you request it, your data will be destroyed at any time.

Withdrawal

Your participation in this study is entirely voluntary, and you may withdraw your consent to participate in this study at any time.

Invitation to ask further questions

If you have any questions about this study, or are unsure about any aspect of the information presented here, please contact the investigator, Rosie Kingston (refk201@exeter.ac.uk). You should ask any questions you have concerning this research before you give your consent to participate in this study.

Consent

Please check the following boxes to indicate your agreement with the statements and your giving of informed consent to participate in this research study.

☐ I confirm that I am at least 18 years old.

☐ I confirm that I have read and understood the information presented to me about this study, and have received answers to any questions I asked.

☐ I understand that my participation is voluntary, and that I am free to withdraw from the study at any time, without giving any reason.

☐ I give my consent to take part in this research study, which involves completing questionnaires online on two occasions separated by 6 - 8 weeks.

Study 3

Study Information Sheet: Investigating Personality and Thinking Styles

Purpose of Study

This experiment is designed to investigate various aspects of your personality. Specifically, we will look at the way you respond to problems, and how easily those ways of responding come to mind. Also, we will get you to think about your personality, and the particular characteristics you find desirable or undesirable. You will also do a simple breathing and thought sampling exercise between the tasks, to assess what was on your mind during the experiment, and to see if the effect of one task carries on to another.

Procedure

There are a few different tasks that you will be asked to do during the experiment. To start, you will be asked to do a simple breathing exercise. Then, you will be asked to call to mind three different situations when you have repetitively thought about or dwelled on a problem, and you'll be asked to fill in a questionnaire which examines the way in which you thought about the problem and the effect it had on you. Before moving on to the next task, you'll complete the breathing exercise for a second time. Then, you'll be asked to fill in a questionnaire that asks you to think about your personality, and the personality characteristics that you find desirable or undesirable. You will then complete the breathing exercise for a third time. The session will finish with you being given a final pack of questionnaires to complete, before being debriefed. The whole session will last approximately 40 minutes.

Remuneration

Participants will receive a single payment of £5 (subject to funding availability) or 1.5 course credits for PSY1206 for their participation in this study. At the end of the experiment, you will be asked whether you wish to receive payment or course credit.

Potential Risks and Ethical Considerations

The main risk associated with participation in this study is possible discomfort when answering some personal questions. No other risks are known to the investigators at this time.

Confidentiality

The information you give in this study will be kept strictly confidential, except as may be required by law or the ethical professional guidelines that govern psychologists (e.g., if something is revealed that suggests that you are at significant risk of harm to yourself or others, in which case information may be disclosed to a doctor or another professional, but normally only after discussion with you). No-one outside of the research team immediately involved with this specific research study will see or have access to any of the data you provide in this study. All personally identifying information will be deleted from questionnaires

prior to any analysis, and will never be associated with any research publications or presentations that report the results of this study. Should you wish it, you can request that the data you provide (i.e., questionnaires and/or audio tapes) be destroyed at any time.

Withdrawal

Your participation in this research study is entirely voluntary, and you may withdraw your consent to participate at any time. You do not need to provide any explanation if you do not wish to continue with the study.

Invitation to Ask Further Questions

If you have any questions relating to any aspect of this study, or if you find any part of this information unclear, please ask the experimenter for clarification now.

Consent

If you wish to take part in this study, please inform the experimenter, who will provide you with a Consent Form to sign. If you have any questions about the study, please make sure to ask them before signing this form. Even if you sign the consent form, you remain free to withdraw from the study at any time.

Thank you for reading this information sheet.

Consent Form

Study Title: Investigating Personality and Thinking Styles

Name of Researchers: Rosemary Kingston, PhD student, supervised by Prof. Ed Watkins and Dr. Heather O'Mahen

Please tick the box if you agree with the statement:

1. I have read and understood the study information sheet, and have had the opportunity to ask questions.	☐
2. I understand that my participation is voluntary, and that I am free to withdraw from the experiment at any time, without giving a reason.	☐
3. I give my informed consent to participate in this study.	☐

Participant name (please print): _____

Participant signature: _____ **Date**:_____

Experimenter name: _____ **Date**: _____

If you would be willing to be contacted about participating in other research studies that are being conducted in the Mood Disorders Centre at the University of Exeter, please write your e-mail address below. If you would prefer not to be contacted, please leave this section blank.

E-mail address: _____

Study 4

Study Information Sheet: Cognitive Abilities and Thinking Styles

Purpose of Study

This study is designed to investigate various aspects of your personality, specifically, the way you respond to problems, and how easily those ways of responding come to mind; and how these might be linked to some specific cognitive abilities. You will also do a simple breathing and thought sampling exercise between the tasks, just to assess what was on your mind during the experiment, and to see if the effect of one task carries on to another.

Procedure

There are a few different tasks that you will be asked to do during the experiment. To start, you will be asked to do a simple breathing exercise. Then, you will be asked to call to mind two different situations when you have repetitively thought about or dwelled on a problem, and the experimenter will ask some questions that examine the way you thought about the problem and the effect it had on you, and you'll be asked to speak your answers aloud (if you consent to this, this section will be audio-recorded). Before moving on to the next task, you'll complete the breathing exercise for a second time. Then, you'll be asked to complete a short cognitive task, which involves unscrambling anagrams to make real words as quickly and accurately as possible. You will then complete the breathing exercise for a third time. The session will finish with you being given a final pack of questionnaires to complete, before being debriefed. The whole session will last approximately 60 – 70 minutes.

Remuneration

Participants will receive a single payment of £5 or 1.5 course credits for PSY1206 for their participation in this study.

Potential Risks and Ethical Considerations

The main risk associated with participation in this study is possible discomfort when answering some personal questions. No other risks are known to the investigators at this time.

Confidentiality

The information you give in this study will be kept strictly confidential, except as may be required by law or the ethical professional guidelines that govern psychologists (e.g., if something is revealed that suggests that you are at significant risk of harm to yourself or others, in which case information may be disclosed to a doctor or another professional, but normally only after discussion with you). No-one outside of the research team immediately involved with this specific research study will see or have access to any of the data you provide in this study. All personally identifying information will be deleted from questionnaires prior to any analysis, and will never be associated with any research publications or

presentations that report the results of this study. Should you wish it, you can request that the data you provide (i.e., questionnaires and/or audio recordings) be destroyed at any time.

Withdrawal

Your participation in this research study is entirely voluntary, and you may withdraw your consent to participate at any time. You do not need to provide any explanation if you do not wish to continue with the study.

Invitation to Ask Further Questions

If you have any questions relating to any aspect of this study, or if you find any part of this information unclear, please ask the experimenter for clarification now.

Consent

If you wish to take part in this study, please inform the experimenter, who will provide you with a Consent Form to sign. If you have any questions about the study, please make sure to ask them before signing this form. Even if you sign the consent form, you remain free to withdraw from the study at any time.

Thank you for reading this information sheet.

Consent Form

Study Title: Cognitive Abilities and Thinking Styles

Name of Researchers: Rosemary Kingston, PhD student, supervised by Prof. Ed Watkins and Dr. Heather O'Mahen

Please tick the box if you agree with the statement:

1. I have read and understood the study information sheet, and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary, and that I am free to withdraw from the experiment at any time, without giving a reason. ☐
3. I give consent to have my verbal responses to questions from the researcher about times when I have repeatedly thought about problems audio-recorded for further analysis. ☐
4. I give my informed consent to participate in this study. ☐

Participant name (please print): _____

Participant signature: _____ **Date**: _____

Experimenter name: _____ **Date**: _____

If you would be willing to be contacted about participating in other research studies that are being conducted in the Mood Disorders Centre at the University of Exeter, please write your e-mail address below. If you would prefer not to be contacted, please leave this section blank.

E-mail address: _____

Study 5

Study Information Sheet: Assertiveness and Thinking Styles

Purpose of Study

The purpose of this study is to explore the factors which make it easy or hard for individuals to be assertive with people they are close to, when faced with particular problems or concerns. Specifically, the study will examine whether certain ways of thinking about problems or concerns can help people to find it easier to put assertiveness into action.

Procedure

There are a few different tasks which you will be asked to do during the experiment. To start, you will be asked to fill in some questionnaires about yourself, to get an idea of how you are currently feeling, and the sort of person that you are. You will then be asked to identify a current personal issue which you'd like to be assertive about. You will be given some questionnaires which explore this concern in more detail, and then you'll be asked to take part in a short exercise, where you will spend a few moments thinking through the assertiveness issue. Next, you'll be asked to think about being assertive – with the experimenter prompting you with a series of questions to help you think about the issue in a certain way, which are intended to help you become more assertive. This discussion will be recorded on a digital audio recorder. The session will finish with you being given a final pack of questionnaires to complete. The whole session will last approximately 45 minutes.

Two weeks after the initial session, the experimenter will contact you via e-mail, inviting you to complete a very brief electronic questionnaire (less than 5 minutes), to see if you were able to take any action with the assertiveness issue, and talk to the other person about your concern. You are under no obligation to do anything or take any action relating to the issue you identified in the initial session; this brief questionnaire is simply to identify whether or not participating in the session today has any effect on your future assertiveness.

Remuneration

Participants will receive a single payment of £5 or 1 course credit for PSY1206 for their participation in this study. At the end of the experiment, you will be asked whether you wish to receive payment or course credit.

Potential Risks and Ethical Considerations

The main risk associated with participation in this study is possible discomfort when answering some personal questions during the questionnaires or interview. It is possible that some participants may feel anxious or uncomfortable when thinking about confronting the assertiveness issue. No other risks are known to the investigators at this time.

Confidentiality

The information you give in this study will be kept strictly confidential, except as may be required by law or the ethical professional guidelines that govern psychologists (e.g., if something is revealed that suggests that you are at significant risk of harm to yourself or others, in which case information may be disclosed to a doctor or another professional, but normally only after discussion with you). No-one outside of the research team immediately involved with this specific research study will see or have access to any of the data you provide in this study. All personally identifying information will be deleted from audio tapes and questionnaires prior to any analysis, and will never be associated with any research publications or presentations that report the results of this study. Audio recordings of the brief interview will only be heard by the experimenter and the immediate team directly involved in this research to assist in analysing information for the purposes of the study. Furthermore, the audio recordings will be used solely for the purposes above, in accordance with the ethical standards of confidentiality that govern psychologists. The audio recordings will be destroyed within two years of completion of the study. Should you wish it, you can request that the data you provide (i.e., questionnaires and/or audio tapes) be destroyed at any time.

Withdrawal

Your participation in this research study is entirely voluntary, and you may withdraw your consent to participate at any time. You do not need to provide any explanation if you do not wish to continue with the study.

Invitation to Ask Further Questions

If you have any questions relating to any aspect of this study, or if you find any part of this information unclear, please ask the experimenter for clarification now.

Consent

If you wish to take part in this study, please inform the experimenter, who will provide you with a Consent Form to sign. If you have any questions about the study, please make sure to ask them before signing this form. Even if you sign the consent form, you remain free to withdraw from the study at any time.

Thank you for reading this information sheet.

Consent Form

Study Title: Assertiveness and Thinking Styles

Name of Researchers: Rosemary Kingston, PhD student, supervised by Prof. Ed Watkins and Dr. Heather O'Mahen

Please tick the box if you agree with the statement:

1. I have read and understood the study information sheet, and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary, and that I am free to withdraw from the experiment at any time, without giving a reason. ☐
3. I understand that this study involves me talking to the researcher about an assertivness issue that I have not yet resolved with the person or people it concerns. ☐
4. I give consent to have my verbal responses to questions from the researcher about being assertive audio-recorded for further analysis. ☐
5. I give my informed consent to participate in this study. ☐

Participant name (please print): _____

Participant signature: _____ **Date**: _____

Experimenter name: _____ Date: _____

If you would be willing to be contacted about participating in other research studies that are being conducted in the Mood Disorders Centre at the University of Exeter, please write your e-mail address below. If you would prefer not to be contacted, please leave this section blank.

E-mail address: _____

Appendix 3: Supplementary Ethical Protocols

Some of the studies reported in this thesis involved the potential risk of participants becoming distressed whilst participating. As such, some specific ethical protocols were developed for these studies, which are outlined as follows.

Study 1 and Study 2

Study 1/Study 2 involved the risk of participant distress relating to the completion of self-report measures exploring highly personal issues, specifically, depression and the experience of childhood abuse. As such, a thorough and carefully conceived protocol was developed and ethically approved for dealing with the report of moderate/severe symptoms of depression, the report of thoughts of suicide or self-harm, and/or the report of physical or sexual abuse in childhood.

If reporting moderate/severe symptoms of depression (BDI-II score >= 20) and/or suicidal thoughts or thoughts of self-harm (scoring 2 or 3 on item 9 on the BDI-II), an e-mail was sent (see Figure 8.1). The text was modified to reflect whether the participant reported a high BDI score, suicidal/self-harm thoughts, or both high BDI score and suicidal/self-harm thoughts. A PDF file was also attached to the e-mail, which was an electronic copy of a leaflet produced by the Royal College of Psychiatrists, which contained more information about depression and seeking help.

Hello,

You are receiving this e-mail because you recently participated in a research study, where you completed a series of online questionnaires designed to investigate individual differences in worry and rumination. Thank you very much for your participation.

The reason I am contacting you again is because on one of the questionnaires, the Beck Depression Inventory, you scored above a particular threshold score, indicating that you may currently be experiencing a high level of symptoms of depression

and/or that you may currently be experiencing a high level of thoughts about suicide or self-harm.

You may not be interested in receiving any information about depression, or you may already be managing or seeking help for your symptoms. Alternatively, what you reported in the questionnaires may have resolved itself since you completed the questionnaires, or the questionnaires may have exaggerated how distressed you were feeling (which can sometimes happen since questionnaires only have limited response options). If any of the above is the case, please feel free to disregard this e-mail. This does not affect your participation in this study in any way – if you wish to participate in part two of the study, please follow the link in the follow-up e-mail you will receive at a later date.

However, if you are experiencing these difficulties and not currently receiving help, or if you are interested in receiving some more information about depression, you may find the following information helpful.

First of all, there is a PDF attached to this email that provides useful information on depression.

Second, if you are experiencing depression or suicidal thoughts, and you are currently not receiving any treatment, it is strongly recommended that you make an appointment with your GP to talk about how you are feeling and to consider treatment options. Your GP is there to support you and can either directly provide treatment (e.g., by prescribing medication, if that is appropriate and your choice), or can access other treatments (such as psychological therapy) for you.

Third, if you want immediate support or advice for any difficulties, we recommend you contact the following:

Samaritans
Samaritans provides confidential emotional support, 24 hours a day, for people who are experiencing feelings of distress or despair. Samaritans are there if you're worried about something, feel upset or confused, or just want to talk to someone.
Telephone (24 hours): 08457 90 90 90
E-mail: jo@samaritans.org
Website: http://www.samaritans.org
Address: Chris, P.O. Box 9090, Stirling, FK8 2SA

Depression Alliance
Depression Alliance is a charity which aims to assist people who are affected by depression. Depression Alliance offer information, a range of publications, self-help and support groups for people with depression.
Telephone (to request an information pack): 0845 123 23 20
E-mail: information@depressionalliance.org
Website: http://www.depressionalliance.org
Address: Depression Alliance, 20 Great Dover Street, London, SE1 4LX

SANEline
SANEline is a national out-of-hours telephone helpline, offering emotional support and information for people affected by mental health problems. They also offer e-mail support through SANEmail, their e-mail service.
Telephone (6pm – 11pm, daily): 0845 767 8000
E-mail: visit http://www.sane.org.uk/SANEmail
Website: http://www.sane.org.uk/SANEline
Address: 1st Floor Cityside House, 40 Adler Street, London E1 1EE

National Association for People Abused in Childhood (NAPAC)
NAPAC offers support for adult survivors of any form of childhood abuse, including sexual, physical and emotional abuse, and neglect. They offer support, advice and guidance via their national freephone support line, by e-mail, and in writing. They can also provide information about local support services.
Telephone (see website for current opening hours): 0800 085 3330
E-mail: info@napac.org.uk
Website: http://www.napac.org.uk
Address: NAPAC, 42 Curtain Road, London, EC2A 3NH

Fourth, if you have any specific questions or concerns, please contact me at refk201@exeter.ac.uk, and I or my supervisors, who are qualified and experienced clinical psychologists, will provide further advice and guidance.

Kind regards,
Rosie Kingston
Principal Investigator – Understanding Worry and Rumination Study

Figure 8.1. E-mail sent to participants reporting moderate/severe symptoms of depression and/or thoughts of suicide or self-harm.

For participants reporting particular abuse experiences on the Life Events Questionnaire, an alternative e-mail was sent (see Figure 8.2). Consideration was given as to which items or combinations of items should trigger the e-mail, since certain items could be endorsed without the participant intending to indicate that they had experienced abuse (e.g., reporting being hit or kicked could indicate an abusive incident, or it could indicate a less serious incident, for example, a minor fight with a sibling). As such, the e-mail was sent if any of the following conditions were met:

(i) Answering "yes" to any of the sexual abuse items (LEQ questions 39 - 64);

(ii) Answering "yes" to three or more of the following physical abuse items: Q29 "Did anyone ever throw or push you?"; Q31 "Were you ever hit hard with a fist, kicked, or slapped really hard?"; Q32 "Were you ever beaten up?"; Q33 "Did any adults ever hit you with an object?".

(iii) Answering "yes" to one or more of the following physical abuse items: Q28 "Did any of your caretakers fail to protect you from physical harm?"; Q30 "Did anyone ever lock you in a room or closet for several hours?"; Q34 "Did anyone ever try to choke, strangle or smother you?"; Q35 "Did anyone ever deliberately cause you serious physical pain?"; Q36 "Did anyone ever attack you with a weapon?"; Q37 "Were you ever tied up so you could not protect yourself from harm?; Q39 "Did a boyfriend/girlfriend/date ever hit, kick, shove or throw you?"

Hello,

You are receiving this e-mail because you recently participated in a research study, where you completed a series of online questionnaires designed to investigate individual differences in worry and rumination. Thank you very much for your participation.

The reason I am contacting you again is because on one of the questionnaires, the Life Events Questionnaire, you reported items that could indicate that you may have experienced physical and/or sexual abuse before you were 16 years old.
You may not be interested in receiving any information for adult survivors of abuse, or you may feel that you do not want or need any help or support. Alternatively, the questionnaires may have exaggerated the impact, frequency or severity of the incident that you reported (e.g., you may have reported that you had been hit, kicked or pushed, but this may have been by a sibling and you but do not feel as though this constitutes physical abuse). If this is the case, please feel free to disregard this e-mail. This does not affect your participation in this study in any way – if you wish to participate in part two of the study, please follow the link in the follow-up e-mail you will receive at a later date.

However, if you are experiencing any difficulty or distress following your experience, and you are not currently receiving help, or if you are interested in receiving more information for adults who were abused in childhood, you may find the following organisations helpful.

National Association for People Abused in Childhood (NAPAC)
NAPAC offers support for adult survivors of any form of childhood abuse, including sexual, physical and emotional abuse, and neglect. They offer support, advice and guidance via their national freephone support line, by e-mail, and in writing. They can also provide information about local support services.
Telephone (see website for current opening hours): 0800 085 3330
E-mail: info@napac.org.uk
Website: http://www.napac.org.uk
Address: NAPAC, 42 Curtain Road, London, EC2A 3NH

Help for Adult Victims of Child Abuse (HAVOCA)
HAVOCA is an organisation which aims to provide help, support and information for any adult who has experienced abuse in childhood. The website contains a large amount of information and resources, and also contains details of local support organisations.
Website: http://www.havoca.org/HAVOCA_home.htm

Samaritans
Samaritans provides confidential emotional support, 24 hours a day, for people who are experiencing feelings of distress or despair. Samaritans are there if you're worried about something, feel upset or confused, or just want to talk to someone.
Telephone (24 hours): 08457 90 90 90
E-mail: jo@samaritans.org
Website: http://www.samaritans.org
Address: Chris, P.O. Box 9090, Stirling, FK8 2SA

Finally, if you have any specific questions or concerns, please contact me at refk201@exeter.ac.uk, and I or my supervisors, who are qualified and experienced clinical psychologists, will provide further advice and guidance.

Kind regards,
Rosie Kingston
Principal Investigator – Understanding Worry and Rumination Study

Figure 8.2. E-mail sent to participants reporting certain childhood abuse or maltreatment experiences.

For participants reporting high levels of depression symptoms as well as abuse experiences, an e-mail was sent combining the messages displayed in Figure 8.1 and Figure 8.2. Participant responses were screened as quickly as possible after being submitted and all necessary e-mails were sent within 24 hours of the response being submitted. As such, using this e-mail sending procedure, I was able to respond in an ethically sensitive way to participant risk and report of distressing experiences.

Study 5

As Study 5 involved participants having to talk in detail about a current and unresolved interpersonal difficulty, a protocol was developed to deal with participant distress, or participant disclosure of risk to self or others. The protocol is displayed below.

To be triggered if the participant raises a very serious topic when asked to identify an assertiveness issue, or identifies an issue where they, or someone else, is at risk; or if participant becomes distressed during the session. Rough wording:

> "That sounds like a really difficult problem. Can I just ask if this is something you've sought help for/have you had any help for this?"

Whether yes or no:

> "It seems as though this topic might be difficult/upsetting to talk about. Are you happy to continue, or would you like us to stop the session now? Please let me know what you would prefer to do, there is no pressure to continue if you do not feel comfortable."

Experimenter to terminate the session immediately if participant does not wish to continue. If participant does wish to continue, experimenter may still discontinue the session if the participant appears distressed.

If participant disclosure relates to mental health problems (not including suicide risk), and they do not say that they have had any help with it, say something like: "I would strongly encourage you to make an appointment to speak with your GP about these feelings."

If participant disclosure relates to someone else harming them, and they do not say that they have any help with it, say something like: "Have you spoken to the police about this? If you have been harmed/are at risk of being harmed in the future, it is really important that you tell the police."

If participant discloses anything suggesting that they are having thoughts of suicide, enact MDC Risk Protocol.

If experimenter is seriously concerned about the welfare of the participant at any stage (i.e., they seem very distressed, and/or have not sought any help at all for a serious problem), whether or not they choose to continue with the session, say something like: "This sounds like a very serious issue and I am concerned for your wellbeing at this moment. I think it might be helpful for me to get my supervisor, because it's important to make sure you are receiving the right kind of support. I'm just going to telephone him now."

Experimenter also has copy of "Sources of Support" document, containing contact details for various support organisations, to give to participant if appropriate.

Appendix 4: Measures, Tasks, Interview Scripts, and Coding Protocols

Measures, tasks, interview scripts, and interview coding protocols that are non-copyright or that have been developed for this thesis will be reported in this appendix as follows.

Measures

Tasks

Interview Scripts

Interview Coding Protocols

RSQ-RRS

People think and do many different things when they feel down, sad or depressed. Please read each of the items below and indicate whether you never, sometimes, often, or always think or do each one when you feel down, sad or depressed. Please indicate what you *generally* do, not what you think you should do, by placing a tick in the appropriate box.

Almost Never	Sometimes	Often	Almost Always	
☐	☐	☐	☐	1. Think about how alone you feel.
☐	☐	☐	☐	2. Think "I won't be able to do my job/work because I feel so bad"
☐	☐	☐	☐	3. Think about your feelings of fatigue and achiness
☐	☐	☐	☐	4. Think about how hard it is to concentrate
☐	☐	☐	☐	5. Think about how passive and unmotivated you feel
☐	☐	☐	☐	6. Analyse recent events to try and understand why you are depressed.
☐	☐	☐	☐	7. Think about how you don't seem to feel anything anymore
☐	☐	☐	☐	8. Think "Why can't I get going?"
☐	☐	☐	☐	9. Think "Why do I always react this way?"
☐	☐	☐	☐	10. Go away by yourself and think about why you feel this way
☐	☐	☐	☐	11. Write down what you are thinking about and analyse it
☐	☐	☐	☐	12. Think about a recent situation, wishing it would have gone better
☐	☐	☐	☐	13. Think "Why do I have problems other people don't have?"
☐	☐	☐	☐	14. Think about how sad you feel
☐	☐	☐	☐	15. Think about all your shortcomings, failings, faults and mistakes

Almost Never	Sometimes	Often	Almost Always	
☐	☐	☐	☐	16. Think about how you don't feel up to doing anything
☐	☐	☐	☐	17. Analyse your personality to try and understand why you are depressed
☐	☐	☐	☐	18. Go someplace alone to think about your feelings
☐	☐	☐	☐	19. Think about how angry you are with yourself
☐	☐	☐	☐	20. Listen to sad music
☐	☐	☐	☐	21. Isolate yourself and think about the reasons why you feel sad
☐	☐	☐	☐	22. Try to understand yourself by focusing on your depressed mood
☐	☐	☐	☐	23. Think "What am I doing to deserve this?"
☐	☐	☐	☐	24. Think "I won't be able to concentrate if I keep feeling this way".
☐	☐	☐	☐	25. Think "Why can't I handle things better?"

PSWQ

Enter the number that best describes how typical or characteristic each item is of you, putting the number next to the item.

1	2	3	4	5
not at all typical		**somewhat typical**		**very typical**

_____ 1. If I don't have enough time to do everything, I don't worry about it.

_____ 2. My worries overwhelm me.

_____ 3. I don't tend to worry about things.

_____ 4. Many situations make me worry.

_____ 5. I know I shouldn't worry about things, but I just can't help it.

_____ 6. When I am under pressure I worry a lot.

_____ 7. I am always worrying about something.

_____ 8. I find it easy to dismiss worrisome thoughts.

_____ 9. As soon as I finish one task, I start to worry about everything else I have to do.

_____ 10. I never worry about anything.

_____ 11. When there is nothing more I can do about a concern, I don't worry about it anymore.

_____ 12. I've been a worrier all my life.

_____ 13. I notice that I have been worrying about things.

_____ 14. Once I start worrying, I can't stop.

_____ 15. I worry all the time.

_____ 16. I worry about projects until they are all done.

PHQ-9

Over the **last 2 weeks**, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself – or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

STAI-State

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate value to the right of the statement to indicate how you have been feeling during the last two weeks, including today. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

I feel calm	not at all	somewhat	moderately	very much
I feel secure	not at all	somewhat	moderately	very much
I am tense	not at all	somewhat	moderately	very much
I feel strained	not at all	somewhat	moderately	very much
I feel at ease	not at all	somewhat	moderately	very much
I feel upset	not at all	somewhat	moderately	very much
I am presently worrying about possible misfortunes	not at all	somewhat	moderately	very much
I feel satisfied	not at all	somewhat	moderately	very much
I feel frightened	not at all	somewhat	moderately	very much
I feel comfortable	not at all	somewhat	moderately	very much
I feel self-confident	not at all	somewhat	moderately	very much
I feel nervous	not at all	somewhat	moderately	very much
I am jittery	not at all	somewhat	moderately	very much
I feel indecisive	not at all	somewhat	moderately	very much
I am relaxed	not at all	somewhat	moderately	very much
I feel content	not at all	somewhat	moderately	very much
I am worried	not at all	somewhat	moderately	very much
I feel confused	not at all	somewhat	moderately	very much
I feel steady	not at all	somewhat	moderately	very much
I feel pleasant	not at all	somewhat	moderately	very much

PSS

The questions in this scale ask you about your feelings and thoughts **during the last month**. In each case, you will be asked to indicate by circling how often you felt or thought a certain way.

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly?	**0**	**1**	**2**	**3**	**4**
2. In the last month, how often have you felt that you were unable to control the important things in your life?	**0**	**1**	**2**	**3**	**4**
3. In the last month, how often have you felt nervous and "stressed"?	**0**	**1**	**2**	**3**	**4**
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	**0**	**1**	**2**	**3**	**4**
5. In the last month, how often have you felt things were going your way?	**0**	**1**	**2**	**3**	**4**
6. In the last month, how often have you found that you could not cope with all the things you had to do?	**0**	**1**	**2**	**3**	**4**
7. In the last month, how often have you been able to control irritations in your life?	**0**	**1**	**2**	**3**	**4**
8. In the last month, how often have you felt that you were on top of things?	**0**	**1**	**2**	**3**	**4**
9. In the last month, how often have you been angered because of things that were outside of your control?	**0**	**1**	**2**	**3**	**4**
10. In the last month, how often have you felt difficulties were piling up so high that you could not have overcome them?	**0**	**1**	**2**	**3**	**4**

CRBPI-30

Please read each statement on the following pages and circle the answer that most closely describes the way each of your parents acted toward you, before you were 16 years old.
If you think the statement describes a person who was **Not Like** your parent, circle **1**.
If you think the statement describes a person who was **Somewhat Like** your parent, circle **2**.
If you think the statement describes a person who was **A Lot Like** your parent, circle **3**.

MY MOTHER WAS A PERSON WHO …	**Not Like**	**Some-what Like**	**A Lot Like**
1. … made me feel better after talking over my worries with her.	1	2	3
2. … told me of all the things she had done for me.	1	2	3
3. … believed in having a lot of rules and sticking with them.	1	2	3
4. … smiled at me often.	1	2	3
5. … said, if I really cared for her, I would not do things that caused her to worry.	1	2	3
6. … insisted that I must do exactly as I was told.	1	2	3
7. … was able to make me feel better when I was upset.	1	2	3
8. … was always telling me how I should behave.	1	2	3
9. … was very strict with me.	1	2	3
10. … enjoyed doing things with me.	1	2	3
11. … would have liked to be able to tell me what to do all the time.	1	2	3
12. … gave hard punishment.	1	2	3
13. … cheered me up when I was sad.	1	2	3
14. … wanted to control whatever I did.	1	2	3
15. … was easy with me.	1	2	3
16. … gave me a lot of care and attention.	1	2	3
17. … was always trying to change me.	1	2	3
18. … let me off easy when I did something wrong.	1	2	3
19. … made me feel like the most important person in her life.	1	2	3
20. … only kept rules when it suited her.	1	2	3
21. … gave me as much freedom as I wanted.	1	2	3
22. … believed in showing her love for me.	1	2	3
23. … was less friendly with me, if I did not see things her way.	1	2	3
24. … let me go any place I pleased without asking.	1	2	3
25. … often praised me.	1	2	3
26. … would avoid looking at me when I had disappointed her.	1	2	3
27. ... let me go out any evening I wanted.	1	2	3
28. … was easy to talk to.	1	2	3
29. … if I had hurt her feelings, stopped talking to me until I pleased her again.	1	2	3
30. … let me do anything I liked to do.	1	2	3

MY FATHER WAS A PERSON WHO …	Not Like	Some-what Like	A Lot Like
1. … made me feel better after talking over my worries with him.	1	2	3
2. … told me of all the things he had done for me.	1	2	3
3. … believed in having a lot of rules and sticking with them.	1	2	3
4. … smiled at me often.	1	2	3
5. … said, if I really cared for him, I would not do things that caused him to worry.	1	2	3
6. … insisted that I must do exactly as I was told.	1	2	3
7. … was able to make me feel better when I was upset.	1	2	3
8. … was always telling me how I should behave.	1	2	3
9. … was very strict with me.	1	2	3
10. … enjoyed doing things with me.	1	2	3
11. … would have liked to be able to tell me what to do all the time.	1	2	3
12. … gave hard punishment.	1	2	3
13. … cheered me up when I was sad.	1	2	3
14. … wanted to control whatever I did.	1	2	3
15. … was easy with me.	1	2	3
16. … gave me a lot of care and attention.	1	2	3
17. … was always trying to change me.	1	2	3
18. … let me off easy when I did something wrong.	1	2	3
19. … made me feel like the most important person in his life.	1	2	3
20. … only kept rules when it suited him.	1	2	3
21. … gave me as much freedom as I wanted.	1	2	3
22. … believed in showing his love for me.	1	2	3
23. … was less friendly with me, if I did not see things his way.	1	2	3
24. … let me go any place I pleased without asking.	1	2	3
25. … often praised me.	1	2	3
26. … would avoid looking at me when I had disappointed him.	1	2	3
27. ... let me go out any evening I wanted.	1	2	3
28. … was easy to talk to.	1	2	3
29. … if I had hurt his feelings, stopped talking to me until I pleased him again.	1	2	3
30. … let me do anything I liked to do.	1	2	3

LEQ (Modified)

Instructions: Please read each item carefully and decide whether you have ever, before you turned 16 years old, had the experience described. Then **circle yes or no** to indicate whether you have ever had the experience. If you are not sure whether an experience you have had "fits" a given item, please circle **not sure**.

Please note: We use the word "caretaker" throughout this questionnaire to refer to adults who were primarily responsible for taking care of you while you were growing up. Parents are the usual caretakers, but many people also grew up with other caretaking adults such as step-parents, grandparents, foster parents, and others. "Siblings" refers to biological brothers and sisters, as well as stepbrothers and stepsisters or adopted siblings.

Background Information

A. When you were growing up (i.e., until you left your family home as an adult), who were your primary caretakers?

Please circle as many as apply:

1) Biological mother
2) Biological father
3) Stepmother
4) Stepfather
5) Grandparent
6) Other (please describe) _____

B. Did you have brothers or sisters (including stepsiblings with whom you lived)? If yes, how many?

Brothers = _____ Sisters = _____

1. Did you feel that any of your caretakers clearly preferred your brother(s) or sister(s) over you? For example, were much more affectionate, gave more attention or presents or privileges? Or, did any of your caretakers ever appear to lavish love or attention on another child while acting in a cold, rejecting, or indifferent manner towards you?
NO YES NOT SURE

2. Did any adults ever say to you that you were not as good as other children? For example, say that you were not as smart, friendly, talented, or attractive as another child?
NO YES NOT SURE

3. Did any of your caretakers ever say they wished they were not parents or that you had never been born?
NO YES NOT SURE

4. Did anyone ever say they wished you were dead?
NO YES NOT SURE

5. Were you labeled the "black sheep" or the "bad kid" or the "troublemaker" of your family?
NO YES NOT SURE

6. Were you often punished unfairly for things you did not do?
NO YES NOT SURE

7. Did anyone humiliate or demean you in the presence of other people? (For example, a teacher saying you were stupid in the presence of other students, a parent saying you were fat or ugly in front of your boy/girlfriend)?
NO YES NOT SURE

8. Did anyone ever say negative things to you about your personal attributes (e.g., your intelligence, personality, physical appearance, etc.)?
NO YES NOT SURE

9. Did anyone ever say very negative things about your personal attributes (e.g., intelligence, personality, physical appearance, etc.) in a teasing way? For example, say something critical about you but then laugh as if they didn't mean it.
NO YES NOT SURE

10. Did anyone continue to say something to you that made you feel bad even after you had told them it hurt your feelings or you had acted visibly upset?
NO YES NOT SURE

11. Did anyone consistently swear at you a lot (e.g., calling you a bitch, bastard, etc.)?
NO YES NOT SURE

12. Did anyone say to you that you were selfish, hateful, no-good, mean, or that you had other negative qualities?
NO YES NOT SURE

13. Did anyone ever say that they weren't giving you something (e.g., a toy) because you didn't deserve it or you weren't good enough?
NO YES NOT SURE

14. Did anyone ever tell you that you would be punished or doomed later in life for being a bad person?
NO YES NOT SURE

15. Did anyone ever tell you that you wouldn't succeed in something that was important to you?
NO YES NOT SURE

16. Were you ever punished for not doing well enough at something even though you had tried very hard to succeed?
NO YES NOT SURE

17. Did any important person in your life ever express disappointment in your efforts or achievements even though you believed you had made your best effort?
NO YES NOT SURE

18. Did any important person in your life set such high standards for you that you believed you could not meet the standards? Note that "setting standards" may be done directly by telling you what they expect of you (e.g., "You should earn an A average"), or indirectly by holding up their own or others' accomplishments as models (e.g., saying "When I was in high school, I was a prefect" while criticising your school performance).
NO YES NOT SURE

19. Did any of your caretakers or an important boyfriend or girlfriend or a date ever refuse to speak to you (e.g., give you the "silent treatment," convey messages to you through other people, etc.)?
NO YES NOT SURE

20. Did any of your caretakers ever disown you or threaten to disown you or cut off your financial support (e.g., say they would leave you out of their will, say they would no longer pay for your education expenses even though they had agreed to support you through school)?
NO YES NOT SURE

21. Did anyone ever keep you under such strict control that you were unable to participate in activities that most other people your age considered ordinary? (For example, a parent demanding that you be at home at all times you were not at school so that you could never date or participate in extracurricular activities such as dances or clubs?)
NO YES NOT SURE

22. Did anyone ever deliberately try to frighten you by "playing tricks" or "practical jokes" on you? For example, hiding in your closet at night with a flashlight pointed at his/her face so you were very frightened when you opened your closet door, or holding a pillow over your face so you feared you would smother, then saying it was a joke?
NO YES NOT SURE

23. Did anyone ever deliberately and repeatedly try to frighten you? (For example, by threatening to kill you or harm somebody you loved.)
NO YES NOT SURE

24. Did anyone ever tell a lie in order to cause you pain? (For example, telling you that your dog had been killed when nothing at all had happened to the dog?)
NO YES NOT SURE

25. Did anyone ever try to get you to do what he/she wanted by threatening to do something that would have extremely negative consequences for you (not physical consequences)? (For example, "blackmailing" you by threatening to spread a rumor that you had AIDS, threatening to tell your teacher a lie that you cheated on an exam?)
    NO YES NOT SURE

26. Did anyone ever try to get you to do what he/she wanted by threatening you or someone you loved with physical harm?
    NO YES NOT SURE

27. Did anyone ever seem to enjoy being physically cruel or violent to you?
    NO YES NOT SURE

28. Did any of your caretakers ever fail to protect you from being physically harmed by someone else? For example, one parent watching while the other parent or sibling beat you? Note: This question does NOT apply to a parent's failure to protect you from sexual abuse.
    NO YES NOT SURE

29. Did anyone ever throw or push you? For example, push you down a staircase or throw you into a wall?
    NO YES NOT SURE

30. Did anyone ever lock you in a room or closet for several hours or longer?
    NO YES NOT SURE

31. Were you ever hit hard with a fist, kicked, or slapped really hard?
    NO YES NOT SURE

31. Were you ever beaten up (hit, kicked, or punched repeatedly)?
    NO YES NOT SURE

32. Did any adults ever hit you with an object such as a belt, whip, coat hanger, brush, wooden spoon, etc.?
    NO YES NOT SURE

33. Did anyone ever try to choke, strangle, or smother you?
    NO YES NOT SURE

34. Did anyone ever deliberately cause you serious physical pain? (For example, burn you with a cigarette, break a bone, cut you?)
    NO YES NOT SURE

35. Did anyone ever attack you with a weapon such as a knife or gun? (Note: Actually being stabbed or shot is not required to say yes; all that is required is that the attacker had the weapon and indicated by words or actions that he/she might use it.)
    NO YES NOT SURE

36. Were you ever tied up, held down, or blindfolded, so you could not protect yourself from harm? For example, one or more people held you while someone else hit you, or someone tied you up and left you alone in a remote place, such as out in the woods?
    NO YES NOT SURE

37. Did a boyfriend/girlfriend/date ever hit, kick, shove, or throw you?
NO YES NOT SURE

38. Did any adult or someone more that five years older than you ever kiss you in a passionate manner, so that you felt the kiss was not merely friendly or the kind of kiss a relative might give a child? Were you ever afraid of being kissed by this person because the kisses seemed wrong or creepy?
NO YES NOT SURE

39. Did anyone about your own age, or up to five years older than you, ever expose himself/herself to you sexually in a way that seemed wrong or creepy? For example, you brother or sister exposing their genitals to you?
NO YES NOT SURE

40. Did any adult or someone more than five years older than you ever expose himself/herself to you sexually? For example, show you that they had no clothes on under their coat?
NO YES NOT SURE

41. Did anyone about your own age, or up to five years older than you, ever insist that you touch him/her in a sexual way?
NO YES NOT SURE

42. Did any adult or someone more than five years older than you ever insist that you touch him/her in a sexual way?
NO YES NOT SURE

43. Did anyone about your own age, or up to five years older than you, ever threaten to force you to engage in sexual activities, but you did not end up having sexual intercourse with him/her?
NO YES NOT SURE

44. Did any adult or someone more than five years older than you ever ask you to engage in sexual activities, or ever threaten to force you to engage in sexual activities, but you did not end up having sexual intercourse with him/her?
NO YES NOT SURE

45. Did anyone about your own age, or up to five years older than you, ever touch you in a sexual way that seemed wrong or creepy? For example your brother or sister touching you in the genital area, or touching your breasts or buttocks?
NO YES NOT SURE

46. Did any adult or someone more than five years older than you ever touch you in a sexual way? For example, touch you in the genital area, touch your breasts or buttocks?
NO YES NOT SURE

47. Did anyone about your own age, or up to five years older than you, ever attempt to force you to have sexual intercourse with him/her against your will? For example, your cousin tried to force you to have sexual intercourse with him/her but you talked him/her out of it, or struggled and got away, etc.
NO YES NOT SURE

48. Did any adult or someone more than five years older than you attempt to force you to have sexual intercourse with him/her but you talked him/her out of it, or struggled and got away, etc.
NO YES NOT SURE

49. Did anyone about your age, or up to five years older than you, ever forrce you to have sexual intercourse against your will? For example, your brother or sister forced you to have sexual intercourse with him/her.
NO YES NOT SURE

50. Did any adult or someone more than five years older than you ever force you to have sexual intercourse against your will? For example, your caretaker forced you to have sexual intercourse with him/her. (Do not count if the person tried to have intercourse with you but you got away or avoided it.)
NO YES NOT SURE

51. Did you ever have cause to believe that someone wished to seriously hurt you or kill you if you told that he/she was sexually molesting you, even if he/she never verbally threatened you with harm? For example, told you that he/she would hurt you, or you had observed this person being violent towards someone else and believed that he/she might hurt you too.
NO YES NOT SURE

52. Did anyone ever use any objects in a sexual way while forcing you to engage in sexual activities? For example, use a cattle prod, a knife, scissors, etc., while they were engaging in sexual activities with you?
NO YES NOT SURE

53. Did your caretakers ever tell you that you were lying or that they did not believe you when you reported that someone was maltreating you sexually?
NO YES NOT SURE

54. Did your caretakers ever fail to protect you form being sexually maltreated, even though you were pretty positive your caretakers knew about it? For example, daughter believes mother knows stepfather is sexually abusing her, but mother does nothing to stop the abuse?
NO YES NOT SURE

55. Did you ever find out that a brother or sister was being sexually molested by someone, and worry that the same thing might happen to you?
NO YES NOT SURE

56. Were you ever asked to keep a "sexual secret" with anyone? For example, being told not to tell about a sexual activity that had occurred?
NO YES NOT SURE

57. Did a boyfriend/girlfriend/date ever use psychological pressure to get you to have sex? For example, saying they would never go out with you again unless you had sex, say they would damage your reputation unless you had sex?
NO YES NOT SURE

58. Did a boyfriend/girlfriend/date ever use physical force to get you to have sex?
NO YES NOT SURE

59. Were you ever raped in a situation that you didn't indicate for one of the above questions?
NO YES NOT SURE

60. Did you ever observe adults in your family engaging in sexual activities even though they knew you could see what they were doing?
NO YES NOT SURE

61. Were you ever forced to dress up like a child of the opposite sex, or pretend to be the opposite sex? For example, a parent dressing a son like a girl, telling other people the son is a girl?
NO YES NOT SURE

62. Did any adult or someone more than five years older than you ever involve you in pornography? For example, force you to pose for nude photos, film you in sexual activities?
NO YES NOT SURE

63. Did any adult or someone more than five years older than you ever force you to view pornography against your will? For example, insist that you look at nude photos or watch X-rated films even though you did not want to?
NO YES NOT SURE

EPQR-N-SF

Please answer each question by circling either 'yes' or 'no'. There are no right or wrong answers, and no trick questions. Please work quickly, and do not think too long about the exact meaning of the questions**.**

1. Does your mood often go up and down?	Yes	No
2. Do you ever feel "just miserable" for no reason?	Yes	No
3. Are you an irritable person?	Yes	No
4. Are your feelings easily hurt?	Yes	No
5. Do you often feel "fed up"?	Yes	No
6. Are you often troubled about feelings of guilt?	Yes	No
7. Would you call yourself a nervous person?	Yes	No
8. Are you a worrier?	Yes	No
9. Would you call yourself tense or "highly-strung"?	Yes	No
10. Do you worry too long after an embarrassing experience?	Yes	No
11. Do you suffer from "nerves"?	Yes	No
12. Do you often feel lonely?	Yes	No

Why Ruminate Questionnaire

Everyone ruminates on negative things from time to time. By ruminate, we mean spending time dwelling on current problems, past difficulties or losses, negative mood or yourself, brooding on difficulties, worrying about problems, repeatedly thinking about yourself and negative experiences, for example, repeatedly asking "why did this happen? why me?". For example, most people would spend some time ruminating after the end of a relationship or when they failed to do as well as they hoped in a job application.

Please use the scale below to express the extent to which each you believe each of the following statements is true (write the number in front of each statement in the space provided).

1 **2** **3** **4** **5**

Not true at all | *Corresponds a little* | *Corresponds somewhat* | *Mostly true* | *Completely true*

1. __ I think about something to help get over it.
2. __ I ruminate about the past in order to learn from my mistakes.
3. __ I ruminate to try and maintain my standards.
4. __ I ruminate to help stick to my goals.
5. __ I ruminate because I think there must be a solution to my problem.
6. __ I ruminate because I am a good person.
7. __ I ruminate to help solve problems
8. __ I ruminate to understand and thereby change myself.
9. __ I ruminate to understand my feelings to help get better.
10. __ I ruminate because I need to know the reasons for why things happen.
11. __ I ruminate to make sense of past events, so that they bother me less.
12. __ I ruminate to remove the pain of upsetting memories and images.
13. __ I ruminate to try and stop bad things happening again.
14. __ If I ruminate, I can find better ways of doing things.
15. __ I ruminate in the hope of knowing what to do.
16. __ I ruminate to try and put the past behind me.
17. __ I ruminate to try and find the answer to my problems.
18. __ I ruminate because I am searching to find some meaning in my life.
19. __ I ruminate because important questions should be resolved immediately and definitely.

20. __ I ruminate because understanding the past and present is essential to improve things.
21. __ I ruminate because making sense of things helps me to accept them.
22. __ Thinking about why something happened makes it less painful.
23. __ I ruminate to help cope with difficult events.
24. __ I ruminate to try and find a way out of my current difficulties.
25. __ I ruminate because I want to be sure about what happened before.
26. __ I ruminate because I like to be certain about things.
27. __ I think about the causes of bad events to prevent them happening again.
28. __ I ruminate because if a difficulty comes to mind, I should think it through.
29. __ I ruminate because I should make sense of unhappy memories.
30. __ I ruminate because analysing a painful memory is less upsetting than imagining it in vivid detail.
31. __ I ruminate to avoid repeating mistakes.
32. __ I ruminate to stop myself losing control.
33. __ I ruminate to avoid becoming selfish or shallow.
34. __ I ruminate to prevent future mistakes.
35. __ I ruminate to distract myself from painful memories
36. __ I ruminate to avoid criticism from others.
37. __ I ruminate to try and get a sense of control
38. __ I ruminate to pre-empt the impact of future negative feelings
39. __ I ruminate to anticipate how other people will respond to me
40. __ I ruminate to change my feelings
41. __ I ruminate to motivate myself
42. __ I ruminate to have better control over my life
43. __ I ruminate to protect myself
44. __ By ruminating I can stop bad things from happening
45. __ I ruminate in order to avoid disappointment
46. __ I ruminate because it has been useful in the past

PEQ

Please note down the **two major problems or issues** that you are currently ruminating about (that is repeatedly dwelling on and frequently thinking about). These problems or issues should be ones that you are greatly concerned about and spend a lot of time thinking about.

1 _____

2 _____

Please write a brief description of the **first major problem or issue**.

Please write down **three potential negative consequences** of the first major problem or issue.

Please write a brief description of the **second major problem or issue**.

Please write down **three potential negative consequences** of the second major problem or issue.

EC Scale

Below are a number of sentences a person might use to describe themselves. Read each sentence, then circle the appropriate number next to each sentence to show how much this sentence describes you. **Indicate how much each sentence describes how you are most of the time.**

	Not at All	Not Much	Some -what	Often	Very Much
1. I do not complete my homework.	**1**	**2**	**3**	**4**	**5**
2. I am able to resist laughing or smiling when it isn't appropriate.	**1**	**2**	**3**	**4**	**5**
3. I really dislike it when someone breaks the rules.	**1**	**2**	**3**	**4**	**5**
4. I have difficulty completing assignments on time.	**1**	**2**	**3**	**4**	**5**
5. When I don't get what I want, it's hard to enjoy something else.	**1**	**2**	**3**	**4**	**5**
6. Whenever I decide anything I always think about whether it's right or wrong.	**1**	**2**	**3**	**4**	**5**
7. I have a hard time following instructions.	**1**	**2**	**3**	**4**	**5**
8. I plan and organize my schoolwork very carefully.	**1**	**2**	**3**	**4**	**5**
9. When an activity or task is difficult, I give up.	**1**	**2**	**3**	**4**	**5**
10. I find it easy to concentrate on what I am doing.	**1**	**2**	**3**	**4**	**5**
11. My parent's ideas of how to do things have always proven best.	**1**	**2**	**3**	**4**	**5**
12. I will move from one task to another without completing any of them.	**1**	**2**	**3**	**4**	**5**
13. I can easily stop an activity when told to do so.	**1**	**2**	**3**	**4**	**5**
14. I usually keep at a task or project until it's done.	**1**	**2**	**3**	**4**	**5**
15. I wait to be called on before speaking.	**1**	**2**	**3**	**4**	**5**
16. Even little things distract me.	**1**	**2**	**3**	**4**	**5**
17. I like to stop and think things over before I do them.	**1**	**2**	**3**	**4**	**5**
18. I leave my own projects or tasks unfinished.	**1**	**2**	**3**	**4**	**5**
19. I have a hard time concentrating on my work because I'm always thinking about other things.	**1**	**2**	**3**	**4**	**5**
20. Once I'm involved in a task, nothing can distract me from it.	**1**	**2**	**3**	**4**	**5**
21. I start many things that I don't finish.	**1**	**2**	**3**	**4**	**5**
22. I often get lost in my work.	**1**	**2**	**3**	**4**	**5**
23. I can lower my voice when asked to do so.	**1**	**2**	**3**	**4**	**5**
24. When I get frustrated with projects or tasks, I quit.	**1**	**2**	**3**	**4**	**5**

ISDI (Modified)

You are now going to be asked to list qualities that you might apply to yourself. You will be asked to list these for three different types of self:

- Your "**SHOULD** self": Traits that you think you **OUGHT** to possess; the type of person you have a **duty**, **obligation**, or **responsibility** to be; the traits you are **morally obligated** to possess.

- Your "**IDEAL** self": Traits that you would **IDEALLY** like to possess; the type of person you **wish**, **desire**, or **hope** to be.

- Your "**UNDESIRED** self": Traits that, in general, you do **NOT** want to possess, traits that are **UNDESIRED**.

How are the "should self" and "ideal self" different?

Here is an example of how the ideal and should selves are different: I may hope to be rich someday, being rich may be a goal I have for myself, but I do not think I have a duty or a moral obligation to be rich. So, rich would be a word that describes the type of person I ideally want to be, but it is not a word that describes the type of person I think I should be.

Is the "should self" just more realistic than the "ideal self"?

No, not necessarily. Everyone differs in how realistic the traits of the ideal and should selves are, as well as how much they actually possess those traits. For you, just think about who you ideally want to be and who you think you should be, not about which one is more realistic.

For each list, think carefully about the type of qualities you are being asked to list. You may use any words you want to describe these different types of self.

Before continuing, please answer the following questions by putting an X next to the best answer:

1. The should self refers to
   _____ what I am now
   _____ what others want me to be
   _____ my moral obligation

2. The ideal self is
   _____ unattainable and perfect
   _____ what I want, dream, or desire to be
   _____ my normal, usual self

Please list the attributes of the type of person you would <u>IDEALLY</u> like to be; the type of person you wish, desire, or hope to be.

Ideal 1: _____

Ideal 2: _____

Ideal 3: _____

Ideal 4: _____

Ideal 5: _____

Please list the attributes of the type of person you believe you <u>SHOULD</u> or <u>OUGHT</u> to be; the traits you believe you are morally obligated to possess.

Should 1: _____

Should 2: _____

Should 3: _____

Should 4: _____

Should 5: _____

Please list the attributes of the type of person you do NOT want to be; the traits that are UNDESIRED.

Undesired 1: _____

Undesired 2: _____

Undesired 3: _____

Undesired 4: _____

Undesired 5: _____

Please tell the experimenter if you are having difficulty completing your lists. [*Experimenter to supply paper copy of "positive word list" and "negative word list" found at the end of this document if participant cannot generate 15 attributes themselves.*]

We would now like you to answer some questions about each of the traits you have listed. For each trait, please indicate how much you think the word actually describes or applies to you <u>at this time</u> by selecting the appropriate option for each word.

[*The computer on which the questionnaire is running will display each of the 15 words that the participant listed, with the following Likert scale for each word*]

1 Does not describe me at all
2 Describes me slightly
3 Describes me somewhat
4 Describes me well
5 Completely describes me

1a. Of the five words you listed, which is the "IDEAL self" trait that you feel <u>LEAST</u> describes you?

_____

1b. In a few sentences, please say more about this "IDEAL self" trait, and describe how you would like to be different.

_____

_____

_____

_____

2a. Of the five words you listed, which is the "SHOULD self" trait that you feel <u>LEAST</u> describes you?

_____

2b. In a few sentences, please say more about this "SHOULD self" trait, and describe how you would like to be different.

_____

_____

_____

_____

3a. Of the five words you listed, which is the "UNDESIRED self" trait that you feel <u>MOST</u> describes you?

_____

3b. In a few sentences, please say more about this "UNDESIRED self" trait, and describe how you would like to be different.

_____

_____

_____

_____

Circumplex Measure of Affect

Please read each emotion word, and then on the line below, circle a response representing the extent to which you feel this emotion **right now**.

Nervous			
Not at all	Somewhat	Quite a bit	A lot
Unhappy			
Not at all	Somewhat	Quite a bit	A lot
Excited			
Not at all	Somewhat	Quite a bit	A lot
Tired			
Not at all	Somewhat	Quite a bit	A lot
Calm			
Not at all	Somewhat	Quite a bit	A lot
Sad			
Not at all	Somewhat	Quite a bit	A lot
Elated			
Not at all	Somewhat	Quite a bit	A lot
Active			
Not at all	Somewhat	Quite a bit	A lot
Relaxed			
Not at all	Somewhat	Quite a bit	A lot
Euphoric			
Not at all	Somewhat	Quite a bit	A lot
Inactive			
Not at all	Somewhat	Quite a bit	A lot

Aroused			
Not at all	Somewhat	Quite a bit	A lot
Bored			
Not at all	Somewhat	Quite a bit	A lot
Grouchy			
Not at all	Somewhat	Quite a bit	A lot
Dull			
Not at all	Somewhat	Quite a bit	A lot
Intense			
Not at all	Somewhat	Quite a bit	A lot
Enthusiastic			
Not at all	Somewhat	Quite a bit	A lot
Quiet			
Not at all	Somewhat	Quite a bit	A lot
Sluggish			
Not at all	Somewhat	Quite a bit	A lot
Delighted			
Not at all	Somewhat	Quite a bit	A lot
Cheerful			
Not at all	Somewhat	Quite a bit	A lot
Astonished			
Not at all	Somewhat	Quite a bit	A lot

Happy			
Not at all	Somewhat	Quite a bit	A lot
Miserable			
Not at all	Somewhat	Quite a bit	A lot
Anxious			
Not at all	Somewhat	Quite a bit	A lot
At rest			
Not at all	Somewhat	Quite a bit	A lot
Content			
Not at all	Somewhat	Quite a bit	A lot
Annoyed			
Not at all	Somewhat	Quite a bit	A lot
Pleased			
Not at all	Somewhat	Quite a bit	A lot
Still			
Not at all	Somewhat	Quite a bit	A lot
Fearful			
Not at all	Somewhat	Quite a bit	A lot
Tranquil			
Not at all	Somewhat	Quite a bit	A lot

Appraisals of the Usefulness of RNT

Please answer the following questions based on how you feel **right now**, at this very moment.

1. Right now, how helpful or unhelpful do you think it is to repeatedly think through problems or difficulties, and repeatedly think about their causes, meanings and implications?

1 - Very unhelpful
2 - Somewhat unhelpful
3 - A little unhelpful
4 - Neither helpful nor unhelpful
5 - A little helpful
6 - Somewhat helpful
7 - Very helpful

2. At this moment, how much do you think that repeatedly dwelling on problems and difficulties, and thinking about their causes, meanings and implications, influences your sense of understanding and insight?

(By "understanding and insight", we mean things like your understanding of yourself, other people, the situation, why things happened, what you should do about the situation, etc.)

1 - It greatly increases my sense of understanding and insight
2 - It somewhat increases my sense of understanding and insight
3 - It very slightly increases my sense of understanding and insight
4 - It has no effect on my sense of understanding and insight
5 - It very slightly decreases my sense of understanding and insight
6 - It somewhat decreases my sense of understanding and insight
7 - It greatly decreases my sense of understanding and insight

Sense of Understanding and Insight

Please read each question, and then place a tick in the appropriate column to indicate your response, based on your feelings **right now**.

	Not at all	A little	Some -what	Quite a bit	A lot
Right now, how much insight do you have into other people?					
Right now, how much insight do you have into your feelings?					
Right now, how much do you have a sense of why things happen to you?					
Right now, how much do you understand yourself?					
Right now, do you have a sense that you know how to improve things in the future?					
Right now do you feel like you know the answer to your problems?					
Right now, how much do you understand the way the world works?					
Right now do you feel that you understand how to avoid repeating past mistakes?					
Right now, do you have a sense that you understand how to prevent negative things from happening again?					
Right now, how much do you feel that you understand other people?					
Right now, how much insight do you have into how your mind works?					
Right now, do you feel like you understand what you should do?					
Right now, how much do you understand why other people do (or don't do) things?					
Right now, do you feel like you understand how to resolve your current problems?					
Right now, how much insight do you have into yourself?					
Right now, how much sense do you have of why you do (or don't do) things?					

Sense of Confidence and Control

Please read each question, and then place a tick in the appropriate column to indicate your response, based on your feelings **right now**.

	Not at all	A little	Some -what	Quite a bit	A lot
Right now, how much do you feel that you are unable to control the important things in your life?					
Right now, how much do you feel in control of your life?					
Right now, how much do you feel that things are going your way?					
Right now, how much do you feel ready to try new things?					
Right now how certain do you feel about things in your life?					
Right now, how ready do you feel to take a chance?					
Right now, how much do you feel that you cannot cope with all the things that you have to do?					
Right now, how confident do you feel about your ability to handle your personal problems?					
Right now, how much do you feel that you are on top of things?					

Sense of Assertiveness Self-Efficacy

Please read each question, and then place a tick in the appropriate column to indicate your response, based on your feelings **right now**.

	Not at all	A little	Some -what	Quite a bit	A lot
Right now, how confident are you that it would go well if you were to be assertive?					
Right now, how risky does being assertive feel to you?					
Right now, how confident are you about saying the right thing if you were to be assertive?					
Right now, how confident do you feel about expressing your opinion?					
Right now, how confident do you feel about asking someone for something?					
Right now, how confident do you feel about standing up for yourself?					

Breathing Exercise

During the 5-minute exercise in response to the tone:

Tone 1

1. Where was your attention focused just before your heard the tone? *(circle one)*

   (a) Breathing (b) Any other thought

2. Was this thought positive, negative, or neutral? *(circle one)*

   (a) Positive (b) Negative (c) Neutral

3. Please provide a brief description of this thought *(a few words)* _____

After the 5-minute exercise, elaborating on "any other thought" items:

Tone 1

Please provide a fuller description of the thought.

_____

_____

1. How often did this thought or a very similar thought come to mind during the 5 minutes of the breathing exercise?

Only once	Twice	Three times	Four times	More than four times
☐	☐	☐	☐	☐

2. How long were you thinking about the subject of the thought during the 5 minutes?

Only for an instant	Under 10 seconds	About 30 seconds	About a minute	About half the time	3-4 minutes	Nearly all of the time
☐	☐	☐	☐	☐	☐	☐

3. When thinking about this subject, how much did your thoughts keep coming back to the same or similar ideas again and again?

Not at all	A bit	Somewhat	Moderately	Extremely
☐	☐	☐	☐	☐

4. How upsetting or distressing was the thought?

Not at all	A bit	Somewhat	Moderately	Extremely
☐	☐	☐	☐	☐

5. How difficult did you find it to stop this thought coming or to move on to other thoughts?

Not at all	A bit	Somewhat	Moderately	Extremely
☐	☐	☐	☐	☐

Writing Exercise Manipulation of Appraisals of RNT

RNT-as-Helpful Manipulation
Sometimes, when people have a personal problem, they spend time thinking through the difficulty and the situation that they're in. This process of thinking things through and repeatedly dwelling on the problem can be really helpful, because reflecting on the situation can give people a greater sense of understanding and insight, and this can help them make sense of the situation.

You are now going to be asked to think of two occasions when repeated thinking about a problem over and over again was helpful to you. It doesn't matter what type of situation you describe, but if possible, please try to select two different types of problem (e.g., situation A – a problem at work; situation B – a problem in a friendship).

Please think of a time when thinking about the causes, meanings and implications of a problem was helpful to you. Spend a moment getting a vivid sense of the problem and the way thinking about it was helpful.

1. What was the problem? Please describe it briefly (i.e., a few sentences).

2. In what way was repetitive thinking about the problem helpful? Please describe how thinking through the problem was helpful, making sure to cover the following questions in your answer.

- In what way did repetitive thinking about the problem improve your understanding/insight?
- In what way did dwelling on the problem help you know what to do about it?
- How did repeatedly thinking about the problem help you realise why it happened?
- In what way did repetitive thinking about the problem help you learn more about yourself/other people?

[*Repeat for second example*]

RNT-as-Unhelpful Manipulation
Sometimes, when people have a personal problem, they spend time thinking through the difficulty and the situation that they're in. This process of thinking things through and repeatedly dwelling on the problem can be really unhelpful, because dwelling on the situation can make people focus on negative emotions, negative aspects of themselves, the situation and other people, without actually moving them any close to taking actions that would resolve the situation.

You are now going to be asked to think of two occasions when repeated thinking about a problem over and over again was not helpful for you. It doesn't matter what type of situation you describe, but if possible, please try to select two different types of problem (e.g., situation A – a problem at work; situation B – a problem in a friendship).

Please think of a time when thinking about the causes, meanings and implications of a problem was unhelpful to you. Spend a moment getting a vivid sense of the problem and the way thinking about it was unhelpful.

1. What was the problem? Please describe it briefly (i.e., a few sentences).

2. In what way was repetitive thinking about the problem unhelpful? Please describe how thinking through the problem was unhelpful, making sure to cover the following questions in your answer.

- In what way did repetitive thinking about the problem seem unhelpful or unconstructive?
- In what way did dwelling on the problem have a negative impact on your mood?
- In what way did repeatedly thinking about the problem make you feel more negative about yourself, your thoughts or your actions?

[*Repeat for second example*]

Anagram IQ Test

On the next page is a list of anagrams. The letters of each anagram make a real word, but the letters are presented here in a scrambled order. Your task is to unscramble each anagram to make a word, and then to write that word on the response sheet provided. You should try to complete as many of the anagrams as possible. If you find a particular anagram is too difficult to solve, you should move on to the next one.

You will need to work quickly and accurately, because your time will be limited. That is, you have 3 minutes to complete the task. Based on the performance of people who have done this task in the past, in 3 minutes we expect you to be able to solve about five or six of the anagrams. However, you should aim to complete as many as possible. From previous research conducted using these anagrams, we know that an individual's performance on these types of tasks is a consistent and reliable indicator of their future academic success. [12]

[1] Wechsler, D. (2008). *Wechsler Adult Intelligence Scale - Fourth Edition*. San Antonio, TX: Pearson.

[2] Alloway, T. P., & Alloway, R. G. (2010). Investigating the predictive roles of working memory and IQ in academic attainment. *Journal of Experimental Psychology, 106*, 20-29.

Participant Code _____

ANAGRAM IQ TEST

oldme _____	datir _____
egujt _____	ifnlu _____
aebrl _____	baehp _____
tinga _____	jutan _____
aewtk _____	tanbo _____
nrdko _____	hugol _____
yenpo _____	eocva _____
aitop _____	iuegb _____
milbe _____	lcoha _____
rigon _____	gaton _____
euohl _____	rmcai _____
baroc _____	ohtna _____
awrlu _____	rdcei _____
nrcui _____	hroab _____
glaei _____	ugarv _____

RNT-as-Helpful Manipulation

Experimenter speaks the following instructions:

"Sometimes, when people have a personal problem, they spend time thinking through the difficulty and the situation that they're in. This process of thinking things through and repeatedly dwelling on the problem can be really helpful, because reflecting on the situation can give people a greater sense of understanding and insight, and this can help them make sense of the situation.

You are now going to be asked to think of two occasions when repeated thinking about a problem over and over again was helpful to you. It doesn't matter what type of situation you describe, but if possible, please try to think of two different types of problem (for instance, a problem at work, and a problem with a friend). We also need these to be problems that are in the past, rather than current problems, and problems that you feel are resolved, or mostly resolved for now.

So first of all, I'd like you to identify your first example of an occasion when you repeatedly thought about a past problem, and found the experience of thinking about the causes, meanings, and implications of a problem helpful for you. Please take a few moments, if you need to, to think of an occasion like this – you may have thought of something already. If you're not sure whether what you've thought of is suitable, please just ask and I can advise. Let me know when you've thought of something."

Experimenter waits for participant to think and identify a concern. Experimenter asks:

"Have you thought of something?"

When participant indicates that they have identified a concern, the experimenter reads the following passage:

"Now, please can you very briefly tell me what the problem was? You don't need to go into a lot of detail at all – this is just so I have a quick background understanding before we move on to the next few questions. Whilst you briefly describe the issue, I am going to switch on this audio recorder such that after the experiment, I can code what you say. Okay?"

Experimenter switches on the recorder, and says: "Participant code *X*" *Participant describes the situation, with the experimenter asking for clarity if necessary. Once the participant has responded, the experimenter asks:*

"Can I just check that this is a problem that you found helpful to repeatedly think through? Also, can I check that this is a past problem that you now consider to be resolved or mostly resolved?"

Participant confirms that the identified problem is one they found helpful to think about, and that is in the past and resolved. If either of these conditions are not met, the experimenter will ask the participant to think of an alternative problem. NOTE: For concerns that may not be fully resolved, experimenter will need to judge that it is okay to proceed (and later, participant will rate how resolved they consider the problem to be, so that this can be statistically controlled). Experimenter then reads the following:

"We are now going to focus in on the ways in which repeated thinking about the problem was helpful for you. What will happen is that I will ask you a few questions for you to focus on, just to explore your feelings about thinking the problem through. If you need to, please take a moment to think about your answer, and then answer each question aloud. Try and spend about a minute answering each question – sometimes, I might prompt you with further questions. Also, some of the questions might seem quite similar, but don't worry if it feels like you're repeating yourself – this is just important to ensure you've thought the issue through thoroughly."

1. "In what way did repetitive thinking about the problem improve your understanding and insight?"

Follow-up questions: "How did the repetitive thinking help you learn more about yourself/other people?", "What are your reasons for thinking that?", "Can you say some more about that?".

2. "In what way did dwelling on the problem help you know what to do about it?"

Follow-up questions: "What are your reasons for thinking that?", "Can you say some more about that?".

3. "How did repeatedly thinking about the problem help you realise why it happened?"

Follow-up questions: "What are your reasons for thinking that?", "Can you say some more about that?".

"Thanks for answering those questions. Now, we're going to repeat this process one more time, as I ask you to think of a second example of an occasion when you repeatedly thought about a past problem, and found the experience of thinking about the causes, meanings, and implications of a problem helpful for you."

[*Repeat for second example*]

RNT-as-Unhelpful Manipulation

Experimenter speaks the following instructions:

"Sometimes, when people have a personal problem, they spend time thinking through the difficulty and the situation that they're in. This process of thinking things through and repeatedly dwelling on the problem can be really unhelpful, because dwelling on the situation can make people focus on negative emotions, negative aspects of themselves, the situation and other people, without actually moving them any close to taking actions that would resolve the situation.

You are now going to be asked to think of two occasions when repeated thinking about a problem over and over again was not helpful for you. It doesn't matter what type of situation you describe, but if possible, please try to think of two different types of problem (for instance, a problem at work, and a problem with a friend). We also need these to be problems that are in the past, rather than current problems, and problems that you feel are resolved, or mostly resolved for now.

So first of all, I'd like you to identify your first example of an occasion when you repeatedly thought about a past problem, and found the experience of thinking about the causes, meanings, and implications of a problem unhelpful for you. Please take a few moments, if you need to, to think of an occasion like this – you may have thought of something already. If you're not sure whether what you've thought of is suitable, please just ask and I can advise. Let me know when you've thought of something."

Experimenter waits for participant to think and identify a concern. Experimenter asks:

"Have you thought of something?"

When participant indicates that they have identified a concern, the experimenter reads the following passage:

"Now, please can you very briefly tell me what the problem was? You don't need to go into a lot of detail at all – this is just so I have a quick background understanding before we move on to the next few questions. Whilst you briefly describe the issue, I am going to switch on this audio recorder such that after the experiment, I can code what you say. Okay?"

Experimenter switches on the recorder, and says: "Participant code *X*" *Participant describes the situation, with the experimenter asking for clarity if necessary. Once the participant has responded, the experimenter asks:*

"Can I just check that this is a problem that you did not find helpful to repeatedly think through? Also, can I check that this is a past problem that you now consider to be resolved or mostly resolved?"

Participant confirms that the identified problem is one they found helpful to think about, and that is in the past and resolved. If either of these conditions are not met, the experimenter will ask the participant to think of an alternative problem. NOTE: For concerns that may not be fully resolved, experimenter will need to judge that it is okay to proceed (and later, participant will rate how resolved they consider the problem to be, so that this can be statistically controlled). Experimenter then reads the following:

"We are now going to focus in on the ways in which repeated thinking about the problem was not helpful for you. What will happen is that I will ask you a few questions for you to focus on, just to explore your feelings about thinking the problem through. If you need to, please take a moment to think about your answer, and then answer each question aloud. Try and spend about a minute answering each question – sometimes, I might prompt you with further questions. Also, some of the questions might seem quite similar, but don't worry if it feels like you're repeating yourself – this is just important to ensure you've thought the issue through thoroughly."

1. "In what way did repetitive thinking about the problem seem unhelpful or unconstructive?"

Follow-up questions: "What are your reasons for thinking that?", "Can you say some more about that?".

2. "In what way did dwelling on the problem have a negative impact on your mood?"

Follow-up questions: "What are your reasons for thinking that?", "Can you say some more about that?".

3. "In what way did repeatedly thinking about the problem make you feel more negative about yourself, your thoughts or your actions?"

Follow-up questions: "What are your reasons for thinking that?", "Can you say some more about that?".

"Thanks for answering those questions. Now, we're going to repeat this process one more time, as I ask you to think of a second example of an occasion when you repeatedly thought about a past problem, and found the experience of thinking about the causes, meanings, and implications of a problem unhelpful for you."

[*Repeat for second example*]

Interview Manipulation of Processing Mode

Abstract Rumination Manipulation

Experimenter conducts the following interview, reading the first statement and the following questions to the participant, prompting them as necessary if answers are brief or unelaborated.

"We are now going to move on to the next part of the session. Some people find that thinking deeply about personal issues helps them to address them more effectively. Thinking deeply can help people feel clear about what they want, and feel ready to do something about it. So, to help you to be assertive about [identified concern], I am going to ask you some questions for you to concentrate on, to focus your thinking about the [identified concern]. Spend a few moments thinking about each question, and then answer each question aloud. Try and spend at least a minute answering each question aloud. Sometimes, I will prompt you with further questions. Some of the questions might seem quite similar, but don't worry if you feel as though you may be repeating yourself – it's important to ensure that you've thought through the issue thoroughly.

Again, for this section of the session, I am going to switch on this audio recorder such that after the experiment, I can verify that I have asked the questions properly, and so I can code your spoken responses to the questions. Okay?"

Experimenter switches on the recorder, and says: "Participant code X"

1. "Why is [identified concern] important to you? For example, why does this issue bother you, and what are your reasons for wanting to change it?"
   Follow-up questions: "Why do you want to change this behaviour?", "Why does [identified concern] bother you?", "What are the reasons for wanting to change this?", "Why is that important to you?", "What are your reasons for thinking that?", "Why haven't you been able to talk to [identified person] about this yet?", "Why does [identified person] behave this way?", "Why is it happening that you have conflict with [identified person]?", "What does it mean to you?". For brief or unelaborated answers, "Can you say some more about that?", "Can you describe that more?", "What are your reasons for thinking that? Why is that?"

2. "What consequences does [identified concern] have on your relationship with [identified person]? For example, what effect does their behaviour have on you, and what are the implications of their behaviour carrying on?"
   Follow-up questions: "What effect does this behaviour have on you?", "What effect does it have on your relationship?", "What does it mean for your relationship?", "What are the implications of this behaviour carrying on?", "What are the implications of this behaviour stopping?". For brief or unelaborated answers, "Can you say some more about that?", "Can you describe that more?", "What are your reasons for thinking that? Why is that?"

3. "Why does [identified concern] happen? For example, why does [identified person] do this, and what does it mean about them that they do this?"
   Follow-up questions: "What causes this problem?", "Why does [identified person] keep doing this?", "Why does this keep happening?", "What does it mean about [identified person] that they do this?", "What does it mean about you that they do this?". For brief or unelaborated answers, "Can you say some more about that?", "Can you describe that more?", "What are your reasons for thinking that? Why is that?"

4. "Why haven't you addressed this concern yet? For example, what makes it hard to do be assertive about this, and what does it mean about you that you have not done anything yet?"

Follow-up questions: "What makes it hard to do this?", "Why haven't you said anything about it?", "What are the reasons that you have not been assertive about it?", "What are the causes of not talking it through?", "What does it mean about you that you have not done anything yet?". For brief or unelaborated answers, "Can you say some more about that?", "Can you describe that more?", "What are your reasons for thinking/doing that?"

5. "Why do you want to raise [identified concern] with [identified person]? For example, what do you want to achieve, and what is the underlying meaning you want to convey to [identified person]?

Follow-up questions: "What do you want to achieve?", "Why is this an issue for you now?", "What is the deeper meaning underlying this?", "Why is now a good time to confront him/her?", "What is the gist of what you want to communicate to [identified person]?", "What is the underlying meaning you want to convey to [identified person]?". For brief or unelaborated answers, "Can you say some more about that?", "Can you describe that more?", "What are your reasons for thinking/doing that?"

6. "What effect could confronting this issue have on your relationship with [identified person]? For example, what would addressing this issue mean for your relationship?"

Follow-up questions: "What will it mean for your relationship?". For brief or unelaborated answers, "Can you say some more about that?", "Can you describe that more?", "What are your reasons for thinking/doing that?", "Why might that happen? What would that mean?"

7. "What are the possible consequences of raising [identified issue] with [identified person]? For example, what good things could happen if you do this, and what could go wrong?"

Follow-up questions: "What might happen when you are assertive about this?", "What are the implications of doing this?", "What good things could happen if you do this?", "What could go wrong?", "What would that mean?". For brief or unelaborated answers, "Can you say some more about that?", "Can you describe that more?", "What are your reasons for thinking/doing that? Why might that happen? What would that mean?"

Concrete Thinking Manipulation

Experimenter conducts the following interview, reading the first statement and the following questions to the participant, prompting them as necessary if answers are brief or unelaborated.

"We are now going to move on to the next part of the session. Some people find that thinking in detail about the steps to take when faced with a problem helps them to go ahead and address it. Planning out what to do, how to do it, where to do it, and when to do it can make it more likely that any behaviour will be implemented. So, to help you to be assertive about [identified concern], I am going to ask you some questions for you to concentrate on, to focus your thinking about [identified concern]. Spend a few moments thinking about each question, and then answer each question aloud. Try and spend at least a minute answering each question aloud. Sometimes I will prompt you with further questions. Some of the questions might seem quite similar, but don't worry if you feel as though you may be repeating yourself – it's important to ensure that you've thought through the issue thoroughly.

Again, for this section of the session, I am going to switch on this audio recorder such that after the experiment, I can verify that I have asked the questions properly, and so I can code your spoken responses to the questions. Okay?"

Experimenter switches on the recorder, and says: "Participant code X"

1. "How will you prepare in advance for talking about [identified concern]? For example, what actions can you take to prepare to talk with [identified person]?"
   Follow-up questions: "How will you approach talking to [identified person]?", "What will you do to prepare to talk to [identified person]?", "What is the first step towards talking with [identified person] about the [identified concern]?", "What will help you to get ready?", "What will make you feel ready to talk with [identified person]?", "What is the first step towards talking about the issue with [identified person]?". For unelaborated answers, use questions like "How will you do that? What exactly will you do?"

2. "What exactly do you want to say? For example, what are some of the exact words you might say, and what tone of voice will you use?"
   Follow-up questions: "What are the exact words you will say?", "How will you say it?", "What tone of voice will you use?", "How will you act?". For unelaborated answers, use questions like "How will you do that? What exactly will you do?"

3. "How do you want the other person to respond? For example, what do you want them to say or do, and what is their likeliest response?"
   Follow-up questions: "What exactly do you want them to say/do?", "What is their likeliest response?", "What outcome do you want from them?".

4. "How can you increase the chances that [identified person] responds how you want? For example, how exactly should you act to get them to respond in this way?"
   Follow-up questions: "What can you say or do to increase the chances they respond in the way you want?", "How exactly can the way you say or do things influence what happens?"

5. "How will you address any possible difficulties that might come up? For example, what could go wrong, and what can you do to minimise these problems?"

Follow-up questions: "What problems might there be?", "What specifically could go wrong?" "How will you prevent these problems?", "What can you do to minimise these problems?", "How can you have back-up plans?", "What will you do if the person does not respond to the first thing you say?", "What will you do next?". For unelaborated answers, use questions like "How will you do that? What exactly will you do?"

6. "How will you raise this [unresolved issue]? For example, what is the sequence you will follow: How will you lead up to this issue, and introduce it?"

Follow-up questions: "How do you raise this issue?", "What is your plan for raising this issue?", "How will you lead up to the issue?", "How will you introduce it?". For unelaborated answers, use questions like "How will you do that? What exactly will you do?"

7. "Where will you discuss it? For example, how will you decide where to do this, and where would you do it?"

Follow-up questions: "What would be a suitable place to do this?", "How do you decide where to do this", "What is your final choice for where it will be discussed?", "Can you commit to a place to do this?". For unelaborated answers, use questions like "How will you do that? What exactly will you do?"

8. "When will you discuss it? For example, how will you decide when to do this, and what time of day would you choose?"

Follow-up questions: "What would be the most suitable time to do this?" "How do you decide when to do this", "What is your final choice for where it will be discussed?", "What day would you do it?" "What time of the day would you do it?", "Can you commit to a particular date to do it?". For unelaborated answers, use questions like "How will I do that? What exactly will I do?"

Coding Protocol for Avoidance

Code on **three factors**, which represent **three justifications for avoidance, withdrawal, and inactivity**:

Avoidance because of Perceived Lack of Control – certainty that efforts will be fruitless and nothing will work.

> In other words, participants who talk about avoiding/failing to take action with the issue because they think that they have no control over the problem, nothing they would do would work effectively, etc.

Avoidance because of Reduced Sense of Responsibility – not my fault, not up to me, it's not my responsibility.

> In other words, participants who talk about avoiding/failing to take action with the issue because they don't feel responsible for the situation itself, or resolving the situation, or that it isn't any of their business, etc.

Avoidance because of Wish to Avoid Distress – avoiding it to reduce or avoid feeling upset.

> In other words, participants who talk about avoiding/failing to take action with the issue because they want to avoid a negative, unpleasant or uncomfortable outcome, either in terms of their own emotions, or general 'atmosphere' that they would find aversive.

All subscales are coded on a scale of 1 to 4, which represents that each factor is either:

1 – not demonstrated at all
2 – demonstrated slightly
3 – demonstrated moderately
4 – demonstrated a lot

NB: For all of the above, must remember to only code for *avoidance* that relates to the above three themes. So when coding, remember you are first identifying passages that seem avoidant, and then you are looking at them more closely to see what justification is given for that avoidance (i.e., which subscale it belongs to).

Don't code discussion of any of the themes if it doesn't specifically relate to avoidance. For instance, a participant may say that the situation might cause a negative emotional outcome, but if they don't talk about avoiding/failing to take action in relation to that, then it isn't coded as avoidance.

To give a specific example, take the following two statements: (i) "she'll probably react really badly"; (ii) "she'll probably react really badly, and that uncomfortable atmosphere really puts me off talking to her about it". Example (i) mentions a distress outcome that is relevant to the third subscale, but the statement stands alone and no avoidance is mentioned. Example (ii) mentions a distress outcome *and* the subsequent desire to avoid it happening, so only this example would be coded on the Avoid Distress subscale.

Exemplar from participant interview representing "Avoidance because of a Perceived Lack of Control":

> "I don't think he's the sort of person that would deal well with criticism. I don't think he'd build on that. Because I've tried telling him before, when I

was like... years ago, and he said "yeah, yeah", but then he didn't really do anything. He's the sort of person that makes promises, but doesn't keep them. So... I think it would just make it worse, or nothing would change. It'd just stay the same."

Exemplar from participant interview representing "Avoidance because of Reduced Sense of Responsibility":

"He's never been directly… arrogant to me, and he has, he has once, and… I guess I was assertive in the way that I just… I just walked out of the room really angrily, that was my reaction. But sometimes, he just does it with my friends, and you know, like… they're big children, you know, and they can, you know, they can stand up for themselves, it's not my job to do it for them."

Exemplar from participant interview representing "Avoidance because of Wish to Avoid Distress":

"I'm a quite polite person, and I don't enjoy conflict, so I haven't done anything yet because if it went wrong, not only would it make me look impolite, and horrible, but also, I'd have to cope with him when he lives only a door down from me. So it wouldn't be something that I could escape, it would be something that I had to face the consequences, all the time, for the rest of the year, which would wreck the rest of my life at university."