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Cognitive Flexibility amongst Angry Ruminators and the Effects of Angry Rumination on Interpersonal Problem Solving

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Overview

The thesis is comprised of three parts: the literature review, the empirical paper, and the critical appraisal. The first part, the literature review, explores whether the theory and research relating to depressive rumination can be applied to angry rumination. In particular, it asks whether angry rumination functions in the same way as depressive rumination, and whether it leads to the same negative consequences that have been found for depressive rumination. In order to explore these questions, the main research findings and theoretical accounts relating to depressive rumination are reviewed. Also, theory that suggests a similar, as well as a different, role for angry and depressive rumination is presented, and the small amount of experimental research that has been conducted on angry rumination is reviewed and discussed in light of this theory. The second part, the empirical paper, goes on to investigate whether the findings from two areas of the depressive rumination literature can be applied to angry rumination. More specifically, as depressive rumination has been found to be associated with an inflexible and perseverative cognitive style and lead to impairments in interpersonal problem solving, the empirical paper examines whether this is also true of angry rumination. Finally, the third part, the critical appraisal, explores the methodological and conceptual issues encountered during the process of conducting the research project. It focuses primarily on the difficulties involved in inducing anger and rumination, and measuring interpersonal problem solving. It also includes a reflection on what could have been done differently.

Table of Contents

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Part 1: Literature Review

Angry Rumination and its Relationship to Depressive Rumination: Can the Theory and Research Findings from the Depressive Rumination Literature be Applied to Anger?

1. Abstract

In recent years there has been increased interest in the role that rumination plays in psychological disorders. However, the majority of the research and theory has revolved around rumination in the context of a depressed mood. Whilst rumination has been theoretically linked to anger control problems, little research has been conducted into angry rumination. As a result, not much is known about the nature, process, functions, or consequences of angry rumination. Therefore, the question arises as to whether the theory and research relating to depressive rumination can be applied to anger. The aim of this paper will be to explore whether angry rumination functions in the same way as depressive rumination, and whether the findings from the depressive rumination literature can be applied to anger. The paper will begin by reviewing the main research findings relating to depressive rumination. The theoretical accounts that have been put forward to explain why people engage in depressive rumination will then be presented. Theory that supports a similar role for angry and depressive rumination will be explored, as well as theory that suggests that angry rumination may have different functions and consequences to depressive rumination. A review of the experimental research on angry rumination will then be conducted, as well as a discussion of how the findings relate to theory. The paper ends with suggestions for further research.

2. Introduction

Since Nolen-Hoeksema's (1991) Response Styles Theory, the role of rumination in depression has received a great deal of attention. Nolen-Hoeksema (1991) defined depressive rumination as thoughts and behaviours that focus the depressed individual's attention on his or her symptoms (e.g. how tired one feels) and the possible causes and consequences of those symptoms (e.g. not being able to get work done because of feeling unmotivated). In terms of its phenomenology, rumination has been described as an ongoing stream of thoughts that keeps the individual stuck dwelling on negative themes, such as past mistakes. It may take the form of "why" questions, such as "why me?" or "why do I feel like this?", and it is experienced by the person as involuntary, repetitive, persistent and distressing. It often escalates from an initial trigger to numerous problems and memories, and despite its distressing nature the individual often feels compelled to do it (Watkins, 2003).

Rumination is clinically significant because it has been given a central role in several theories of depression (e.g. Pyszczynski & Greenberg, 1987; Teasdale & Barnard, 1993). In addition to its importance within depression, rumination has also been implicated in a range of other psychological disorders (Ingram, 1990). For example, Watkins (2003) argued that rumination is an important feature in both anxiety and anger disorders. Also, Wells and Matthews (1994) proposed that rumination and worry are central to the maintenance of all emotional disorders because of their role in enhancing intrusive negative thinking and priming attention to self-focused and mood congruent

material (Simpson & Papageorgiou, 2003). However, despite its hypothesised role in other psychological disorders, rumination has primarily been formulated and investigated within the context of a depressed mood.

The aim of this paper will be to explore whether the theory and research findings relating to depressive rumination can be applied to anger. In particular, this paper will be asking whether rumination in the context of an angry mood functions in the same way as it does in a depressed mood, and whether it leads to the same negative consequences that have been found within the depressive rumination literature. To achieve this aim, the research and theory relating to depressive rumination will be reviewed. Literature that suggests a similar role for rumination in anger and depression will be presented, as well as any literature that indicates that rumination in anger may function in a different way to rumination in depression. The scant experimental evidence that has been conducted on rumination in the context of an angry mood will be reviewed and discussed in light of the literature. Finally, a number of possible directions for future research will be proposed.

3. Depressive Rumination

3.1. Nolen-Hoeksema's Response Styles Theory (1991)

The main premise of Nolen-Hoeksema's Response Styles Theory (1991) was that the way in which individuals typically respond to their depressed moods influences the

duration of these moods. More specifically, she hypothesised that individuals with a ruminative style of responding to depressed mood would have more prolonged periods of depressed mood. She defined this ruminative response style as a pattern of behaviours and thoughts that focus the individual's attention on his or her mood state and inhibit any actions that might distract the individual from this mood state. She characterised the ruminative response style as a behavioural attentional style, which she hypothesised was a stable, individual difference characteristic.

Nolen-Hoeksema (1991) proposed three mechanisms by which a ruminative response style may influence the duration of depression. Firstly, she hypothesised that ruminative responses allow depressed mood to influence thinking. Several theorists have proposed that one way depression is maintained is by its effects on information processing, in that a vicious cycle develops in which depressed mood leads to negative attributions and self-evaluations, which, in turn, leads to further depressed mood (e.g. Blaney, 1986; Ingram, 1984; Teasdale, 1983). Nolen-Hoeksema (1991) hypothesised that when individuals engage in ruminative responses to depressed mood they may be more likely to fall into this vicious cycle. Secondly, she proposed that a ruminative response style may interfere with instrumental behaviour, in that individuals who ruminate may not engage in behaviours that provide positive reinforcement and a sense of control in one's environment, which, in turn, may contribute to learned helplessness (Seligman, 1975) and increased depression. Also, failures that result from these difficulties in engaging in instrumental behaviour may lead to lowered expectations for future success and decreased motivation. Finally, Nolen-Hoeksema (1991) suggested that rumination may

interfere with effective problem solving because it makes negative cognitions more accessible and impedes the initiation of positive behaviours. The resulting difficulties in problem solving may then help to maintain the depressed mood.

3.2. Review of Research on Depressive Rumination

Since the introduction of the Response Styles Theory (Nolen-Hoeksema, 1991), an extensive body of research has been generated by Nolen-Hoeksema and her colleagues into the role of rumination in depression. This research has consistently provided support for the Response Styles Theory, and its main findings will be summarised below.

3.2.1. Prospective Studies

A number of prospective studies have been conducted that have shown that a ruminative response style predicts the onset of depressive symptoms or episodes. For example, Just and Alloy (1997) found that, amongst non-depressed participants, those who reported ruminating in response to their depressive symptoms were more likely to experience a depressive episode over a period of 18 months than participants who reported that they distract themselves from their symptoms. In this study, a ruminative response style was also found to predict the severity of the depressive episode. Similarly, Nolen-Hoeksema and Morrow (1991a) found that the presence of a ruminative response style predicted depressive symptoms in college students 7 weeks

after an earthquake, even after controlling for initial levels of depression. A ruminative response style has also been found to predict the severity of depression. In addition to the Just and Alloy (1997) study quoted above, Nolen-Hoeksema, Parker and Larson (1994) found that amongst people who were bereaved, those who tended to ruminate about their depressive symptoms one month after their loss were more severely depressed six months after their loss compared to bereaved people who did not tend to ruminate. This relationship held after controlling for initial levels of depressive symptoms, amount of social support, stress and gender. Finally, rumination has been found to predict the duration of a depressive episode (e.g. Nolen-Hoeksema, Morrow & Fredrickson, 1993). Nolen-Hoeksema et al. (1993) asked participants to monitor their moods and their responses to their moods for 30 days. They found that the more participants engaged in ruminative responses to their depressed moods, the longer were their periods of depressed moods, even after taking into account the initial severity of the mood.

With the exception of the Just and Alloy (1997) study, the studies cited above examined the role of rumination in predicting depressive symptoms. However, two studies have also found that rumination predicts clinical levels of depression. Kuehner and Weber (1999) found that amongst a sample of clinically depressed participants, rumination predicted future levels of depression, even when baseline levels of depression were accounted for. Also, amongst a sub-sample of patients, rumination predicted the presence of a major depressive episode at three-month follow-up. In addition, Nolen-

Hoeksema (2000) found that a ruminative response style predicted major depressive disorders, including new onsets of depressive episodes, at one-year follow-up.

3.2.2. Experimental Studies

A series of experimental studies have also been conducted by Nolen-Hoeksema and her colleagues, in which rumination has been compared with another mood regulation strategy, distraction. In these studies, dysphoric and non-dysphoric participants were induced to ruminate or distract. The results of these studies indicated that rumination in the presence of a dysphoric mood has negative consequences for mood, thinking and interpersonal problem solving.

Mood:

Amongst dysphoric participants, compared to a distraction manipulation, a rumination manipulation has been found to exacerbate or elevate dysphoric mood (e.g. Lyubomirsky, Caldwell & Nolen-Hoeksema, 1998; Lyubomirsky & Nolen-Hoeksema, 1993, 1995; Nolen-Hoeksema & Morrow, 1993). For example, Nolen-Hoeksema and Morrow (1993) assigned moderately depressed and non-depressed participants to either a rumination or distraction task. For the moderately depressed participants, the rumination manipulation significantly increased depressed mood and the distraction manipulation significantly decreased depressed mood. Neither manipulation had significant effects on the mood of the non-depressed participants.

Cognitive Distortions and Negative Thinking:

Rumination in the presence of a dysphoric mood has been found to increase cognitive distortions and negative thinking (e.g. Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky, Tucker, Caldwell & Berg, 1999). Lyubomirsky and Nolen-Hoeksema (1995) found that dysphoric participants who ruminated selected significantly more negatively distorted interpretations of hypothetical problematic events on the CBQ (Cognitive Bias Questionnaire; Krantz & Hammen, 1979) and significantly fewer non-depressed and non-distorted responses than the other three groups of participants (i.e. dysphoric distractors and non-dysphoric ruminators and distractors). Also, dysphoric ruminators made significantly more pessimistic attributions for the negative hypothetical situations (i.e. high stability, internality, and globality) than the other three groups. Therefore, dysphoric ruminators gave more negatively biased interpretations of events and offered more pessimistic attributions for events than dysphoric distractors. Given that previous studies have found that negatively distorted thinking and pessimistic attributions can maintain and exacerbate dysphoria (e.g. Abramson, Metalsky & Alloy, 1989; Peterson & Seligman, 1984; Sweeney, Anderson & Bailey, 1986), the authors of this study suggested that one reason people who ruminate when dysphoric remain dysphoric for longer is that they are more likely to be engaging in negative, distorted thinking than people who distract.

Lyubomirsky and Nolen-Hoeksema (1995) also found that rumination in the presence of a dysphoric mood led to reduced expectations of the likelihood of future positive events. Dysphoric ruminators listed the same number of happy events that might happen

to them in their future as the other three groups of participants. However, the dysphoric participants who ruminated rated these events as being significantly less likely to happen to them in their future compared to the other three groups. This suggests that whilst dysphoric ruminators do not differ from others in terms of their goals for the future, they have lower expectations of being able to attain these goals.

Negative Autobiographical Memories:

Rumination has been found to increase the accessibility of negative autobiographical memories (Lyubomirsky et al., 1998; Pyszczynski, Hamilton, Herring & Greenberg, 1989). Lyubomirsky et al. (1998) found that rumination in the context of a depressed mood led students to retrieve more negative memories from their past and recall negative events (e.g. "my parents punished me unfairly") as having occurred more frequently in their lives than positive events. Similarly, Pyszczynski et al. (1989) found that dysphoric participants who were induced to focus on themselves retrieved more negative events from their past than participants who were induced to focus externally. These authors suggest that rumination may increase the recall of negative memories by simply drawing one's attention to the negative memories that have been made accessible by the depressed mood.

Interpersonal Problem Solving:

Dysphoric rumination has been shown to interfere with effective interpersonal problem solving (Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky et al., 1999; Watkins & Baracaia, 2002). For example, Lyubomirsky and Nolen-Hoeksema (1995) found that

dysphoric participants who were induced to ruminate on their feelings generated less effective solutions to interpersonal problems on the MEPS (Means-Ends Problem-Solving Procedure; Platt & Spivack, 1975) than non-dysphoric participants or dysphoric participants induced to distract. They hypothesised that whilst negative mood activates negative thinking, self-focused rumination brings these types of thoughts to the individual's attention and allows them to interfere with their interpretations of current events, which, in turn, impairs their ability to find effective solutions to their problems.

Lyubomirsky et al. (1999) also examined the effects of dysphoric rumination on interpersonal problem solving. They found that dysphoric ruminators rated their problems as more severe and less solvable than dysphoric distractors and the non-dysphoric participants. However, independent judges did not rate their problems as being any worse than those of the other participants. Also, whilst they found that there were no differences amongst the groups in terms of their confidence in the effectiveness of their solutions, dysphoric ruminators rated themselves as significantly less likely to implement their solutions that the other three groups. They also looked at the content of participants' thoughts and found that dysphoric ruminators' thoughts had a more negative tone, were more problem-focused, self-blaming and self-critical, and were less confident, less optimistic, and had less perceived control than the other three groups. In addition, they found that dysphoric ruminators produced significantly less effective solutions to problems on the MEPS than the other three groups. Finally, Lyubomirsky et al. (1999) found that problem solving effectiveness was significantly correlated with the content of participants' negative thinking, in that it was associated with diminished

negative tone, less focusing on one's problems and feelings, less self-criticism, as well as increased self-confidence and perceived control. From these results, the authors concluded that rumination interferes with all three stages of problem solving (i.e. definition or appraisal of the problem, generation of alternative solutions and implementation; D'Zurilla & Goldfried, 1971), in that rumination led to biased appraisals of problems, less effective solutions to problems, and a reduced willingness to implement the solutions.

3.3. Spreading Activation or Associative Network Theories

Spreading activation or associative network theories of mood (e.g. Bower, 1981; Clark & Isen, 1981; Ingram, 1984; Teasdale, 1983) have been used by Nolen-Hoeksema and her colleagues (e.g. Lyubomirsky & Nolen-Hoeksema, 1995) to explain the effects of rumination and distraction on negative mood that were presented above. In these theories, emotions organise information stored in semantic networks in memory. Each emotion is believed to act as a central organising node that links together causally related information (Rusting & Nolen-Hoeksema, 1998). When an emotion is triggered, other associated information in the network (e.g. memories, beliefs, schemas, action tendencies, and physiological responses) will also be activated, thus prolonging or augmenting the emotion. Therefore, according to these theories, a depressed mood will trigger the activation of a network of negative beliefs, memories and schemas, which will then lead to an intensification of the depressed mood. A number of studies have found support for these theories, in that they demonstrated that negative moods

selectively prime mood congruent material (e.g. Bower, 1981; Clark & Teasdale, 1982; Krantz & Hammen, 1979; Teasdale, 1983, 1985). However, the research literature has not found consistent support for spreading activation theories. For example, several studies have found that whilst positive affect facilitated the recall of positively valenced material, negative affect failed to produce a similar result with negatively valenced material (e.g. Brown & Taylor, 1986; Gerrig & Bower, 1982; Mischel, Ebbesen & Zeiss, 1976)

Nolen-Hoeskema and her colleagues (e.g. Lyubomirsky & Nolen-Hoeksema, 1995) hypothesised that rumination enhances the effects of depressed mood on negative thinking, in that by drawing attention to one's depressed mood and symptoms, rumination increases the likelihood that the network of negatively biased thoughts, memories and schemas will be activated. Further, rumination is hypothesised to bring the negative thoughts and memories that were activated by the depressed mood to the attention of the person and allow them to affect the individual's judgment and interpretation of current events. In turn, these negative thoughts, interpretations, and memories are believed to exacerbate the depressed mood, thus leading to the vicious cycle between depressed mood and thinking described by Teasdale (1985). Rumination's negative effects on thinking are also proposed to impair the depressed individual's ability to come up with effective solutions to their problems by, for example, leading to biased appraisals of their problems. Ineffective problem solving may then lead to more negative life events and stress, which may help to maintain depressed mood.

3.4. Critiques of Nolen-Hoeksema and Colleagues' Findings

Whilst the role of rumination as a key process in the onset and maintenance of depression has been well supported in the literature, some theorists have recently begun to query the way that rumination has been conceptualised and measured by Nolen-Hoeksema and her colleagues. In particular, a number of theorists have expressed reservations about the construct validity and clinical utility of the main tool used to measure rumination, the RSQ (Response Styles Questionnaire; Nolen-Hoeksema & Morrow, 1991b). For example, Kasch, Klein and Lara (2001) found that rumination, as measured by the Ruminative Response Scale of the RSQ, was not stable over a six-month period and was closely related to the severity of the depressive episode and other similar concepts (i.e. negative affectivity, emotion-focused coping and self-criticism). Further, they found that rumination was only minimally predictive of the six-month course and outcome of depression, whereas negative affectivity and self-criticism exhibited significant associations with the course of depression. Similarly, Spasojevic and Alloy (2001) found that rumination mediated the relationship between negative cognitive style, self-criticism and history of depression and the number of prospective episodes of major depression. Therefore, they argued that rumination may be a mechanism through which other vulnerability factors affect depression.

Several other studies have also addressed this issue of rumination (as measured by the RSQ) being confounded with the levels or severity of depression. For example, Bagby and Parker (2001) conducted a factor analysis on the RSQ and found three factors:

distraction, symptom-focused rumination and self-focused rumination. They argued that the RSQ may be measuring two different types of rumination, in that self-focused rumination may be a more trait-like construct that could occur in the absence of a depressed mood, whereas symptom-focused rumination requires the presence of depressive symptoms and may therefore be linked to the severity of depressed mood. A recent study by Treynor, Gonzalez and Nolen-Hoeksema (2003) attempted to address this potential problem of a component of the Ruminative Response Scale (RRS) being confounded with the symptoms of depression. They removed the symptom related items on the RRS and found two factors that were differentially associated with concurrent and long-term severity of depression. The 'reflective' component was associated with higher current but lower long-term severity of depression, whilst the 'brooding' component was associated with both higher current and long-term severity. They argued that 'reflection' may be triggered by negative affect or result in negative affect in the short-term, but may actually be adaptive in reducing negative affect in the long-run, possibly because it leads to effective problem solving.

In addition to the concerns raised above regarding the RSQ, theorists have also argued that there may be problems with how rumination has been conceptualised by Nolen-Hoeksema and her colleagues. Watkins (2004) argued that despite the consistent findings that rumination leads to detrimental consequences, focusing on depressed mood can also lead to adaptive outcomes. In particular, he proposed that prolonged focus on negative emotional material is necessary for successful emotional processing (e.g. Hunt, 1998), and can lead to greater self-regulation (Carver & Scheier, 1990) and

self-knowledge (Watkins, 2004). In order to reconcile these contradictory views of rumination, Watkins (2004) argued that it was important to attend to the precise way in which people focus on themselves, because different styles of self-focus can lead to different consequences (McFarland & Buehler, 1998; Teasdale, 1999). Indeed, numerous studies have indicated that there are different modes of self-focused attention, which each have distinct functional properties (McFarland & Buehler, 1998; Trapnell & Campbell, 1999; Treynor et al., 2003; Watkins, 2004; Watkins & Baracaia, 2002; Watkins & Teasdale, 2001). For example, Trapnell and Campbell (1999) argued that the private self-consciousness construct may be comprised of two different types of self-awareness: reflective self-focus and ruminative self-focus. They found that reflective self-focus was motivated by epistemic curiosity and was correlated with openness-to-experience. In contrast, ruminative self-focus was found to be motivated by perceived losses and threats to the self and was correlated with neuroticism.

Watkins (2004) found support for his hypothesis that different styles of rumination have disparate effects on emotional processing. He asked participants to write about the experience of taking a test they had been induced to fail. One group was asked to write about the experience in a conceptual-evaluative mode (e.g. write about why they feel as they do and why they performed as they did), which involved a more analytical and evaluative way of thinking about the self. The other group was asked to write in an experiential mode (e.g. write about how you feel and how you attempted the test), which focused on a non-evaluative, experiential awareness of experience in the moment. Watkins (2004) found that amongst high ruminators a "how" (or experiential)

style of self-focus improved emotional processing (i.e. lead to a faster recovery from the negative mood). He also found that the conceptual-evaluative mode led to poorer emotional processing, especially as levels of trait rumination increased. The findings from the Treynor et al. (2003) study mentioned above seem to be consistent with these results. Given that the 'reflective' component was associated with higher concurrent but lower long-term severity of depressed mood, it may be that it facilitated emotional processing in a similar way to the experiential mode of processing employed in this study. Similarly, the 'brooding' component, with its long-term negative outcomes for depression severity, may impede emotional processing, as was found to be the case for the conceptual-evaluative mode in this study.

Watkins and Baracaia (2002) also found that different styles of rumination had distinct consequences for interpersonal problem solving. In this study, currently depressed, recovered depressed and never depressed participants were asked to complete the MEPS (Platt & Spivack, 1975), whilst simultaneously thinking about questions in a conceptual-evaluative mode (e.g. focus on why you have a problem), an experiential mode (e.g. focus on how you decide to solve a problem), or a no question control. In the control condition, the currently depressed group was significantly impaired at interpersonal problem solving compared to the other two groups, who did not differ from one another. However, thinking about questions in an experiential mode significantly improved interpersonal problem solving in currently depressed participants. Also, having to think about questions in a conceptual-evaluative mode significantly impaired problem solving in the recovered depressed group, despite the

fact that they did not differ from never depressed participants in the no question control. Therefore, these studies suggest that a more abstract, conceptual-evaluative ("why") style of rumination compared to a more concrete, experiential ("how") style leads to poorer problem solving and impaired emotional processing.

3.5. Theories of Depressive Rumination

Given the largely negative consequences that have been found for engaging in depressive rumination, it becomes important to understand why people respond to their depressed mood by ruminating. A number of theories have been put forward to explain why people engage in depressive rumination and they will be presented below.

3.5.1. Developmental Account (Nolen-Hoeksema, 1991)

Nolen-Hoeksema (1991) hypothesised that parents influence the development of their children's styles of responding to negative mood. In particular, she proposed that children who feel little control over their environment and who have not been taught more adaptive, active ways of dealing with negative affect will be particularly prone to developing a ruminative response style. As evidence for this hypothesis, Nolen-Hoeksema (1991) cited the Nolen-Hoeksema, Wolfson, Mumme and Guskin (1990) study, which found that the way in which mothers responded to their children when they were frustrated predicted the children's ability to problem solve and regulate their affect. In particular, they found that mothers who were intrusive and therefore did not

allow their children to learn how to solve their own problems, who did not teach their children to try different approaches to solving a problem, and who were unsupportive and critical when their children failed had children with poorer problem solving skills and a greater tendency to respond to negative affect by becoming helpless and passive. Dweck (1998) found that children who tend to become helpless in the face of frustration are more likely to engage in rumination. Therefore, according to this account, parents who are overprotective and rejecting provide children with little opportunity to learn and try out different ways of coping with low mood or to develop a sense of mastery over their environment, which leads to the development of a passive, ruminative style of responding to their low mood, and which, in turn, increases their risk of becoming depressed in the future.

In support of this account, numerous studies have found that depressed people consistently report that they were raised by over-intrusive, over-controlling, authoritarian and rejecting parents (e.g. Barber, 1996; Burbach & Bourduin, 1986; Gerlsma, Emmelkamp & Arrindell, 1990). Also, Spasojevic and Alloy (2002) found that reports of over-controlling parenting were significantly related to participants' scores on the Ruminative Response Scale of the RSQ. They also demonstrated that rumination fully mediated the relationship between over-controlling parenting and the number of major depressive episodes experienced by the participants during the follow-up period. However, these studies have relied upon retrospective accounts, which may be subject to biases and inaccuracies in recall. Longitudinal studies are needed in order to elucidate the developmental antecedents of ruminative response styles.

3.5.2. Goal Discrepancy Account (Carver & Scheier, 1990; Martin & Tesser, 1996; Pyszczynski & Greenberg, 1987)

These are self-regulatory models in which discrepancies between goal states and actual states are hypothesised to result in processing in order to resolve the discrepancies. In these accounts, rumination is seen as recurring thoughts that focus on the self and on problems in an attempt to reach goal states (Martin & Tesser, 1996). Further, Martin and Tesser (1996) argued that rumination is generally adaptive in helping individuals to solve their problems. Similarly, Carver and Scheier (1990) conceptualised ruminative self-focus as part of a self-regulatory negative feedback cycle, which functions to keep individuals on track in pursuit of important goals. In this model, when a goal or behavioural standard is salient the individual compares their current state with that standard. If they have met or exceeded the standard then they exit the cycle and cease to self-focus. However, if they fall short of the standard, they will engage in behaviour that is aimed at bringing them closer to their goal. If the individual is unlikely to reach their goal, they will typically experience negative affect and will disengage from the goal. Carver and Scheier (1990) argued that an individual's ability to disengage from unobtainable goals is an important part of normal self-regulation because it allows the person to pursue alternative goals. However, if the person is unable to disengage from the goal because it is very important to the person or central to how they view themselves, this self-regulatory process gets stuck in a loop. This, in turn, leads to

unhelpful rumination on the negative feelings that arise from being unable to let go of something unattainable, which results in depression.

Consistent with these models, rumination has been found to be prompted by discrepancies in goal progress, especially for goals seen as being central to personal well-being (Martin & Tesser, 1996; Millar, Tesser & Millar, 1988). Also, McIntosh and Martin (1992) found that people who link lower-order goals (e.g. appearance) to higher-order goals (e.g. happiness) experience more rumination and negative affect when their lower-order goals are not attained. Whilst these models have good explanatory power for depressive episodes that are triggered by a disruption in progress towards an important goal (e.g. loss of a job), they may be less able to explain episodes that do not appear to be precipitated by an external stressor.

3.5.3. Behavioural Activation Account (Martell, Addis & Jacobson, 2001)

In this model, the focus is on the context in which depression occurs. This approach emphasises the need to look at the function and consequences of thoughts and behaviours associated with depression, rather than their content. It focuses on the environmental factors that might be connected with the individual's depression and how the individual's responses to those environmental factors might be maintaining their depressed mood. Ferster (1973) hypothesised that escape and avoidance are key motivating goals in depression, and that many behaviours seen in depression (e.g. inactivity, withdrawal and inertia) may serve this function. These avoidance behaviours

provide temporary relief (i.e. escape from aversive environments), but, in the long run, they deny people access to sources of positive reinforcement. Therefore, in this account, rumination must also be viewed in terms of its function and consequences within the context that it occurs. As with other behaviours associated with depression, rumination is hypothesised to function as a means of avoiding aversive experiences. For example, like worry, rumination has been proposed to function as a means of cognitive avoidance (Borkovec, Ray & Stober, 1998), in that thinking in an analytical way about why things have gone wrong allows one to avoid the distress associated with detailed memories of painful past events. Rumination may also function to keep the person safe from taking risks and failing. Therefore, in this theory, rumination is viewed as a part of a set of unhelpful escape and avoidance behaviours that have been negatively reinforced in the past by reducing distress.

Whilst the hypothesis that worry functions as a means of cognitive avoidance has received experimental support (e.g. Borkovec & Hu, 1990; Borkovec & Inz, 1990; Borkovec, Lyonfields, Wiser, & Diehl, 1993; Vrana, Cuthbert, & Lang, 1986), there has been no corresponding research conducted into whether rumination also functions in this way. However, given that both rumination and worry are forms of abstract verbal thought, which has been shown in the case of worry to suppress somatic responses to aversive images (e.g. Borkovec & Hu, 1990; Borkovec et al., 1993; Vrana et al., 1986), it is plausible that rumination, like worry, is also negatively reinforced by its capacity to diminish such somatic responses. Whilst this model has not received any experimental attention with regards to rumination, it has a great deal of clinical utility, in that it

encourages clinicians to determine the functions and consequences of rumination for each individual client through conducting a functional analysis.

3.5.4. Meta-Cognitive Account (Papageorgiou & Wells, 2001; Watkins & Baracaia, 2001)

Wells and Matthews (1994) proposed a meta-cognitive model of emotional disorders, in which perseverative negative thinking, such as rumination and worry, is maintained by meta-cognitive beliefs about the functions and consequences of such thinking (Papageorgiou & Wells, 2001). In this model, rumination is hypothesised to be underpinned by both positive and negative meta-cognitive beliefs. Positive meta-cognitive beliefs about rumination (e.g. "rumination will help me understand my situation better") are proposed to increase the likelihood that individuals will adopt rumination as a means of coping with their low mood. However, once rumination has begun, negative meta-cognitive beliefs about rumination (e.g. "I can't control my rumination") also arise, which is hypothesised to lead to rumination about rumination and increased negative mood.

In support of this model, Papageorgiou and Wells (2001) found that depressed participants reported both positive and negative beliefs about rumination. The advantages they gave for rumination, such as to find answers to their depression, to understand past mistakes and failures, and to find causes for their depression, all reflected themes concerning the use of rumination as a coping strategy. The

disadvantages of rumination reflected themes of uncontrollability and harm and negative interpersonal consequences of rumination. In addition, Watkins and Baracaia (2001) found that high levels of self-reported rumination were correlated with high levels of endorsements of the advantages of rumination. Similarly, Papageorgiou and Wells (2003) found that both positive and negative beliefs about rumination were significantly positively correlated with both rumination and depression. However, these studies have utilised small sample sizes and have not demonstrated a causal role for meta-cognitive beliefs in rumination.

3.6. Summary

Since the advent of Nolen-Hoeksema's (1991) Response Styles Theory, a great deal of research has been conducted into the role of rumination in depression. This research has found that the presence of a ruminative response style predicts the onset, severity and duration of depressive episodes (Just & Alloy, 1997; Nolen-Hoeksema & Morrow 1991a; Nolen-Hoeksema et al., 1993; Nolen-Hoeksema et al., 1994). Experimental studies have also demonstrated that compared to distraction, rumination increases dysphoric mood (Lyubomirsky et al., 1998; Lyubomirsky & Nolen-Hoeksema, 1993, 1995; Nolen-Hoeksema & Morrow, 1993), cognitive distortions and negative thinking (e.g. Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky et al., 1999), accessibility of negative autobiographical memories (Lyubomirsky et al., 1998; Pyszczynski et al., 1989), and interferes with effective interpersonal problem solving (Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky et al., 1999; Watkins & Baracaia, 2002).

However, recent evidence (e.g. Bagby & Parker, 2001; Treynor et al., 2003; Watkins, 2004; Watkins & Baracaia, 2002) suggests that the consequences of rumination in depression depend upon the specific form it takes. In particular, the work by Watkins (e.g. Watkins, 2004; Watkins & Baracaia, 2002) indicates that an abstract or "why" form of rumination inhibits emotional processing and effective interpersonal problem solving, whilst an experiential or "how" form of rumination enhances these processes. Several models have been put forward to explain why people engage in depressive rumination, and they have all received some degree of experimental support, which makes it difficult to make decisions about their respective validity. However, these models may represent different levels of explanation and, as such, may not be mutually exclusive. For example, both the developmental and meta-cognitive accounts attempt to explain why rumination develops, whilst the goal discrepancy and behavioural activation accounts discuss the possible mechanisms through which rumination is maintained.

4. Angry Rumination

4.1. Anger and Angry Rumination

Despite it being a central feature of human existence, we know little about anger compared to the extensive knowledge that has been accumulated on other emotions, such as anxiety and sadness (Norlander & Eckhardt, 2005). Anger is under-researched and often not well defined in research literature (DiGiuseppe, Tafrate & Eckhardt, 1994;

Eckhardt, Barbour & Stuart, 1997; Eckhardt & Deffenbacher, 1995). The dearth of research into anger partly reflects the difficulty in studying people with anger problems, in that whilst anger is included as a symptom of several DSM-IV disorders (Diagnostic and Statistical Manual – Fourth Edition; American Psychiatric Association, 1994), such as Borderline Personality Disorder and Posttraumatic Stress Disorder, there are no formal diagnostic categories for defining an 'anger problem', nor are there any accepted criteria for studying people with 'anger disorders' (Eckhardt & Deffenbacher, 1995; Novaco, 1985). Also, due to ethical constraints, researchers are limited in the extent they can make participants angry in controlled laboratory conditions (Baumeister, Stillwell & Wotman, 1990). As a result, the quality and quantity of basic research on anger has been lacking despite a clear need to understand the causes and consequences of anger. In terms of its clinical relevance, Edmondson and Conger (1996) have reported that clients seeking therapy often present with angry feelings as a part of their clinical picture. Also, anger problems frequently cause concern because of their links to aggressive and violent impulses and acts (Howells, 1998; Novaco, 1997). In addition, anger has been associated with impaired physiological functioning and cardiovascular damage (e.g. Blascovich & Katkin, 1993; Siegman, 1994).

Angry rumination is generally considered to be a relatively independent component of the broader anger phenomenology (Sukhodolsky, Golub & Cromwell, 2001). Sukhodolsky et al. (2001) defined angry rumination as the tendency to engage in unintentional reoccurring thoughts about anger episodes. They concluded that the construct of angry rumination included three different processes: memories of past

anger episodes, attention to immediate anger-provoking experiences, and counterfactual thinking about anger events. Counterfactual thinking refers to thought content that is at variance with actual events, such as thinking that an anger experience should not have happened (Roese, 1997; Roese & Olson, 1995). Angry rumination, like anger, has received very little experimental attention, despite the fact that it has been implicated in the maintenance of anger-control problems (Beck, 1976; Ellis, 1977; Novaco, 1975). Also, rumination on anger experiences and the associated emotion has been linked to the development of aggression (Averill, 1983; Spielberger, 1988).

Despite this hypothesised link between angry rumination and anger-control problems, not much is known about the nature, process, functions or consequences of angry rumination. In the literature, rumination has largely been treated as a unitary concept that occurs across a range of psychological disorders, such as depression, anxiety, and anger (e.g. Ingram, 1990; Watkins, 2003; Wells & Matthews, 1994), and little attention has been paid to whether rumination functions in the same way across these different disorders. However, as most of the research into rumination has been conducted in the context of a depressed mood, it is difficult to know whether the findings are applicable to rumination in the context of other mood states or whether they are only specific to rumination in depression. The following two sections of this paper will explore whether rumination in the context of an angry mood functions in the same way as in a depressed mood, and whether the findings from the depressive rumination literature can be applied to anger.

4.2. Theories that Suggest a Similar Role for Angry and Depressive Rumination

Given that rumination has been regarded as occurring uniformly across a range of negative moods, angry rumination might be expected to have similar functions and consequences to depressive rumination. In particular, it might be predicted that angry rumination would lead to similar negative consequences for mood, thinking and interpersonal problem solving that have been found to result from depressive rumination. In order to explore these possibilities, literature that suggests a similar role and consequences for angry and depressive rumination will be discussed below.

4.2.1. Associative Network Account

Rusting and Nolen-Hoeksema (1998) argued that associative network theories predict that any type of mood state activates mood-congruent cognitions and memories, which prolong or increase the mood. Rumination on the negative mood is hypothesised to enhance spreading activation in the associative network, thus exacerbating the negative mood. In contrast, distraction is believed to interrupt spreading activation, thereby allowing the emotion to abate. Therefore, according to associative network theories, the pattern of effects that rumination and distraction has on anger should be the same as their effects on depression. In particular, rumination in the context of an angry mood should enhance and prolong anger state in the same way that depressive rumination increases and maintains depressed mood. Studies of anger based upon the associative network approach have generated some evidence for the first part of this account, in that

they have found that angry mood does indeed lead to an increased availability of angry thoughts and memories (Laird, Cuniff, Sheehan, Shulman & Strum, 1989; Laird, Wagener, Halal & Szegda, 1982; Nasby & Yando, 1982). For example, Nasby and Yando (1982) found that an angry mood facilitated the processing of emotionally upsetting material and inhibited the processing of pleasant material. Given that angry mood has been found to increase the accessibility of angry thoughts and memories, anything that focuses attention on the angry mood, such as rumination, should enhance this process, thus resulting in more intense and prolonged anger.

Therefore, according to the associative network account, rumination in the context of an angry mood may function in a similar way to depressive rumination, in that they both involve focusing attention on the negative mood and the causes and consequences of the negative mood, which is hypothesised to result in the prolongation of the mood (Rusting & Nolen-Hoeksema, 1998). Rusting and Nolen-Hoeksema (1998) also argued that anger-prone individuals may be especially likely to ruminate in response to angry events, and that this rumination is likely to strengthen angry associations in memory, which might enhance their predisposition to experience further anger, thus setting up a vicious cycle that is difficult to escape. It is also possible that, like depressive rumination, angry rumination directs the individual's attention to the products of spreading activation (i.e. angry memories and thoughts) and allows them to influence the individual's judgment and behaviour. If this were the case, angry rumination would be expected to increase biased or distorted thinking and to interfere with effective

interpersonal problem solving, as has been found to be the case with depressive rumination.

Biased or Distorted Thinking:

Problems with excessive levels of anger have been theoretically and empirically linked to the presence of cognitive distortions (e.g. Beck, 1976; Berkowitz, 1993; Eckhardt & Deffenbacher, 1995; Ellis, 1977). Numerous studies have found a moderate but significant overlap in measures of self-reported anger and irrational ideation across a range of participants, such as undergraduates, violent prisoners, and clinical outpatients (e.g. Ford, 1990; Hazaleus & Deffenbacher, 1985; Kassinove & Eckhardt, 1994; Mizes, Morgan & Buder, 1990; Zwemer & Deffenbacher, 1984). Cognitive distortions have also been studied in maritally violent men. For example, Holtzworth-Munroe and Hutchinson (1993) found that maritally violent men were more likely than non-violent controls to attribute the cause of hypothetical marital conflicts to the hostile intentions of their wives. In addition, Eckhardt, Barbour and Davison (1998) found that, when angered, maritally violent men emitted significantly more total irrational beliefs and demandingness statements than non-violent controls. They also articulated significantly more cognitive distortions, such as overgeneralisation, dichotomous thinking, arbitrary inference and magnification. These results were replicated by Eckhardt and Jamison (2002) with men who engaged in dating violence. Also, these studies found that the cognitive distortions were only apparent when the participants were angered. This is consistent with associative network theories, in which anger arousal is necessary in order to activate cognitive networks. Whilst unproven, it is possible that, like depressive

rumination, angry rumination may enhance the effects of angry mood on thinking, in that it may draw the individual's attention to the angry and distorted cognitions and allow them to affect the individual's judgment and interpretation of current events.

Interpersonal Problem Solving:

Numerous studies have found evidence of a link between both anger and aggression and deficiencies in interpersonal problem solving. For example, aggressive children and adolescents have been found to generate fewer alternative solutions to interpersonal problems compared to their more pro-social peers, and the solutions they produce are more aggressive and less effective (e.g. Asarnow & Callan, 1985; Lochman & Lampron, 1986; Richard & Dodge, 1982). Several studies have also found evidence for this link in adults (e.g. Basquill, Nezu, Nezu, & Klein, 2004; D'Zurilla, Chang & Sanna, 2003; McMurran, Blair & Egan, 2002; Tescher, Conger, Edmondson & Conger, 1999). For example, D'Zurilla et al. (2003) found that amongst college students poor social problem solving was a significant predictor of subsequent aggression. Also, all three dysfunctional problem solving dimensions on the SPSI-R (Social Problem-Solving Inventory-Revised; D'Zurilla, Nezu & Maydeu-Olivares, 2001) were positively correlated with both anger and hostility. In addition, Tescher et al. (1999) found that high-anger prone participants had poorer social skills than low anger prone individuals. Similarly, numerous studies have demonstrated that maritally violent men have deficits in interpersonal problem solving. For example, Holtzworth-Munroe and Anglin (1991) found that maritally violent men offered the fewest competent solutions compared to control groups for hypothetical conflict situations. Also, Dutton and Browning (1988)

found that maritally violent men's coping responses involved less constructive reasoning and more verbal and physical aggression than controls. Finally, Eckhardt and Kassinove (1998) found that maritally violent men were significantly less likely than non-violent men to spontaneously articulate anger-controlling statements during anger arousal.

Given these findings, it is possible that rumination in the context of an angry mood may have a role to play in interfering with effective interpersonal problem solving. It is possible to hypothesise that, like depressive rumination, the effects of angry rumination on thinking (i.e. increased accessibility of angry, distorted cognitions) may bias the individual's interpretation of current events and impair their ability to generate effective solutions to their problems. Incorporating the findings from above, angry rumination may decrease the likelihood that individuals will use anger-controlling statements, interfere with their ability to generate competent solutions to their problems, and increase the likelihood of their choosing an aggressive response.

4.2.2. Theories that are Consistent with the Associative Network Account

Several other theories make predictions about the consequences of angry rumination that are consistent with those of the associative network account. In particular, they propose that angry rumination enhances and maintains anger state. For example, Tice and Baumeister (1993) argued that if a person focuses their attention on the anger provoking event, it may be relatively easy to control their anger. However, if the

individual ruminates, they may uncover additional implications to the offence and recall similar past grievances, which may help to place the incident in a broader context of injustice. This provides the individual with more information to dwell on and it increases the likelihood that anger will be prolonged and enhanced. In support of this, Baumeister et al. (1990) found that angry people link anger experiences into more lasting associative networks compared to the people who offended them, in that angry victims' accounts of anger events involved multiple provocations, long-term negative consequences, relationship damage and other signs of the event being connected to broader contexts. Also consistent with the associative network account, Sukhodolsky et al. (2001) proposed that the three processes that comprise angry rumination (i.e. memories of past anger episodes, attention to immediate anger-provoking experiences, and counterfactual thinking about anger events) function to maintain and augment anger. In particular, they argued that memories of past anger episodes trigger new episodes of anger, attention to anger experiences amplifies its intensity and duration, and counterfactual thinking increases action tendencies towards resolution or retaliation. They hypothesised that following an initial provocation, the individual's attention and thinking will be continuously focused on, or will frequently return to, the anger provoking event, which will enhance and prolong the anger experience and exacerbate the possible negative consequences of anger.

In addition, two recent models of aggression appear to include a process similar to angry rumination, which they propose leads to increased anger and potential for aggression. In Beck's (1999) model, aggression is believed to be the result of a

particular style of cognitive processing, in which the individual is preoccupied with perceived past and current injustices and threats to the self. Further, he hypothesised that the individual's interpretation of an event as representing a violation of an important personal rule will activate memories of prior violations in similar contexts, which may further increase affective arousal. This appears to be consistent with other conceptualisations of angry rumination as involving the activation of memories of past angry experiences, which results in an increase in angry mood (e.g. Sukhodolsky et al., 2001). Similarly, Anderson and Bushman's (2002) theory of aggression seems to include a process analogous to angry rumination. They posit the existence of a reappraisal process that may occur after the initial appraisal of the anger-provoking event. They describe this reappraisal process as involving a search for an alternative view of the situation, which may include a search for relevant memories and information about the cause of the event. They hypothesised that this may lead to an increase in anger as the individual remembers past wrongs and as the damage the anger-provoking event has done to their social image becomes clear. This reappraisal process seems comparable to other definitions of angry rumination, in that the search for causes appears similar to Nolen-Hoeksema's (1991) definition of rumination, and the search for relevant memories seems consistent with Sukhodolsky et al.'s (2001) conceptualisation of angry rumination. Therefore, in both of these models of aggression, a process that appears to be analogous to rumination is hypothesised to lead to an increase in anger and aggression.

4.2.3. Meta-cognitive Account

Finally, Wells and Matthews' (1994) model treats rumination uniformly across the emotional disorders and would therefore posit a similar role for rumination in the context of an angry mood as for rumination in the context of a depressed mood. In this model, perseverative negative processing, such as rumination and worry, is seen as crucial to the maintenance of emotional disorders because it nurtures intrusive thinking, triggers negative thoughts, increases self-focused processing, and primes attention to mood relevant material (Simpson & Papageorgiou, 2003). Rumination is hypothesised to be sustained by both positive and negative meta-cognitive beliefs about its functions and consequences. Therefore, this model would predict that, like depressed people, angry individuals would have both positive and negative meta-cognitive beliefs about rumination and that rumination would maintain their anger problem by the processes described above (i.e. nurturing intrusive thinking etc.).

4.2.4. Summary

Both the associative network and meta-cognitive accounts argue that depressive and angry rumination function in a similar way. For example, the associative network account predicts that, as with depressive rumination, angry rumination results in an increase in the intensity and duration of anger state experience. This conclusion has also been reached by several other theorists (e.g. Anderson & Bushman, 2002; Beck, 1999; Sukhodolsky et al., 2001; Tice & Baumeister, 1993). Also, given the research indicating

that cognitive distortions and deficits in interpersonal problem solving are a feature of individuals with anger control problems (e.g. D'Zurilla et al., 2003; Eckhardt & Deffenbacher, 1995; Tescher et al., 1999), it has been argued here that angry rumination may function in a similar way to depressive rumination, in that it may bring distorted cognitions to the individual's attention and allow them to interfere with their judgment and ability to solve social problems. Therefore, from the literature described above, it seems reasonable to predict that, like depressive rumination, angry rumination exacerbates angry mood, increases negative thinking and interferes with effective interpersonal problem solving. Literature that suggests an opposing viewpoint (i.e. that angry and depressive rumination have different functions and consequences) will be presented in the following section.

4.3. Theories that Suggest a Different Role for Angry and Depressive Rumination

Differential-emotions theories (e.g. Ekman, Friesen & Ancoli, 1980; Izard, 1977) propose that each emotion has a unique pattern of expression and activation. As such, Rusting and Nolen-Hoeksema (1998) argued that different emotions may require different emotion regulation strategies. Therefore, these theories raise the question as to whether rumination and distraction operate differently in different emotions, such as anger and sadness. In order to attempt to answer this question, literature that suggests how anger differs from other negative moods will be presented first. Then, the ways in which these differences may impact upon the role that rumination plays in anger compared to the role it plays in depression will be discussed.

4.3.1. How Anger May Differ from Other Negative Emotions

Self-justification:

One possible way that anger differs from other negative emotions is self-justification. Rusting and Nolen-Hoeksema (1998) argued that anger, unlike sadness or anxiety, is more likely to involve attributions of blame to others (e.g. Averill, 1982, 1983; Frijda, 1986). Averill (1983) described anger as an accusation, which results from an appraisal of some deliberate, negligent or at least avoidable transgression. In support of this, Averill (1983) found that over 85% of anger episodes involved either an act the person considered voluntary and unjustified or a potentially avoidable accident. Therefore, as anger involves perceived injustice and blame of others, there is an element of self-justification in anger that is unlikely to be present in anxiety or sadness. Rusting and Nolen-Hoeksema (1998) proposed that this means that people are more likely to feel that they have a right to be angry than they have a right to be sad or anxious. Baumeister et al. (1990) found support for this, in that they found that angry people often argued that the other person was wrong and that their own feelings of anger were justified. Rusting and Nolen-Hoeksema (1998) hypothesised that because of such self-justification anger may be more difficult to disengage from using distraction than is the case for anxiety or sadness. There is some evidence to support this hypothesis, in that Tice (1990, cited in Tice & Baumeister (1993)) found that people had fewer successful strategies for controlling anger compared to other negative emotions. However, Zillman and his colleagues have found that distraction can be successful in reducing anger when

people engage in highly absorbing and entertaining activities (e.g. Zillman, 1988; Zillman, Hezel & Medoff, 1980). Whilst Rusting and Nolen-Hoeksema (1998) did not discuss rumination in relation to self-justification, it is possible to hypothesise that because people feel they have a right to be angry they may be motivated to engage in angry rumination as a means of analysing the other person's culpability and vindicating themselves.

The Utility of Anger:

Another way in which anger may be different from other negative emotions is its ability to enable people to achieve positive goals in their life. There is evidence that suggests that people believe anger can have useful and desirable functions (e.g. Averill, 1982; Tarvis, 1989). In Averill's (1983) survey, participants reported three times more beneficial than harmful consequences of anger. Also, current theoretical conceptualisations of anger (e.g. Ortony, Clore & Collins, 1988; Power & Dalgleish, 1999) describe it as a fundamentally goal-oriented emotion. In these models, anger is triggered by obstacles to personal goal attainment and is often functional in removing these obstacles (Berkowitz, 1999; Stein & Levine, 1999). Similarly, Robins and Novaco (1999) described anger as both a cue that something needs to change and a means of changing it. In support of this, Averill (1982) found that frustration or the interruption of some ongoing or planned activity was the most frequently mentioned precipitant for anger. Also, Thompson and Kolstoe (1973) found that frustration led to an increase in aggression when participants were close to their goal and when aggression could help overcome the frustration. Whilst these theories do not explicitly mention angry

rumination, it is possible to hypothesise that a role for angry rumination exists. Given that the goal-oriented theories of anger seem similar to the goal discrepancy account of rumination (Carver & Scheier, 1990; Martin & Tesser, 1996; Pyszczynski & Greenberg, 1987), it may be the case that angry rumination is the mechanism through which anger enables people to attain important goals. In particular, as has been proposed by the goal discrepancy account of rumination, angry rumination may be prompted by disruptions in goal progress and function to keep the individual's attention focused on the discrepancy between their current state and the goal state, which, in turn, keeps them on track in pursuit of their goals.

What sorts of goals may anger and aggression be enabling the person to achieve? Tice and Baumeister (1993) argued that one potential beneficial consequence of anger is that it can facilitate making important changes in one's environment. They proposed that people may need to become angry in order to make positive changes in their life, such as confronting someone who has been treating them badly. Also, Bushman and Anderson (2001) argued against the utility of the angry aggression versus instrumental aggression dichotomy and maintained instead that most aggression involves mixed motives (i.e. both angry and instrumental motives). They proposed that some of the goals of aggression are: to re-establish self-esteem or public image, to express grievances or right a wrong, and to obtain material benefits, such as money (Tedeschi & Felson, 1994). Therefore, both anger and its expression may facilitate the achievement of a range of social and other goals (Robins & Novaco, 1999).

In terms of social benefits, it is clear that anger can confer social status in a way that is unlikely to be true for other negative emotions. Clark, Pataki and Carver (1996) argued that expressions of anger represent an intimidation strategy and create the impression that the expressor is strong and that others should comply. However, Tiedens (2001) argued that expressions of anger would be unlikely to remain effective in the long-run if they only worked through intimidation. She hypothesised that in order for anger to be a durable social influence strategy, it must also indicate that the expressor is to be valued and respected. Several studies have found evidence to support this hypothesis. People expressing anger are seen as dominant, strong, competent and smart, but also less friendly and warm (Clark et al., 1996; Labott, Martin, Eason & Berkey, 1991). Another study found that people rated individuals with angry facial expressions as occupying more powerful social positions than individuals with sad expressions (Keating, 1985). Similarly, Tiedens, Ellsworth and Mesquita (2000) demonstrated that participants rated the angry character in a vignette as high status and the sad character as low status. Finally, Tiedens (2001) found that anger expressions created the impression that the expressor was competent, and status was conferred on the basis of perceived competence. Although the angry expressors were also seen as less likeable, likeability was not related to status conferral. She interpreted these results as indicating that anger displays may be effective in attaining social status.

4.3.2. The Role of Rumination

Given that people believe that anger can have useful and desirable functions, they may try to produce or prolong angry mood states. Tice and Baumeister (1993) hypothesised that individuals may try to maintain their anger, in order to enable them to do things that they would find difficult to do if they were not angry. They also described a mechanism through which such anger may be maintained. They argued that whilst people experience a range of anger-provoking events, they will typically view these events as isolated incidents, which keeps their anger at a low level. However, they contend that many major life changes begin with the individual assembling all of the anger-provoking events into what appears to be a recurrent pattern. Further, they argue that preserving anger across individual episodes may facilitate people discovering these broad patterns, which, in turn, enable them to make large-scale changes in their life. In support of this, Tice (1990, cited in Tice & Baumeister, 1993) found that compared to other negative mood states, participants were somewhat less likely to report trying to generate a state of anger, but they were more likely to report trying to prolong an angry mood. The primary method used to sustain the angry mood over long periods of time was "rehearsing the cognitive and experiential basis for it, such as brooding about one's grievance" (Tice & Baumeister, 1993, p. 402). Therefore, this study found that people often report trying to prolong their angry mood, and the primary method they use to do this is angry rumination. Taken together, Tice and Baumeister's (1993) theoretical account and the findings from this study seem to suggest that angry rumination is the

mechanism through which people maintain their anger to enable them to make changes in their life and achieve the social and other goals described above.

Further support for this account was found by O'Neal and Taylor, who demonstrated that people do try to prolong their angry moods, but only when it is useful to do so (O'Neal & Taylor, 1989; Taylor, 1992). In particular, O'Neal and Taylor (1989) found that angered participants who expected the opportunity to retaliate against the person who provoked them were more interested in viewing violent videos than both non-angered controls and angered participants who did not expect an opportunity to retaliate. These findings suggest that participants chose materials that would help perpetuate a useful emotional state. Similarly, Taylor (1992) found that angered participants who anticipated the opportunity to retaliate against the person who provoked them recalled more negative words than other participants, and recalled more negative words than positive or neutral words. This was not true for angered participants who did not expect the opportunity to retaliate. These results were interpreted as indicating that participants selectively recalled negative items only when it was useful to perpetuate an angry mood. It is possible that rumination may facilitate or underscore this process of selectively recalling anger-relevant material when it is advantageous to maintain an angry mood.

In addition to making positive changes in one's life and attaining important goals, angry rumination may serve other positive functions. In the Tice (1990, cited in Tice & Baumeister, 1993) study, one of the strategies that people reported using to cope with

their angry mood was to try to understand the behaviour of the person who offended them. It could be argued that this is analogous to angry rumination, as one of the four factors on the Anger Rumination Scale (Sukhodolsky et al., 2001) is 'understanding the causes of the anger event'. Despite the fact that this strategy involves focusing on the anger-provoking event, people sometimes reported that it was an effective means of controlling their anger. Baumeister et al. (1990) argued that anger is often characterised by an inability to understand that the other person had an acceptable reason for acting as they did. Angry people tend to report that the offender's intentions are unclear, incoherent, unreasonable or otherwise opaque or they view the offender as being motivated by malice because they are unable to see any decent reason for their behaviour (Tice & Baumeister, 1993). However, offenders do not see themselves in this way and are usually able to come up with a reasonable explanation for their actions. In this way, Baumeister et al. (1990) hypothesised that anger is characterised by a gap in interpersonal understanding, in which one person is not able to comprehend the other's intentions. Therefore, Tice and Baumeister (1993) argued that attempts to try and understand the offender's intentions (i.e. rumination) may help to bridge this gap in interpersonal understanding.

Also, Tice and Baumeister (1993) argued that whilst anger typically involves expressing disapproval of another's actions, the expression of anger itself is often subject to disapproval in society. Therefore, they proposed that both the offender and the angry person may feel pressure to justify themselves. They argued that because society tends to consider anger more appropriate when the offence is more severe, the angry person

may try to justify their angry response by exaggerating the severity of the offence. Tice and Baumeister (1993) interpreted the results of the Baumeister et al. (1990) study as providing evidence for this hypothesis, in that angry people were found to describe angry events in more long-term contexts and as having more negative enduring consequences. Whilst Tice and Baumeister (1993) did not address rumination here, it is possible that angry rumination may function in this way, i.e. to aid the person in justifying their angry expression by exaggerating the severity of the provocation.

4.3.3. Summary

One possible difference between how the mood regulation strategies function in anger compared to other negative moods was suggested by Rusting and Nolen-Hoeksema (1998). They argued that because anger, unlike sadness and anxiety, involves self-justification and blame of others, people may be more reluctant to disengage from their anger. Other theorists have argued that anger, unlike other negative emotions, can have useful and desirable functions, such as enabling people to make large-scale changes in their life, achieve important goals and gain social status (e.g. Bushman & Anderson, 2001; Tice & Baumeister, 1993; Tiedens, 2001). Further, Tice and Baumeister (1993) hypothesised that people may try to maintain their anger in order to achieve these positive changes. Whilst the theory and evidence relating to anger's potential to facilitate the realisation of social and other goals does not specifically mention a role for rumination, Tice (1990, cited in Tice & Baumeister, 1993) found that the method people used to prolong their anger state was to brood on one's grievances, which can be seen to

be analogous to rumination. Therefore, this account proposes very different functions and consequences for rumination in the context of an angry mood than has been found for rumination in the context of a depressed mood. According to this account, individuals may engage in angry rumination to help perpetuate an angry mood, in order to enable them to achieve a range of positive goals. The next section will review the research that has been conducted on angry rumination thus far and will discuss these findings in light of the two opposing accounts of the functions and consequences of angry rumination that have been presented here.

4.4. A Review of the Experimental Research on Angry Rumination

Angry rumination has been the subject of a small amount of experimental attention. The few studies that have been conducted appear to support the associative network account of rumination. The main findings from these studies will be reported below.

Rusting and Nolen-Hoeksema's (1998) study probably represents the most direct test of whether rumination and distraction lead to similar consequences in the context of an angry mood to those found in a depressed mood. They found that participants who ruminated following an angry mood induction exhibited an increase in angry mood, whereas those who distracted did not show this increase. Distraction either had no effect on participants' angry mood or it led to a decrease in anger. Therefore, these findings suggest that rumination in the context of an angry mood operates in much the same way as rumination in the context of a depressed mood. The results also support the

associative network account of rumination, especially as participants in the rumination condition were found to have produced more negative beliefs, memories and events in the stories they wrote in response to an emotionally ambiguous sentence.

A number of other studies have examined the impact of rumination and distraction on anger and aggression. For example, Bushman (2002) investigated the effects of venting anger on aggression. He found that participants who ruminated about the person who provoked them whilst hitting a punching bag had higher levels of anger and aggression than those who distracted. Another study found that rumination increased aggression after a minor triggering event (Bushman, Pedersen, Vasquez, Bonacci & Miller, 2001, cited in Bushman, 2002). In this study, participants who had been provoked were either asked to focus their attention on or away from their negative mood. Later on, they were given the opportunity to engage in displaced aggression towards a competent or fumbling confederate. They found that provoked participants who had ruminated engaged in more displaced aggression towards the fumbling participant than did participants who distracted away from their negative mood. In the field of sports psychology, Maxwell (2004) found that aggression level correlated positively with scores on the ARS (Anger Rumination Scale; Sukhodolsky et al., 2001). Also, Konecni (1974) found that aggression towards an insulting confederate was reduced by having people solve math problems. This result was interpreted as indicating that the math problems functioned as a means of distracting participants' attention away from their anger. Taken together, these studies suggest that rumination on anger or the source of their provocation led to enhanced anger and aggression, whilst distraction led to a

reduction in anger and aggression. Therefore, these findings are consistent with the associative network account of rumination.

Linden et al. (2003) found a moderately high correlation between rumination (as measured by the BARQ (Behavioural Anger Response Questionnaire)) and trait anger. From this result, they concluded that individuals with high trait anger may possess a set of repetitious thought patterns (i.e. angry rumination), which themselves are likely to predispose these individuals to greater subsequent anger responses (Earle, Linden & Weinberg, 1999). This conclusion appears very similar to Rusting and Nolen-Hoeksema's (1998) hypothesis regarding the role of angry rumination amongst anger-prone individuals (i.e. that it may strengthen angry associations in memory and increase their predisposition to experience anger). Linden et al. (2003) also found a small but consistent correlation between rumination and aggressive anger-out, which they interpreted as indicating that rumination, by maintaining the individual's attentional focus on past anger feelings, will lead to more readily experienced and more aggressively expressed anger when faced with a new provocation.

Finally, Simpson and Papageorgiou (2003) found evidence to support the meta-cognitive account of rumination, in that they demonstrated that people with anger control problems hold both positive and negative meta-cognitive beliefs about angry rumination. The negative beliefs that angry participants reported were similar to those that have been found amongst depressive ruminators. They included rumination heightening angry mood and interfering with functioning and interpersonal situations.

The positive beliefs that participants endorsed were also very similar to those that have been found in the depressive literature. The positive beliefs involved rumination helping them to prepare for similar situations in the future, gain insight and understanding into their problems, and justify their response to the anger eliciting situation. This last positive belief (i.e. justifying their response) seems similar to the hypothesis made by Tice and Baumeister (1993) that people may exaggerate the severity of an offence to justify their angry response. It was proposed in this paper that angry rumination may function to underpin this exaggeration process, which appears to have been borne out by this study. However, this study utilised an extremely small sample size (i.e. ten people), so the reliability and validity of its results must be interpreted with caution.

5. Conclusions and Directions for Future Research

A review of the research that has been conducted on angry rumination seems to support the notion that angry and depressive rumination function in a similar way. In particular, like depressive rumination, angry rumination has been found to increase anger and aggression (e.g. Bushman 2002; Bushman et al., 2001; Rusting & Nolen-Hoeksema, 1998). These results are also consistent with spreading activation or associative network theories. However, there is also some tentative evidence supporting the meta-cognitive account of rumination (i.e. Simpson & Papageorgiou, 2003), which also posits a similar role for both angry and depressive rumination. Whilst the evidence presented above suggests that angry and depressive rumination function in a similar manner, there may be reason to remain sceptical at this stage. In particular, as only a small number of

studies have been carried out on angry rumination, these conclusions are fairly tentative. More research needs to be carried out in order to feel more assured that angry rumination has similar functions and consequences to those of depressive rumination.

In particular, more research that is guided by associative network theories needs to be conducted on angry rumination. According to these theories, any negative mood primes mood-congruent material, such as memories and thoughts. Also, rumination in the context of any negative mood is hypothesised to make these mood-congruent thoughts and memories more accessible. If these theories are correct, angry rumination, like depressive rumination, would be expected to lead to enhanced accessibility of angry memories, increased distorted/biased thinking and impaired interpersonal problem solving. Therefore, research needs to be carried out to determine the consequences of angry rumination on memory, cognition and interpersonal problem solving. Also, it is not clear at this stage whether a tendency towards ruminating in response to angry moods predicts the onset and maintenance of angry episodes or anger problems. Therefore, prospective studies are needed to elucidate whether angry rumination predicts the onset, severity and duration of angry episodes, as has been found to be the case for depressive rumination.

In addition, given Watkins' (e.g. Watkins, 2004; Watkins & Baracaia, 2002) more recent findings relating to depressive rumination, more attention needs to be paid to the precise manner in which people attend to their anger episodes. It may be the case that the consequences for both angry and depressive rumination depend upon the styles of

rumination, with different styles having different outcomes for emotional processing and interpersonal problem solving. Also, given the research described earlier by O'Neal and Taylor (i.e. O'Neal & Taylor, 1989; Taylor, 1992), it seems important to consider the context in which angry rumination occurs, in that the consequences of angry rumination may depend on how useful it is to perpetuate an angry mood. It is possible that angry rumination may lead to positive outcomes in certain contexts. For example, the literature presented earlier suggests that it may be useful to prolong an angry mood in order to: facilitate making changes in one's environment (e.g. to help bring someone to the point at which they can communicate their dissatisfaction), overcome obstacles to one's goals, or achieve social status.

Until more basic research is conducted into angry rumination, it is difficult to draw any firm conclusions regarding its functions and consequences and whether they are similar or different to those of depressive rumination. In addition to helping redress the imbalance in accumulated knowledge between anger and other negative emotions and shedding light on this important aspect of human experience, this research would potentially have significant clinical implications. Currently, rumination is regarded as a unitary concept that functions similarly across all negative emotions, and as such it has been proposed as an effective means of combating co-morbidity (e.g. Watkins, 2003). However, unless more research is conducted to determine whether this conceptualisation is valid, treatments based on this notion may not be effective when they are applied to non-depressive disorders, such as anger problems.

6. References

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Part 2: Empirical Paper

Cognitive Flexibility amongst Angry Ruminators and the Effects of Angry Rumination on Interpersonal Problem Solving

1. Abstract

Depressive rumination has been found to be associated with an inflexible and perseverative cognitive style (Davis & Nolen-Hoeksema, 2000) and lead to impairments in effective interpersonal problem solving (Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky, Tucker, Caldwell & Berg, 1999; Watkins & Baracaia, 2002). The aim of this study was to explore whether this was also true for angry rumination. Study 1 employed a correlational design and examined the relationships between cognitive flexibility, trait angry rumination and interpersonal problem solving. Study 2 was experimental and aimed to explore the impact of state angry rumination on interpersonal problem solving by inducing anger and rumination and distraction, and measuring its impact on interpersonal problem solving. The results of study 1 indicated that cognitive flexibility was not related to trait angry rumination, but that both cognitive flexibility and trait angry rumination predicted interpersonal problem solving. Contrary to predictions, study 2 found that the rumination induction did not lead to less effective interpersonal problem solving compared to the distraction induction. However, further analyses with the addition of a cognitive flexibility factor (i.e. high versus low cognitive flexibility) showed that the rumination induction did result in less effective interpersonal problem solving, but only for those participants low on cognitive flexibility.

2. Introduction

2.1. Rumination

Rusting and Nolen-Hoeksema (1998) defined rumination as thoughts and behaviours that focus an individual's attention on a negative mood, the causes and consequences of this mood, and self-evaluations related to the mood. Numerous theorists have stressed the importance of rumination in emotional disorders. For example, both Teasdale and Barnard's (1993) and Pyszcynski and Greenberg's (1987) theories of depression highlighted the role of rumination. In addition, Wells and Matthews (1994) viewed rumination and worry as crucial to the maintenance of emotional disorders because of their role in triggering negative thoughts, increasing self-focused attention and priming attention to mood relevant material.

2.2. Depressive Rumination

Rumination has primarily been investigated within the context of a depressed mood and has been consistently implicated in the onset and maintenance of depression. A number of prospective studies have found that a ruminative response style predicts the onset of depressive symptoms or episodes, the severity of depressive symptoms, and the duration of a depressive episode (Just & Alloy, 1997; Nolen-Hoeksema & Morrow, 1991; Nolen-Hoeksema, Morrow & Fredrickson, 1991, 1993; Nolen-Hoeksema, Parker & Larson, 1994). For example, Nolen-Hoeksema, Parker and Larson (1994) found that

bereaved people who tended to engage in a ruminative response style one-month after the bereavement were more severely depressed at six-months, even after controlling for initial depression levels, social support, stress and gender.

Experimental studies have also been conducted in which rumination is contrasted with another mood regulation strategy, distraction. In these studies, dysphoric and non-dysphoric participants are induced to ruminate or distract. These studies have found that, compared to distraction, rumination increases dysphoric mood (Lyubomirsky, Caldwell & Nolen-Hoeksema, 1998; Lyubomirsky & Nolen-Hoeksema, 1993, 1995; Nolen-Hoeksema & Morrow, 1993), cognitive distortions and negative thinking (e.g. Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky et al., 1999), and the accessibility of negative autobiographical memories (Lyubomirsky et al., 1998; Pyszczynski, Hamilton, Herring & Greenberg, 1989).

Typically, these effects of rumination have been explained within associative networks or spreading activation theories of mood (e.g. Bower, 1981; Ingram, 1984; Teasdale, 1983). In these theories, emotions are hypothesised to organise information stored in semantic memory networks. Each emotion acts as a 'central node' that links together causally related information (Rusting & Nolen-Hoeksema, 1998). When an emotion is triggered, associated information (e.g. thoughts, memories, action tendencies, and physiological responses) will be activated, thus prolonging or amplifying the emotion. Rumination on the negative emotion is hypothesised to enhance this spreading activation, whilst distraction interrupts it (Rusting & Nolen-Hoeksema, 1998).

2.2.1. Depressive Rumination and Interpersonal Problem Solving

As well as enhancing negative thinking, several studies have demonstrated that rumination also interferes with interpersonal problem solving (Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky et al., 1999; Watkins & Baracaia, 2002). For example, Lyubomirsky and Nolen-Hoeksema (1995) found that dysphoric participants who were induced to ruminate generated less effective solutions to interpersonal problems than non-dysphoric participants or dysphoric participants induced to distract. They hypothesised that, whilst negative mood activates negative thinking, rumination brings these negative thoughts to the individual's attention and allows them to interfere with their interpretations of current events, which, in turn, impairs their ability to find effective solutions to their problems. Lyubomirsky et al. (1999) found support for this conceptualisation, in that dysphoric ruminators' negative biases in their thinking were shown to be related to the effectiveness of their social problem solving solutions. In particular, compared to dysphoric distractors and non-dysphoric controls, dysphoric ruminators rated their problems as more severe and less solvable, and they rated themselves as less likely to implement their solutions. Also, compared to the other groups, the content of their thoughts was more negative, problem-focused and self-blaming. As was found by Lyubomirsky and Nolen-Hoeksema (1995), dysphoric ruminators produced significantly less effective solutions to hypothetical social problem scenarios on the Means Ends Problem Solving procedure (MEPS; Platt & Spivack, 1975). Finally, the effectiveness of solutions was found to be related to the content of participants thinking, in that it was significantly associated with diminished negative

tone, less focusing on one's problems and feelings, and less self-criticism, as well as increased self-confidence and perceived control.

2.2.2. Depressive Rumination and Cognitive Inflexibility

Given that rumination has been found to produce such negative outcomes, why do people continue to ruminate? Davis and Nolen-Hoeksema (2000) advanced one possible explanation for the maintenance of depressive rumination. They proposed that rumination may reflect a more general tendency towards cognitive inflexibility or perseveration. Davis and Nolen-Hoeksema (2000) hypothesised that people who are cognitively inflexible may tend to ruminate when they are depressed because they have difficulty generating alternative ways of coping, and because it is difficult for them to switch their attention away from themselves and their problems. Therefore, they predicted that ruminators would exhibit deficits in their ability to abandon ineffective cognitive behaviour and have difficulty maintaining effective cognitive behaviour. In support of this hypothesis, Davis and Nolen-Hoeksema (2000) found that ruminators committed more perseverative errors and failed to maintain set more often than non-ruminators on the Wisconsin Card Sort Test (WCST; Grant & Berg, 1948). These effects were independent of mood, general intelligence and other general cognitive functions (e.g. working memory, reasoning, and task switching). They interpreted these findings as suggesting that ruminators prematurely abandon adaptive cognitive sets, and have difficulty adjusting their cognitive sets to changing environmental contingencies, even when the adaptiveness of the set has been invalidated by negative feedback. Therefore, ruminators have difficulty inhibiting perseverative tendencies and

maintaining adaptive tendencies. Davis and Nolen-Hoeksema (2000) concluded that the tendency to ruminate when dysphoric may be a consequence of cognitive inflexibility and perseveration, in that people who cannot inhibit perseverative tendencies and who fail to maintain adaptive cognitive behaviour may become trapped in unproductive perseveration on negative moods and events. In addition, they hypothesised that this cognitive inflexibility may contribute to difficulties in interpersonal problem solving that help to perpetuate negative mood.

2.3. Angry Rumination

In contrast to the large amount of research conducted into depressive rumination, angry rumination has received very little experimental attention, despite the fact that it has been implicated in the maintenance of anger-control problems (Beck, 1976; Ellis, 1977; Novaco, 1975, 1979). Rumination over the causes of anger and the resultant affect has also been implicated in the development of aggression (Averill, 1983; Spielberger, 1988). Sukhodolsky, Golub and Cromwell (2001) defined angry rumination as the tendency to engage in unintentional reoccurring thoughts about anger episodes. Several researchers have hypothesised that such rumination may lead to an increase or prolongation of anger state and potentiate aggression. For example, Tice and Baumeister (1993) hypothesised that by ruminating one may appreciate further implications of an offence (e.g. loss of social standing), recall similar past grievances, or see the incident as part of a broader context of injustice, which increases or maintains anger. Similarly, Sukhodolsky et al. (2001) proposed that angry rumination triggers new

episodes of anger, amplifies the intensity and duration of anger, and potentiates behavioural responses towards resolution and retaliation.

The few studies that have examined angry rumination have provided support for its role in enhancing anger-state experience and increasing the likelihood of aggressive responses. Rusting and Nolen-Hoeksema (1998) examined the impact of rumination and distraction on angry mood. They found that rumination increased anger, and distraction either decreased it or had no impact on it. They also found more negative beliefs, memories and events present in the stories that participants induced to ruminate wrote in response to an ambiguous sentence. Linden et al. (2003) found that angry rumination was associated with anger-in and trait anger on the State-Trait Anger Expression Inventory (STAXI; Spielberger, 1988). They interpreted this as indicating that individuals high on trait anger manifest their angry outlook through a set of repetitive thoughts (i.e. rumination), which, in turn, predisposes them to further anger experiences and makes it more difficult to recover from such experiences. They also found that the presence of a ruminative style worsened the consequences of avoidance of anger on men's blood pressure and reversed the otherwise beneficial effect of assertion for women. Bushman, Pedersen, Vasquez, Bonacci and Miller (2001; cited in Bushman, 2002) found that compared to participants who focused their attention away from their angry mood (i.e. distracted), participants who ruminated on their angry mood later engaged in more displaced aggression towards an incompetent confederate. Bushman (2002) also found that asking angered participants to ruminate about the individual who had provoked them led to more anger and aggression than those who distracted from

their angry mood or did nothing. Finally, within the field of sports psychology, Maxwell (2004) found that rumination on provocations and the associated anger led to a greater risk of retaliation.

2.3.1. Anger/Aggression and Interpersonal Problem Solving

There has been no research conducted into whether, like depressive rumination, angry rumination also leads to deficits in interpersonal problem solving. However, there is a substantial amount of evidence linking anger and aggression to poor interpersonal problem solving. In fact, aggression and violent behaviour has often been described as a maladaptive attempt at trying to solve a social problem (e.g. Basquill, Nezu, Nezu & Klein, 2004; D'Zurilla, Chang & Sanna, 2003; Jarvinen, 2001). In support of this view, a number of studies have found a significant positive relationship between social problem solving deficits and aggression in both children and adolescents (e.g. Lochman & Dodge, 1994; Lochman & Lampron, 1986; Lochman, Wayland & White, 1993; Loeber & Dishion, 1985). In particular, aggressive children and adolescents have been found to generate fewer alternative solutions to interpersonal problems compared to their more pro-social peers, and the quality of the solutions they generate are poor, in that they are more aggressive and less effective (e.g. Asarnow & Callan, 1985; Lochman & Lampron, 1986; Lochman, Lampron, Burch & Curry, 1985; Richard & Dodge, 1982).

Several studies have also demonstrated such a link in adults (e.g. Basquill et al., 2004; D'Zurilla et al., 2003; McMurran, Blair & Egan, 2002; Tescher, Conger, Edmondson &

Conger, 1999). For example, D'Zurilla et al. (2003) found that, amongst college students, poor social problem solving (as measured by the Social Problem-Solving Inventory-Revised – SPSI-R; D'Zurilla, Nezu & Maydeu-Olivares, 2001) was a significant predictor of subsequent aggression. Also, all three dysfunctional problem solving dimensions on the SPSI-R (i.e. Negative Problem Orientation (NPO), Impulsivity/Carelessness Style (ICS) and Avoidance Style (AS)) were positively correlated with both anger and hostility. In addition, Tescher et al. (1999) found that high-anger prone participants had poorer social skills (i.e. total SPSI score (Social Problem Solving Inventory; D'Zurilla & Nezu, 1990)) than low anger prone individuals. This was especially true for the Problem Orientation Scale, which measures the motivational component of social problem solving. Finally, several studies on maritally violent men have consistently found they possess deficits in interpersonal problem solving, in that they produce fewer competent solutions to hypothetical conflict situations and their solutions involve more aggression compared with non-violent controls (Dutton & Browning, 1988; Holtzworth-Munroe & Anglin, 1991).

2.3.2. Anger and Cognitive Inflexibility

Whilst there has been no research conducted into a possible direct link between anger (or angry rumination) and cognitive inflexibility, there is some evidence to suggest that cognitive inflexibility may be a feature of some individuals with anger-control problems. Neurological models have suggested that violence may be associated with dysfunction in the prefrontal cortex (Cummings, 1985; Heaton, 1981). Evidence for this has come from neuroimaging studies, which have demonstrated that prefrontal activity

is reduced in many violent offenders (see Soderstrom, Tullberg, Wikkelso, Ekholm & Forsman, 2000 for a review). This appears to be particularly true for those offenders who commit impulsive or affective violent acts compared to those who commit planned or predatory ones (Raine et al., 1998). Raine et al. (1998) hypothesised that the reduced prefrontal activity in these offenders makes it more difficult for them to regulate aggressive impulses originating from sub-cortical structures.

Evidence for these models also comes from studies using measures that are sensitive to prefrontal deficits, such as the WCST. Patients with lesions of the prefrontal cortex have frequently been found to exhibit perseverative behaviour and reduced cognitive flexibility on tasks such as the WCST (Dreisbach & Goschke, 2004). Bergvall, Wessely, Forsman and Hansen (2001) found that violent offenders showed marked impairment on an attentional set-shifting task that was analogous to the WCST. Also, Sreenivasan et al. (1997) found that cognitive inflexibility, as measured by number of perseverative responses on the WCST, was a significant factor in distinguishing between high and low violent psychiatric patients. Unlike previous studies (e.g. Nestor, Haycock, Doiron, Kelly & Kelly, 1995), the WCST scores were independent of the presence of a psychotic disorder, in that both high violent psychotic and non-psychotic participants performed similarly. This suggests that cognitively inflexibility may be more closely linked to violence than psychiatric diagnosis and provides support for the neurological models of violence. Sreenivasan et al. (1997) concluded that cognitive inflexibility may increase the likelihood of violence by making it difficult for people to consider alternative explanations for other's behaviour (especially non-hostile

explanations), and to develop different approaches to dealing with difficult situations or conflicts. Similarly, many theorists have hypothesised that cognitive inflexibility (or prefrontal dysfunction) enables the development of violence by impairing the acquisition of social and moral knowledge (Anderson, Bechara, Damasio, Tranel & Damasio, 1999; Damasio 2000; Grattan & Eslinger, 1992; Lapierre, Braun & Hodgins, 1995; Raine, Lencz, Bihrle, LaCasse & Colletti, 2000). Therefore, they have proposed a direct link between cognitive inflexibility, social problem solving deficits and aggression.

In support of this, there has been some evidence to suggest a link between cognitive flexibility and interpersonal problem solving. For example, Rubin and Martin (1994) found that cognitive flexibility was positively associated with interpersonal communication competence. Also, cognitive flexibility has been found to be significantly associated with social problem solving in patients with schizophrenia (Addington & Addington, 1999; Hatashita-Wong, Smith, Silverstein, Hull & Willson, 2002). For example, Hatashita-Wong et al. (2002) found that cognitive flexibility (i.e. WCST conceptual level responses) was correlated with several of the social problem solving measures from the Social Problem-Solving Assessment Battery (SPSA; Sayers, Bellack, Wade, Bennett & Fong, 1995), such as correctness, appropriateness, and elaboration of solutions to hypothetical social problem scenarios. Also, the WCST categories completed measure was found to be significantly correlated with elaboration of scenarios and appreciation of the potential limitations of solutions.

2.4. Current Study

Given that depressive rumination has been found to impair interpersonal problem solving, it seems important to establish whether this is also true for angry rumination. As angry rumination has been found to increase anger and potentiate aggression (e.g. Bushman, 2002; Bushman et al., 2001; Maxwell, 2004; Rusting & Nolen-Hoeksema, 1998), and both anger and aggression have been linked with interpersonal problem solving deficits (e.g. D'Zurilla et al., 2003; Lochman & Dodge, 1994; Tescher et al., 1999), it seems reasonable to hypothesise that angry rumination may have a detrimental impact upon interpersonal problem solving. In particular, angry rumination may impair an individual's ability to generate multiple strategies to solve a social problem, and instead lead to a narrowing of options that the individual considers. Also, as rumination has been found to increase angry mood and negative, biased thinking (Rusting & Nolen-Hoeskema, 1998), the types of solutions that people are able to produce may be ineffective. In particular, they may be of a hostile, aggressive nature.

Davis and Nolen-Hoeksema (2000) suggested that rumination is associated with a cognitive style that is inflexible and perseverative in nature, and that this cognitive inflexibility may contribute to impairments in social problem solving. However, they did not examine this hypothesis directly, and it therefore seems important to investigate whether there is a link between cognitive inflexibility and interpersonal problem-solving deficits. There is a small amount of research, especially in the schizophrenia literature, that suggests such a relationship (e.g. Addington & Addington, 1999; Hatashita-Wong et al., 2002; Rubin & Martin, 1994). Also, whilst there is some

evidence of a link between angry rumination and aggressive behaviour, and a link between violence and cognitive inflexibility, it is not clear whether angry ruminators are also cognitively inflexible, as has been found to be the case with depressive ruminators (Davis & Nolen-Hoeksema, 2000).

The aim of this study was therefore to investigate whether angry rumination has a detrimental impact on people's ability to solve interpersonal problems. In addition, it aimed to explore whether people who tend to engage in angry rumination have an inflexible cognitive style and whether this impacts upon their interpersonal problem solving ability. Also, as Davis and Nolen-Hoeksema (2000) hypothesised that rumination was the result of an inflexible cognitive style and was likely to contribute to difficulties in interpersonal problem solving, and because of the hypothesised links in this study between cognitive flexibility and angry rumination and between angry rumination and interpersonal problem solving deficits, the study also aimed to explore whether angry rumination mediates the relationship between cognitive flexibility and interpersonal problem solving.

In effect, these aims were investigated in two studies. However, in practice, both studies were conducted on the same participants and combined within a single testing session. In ***study 1***, the focus was upon ***trait*** angry rumination. Nolen-Hoeksema (1991) considered the tendency to engage in a ruminative response style to be an individual difference variable that was relatively constant over time. For example, Nolen-Hoeksema, Morrow and Frederickson (1991) found that 83% of participants were

consistent in their response to a depressed mood. Therefore, the term 'trait angry rumination' was employed in this study to describe an individual's tendency to engage in a ruminative response style in the presence of an angry mood. Study 1 utilised a correlational design and aimed to explore the relationships between trait angry rumination (as measured by the Anger Rumination Scale - ARS; Sukhodolsky et al., 2001), cognitive flexibility (as measured by performance on the Wisconsin Card Sort Test-64 - WCST-64; Kongs, Thompson, Iverson & Heaton, 2000), and interpersonal problem solving (as measured by the MEPS and the SPSI-R).

Study 2 employed an experimental design and explored the impact of ***state*** angry rumination on interpersonal problem solving. This involved inducing participants to feel angry, after which they were either induced to ruminate or distract from their angry mood. The impact of these experimental manipulations on interpersonal problem solving was then measured using the MEPS.

2.5. Hypotheses

2.5.1. Study 1: Trait Angry Rumination

1) Trait angry rumination (on the ARS) will be associated with performance on the WCST-64, in that those participants who score higher on the ARS will be more cognitively inflexible than participants who have a lower score on the ARS. In particular, individuals with higher levels of trait angry rumination will commit more perseverative and failure to maintain set errors on the WCST-64 than

individuals with lower levels of trait angry rumination. In addition, this relationship will be independent of cognitive functions that may be associated with performance on the WCST-64 (i.e. general intelligence and working memory). However, it is likely to covary with trait anger, as measured by the trait anger scale of the State-Trait Anger Expression Inventory-2 (STAXI-2; Spielberger, 1999).

2) Performance on the test of cognitive flexibility (i.e. the WCST-64) will also correlate with performance on the interpersonal problem solving measures (i.e. the MEPS and the SPSI-R), in that those people who are more cognitively inflexible will demonstrate poorer interpersonal problem solving skills. This relationship will also be independent of general intelligence and working memory.

3) Trait angry rumination (as measured by the ARS) will be associated with measures of social problem solving (i.e. MEPS and SPSI-R), in that those participants high on trait angry rumination will exhibit less effective interpersonal problem solving than those low on trait angry rumination. This relationship will be independent of general intelligence, working memory and trait anger.

4) Trait angry rumination (as measured by the ARS) will mediate the relationship between cognitive flexibility and interpersonal problem solving. This hypothesis will be tested by a series of regressions, as outlined in Baron and Kenny (1986). First, the mediator (i.e. trait angry rumination) will be regressed onto the independent variable (i.e. cognitive flexibility). Then the dependent variable (i.e.

interpersonal problem solving) will be regressed onto the independent variable (i.e. cognitive flexibility). Finally, the dependent variable (i.e. interpersonal problem solving) will be regressed onto both the independent variable (i.e. cognitive flexibility) and the mediator (i.e. trait angry rumination). In order to establish mediation the following conditions must be met: (1) the independent variable must affect the mediator in the first equation, (2) the independent variable must affect the dependent variable in the second equation, (3) the mediator must affect the dependent variable in the third equation, and (4) the effect of the independent variable on the dependent variable must be less in the third equation than in the second equation. The Sobel (1982) test will be used to determine whether the mediator (i.e. trait angry rumination) significantly accounts for the relationship between the independent variable (i.e. cognitive flexibility) and the dependent variable (i.e. interpersonal problem solving). Also, these relationships will be independent of the controlling variables mentioned earlier (i.e. working memory, general intelligence and trait anger).

2.5.2. Study2: State Angry Rumination

1) Participants who have ruminated following the anger induction procedure will be angrier than those who have distracted.

2) Participants who have been induced to ruminate following the anger induction procedure will produce less effective solutions to interpersonal problem-solving scenarios on the MEPS compared to a group that has been distracted from their

angry mood, and compared to participants' performance on the MEPS before the anger induction.

3) The influence of the response manipulations (i.e. rumination and distraction) on interpersonal problem solving effectiveness will vary depending on whether the participants are high or low on cognitive flexibility. Participants low on cognitive flexibility will show particular deficits in interpersonal problem solving following the rumination induction. However, participants high on cognitive flexibility may be less influenced by the rumination induction and, therefore, will not exhibit a decrease in interpersonal problem solving effectiveness after the rumination induction. In contrast, the level of cognitive flexibility should have little effect on the participants who have been induced to distract, with participants both high and low on cognitive flexibility showing little change in their interpersonal problem solving effectiveness from pre to post distraction induction.

3. Method

3.1. Participants

One-hundred and three participants (48 males and 55 females) were recruited from UCL's student population. Posters advertising the study were placed throughout UCL and this was the principal method of recruiting participants. Participants were paid £6 for taking part in the study. In terms of inclusion and exclusion criteria, all participants

were accepted onto the study with the exception of those students who were not able to speak English fluently. Participants ranged in age from 18 to 58 years of age (M = 23.73, SD = 5.76) and the vast majority of participants were undertaking or had completed an undergraduate degree (i.e. 98.1%).

The estimated number of participants needed in this study, which was based on a power calculation, was 85. The effect size for the power analysis was based upon the Davis and Nolen-Hoeksema (2000) study, which examined the relationship between depressive rumination and cognitive flexibility. This study provided an estimate of the effect hypothesised for study 1, which, given its focus on individual differences, was predicted to be smaller than that for study 2. Therefore, this association was chosen because it should represent the smallest effect in the study. Davis and Nolen-Hoeksema (2000) found associations which ranged in effect size from medium to large. As a conservative estimate, the smallest of these was selected for the purposes of statistical power estimation. In order to have 80% power to detect a change in R-squared of .09 in a multiple regression (representing a partial correlation of .30, the lower bound of the medium effect range) a sample size of 85 was required (two-tailed).

3.2. Ethics

The UCL Committee on the Ethics of Non-NHS Human Research approved this study. A copy of the approval letter is provided in the appendix. There were several ethical dilemmas raised in this study. Firstly, the study involved some deception, in that certain

information was withheld from participants until after their data had been collected. In particular, participants were not told that the focus of the research was on angry rumination. Also, participants were not informed about the purpose of the anger induction and response manipulation tasks. Instead, these tasks were described as imagination exercises. The rationale for temporarily withholding this information from participants was to avoid any bias in their responses to the anger induction and response manipulation tasks. For example, if participants had been told that the purpose of the anger induction task was to make them angry, this may have affected how they responded to the task. The other ethical dilemma raised in this study was the induction of anger in participants, which may be aversive or stressful. This dilemma has posed problems for other researchers into anger (e.g. Baumeister, Stillwell & Wotman, 1990), as it is difficult to strike a balance between inducing anger experience that is authentic and measurable and ensuring that the study is ethically sound.

A number of steps were taken to mitigate against the impact of these ethical dilemmas. Firstly, in order to minimise the potential stress of being made angry, a relatively mild anger induction procedure was chosen, which has been shown to induce a mild anger reaction in participants (e.g. Rusting & Nolen-Hoeksema, 1998). Secondly, participants were monitored throughout the data collection process for any adverse reactions to the anger induction procedure. No such adverse reactions occurred. Finally, a full debriefing was provided once the participants had completed the study. In particular, any negative reactions to the anger induction or response manipulation tasks were attended to and discussed with the participant to ensure that they did not persist.

3.3. Measures

The Trait Anger Scale of the State-Trait Anger Expression Inventory-2 (STAXI-2; Spielberger, 1999). This scale measures how often an individual experiences anger over time. The scale consists of 10 items and responses are measured on 4 point Likert-type scales. This scale has been shown to be internally consistent (alpha = .82; Speilberger, 1999), to correlate positively with other measures of anger (Speilberger, 1999), and to discriminate high anger individuals from others (Deffenbacher, Deen & Brandon, 1986; Lopez & Thurman, 1986).

Anger Rumination Scale (ARS; Sukhodolsky et al., 2001). This 19-item questionnaire was developed to measure the tendency to focus attention on angry moods, recall past anger experiences, and think about the causes and consequences of anger episodes. It has been found to have adequate internal consistency (alpha = .93) and one month test-retest reliability (.77). Also, convergent and discriminant validity were supported by the expected pattern of associations between the ARS and measures of anger experience, anger expression, negative affectivity, emotional attention, satisfaction with life, and social desirability (Sukhodolsky et al., 2001). A copy of this measure is provided in the appendix.

Mood Questionnaire. State anger was measured using a mood questionnaire that was based on the one employed in the Rusting and Nolen-Hoeksema (1998) study. The questionnaire asked participants to rate their present mood on a number of 9 point

Likert scales, ranging from "not at all" (1) to "extremely" (9). Anger was assessed by using several items (i.e. "angry", "hostile", "irritable", "annoyed" and "disgusted"), which were averaged to attain a single measure of anger. The questionnaire also included a number of filler items measuring other mood states, such as anxiety and sadness. The questionnaire was found to have good internal consistency in this study, in that the alpha coefficients ranged from .77 to .85. A copy of this questionnaire is included in the appendix.

Wisconsin Card Sort Test - 64 Card Version (WCST-64; Kongs et al., 2000). The WCST-64 was utilised as the measure of cognitive flexibility. It is an abbreviated form of the standard 128 card version of the WCST (Heaton, 1981), in that it only uses the first 64 cards. It has good test-retest reliability (i.e. the median generalisability coefficient was .60; Heaton, Chelune, Talley, Kay & Curtiss, 1993), and construct validity (e.g. Shute & Huertas, 1990). The WCST-64 consists of four stimulus cards and 64 response cards that vary in terms of their shape (crosses, circles, triangles, or stars), colour (red, blue, yellow, or green) and number (one to four). The four stimulus cards are placed in front of the participant, who is then asked to match each of the 64 cards in the deck to whichever stimulus card he or she thinks it matches. The participant is not told how to match the cards, only whether each response is correct or incorrect. After ten consecutive correct responses the matching principle is changed without informing the participant. This continues until the participant has matched all 64 cards.

Other Cognitive Tests: Wechsler Test of Adult Reading (WTAR; Wechsler, 2001) and the Backward Digit Span (from the Wechsler Adult Intelligence Scale- Revised - WAIS-R; Wechsler, 1981). As in the Davis and Nolen-Hoeksema (2000) study, measures of working memory (i.e. Backward Digit Span) and general intellectual functioning (i.e. WTAR) were included in this study because they were thought to be potentially correlated with performance on the WCST-64. As such, it was felt to be important to measure these cognitive processes and control for their possible effects to ensure that any differences between the groups were due to differences in cognitive flexibility and not to working memory or general intellectual functioning. In the Backward Digit Span task, the researcher reads aloud groups of digits to the participant who then repeats them back in the reverse order in which they were given. The WTAR involves the participant pronouncing a list of words aloud.

Means-Ends Problem-Solving Procedure (MEPS; Platt & Spivack, 1975). The MEPS was designed as a measure of interpersonal problem solving, and it involves asking participants to generate solutions to hypothetical interpersonal problems. It has satisfactory internal consistency (from .80 to .84) and construct validity (e.g. Platt & Spivack, 1972, 1975). This study employed a shortened version of the MEPS (i.e. scenarios 2, 4, 8, and 10), which is similar to the procedure adopted by Lyubomirsky and Nolen-Hoeksema (1995) and Watkins and Baracaia (2002). The four scenarios utilised in this study were as follows: (a) you are having problems getting along with your boss, (b) you have just moved to a new area and you don't know anyone, (c) you notice that one of your friends seems to be avoiding you, and (d) you had an argument

with your boyfriend/girlfriend. Participants were presented with the beginning and ending of each scenario. An example of one of the scenarios given to participants was: "You notice that one of your friends seems to be avoiding you. You really like and enjoy spending time with this person, and want him or her to like you. The situation ends when he or she likes you again. Begin the story when you notice your friend avoiding you". Participants were asked to record their solutions in writing.

The scoring procedure employed in this study was identical to that of Watkins and Baracaia (2002), in that a judge who was blind to the condition scored all solutions for the number of relevant means and for their effectiveness. Relevant means were defined as sequential behaviours that were effective in enabling the participant to obtain the stated goal. The effectiveness of each response was scored on a 7 point Likert scale, ranging from "not at all effective" (1) to "extremely effective" (7). Finally, as in Watkins and Baracaia (2002), a second independent judge, also unaware of the condition, scored a random selection of 10% of all responses. High inter-rater reliability was found between the two judges (relevant means, $r = .90$; effectiveness, $r = .89$).

Social Problem-Solving Inventory-Revised (SPSI-R; D'Zurilla et al., 2001). The short version of the SPSI-R contains 25 items and is a self-report measure that assesses participants' strengths and weaknesses in their problem solving abilities. It has five scales: Positive Problem Orientation (PPO), Negative Problem Orientation (NPO), Rational Problem Solving (RPS), Impulsivity/Carelessness Style (ICS), and Avoidance Style (AS). The SPSI-R has been shown to have good internal consistency (.76 to .92),

test-retest reliability (.72 to .88), and construct validity (Chang & D'Zurilla, 1996; D'Zurilla et al., 2001).

3.4. Procedure

As mentioned previously, all participants completed study 1 and 2 within the same testing session. The procedures for each study are described below and the chronology is presented diagrammatically (see Figure 1 below).

3.4.1. Study 1

Participants were first asked to rate their current mood (baseline) on the mood questionnaire. They were then given the three brief cognitive tasks to complete: the WTAR, the Backward Digit Span, and the WCST-64. Following this, they were asked to solve two of the interpersonal problem solving scenarios from the MEPS. Participants were asked to imagine themselves experiencing these situations and were given the following instructions: *"In this task we are interested in your imagination. You are to make up some stories. For each story you will be given the beginning of the story and how the story ends. Your job is to make up a story that connects the beginning that is given to you with the ending given to you. In other words, you will make up the middle of the story. Write at least one paragraph for each story."* After this, participants completed the SPSI-R.

As part of study 1, participants were also asked to fill out two trait measures (i.e. the trait anger scale of the STAXI-2 and the ARS). However, these two measures were administered at the very end of the procedure, in order to disguise the study's focus on angry rumination (please refer to the * on Figure 1 below).

3.4.2. Study 2

All participants then underwent an anger induction procedure. The procedure employed in this study was based on the idiographic anger induction used in the Rusting and Nolen-Hoeksema (1998) study. To disguise the purpose of the task, participants were told it was an imagination exercise that was concerned with their "ability to remember and imagine past experiences". Participants were invited to reach into an envelope and choose a slip of paper. They were told that on each slip of paper was a topic about which they were to choose a past memory to remember and imagine. What the participants did not know was that every slip of paper had the same topic written on it: "Think of a time in your life when somebody made you feel so angry you wanted to explode". Once they had read the topic, participants were given the following instructions:

"During the next 5 minutes try to re-experience the memory you've retrieved as vividly as you can. Picture the event happening to you all over again. Picture in your "mind's eye" the surroundings as clearly as possible. See the people or objects; hear the sounds; experience the events happening to you. Think the thoughts you actually thought in that situation. Feel the same feelings you felt in that situation. Let yourself

react as if you were actually there right now. As you're re-imagining the event, write about what is happening, what you are thinking and how you are feeling."

Following the anger induction procedure, another measure of mood was taken (using the mood questionnaire). Then one-half of participants were randomly assigned to a rumination induction procedure, and one-half were randomly assigned to a distraction induction procedure.

Rumination and Distraction Induction Procedures:

These procedures were adapted from those used in the Rusting and Nolen-Hoeksema (1998) study. Participants in the rumination condition were asked to focus their attention on thoughts that were self-focused and relevant to the emotion induced (i.e. anger), but the items did not directly refer to anger. They included items such as "why the person treated you as they did" and "why what happened to you was unfair". As in the Rusting and Nolen-Hoeksema (1998) study, items used in previous rumination research (i.e. Morrow & Nolen-Hoeksema, 1990; Nolen-Hoeksema & Morrow, 1993) were modified to make them more relevant to anger. In order to do this, themes from the ARS and other relevant literature (e.g. attribution theory of anger (Averill, 1982, 1983; Frijda, 1986)), as well as the few examples provided by Rusting and Nolen-Hoeksema (1998), were used to generate items. In the distraction condition, participants were asked to focus their attention on external, non-emotional details, such as "the layout of the local post office". These items were derived directly from the items used

in the Rusting and Nolen-Hoeksema (1998) study. A total of 17 items were generated for each condition (please refer to the appendix).

This task was also introduced as an imagination exercise. Participants were asked to close their eyes and recall the memory they had just retrieved in the previous imagination exercise. The researcher read aloud the instructions from the anger induction procedure to facilitate participants' recall of the memory. Then they were given the following instructions:

"Now I am going to read out a series of ideas that I would like you to think about. Please continue to keep your eyes closed throughout this exercise. I will read out each item at a set pace. As I read each idea out loud, I would like you to remember the memory you retrieved and use your imagination and concentration to focus your mind on each of the items."

Each item was read out loud by the researcher at a rate of 1 per 17 seconds, which meant that participants spent a total of five minutes either ruminating or distracting. Following the rumination/distraction procedure another measure of mood was taken. Both groups were then asked to solve the other two interpersonal scenarios from the MEPS. The administration of the two sets of interpersonal problem solving scenarios was counterbalanced across the two presentations. The entire procedure can be seen diagrammatically below in Figure 1.

Figure 1:

Study 1:

- Mood Questionnaire (Baseline)
- Cognitive Tests (WTAR, Backward Digit Span, WCST-64)
- Interpersonal Problem Solving Measures (MEPS 1&2 & SPSI-R)

Study 2:

Anger Induction Procedure followed by Mood Questionnaire (2)

½ receive Rumination Induction followed by Mood Questionnaire (3)

½ receive Distraction Induction followed by Mood Questionnaire (3)

MEPS 3&4 followed by the final Mood Questionnaire (4)

Trait Measures (ARS and trait scale of STAXI-2)*

*(*Although the ARS and STAXI-2 form part of study 1, they were administered at the end of study 2 to disguise the focus of the research on angry rumination)*

3.5. Design

Study 1: Study 1 utilised a correlational design, in which the associations between three variables were examined: **trait angry rumination** (as measured by the ARS), **cognitive flexibility** (as measured by the WCST-64), and **interpersonal problem solving** (as measured by the MEPS and SPSI-R).

Study 2: Study 2 employed a randomised experimental design. More specifically, it was a 2x2 mixed model factorial design. The first variable, **response condition**, was between subjects and had two levels (rumination induction versus distraction induction), referring to the random assignment of participants to either a rumination induction or a distraction induction. The second variable, **pre and post MEPS presentation,** was within subjects, and also had two levels that referred to the presentation of the MEPS scenarios before and after anger and rumination/distraction induction procedures. The dependent variables were the various scores on the MEPS (i.e. number of relevant means and effectiveness of solutions). In order to more fully assess the relationship between the three constructs of interest (i.e. angry rumination, cognitive flexibility and interpersonal problem solving), another between subjects factor was added making it a 2x2x2 mixed model factorial design. This additional variable was **cognitive flexibility**, which had two levels (i.e. high and low cognitive flexibility) that were derived through a median split of participants' perseverative errors scores on the WCST-64.

4. Results

4.1. Skewness

All of the WCST-64 raw scores were found to be significantly skewed. Therefore, the WCST-64 standard scores, which were normally distributed, were utilised in most of the analyses. The only WCST-64 raw score employed in this study was perseverative

errors (see study 2), which was significantly positively skewed (skewness = 1.795). After applying an inverse transformation to the perseverative errors raw score data, the distribution was no longer significantly positively skewed (skewness = -.166). In addition to the WCST-64 variables, the majority of the negative affect data (i.e. anger, anxiety and sadness) were also significantly positively skewed. This is consistent with what has been found in other studies (Watson, Clark & Tellegen, 1984; Watson & Tellegen, 1985; Zevon & Tellegen, 1982). In order to rectify the positive skewness, the appropriate transformations were applied to these data, and the analyses that utilised the data were repeated to ensure there were no differences between the transformed and non-transformed data (see study 2). All other measures employed in this study were normally distributed.

4.2. Study 1

Study 1 employed a correlational design and examined the relationships between trait angry rumination, cognitive flexibility and interpersonal problem solving. The results of the analyses for study 1 are presented below and are organised by the hypotheses they relate to.

4.2.1. Hypothesis 1: Participants who have a greater tendency towards trait angry rumination (as measured by the ARS) will be more cognitively inflexible (on the WCST-64).

In order to test this hypothesis and also hypothesis 4 (i.e. that trait angry rumination mediates the relationship between cognitive flexibility and interpersonal problem solving), trait angry rumination was regressed onto cognitive flexibility. This represents the first test of mediation, as outlined by Baron and Kenny (1986), in which the hypothesised mediator (i.e. trait angry rumination) is regressed onto the proposed independent variable (i.e. cognitive flexibility). This regression was found to be not significant ($F(1,100) = .154$, $p = .696$), which does not support hypothesis 1. Further, it means that the first test of mediation failed, thus suggesting that trait angry rumination (on the ARS) does not mediate the relationship between cognitive flexibility and interpersonal problem solving.

4.2.2. Hypothesis 2: Participants who are more cognitively inflexible (on the WCST-64) will demonstrate less effective interpersonal problem solving skills (on the MEPS and SPSI-R).

This hypothesis was tested by regressing interpersonal problem solving onto cognitive flexibility. In order to reduce the risk of making a type 1 error, a composite measure of cognitive flexibility was derived. The composite measure included the following scores from the WCST-64: total number of errors, non-perseverative errors, perseverative errors and conceptual level responses, which were all found to be highly correlated with one another. This composite measure of cognitive flexibility was found to significantly

predict both the number of relevant means ($F(1,95) = 6.322$, $p = .014$; adjusted R square = .053) and effectiveness ratings ($F(1,95) = 5.552$, $p = .021$; adjusted R square = . 045) on the MEPS. In order to examine this relationship further, a series of regressions were conducted, in which the two measures from the MEPS (i.e. number of relevant means and effectiveness ratings) were regressed onto each of the four WCST-64 scores that comprised the composite measure of cognitive flexibility. Due to the large number of statistical comparisons being made, $p < .01$ was used to determine statistical significance instead of the customary $p < .05$. Using this more stringent criteria, only the non-perseverative errors score from the WCST-64 was able to significantly predict performance on the two measures of interpersonal problem solving from the MEPS: number of relevant means ($F(1,95) = 8.491$, $p = .004$; adjusted R square = .072) and effectiveness ratings ($F(1,95) = 7.078$, $p = .009$; adjusted R square = .060). With regards to the other scores from the WCST-64, total number of errors approached significance in predicting both the number of relevant means ($F(1,95) = 6.300$, $p = .014$; adjusted R square = .052) and effectiveness ratings ($F(1,95) = 5.605$, $p = .020$; adjusted R square = .046) on the MEPS. Also, conceptual level responses would have significantly predicted social problem solving on the MEPS if the less stringent $p < .05$ level of significance had been used (number of relevant means; $F(1,95) = 4.913$, $p = .029$; adjusted R square = .039 and effectiveness ratings; $F(1,95) = 4.016$, $p = .048$; adjusted R square = .030). However, the perseverative errors score was not significantly related to social problem solving on the MEPS (relevant means; $F(1,95) = 3.059$, $p = .084$ and effectiveness ratings; $F(1,95) = 3.108$, $p = .081$). These results indicate that better performance on the

non-perseverative errors score from the WCST-64 predicted enhanced social problem solving on the MEPS.

It was also predicted that the relationship between cognitive flexibility and interpersonal problem solving would be independent of other general cognitive functions that may correlate with performance on the WCST-64. Therefore, the regressions above, in which the two measures from the MEPS were regressed onto the composite measure of cognitive flexibility, were repeated with the addition of Digits Backwards (working memory measure) and the WTAR (general intelligence measure) as controlling variables. Once the controlling variables had been added, the composite measure of cognitive flexibility still significantly independently contributed to the model for both the number of relevant means ($\beta = .227$, $t(1) = 2.197$, $p = .031$) and the effectiveness ratings ($\beta = .252$, $t(1) = 2.457$, $p = .016$), but the overall regression equations were no longer significant (relevant means; $F(3,92) = 1.610$, $p = .193$ and effectiveness ratings; $F(3,92) = 2.061$, $p = .111$). In addition, as only the non-perseverative errors score from the WCST-64 was found to significantly (at $p < .01$) predict performance on the MEPS, only the regressions for this measure were repeated. As with the composite measure, once the controlling variables had been added, the non-perseverative errors score was found to still significantly contribute to the model for both the number of relevant means ($\beta = .275$, $t(1) = 2.663$, $p = .009$) and effectiveness ratings ($\beta = .290$, $t(1) = 2.821$, $p = .006$). The overall regression equation was found to be significant for effectiveness ratings ($F(3,92) = 2.701$, $p = .050$), but not for number of relevant means ($F(3,92) = 2.364$, $p = .076$). Therefore, as predicted, the relationship between cognitive

flexibility and interpersonal problem solving was found to be independent of both working memory and general intelligence.

4.2.3. Hypothesis 3: Participants who have a greater tendency towards trait angry rumination (on the ARS) will demonstrate poorer interpersonal problem solving (on the MEPS and SPSI-R).

This hypothesis was tested by regressing interpersonal problem solving onto trait angry rumination. Trait angry rumination was found to significantly predict how participants responded on the Negative Problem Orientation (NPO) scale of the SPSI-R ($F(1,101) = 24.294$, $p < .001$; adjusted R square = .186), with those participants scoring highly on the ARS also scoring highly on the NPO. However, trait angry rumination did not significantly predict performance on either of the MEPS measures (number of relevant means; $F(1,96) = .109$, $p = .742$ and effectiveness ratings; $F(1,96) = .021$, $p = .885$). The relationship between ARS and NPO held even after adding the following controlling variables: working memory (Digits Backwards), general intelligence (WTAR) and trait anger (trait anger scale of the STAXI-2), in that the overall regression was still significant ($F(4,97) = 6.797$, $p < .001$; adjusted R square = .187) and ARS continued to significantly contribute to the model ($\beta = .351$, $t(1) = 3.335$, $p = .001$).

Taking the results of hypotheses 2 and 3 together, it appears as though cognitive flexibility predicts performance on the MEPS but not the SPSI-R, and trait angry rumination predicts performance on the SPSI-R but not the MEPS. In order to explore this finding further, three multiple regressions were conducted, in which each of the

three measures of interpersonal problem solving (i.e. the NPO from the SPSI-R and the number of relevant means and effectiveness ratings from the MEPS) were regressed onto both the composite measure of cognitive flexibility and trait angry rumination (on the ARS). The results of these analyses confirmed the observations above. In particular, when regressing NPO from the SPSI-R onto both the composite measure of cognitive flexibility and trait angry rumination, only trait angry rumination significantly contributed to the relationship (β = .444, $t(1) = 4.927$, $p < .001$). The composite measure of cognitive flexibility was not a significant predictor in this model (β = -.030, $t(1) = -.336$, $p = .738$). However, when regressing the MEPS dependent variables (i.e. number of relevant means and effectiveness ratings) onto both cognitive flexibility and trait angry rumination, only the composite measure of cognitive flexibility significantly contributed to the relationship (number of relevant means; $\beta = .251$, $t(1) = 2.511$, $p = .014$ and effectiveness ratings; $\beta = .235$, $t(1) = 2.348$, $p = .021$). In contrast, trait angry rumination did not significantly contribute to either model (number of relevant means; $\beta = -.039$, $t(1) = -.392$, $p = .696$ and effectiveness ratings; $\beta = -.020$, $t(1) = -.200$, $p = .842$). Therefore, these results indicate that trait angry rumination predicts performance on the NPO scale of the SPSI-R, and cognitive flexibility (in particular, the non-perseverative errors score from the WCST-64) predicts performance on the MEPS, but not vice versa.

In summary, the results of the regression analyses found that, contrary to predictions, cognitive flexibility was not related to trait angry rumination. As this was the first test of mediation, this null result also suggests that trait angry rumination does not mediate

the relationship between cognitive flexibility and social problem solving. However, both cognitive flexibility and trait angry rumination were found to independently predict social problem solving. More specifically, cognitive flexibility predicted how participants performed on the MEPS, and trait angry rumination predicted participants' scores on the NPO scale of the SPSI-R. Also, as predicted, these relationships were found to be independent of working memory, general intelligence and trait anger. The results of these analyses are summarised below in Figure 2.

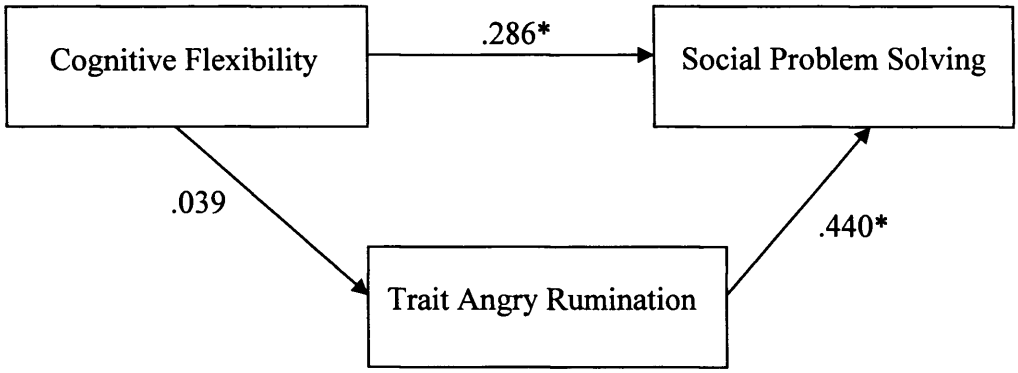


Figure 2: The results of the regression analyses in which trait angry rumination is hypothesised to serve as a potential mediator of the link between cognitive flexibility and social problem solving. All numbers represent standardised beta coefficients. * $p <$ *.01*

4.3. Study 2

Study 2 utilised an experimental design, in which anger and rumination/distraction were induced in order to determine the impact of the response manipulations on interpersonal

problem solving. As above, the results of the analyses are organised by hypothesis. However, before testing the hypotheses for study 2, a number of background checks on the data needed to be performed first, which are presented below.

4.3.1. Randomisation Check

The way the study was designed meant that it was not possible to match the two groups (i.e. rumination and distraction groups) on important variables, such as trait angry rumination, trait anger, or levels of cognitive flexibility. Therefore, a number of t-tests were conducted to check that the randomisation procedure was successful and that the two groups did not significantly differ on any of these important variables. The t-tests revealed that the two groups did not significantly differ on trait angry rumination ($t(101) = -.106$, $p = .809$), trait anger ($t(101) = .312$, $p = .993$), or cognitive flexibility ($t(100) = .067$, $p = .602$). Therefore, the randomisation procedure appeared to be successful in producing equivalent groups.

4.3.2. Mood Induction Checks

In order to ascertain whether the anger induction procedure was successful in inducing anger, a 2x2 mixed model factorial ANOVA was conducted on anger scores with one within subjects factor (pre and post induction) and one between subjects factor (response condition; rumination versus distraction). As predicted, the main effect of pre and post anger induction was significant ($F(1,100) = 83.861$, $p < .001$). A review of the means demonstrates that participants became angrier following the anger induction (Pre-induction; $M = 1.706$, $SD = .088$ and Post-induction; $M = 3.135$, $SD = .176$). There

were no significant differences in anger levels between the two groups (i.e. the main effect of response condition was not significant; $F(1,100) = 3.431$, $p = .067$), nor was the interaction significant ($F(1,100) = .513$, $p = .476$). Therefore, the anger induction was successful in significantly increasing all participants' levels of anger state.

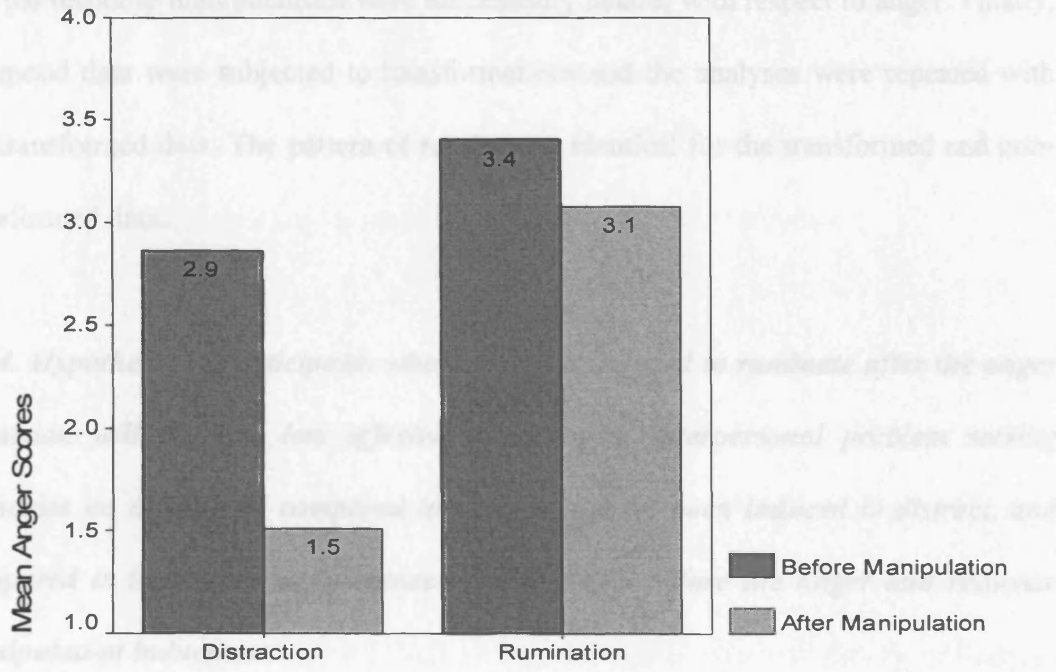
In order to determine whether the anger induction produced a specific state of anger, two further 2x2 mixed model factorial ANOVAs were conducted, in which anxiety and sadness ratings were used as the within-subjects factor and response condition was included as the between subjects factor. With regards to the analysis conducted on the anxiety mood data, neither of the main effects, nor the interaction was significant (pre and post induction; $F(1,100) = .520$, $p = .473$, response condition; $F(1,100) = 3.084$, $p = .082$, and interaction; $F(1,100) = .892$, $p = .347$). Therefore, the anger induction did not significantly increase participants' levels of anxiety. However, similar results to the anger data were found for the sadness ratings, in that the main effect of pre and post induction was significant ($F(1,97) = 44.316$, $p < .001$), but the other main effect and the interaction were not significant ($F(1,97) = 2.033$, $p = .157$ and $F(1,97) = .181$, $p = .671$, respectively). Therefore, following the anger induction, in addition to becoming angrier, participants also became sadder. Finally, as the negative mood data were significantly positively skewed, transformations were applied to ensure their distributions were normal. The above analyses were then repeated on the transformed data. The pattern of results was identical to those reported above.

4.3.3. Hypothesis 1: Participants who ruminate after the anger induction will be angrier than those who distract.

This hypothesis was examined by performing a 2x2 mixed model factorial ANOVA on anger scores with one between subjects factor (response condition; rumination versus distraction) and one within subjects factor (anger scores before and after the response manipulation). A significant interaction would support the hypothesis that the response manipulations differentially affected anger levels. The main effect for pre and post response manipulation was significant ($F(1,100) = 46.004$, $p < .001$), as was the main effect of response condition ($F(1,00) = 13.946$, $p < .001$). A consideration of the means demonstrates that participants were less angry after the response manipulations than before (Pre-induction anger; $M = 3.133$, $SD = .175$ and Post-induction anger; $M = 2.296$, $SD = .129$), and participants in the rumination group were angrier than those in the distraction group (Rumination; $M = 3.241$, $SD = .199$ and Distraction; $M = 2.188$, $SD = .199$). More importantly, the interaction was also significant ($F(1,100) = 17.188$, $p < .001$), thus providing support for hypothesis 1. A perusal of the means in the bar chart below (see graph 1) indicates that participants in the rumination group had similar levels of anger before and after the response manipulation, but participants in the distraction group exhibited a reduction in their anger scores. Bonferroni post-hoc tests confirmed these observations, in that the rumination scores before and after the response manipulation were not significantly different ($p = .065$), but the difference in the distraction scores was significant ($p < .001$). Also, as the anger scores for the rumination and distraction groups prior to the response manipulations appeared

dissimilar, an independent samples t-test was conducted, which revealed they were not significantly different (t(101) = -1.503, p = .128 one-tailed).

Graph 1: The Effects of Response Manipulations on Participants' Anger Scores



In order to ascertain whether the response manipulations affected the other negative moods (i.e. anxiety and sadness) in the same way as anger, two further 2x2 mixed model factorial ANOVAs were performed with anxiety and sadness ratings as the within subjects factor and response condition as the between subjects factor. The pattern of results for both anxiety and sadness was identical to that of anger, in that the main effects (anxiety pre and post induction; $F(1,99) = 47.046$, $p < .001$, anxiety response condition; $F(1,99) = 6.821$, $p = .010$, sadness pre and post induction; $F(1,100) = 14.464$, $p < .001$, and sadness response condition; $F(1,100) = 9.502$, $p = .003$) and the

interactions (anxiety interaction; $F(1,99) = 6.246$, $p = .014$ and sadness interaction; $F(1,100) = 11.627$, $p = .001$) were significant. Therefore, the response manipulations affected all of the negative moods in the same way, which supports the idea that rumination and distraction function similarly across all negative moods. It also suggests that the response manipulations were successfully neutral with respect to anger. Finally, the mood data were subjected to transformations and the analyses were repeated with the transformed data. The pattern of results was identical for the transformed and non-transformed data.

4.3.4. Hypothesis 2: Participants who have been induced to ruminate after the anger induction will produce less effective solutions to interpersonal problem solving scenarios on the MEPS compared to those who have been induced to distract, and compared to their own performance on the MEPS before the anger and response manipulation inductions.

This hypothesis was explored through two 2x2 mixed model factorial ANOVAs, in which one factor was between subjects (response condition; rumination versus distraction) and the other factor was within subjects (performance on the MEPS before and after the anger and response manipulations). The two dependent variables were the number of relevant means and the effectiveness ratings on the MEPS. With regards to the number of relevant means, neither of the main effects, nor the interaction was significant (pre and post induction; $F(1,95) = .603$, $p = .439$, response condition; $F(1,95) = .179$, $p = .673$, and interaction; $F(1,95) = .056$, $p = .813$). For the other dependent variable, effectiveness ratings, only the main effect of pre and post MEPS was

significant (F(1,95) = 5.827, p= .018), with the other main effect and interaction not reaching significance (F(1,95) = .004, p = .949 and F(1,95) = .427, p = .515, respectively). From looking at the means, it appears that all participants' effectiveness scores decreased from pre to post anger and response manipulation inductions, irrespective of group membership (M = 4.486, SD = .144 and M = 4.163, SD = .138, respectively). Therefore, these results do not support hypothesis 2, in that all participants produced less effective solutions to the MEPS after the anger and response manipulation inductions, not just those participants who had ruminated.

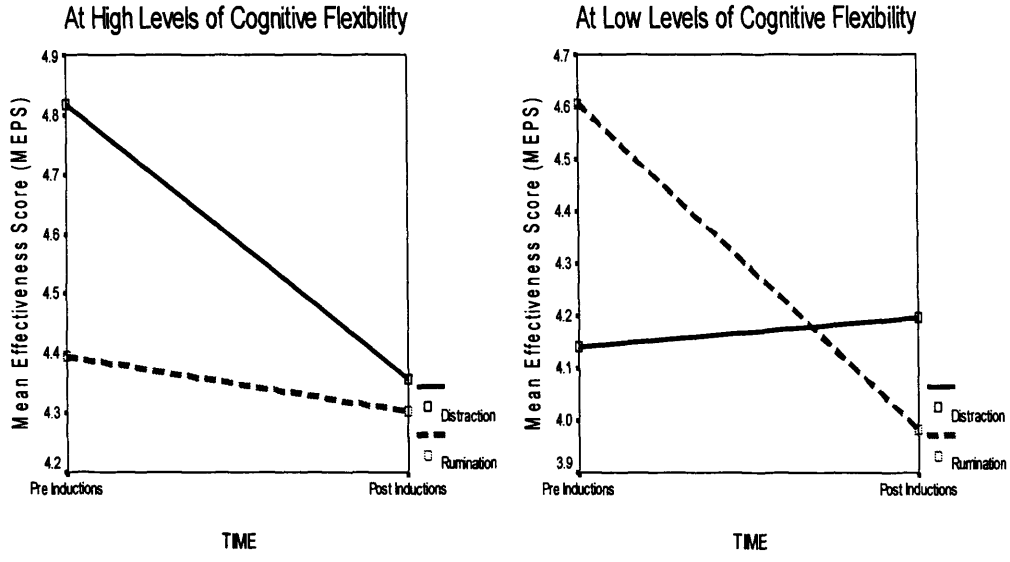
4.3.5. Hypothesis 3: The influence of the response manipulations on interpersonal problem solving will vary depending on whether participants are high or low on cognitive flexibility. Those participants low on cognitive flexibility will have particular difficulty solving interpersonal problems if they have also been induced to ruminate. However, participants high on cognitive flexibility will be less influenced by the rumination induction and will therefore not show a decrement in their interpersonal problem solving ability. The level of cognitive flexibility will not affect those participants induced to distract.

This hypothesis was tested with a 2x2x2 mixed model factorial ANOVA, in which one factor was within subjects (performance on the MEPS before and after the anger and response manipulations) and two factors were between subjects (response condition; rumination versus distraction and cognitive flexibility; high versus low). The cognitive flexibility factor was derived by splitting participants' perseverative error raw scores from the WCST-64 along the median. The dependent variable was the effectiveness

ratings scores from the MEPS. As before, the main effect of pre and post MEPS was significant ($F(1,92) = 4.349$, $p = .040$). More interestingly, the triple interaction (i.e. pre and post MEPS, response condition, and high and low cognitive flexibility) was marginally significant ($F(1,92) = 3.784$, $p = .055$).

From the graphs below (see graph 2), it is clear that, at high levels of cognitive flexibility (i.e. low number of perseverative errors), the rumination group's effectiveness scores changed little from pre to post anger and response manipulation inductions, whilst the distraction group's effectiveness scores appear to have decreased. In contrast, at low levels of cognitive flexibility, the rumination group's effectiveness scores decreased from pre to post induction, whereas the distraction group's scores appear to have remained the same. In order to explore these observations, Bonferroni post-hoc tests were conducted on the triple interaction. The only significant difference found was that, at low levels of cognitive flexibility, the rumination group's effectiveness scores decreased significantly following the anger and rumination inductions ($p = .013$). This finding supports hypothesis 3, in that those participants with low levels of cognitive flexibility showed a significant decrease in their interpersonal problem effectiveness after being induced to ruminate. In comparison, for those participants with high levels of cognitive flexibility, the rumination induction had little effect on their ability to solve interpersonal scenarios effectively. Also, as predicted, the distraction group's scores were not significantly different from pre to post induction at either level of cognitive flexibility.

Graph 2: Participants' Change in Social Problem Solving Effectiveness Scores from Pre to Post Anger and Response Manipulations as a Function of Levels of Cognitive Flexibility



This analysis was repeated with the controlling variables added (i.e. working memory, general intelligence and trait anger), which resulted in a 2x2x2 ANCOVA. Whilst the main effect of pre and post MEPS was no longer significant ($F(1,88) = .825$, $p = .366$), the addition of the controlling variables had little impact on the triple interaction, in that it still approached significance ($F(1,88) = 3.666$, $p = .059$). Also, as the perseverative error raw score data were significantly positively skewed, the 2x2x2 ANOVA was repeated after an inverse transformation had been applied to the perseverative error data. This resulted in very similar findings to those reported above, in that the main effect of pre and post MEPS was significant ($F(1,90) = 4.895$, $p = .029$) and the triple interaction approached significance ($F(1,90) = 3.675$, $p = .058$).

5. Discussion

5.1. Summary of Results

5.1.1. Study 1

Contrary to the prediction made by hypothesis 1, cognitive flexibility was found not to be related to participants' scores on the ARS. As this null result also meant that the first test of mediation failed, it suggests that trait angry rumination cannot mediate the relationship between cognitive flexibility and interpersonal problem solving, thus refuting hypothesis 4. However, the other two hypotheses were supported by the results found for study 1. Both cognitive flexibility and trait angry rumination were found to predict interpersonal problem solving. In particular, enhanced performance on the non-perseverative errors score from the WCST-64 predicted better interpersonal problem solving (i.e. greater number of relevant means and higher effectiveness scores) on the MEPS. However, cognitive flexibility was not related to how participants responded on the SPSI-R. In contrast, how participants responded on the ARS predicted their scores on the NPO scale of the SPSI-R, with those participants scoring highly on the ARS also scoring highly on the NPO. However, participants' scores on the ARS did not predict performance on the MEPS. Finally, as predicted, these relationships were found to be independent of working memory, general intelligence and trait anger.

5.1.2. Study 2

As in study 1, the results found for study 2 provided mixed support for the hypotheses. Firstly, whilst the anger induction was found to be successful in significantly increasing participants' levels of anger, it also significantly increased their levels of sadness, which was not predicted. Participants in the rumination condition were found to be angrier than those in the distraction condition, which provided support for hypothesis 1. However, contrary to predictions made by hypothesis 2, participants who were induced to ruminate did not demonstrate poorer interpersonal problem solving than participants who had been induced to distract. Instead, all participants evidenced less effective interpersonal problem solving after the inductions compared to before, irrespective of whether they had been induced to ruminate or distract. Finally, as was predicted by hypothesis 3, the effects of the response manipulations on interpersonal problem solving were found to depend upon participants' level of cognitive flexibility. In particular, the rumination induction only resulted in less effective interpersonal problem solving for those participants who were less cognitively flexible.

5.2. Interpretation of Results

5.2.1. Study 1

The lack of a significant relationship found in this study between cognitive flexibility and trait angry rumination is surprising given the research on depressive rumination, in which depressive ruminators have been found to commit more perseverative and failure to maintain set errors than depressive non-ruminators (Davis & Nolen-Hoeksema,

2000). It is also surprising when considering the link that has been found between cognitive inflexibility and violence (e.g. Bergvall et al., 2001; Sreenivasan et al., 1997). If the result found in this study is reliable then it suggests that an inflexible cognitive style does not underlie trait angry rumination. However, there may be reasons to question the reliability of this null result. Davis and Nolen-Hoeksema (2000) pre-selected participants who were high and low on depressive rumination, whereas this study did not. The majority of participants (70%) in this study scored within one standard deviation of the mean on the ARS. Therefore, by not pre-selecting participants on the far ends of the continuum (e.g. those participants who scored two standard deviations or more away from the mean on the ARS), the amount of variability was potentially reduced, thereby lessening the likelihood of finding a relationship between cognitive flexibility and trait angry rumination. If this study had pre-selected participants who were high and low on the ARS, it is possible that a similar result would have been found to the one in the Davis and Nolen-Hoeksema (2000) study. Similarly, the use of a non-clinical sample in this study may have also reduced the likelihood of finding a relationship between cognitive flexibility and trait angry rumination. Most of the research into cognitive flexibility and anger has been conducted with violent offenders and psychiatric patients. Therefore, it may be the case that this relationship is only apparent for those people at the more severe ends of the spectrum for anger. Further research with a clinical sample and/or with participants who have been pre-selected as being high and low on trait angry rumination would help to explicate these possibilities.

The finding that better performance on the non-perseverative errors score from the WCST-64 predicted more effective interpersonal problem solving on the MEPS is consistent with the small amount of research that has been conducted in this area with patients with schizophrenia. For example, as in this study, Hatashita-Wong et al. (2002) found that two non-perseverative measures from the WCST (i.e. conceptual level responses and categories completed) were correlated with several aspects of interpersonal problem solving, such as the correctness, appropriateness and elaboration of solutions, as well as the ability to appreciate the possible limitations of solutions. Therefore, the results of this study extends the findings of a link between cognitive flexibility and social problem solving in patients with schizophrenia, and suggests that such a link exists within a non-clinical sample as well. The fact that it was a non-perseverative measure of the WCST-64 that predicted performance on the MEPS is interesting and contrary to what was predicted. The factor structure of WCST-64 indicates that all of the non-perseverative scores (i.e. total errors, non-perseverative errors, conceptual level responses and categories completed) load on one component, which has been interpreted as measuring concept-formation (Kongs et al., 2000). Two other factors were also found: a perseveration component and a failure to maintain set component. Therefore, in this study, it was the WCST-64 score that measures concept formation rather than perseveration that predicted performance on the social problem solving measure: the MEPS. It may be that concept formation predicts social problem solving because this ability enables people to form concepts about the problem, as well as possible solutions to the problem, in the same way that concept formation is thought to enable people to form a concept about the correct sorting strategy in the WCST-64.

The finding that high trait angry rumination predicts poorer interpersonal problem solving (i.e. higher scores on the NPO of the SPSI-R) is consistent with both the depressive rumination literature and the anger/aggression and interpersonal problem solving literature. Lyubomirsky et al. (1999) found that dysphoric ruminators viewed their problems more negatively, more severely and less solvable, and themselves as being less likely to implement their solutions than dysphoric distractors and non-dysphoric controls. Further, they found that this negative biased thinking was related to the effectiveness of solutions participants generated on the MEPS. This negative thinking about problems and ability to solve them is extremely reminiscent of the way the NPO scale has been conceptualised, in that it has been defined as a dysfunctional or inhibitive cognitive-emotional set that involves the tendency to view problems as a threat to well-being, to doubt one's ability to solve problems successfully, and to become easily frustrated and distressed when faced with problems. Therefore, the finding in this study that trait angry rumination is associated with a negative orientation towards social problem solving is consistent with what has been found for depressive rumination.

This result is also consistent with the research that has found a link between anger and social problem solving. For example, Tescher et al. (1999) found that high-anger prone individuals had lower scores than low-anger prone individuals on the Problem Orientation Scale, which, like NPO, measures the motivational component of social problem solving. Also, D'Zurilla et al. (2003) found that NPO was positively correlated

with anger and hostility. Therefore, it seems as though both anger and trait angry rumination are associated with a negative orientation to social problem solving. Whilst these studies are unable to establish the direction of causality, it seems possible that, as has been hypothesised to be the case for depressive rumination, angry rumination may enhance an individual's access to negative, biased thinking, which, in turn, could impair their perception of their ability to solve interpersonal problems effectively (i.e. lead to a negative problem orientation) and reduce the likelihood of positive interpersonal problem solving outcomes. However, it is also possible that a negative problem orientation, with its emphasis on threat and low self-efficacy, may lead to ineffectual angry rumination on problems instead of engaging in active problem solving. Further research is necessary to establish the direction of these relationships.

Finally, the double dissociation found in this study between trait angry rumination predicting a negative orientation towards problem solving (i.e. NPO) but not interpersonal problem solving effectiveness (i.e. MEPS), and cognitive flexibility predicting interpersonal problem solving effectiveness but not a negative problem orientation was unexpected. However, it is possible that this reflects the way in which the constructs were measured. In particular, both the ARS and the NPO are self-report measures, whilst both the WCST-64 and the MEPS are performance measures.

5.2.2. Study 2

The lack of specificity found in this study for the anger induction was surprising and is contrary to what was found in the Rusting and Nolen-Hoeskema (1998) study. Using

the same anger induction procedure as the one employed in this study, they found that it produced a specific state of anger. However, there may be a number of reasons why this study found that the anger induction also increased participants' sadness levels. Firstly, there is a substantial amount of evidence indicating that mood induction procedures often elicit multiple affective states instead of producing one specific emotion. After reviewing the literature, Polivy (1981) stressed that the negative emotions of depression, anxiety and hostility tended to covary. Similarly, S.Vrana (January 1997, personal communication, cited in Tescher et al., 1999) concluded that it is almost impossible to evoke pure emotion and typically negatively valenced emotions elicit other negative emotions. Also, as the anger induction used in this study was idiographic, there was little control over the types of memories that participants chose to recall. In reviewing the accounts provided by the participants, it appeared as though many of the memories involved people close to them betraying or disappointing them in some way, which is likely to lead to feelings of both anger and sadness. In fact, several of the passages explicitly mention feeling both sadness and anger (e.g. "I am crying a lot and flip from being mad to sad and back again"). In future research, it may be helpful to induce both anger and sadness in participants in order to try to control for any effects of sadness that have been produced by the anger induction.

The results of the response manipulations' effects on anger state were largely consistent with the literature. As was found in the Rusting and Nolen-Hoeksema (1998) study, after the response manipulations, participants in the rumination condition were angrier than those in the distraction condition. Also, this study demonstrated that the distraction

induction resulted in a reduction in participants' levels of anger, which was also found by Rusting and Nolen-Hoeksema (1998). However, participants in this study who were induced to ruminate maintained their anger levels from pre to post induction, whilst participants in the rumination condition in the Rusting and Nolen-Hoeksema (1998) study demonstrated an increase in their anger state. This suggests that the rumination induction used in this study was less successful than the one employed in the Rusting and Nolen-Hoeksema (1998) study. Finally, the finding that the response manipulations produced the same pattern of effects for all of the negative mood states provides support for the conceptualisation of rumination as functioning in the same way across all negative moods.

The finding that both the rumination and distraction groups produced less effective solutions to interpersonal problems after the response manipulations compared to before was not predicted. Initially, this was interpreted as possibly reflecting fatigue or reduced effort on the part of participants. Also, the finding that the rumination group did not display less effective interpersonal problem solving compared to the distraction group was unexpected and contradicts what has been found in the depressive rumination literature. When rumination and distraction have been induced in dysphoric participants and non-dysphoric controls, research has consistently shown that the dysphoric ruminators produce less effective interpersonal problem solving, on the MEPS, than dysphoric distractors and non-dysphoric participants (Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky et al., 1999; Watkins & Baracaia, 2002). This null result also contradicts the finding in the correlational part of this study that trait angry

rumination is associated with less effective interpersonal problem solving (i.e. a greater negative problem orientation). There may be several possible explanations for these discrepancies. Firstly, it may be the case that the anger and rumination inductions utilised in this study were not strong enough to overcome participants' natural responses to anger (e.g. suppression) or to interfere with interpersonal problem solving. Given that the social problems on the MEPS are relatively straightforward to solve, stronger inductions may be necessary to disrupt participants' interpersonal problem solving abilities. Similarly, the depressive rumination research utilised dysphoric participants, whereas in this study, angry mood was induced. It may be the case that it is not possible to induce this effect in all participants and instead it may only be apparent in those people who are anger-prone. Also, the work by O'Neal and Taylor (O'Neal & Taylor, 1989; Taylor, 1992) highlights the importance of considering the utility of maintaining an angry mood. In particular, their studies have found that participants engage in behaviours to prolong their angry mood, but only when it is useful to do so (e.g. if they have an opportunity to retaliate). Therefore, if participants do not perceive it be useful to perpetuate an angry mood, they may be disinclined to engage in angry rumination.

Other possible explanations for this null result centre on the interpersonal problem solving construct and how it is measured. Tescher et al. (1999) found that, whilst the Problem Orientation scale of the SPSI differentiated high and low anger prone people, the two groups did not differ on the Problem Solving Skills scale, which measures the ability to define, generate and implement solutions. Also, independent judges were not able to discriminate between the two groups on the effectiveness and appropriateness of

their solutions to anger inducing scenarios. They interpreted these findings as suggesting that high-anger prone participants are capable of generating appropriate solutions to social problems but that the implementation of these solutions is likely to be negatively influenced by their cognitions, emotions and behaviour (i.e. their negative orientation to problems). This may help to explain why, in this study, trait angry rumination was found to be associated with a negative problem orientation, but that when it was induced it did not interfere with people's abilities to generate effective solutions to hypothetical social problems. Other research has found different results depending on what aspect of interpersonal problem solving is being measured. For example, Evans and Short (1991) found that first responses to social problems did not differentiate high versus low aggressive children, but the number of effective second responses did. Also, Basquill et al. (2004) found that, on one interpersonal problem solving measure, only the ability to identify the positive and negative consequences of a solution differentiated aggressive versus non-aggressive adults. Therefore, another possible reason why state angry rumination was not found to lead to impairments in interpersonal problem solving in this study is that only one aspect of social problem solving was measured: means-ends social problem solving. It may be helpful to include measures of different stages or aspects of interpersonal problem solving in future research.

Finally, the finding that the addition of a cognitive flexibility factor to the above analysis resulted in a marginally significant interaction between the three constructs of interest (i.e. cognitive flexibility, state angry rumination and interpersonal problem

solving) may suggest another explanation for why no difference was found between the rumination and distraction groups on interpersonal problem solving. The results of this analysis indicated that the rumination induction only resulted in less effective interpersonal problem solving for those participants who were less cognitively flexible, in that it was only this group of participants whose effectiveness scores decreased significantly from pre to post anger and response manipulations. Whilst this result needs to be interpreted with caution and requires replication because of the marginal level of significance, it suggests that the rumination induction does not impair interpersonal problem solving uniformly across all participants, and rather does so only for those who are less cognitively flexible.

5.2.3. Summary and Conclusions

These findings have implications for the hypothesised model in this study, in which an inflexible and perseverative cognitive style underscores trait angry rumination, which, in turn, leads to difficulties in interpersonal problem solving. The results of the regression analyses performed in study 1 do not support this model, in that trait angry rumination was found not to be related to cognitive flexibility and not to mediate the relationship between cognitive flexibility and interpersonal problem solving. Further, the results demonstrated that cognitive flexibility and trait angry rumination were related to different aspects of interpersonal problem solving, in that a negative problem orientation was predicted by trait angry rumination, and the ability to generate effective solutions to interpersonal problems was predicted by cognitive flexibility. Also, it was a non-perseverative measure of the WCST-64 that predicted performance on the social

problem solving measure, not a perseverative measure. However, the triple interaction found in study 2 tentatively (due to the marginal level of significance) indicates that some sort of relationship exists between the three constructs: cognitive flexibility, state angry rumination and interpersonal problem solving. In particular, the triple interaction suggests that cognitive flexibility may moderate the relationship between state angry rumination and interpersonal problem solving deficits, in that the relationship between these two constructs differed according to the value of cognitive flexibility, with rumination leading to poorer interpersonal problem solving only for those participants who were less cognitively flexible. Also, unlike the correlational study, in study 2, the cognitive flexibility factor that was found to influence the relationship between state angry rumination and interpersonal problem solving was a perseverative measure: the perseverative errors score from the WCST-64.

How is it possible to reconcile the discrepancies between the findings in the two studies? In addition to the potential limitations of the study mentioned previously (i.e. that participants were not pre-selected on the ARS, the possible lack of strength of the anger and rumination inductions, and the use of the MEPS as the only performance measure of social problem solving), there may be other explanations for why these differences were found. As discussed earlier, the dissociation found between the different aspects of interpersonal problem solving that were predicted by trait angry rumination and cognitive flexibility may reflect a difference between whether self-report or performance measures were used. In contrast, in the experimental study, all of the measures were performance based and angry rumination was induced rather than

being enquired about. Therefore, it is worth considering whether trait angry rumination, as measured by the ARS, is actually quite different to state angry rumination that has been induced. Also, the findings from Tescher et al. (1999) discussed earlier suggest that anger prone individuals may not have problems generating effective solutions to hypothetical social scenarios, but that their negative orientation to problems may interfere with their attempts to implement these solutions. Angry rumination may operate in a similar manner, which would help to explain why, in this study, trait angry rumination was found to be associated with a negative problem orientation but not less effective social problem solving on the MEPS, and why state angry rumination did not interfere with participants' ability to generate effective solutions to hypothetical social scenarios.

In addition, according to the mood-state dependent hypothesis, cognitive vulnerability factors are present in vulnerable individuals, but remain dormant until activated by negative mood (Miranda & Persons, 1988). Therefore, it may be necessary to induce anger and rumination in order for it to interfere with interpersonal problem solving performance. Those participants high on trait angry rumination may be perfectly able to solve interpersonal problems when they are in a neutral or positive mood state (i.e. why there was no relationship found between ARS and MEPS), but their performance could deteriorate after engaging in angry rumination. However, the results of the experimental study suggest that this may only be true for those people low on cognitive flexibility. Similarly, an individual's perseverative tendencies may only become apparent and interfere with interpersonal problem solving once the person is angrily ruminating. This

may help to explain why, unlike the experimental study, the correlational study found no relationship between the perseverative measures from the WCST-64 and poorer interpersonal problem solving on the MEPS. Further research would help to discriminate between these various possible explanations and establish whether the relationships found in this study are reliable.

5.3. Limitations of the Study

There were a number of limitations in this study, many of which have already been mentioned. Firstly, the study was constrained because participants were not pre-selected on the basis of being high and low on trait angry rumination. Time constraints meant that screening people for trait angry rumination was not feasible. Also, the use of the ARS as a screening tool would have alerted participants to the study's focus on angry rumination. A second potential limitation was the potency of the anger and rumination inductions. Ethical considerations meant it was necessary to induce a relatively mild and transitory state of anger. Therefore, the effects of the anger and rumination inductions may not have been strong enough or may not have persisted for long enough to have had a detrimental impact on participants' social problem solving abilities. Another possible limitation was the way in which the rumination induction items were derived in this study. As the items utilised in the Rusting and Nolen-Hoeksema (1998) study were not available, new items needed to be generated. The process by which these items were produced was not as rigorous as it might have been had there been more time available. Whilst a small pilot study was conducted to ensure that the anger

induction and the rumination and distraction items were effective on the whole, it would have been helpful to have had the opportunity to test a range of potential items, in order to select those that produced the most potent response in participants. Finally, given the research presented earlier, which suggests that whether or not a relationship is found between anger/aggression and interpersonal problem solving depends upon what aspect of social problem solving is being measured, this study was limited in the use of the MEPS, as it only measures a single aspect of interpersonal problem solving: means-ends problem solving.

5.4. Implications for Further Research and Clinical Practice

The results of this study provide a first step in determining the relationships between cognitive flexibility, angry rumination and interpersonal problem solving, but further research needs to be undertaken to see if these findings are reliable and to extend their scope. In particular, it would be useful to repeat this study with participants who are high and low on trait angry rumination and/or with a clinical (e.g. high anger prone individuals) and a non-clinical sample. Also, the inclusion of measures of interpersonal problem solving that assess the various aspects and stages involved in social problem solving in future research would help to explicate the specific relationships that angry rumination and cognitive flexibility have with interpersonal problem solving. Another potentially fruitful area for further research is establishing the direction of causality between anger and angry rumination and negative problem orientation, as well as the consequences of such a negative problem orientation for how people actually engage in

interpersonal problem solving. In particular, given that a relationship has been found between angry rumination and aggression and between angry rumination and a negative interpersonal problem solving orientation, it is possible that a negative problem orientation may mediate the relationship between angry rumination and aggression. Further research is needed to explore the relationships between these factors.

The potential clinical implications of this research are manifold. This study found that rumination and distraction resulted in similar consequences for all three negative moods (i.e. anxiety, anger and sadness), with rumination maintaining the negative mood and distraction reducing it. Therefore, therapeutic interventions aimed at treating rumination may be a useful way of combating co-morbidity. Also, the results of this study suggest that people who tend to engage in angry rumination are also likely to have a negative orientation to social problem solving, which may reduce the likelihood that they engage in effective interpersonal problem solving. This, in turn, may result in less positive social outcomes and more anger and aggression, which could lead to the establishment of a vicious cycle. Therefore, interventions that target both angry rumination and a negative orientation to social problem solving are likely to interrupt such a vicious cycle and lead to better behavioural outcomes in people with anger-control problems. In addition, the results of this study indicate that participants who are more cognitively flexible are better at solving social problems. Therefore, interventions aimed at promoting greater cognitive flexibility, such as considering multiple viewpoints or alternatives to a problem, may enhance social skills training programs and lead to better outcomes for aggressive or anger-prone children and adults.

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Part 3: Critical Appraisal

1. Introduction

The aim of this paper is to reflect upon some of the methodological and conceptual issues encountered during the process of conducting this research project. In particular, it will focus on the difficulties involved in trying to induce anger and rumination and measure interpersonal problem solving. It will also examine the rationale behind the choices made during the design of the study and consider what could have been done differently.

2. Methodological and Conceptual Issues

2.1. Inducing Anger

As rumination is believed to rely upon the presence of a negative mood to operate, it was clear that it would be necessary to induce anger before attempting to induce rumination. However, the induction of anger or any other mood has a host of issues and difficulties associated with it. These issues, as with most issues in research, involved making decisions and compromises that often improved matters in one area but opened up difficulties in another area. The issues involved in inducing anger and the choices made in relation to these issues will be explored below.

One of the first issues encountered when deciding to induce anger is the ethical implications of making people angry. Given that participants may find the experience of

being made angry unpleasant or stressful, it is usually necessary to limit the amount of anger induced in people, thus resulting in quite mild and transient levels of anger. This makes it difficult to predict whether the amount of anger that is induced is going to be sufficiently strong to result in demonstrable effects that are measurable. Also, the potentially transient nature of the anger induced limits the amount of time available to study its effects. The particular concern in this study was whether the anger level induced (as well as the rumination induction) would be powerful enough and persist for long enough to interfere with participants' interpersonal problem solving ability. This uncertainty makes it difficult to know whether any null results that are found are due to a lack of effectiveness of the anger induction or whether the predictions are not valid. Therefore, there is a trade-off between inducing a level of anger state that is effective enough to produce the effects one is interested in and limiting the potentially aversive impact on participants of being made angry. In practice, this trade-off tends to result in utilising relatively weak anger induction procedures to ensure that participants are not unduly distressed, but also results in limitations in the likelihood of finding an effect.

The other ethical dilemma resulting from the induction of anger was the use of deception. This was felt to be necessary in order to reduce the likelihood of bias in how participants responded to the anger induction. In particular, there was a concern that if participants knew that the purpose of the anger induction procedure was to produce anger, they may have reported feeling angrier than they actually did because they knew that was what the experimenter was looking for. In order to mitigate against ethical repercussions, minimal amounts of deception were employed in this study. In particular,

the aims of the anger and rumination/distraction inductions were withheld, as were the specific hypotheses in the study. However, the descriptions of what would be required of the participant for each task were accurate. In addition to the ethical implications, the strategy of not informing participants of the true purpose of the study also meant that it was not possible to pre-select participants who were high and low on angry rumination because the use of the Anger Rumination Scale (ARS; Sukhodolsky, Golub & Cromwell, 2001) as a screening tool would have alerted them to the study's focus on angry rumination. Similarly, it meant that the groups (i.e. rumination and distraction groups) could not be matched on levels of trait angry rumination or anger, as both the ARS and the STAXI-2 were administered at the very end of the procedure to disguise the fact that angry rumination was the subject under investigation.

Another methodological issue involved the choice of an idiographic anger induction procedure or a hypothetical anger-inducing scenario. In the Rusting and Nolen-Hoeksema (1998) study both methods were employed and the idiographic procedure produced greater increases in participants' anger levels. This is most likely because it involves recalling an actual event that made the person angry compared to asking them to imagine themselves experiencing a hypothetical scenario which has been shown in the past to make a group of people angry. For this study, the idiographic anger induction procedure was chosen because of its potentially enhanced potency, which was confirmed by a small pilot study that was conducted prior to the main research. However, the increased effectiveness of the idiographic anger induction procedure came at the price of less internal validity. In particular, given that people are recalling

different memories, they are not really getting the same anger induction, in that people may be recalling memories that vary in the amount of anger they elicit in the individual. Also, as the memories are from anger experiences that have happened in the past, it is possible that the conflict was resolved, thus potentially limiting the amount of anger it produces when recalled (Rusting & Nolen-Hoeksema, 1998).

In addition to the issues discussed earlier around the potency and sustainability of the angry mood, there were further practical methodological problems to overcome in these areas. With regards to the sustainability of anger, the specific issue was how to ensure that anger was maintained across the rumination manipulation, the mood questionnaires, and the interpersonal problem solving measure, given that every new task could potentially act as a means of distraction from the angry mood. The potential impact of this was mitigated against by re-inducing anger immediately prior to the rumination/distraction inductions. Also, the number of scenarios utilised in the interpersonal problem solving measure was reduced to two to try to reduce the time spent on this measure and, therefore, the likelihood that anger would dissipate. However, there was no obvious way to reduce this risk with regards to the mood questionnaire, which was felt to be essential to ensure that the inductions were having the desired effect. Also, there were additional dilemmas relating to the strength of the anger induction. Following the pilot study, the amount of time that people spent on the anger induction procedure was reduced from ten minutes, which was the method utilised in the Rusting and Nolen-Hoeksema (1998) study, to five minutes. This was done because of feedback that the anger induction procedure was too long. However, it

is possible that the five minutes given in this study was not enough time to ensure that people became angry. One could also argue that if people are given too much time they could reach the resolution stage of the conflict, which would potentially reduce their levels of anger. Therefore, it may be quite difficult to get the timing right in order to maximise the effectiveness of the anger induction. Whilst not possible in this study due to time constraints, more extensive pilot work would help to establish the most efficacious amount of time to spend on the anger induction.

Another issue related to the anger induction, which only became apparent once data collection had begun, was the role of context and culture. In particular, the question as to whether the anger induction was sufficient to overcome people's reluctance to be made angry was raised when it became clear that a number of participants' anger scores did not change after the anger induction. One potential explanation for this failure to induce anger in some participants is that there may be individual differences in the stories that people have about their relationship with anger, which might influence how they react to an anger induction. For example, a number of participants stated that they are not angry people when they were faced with the prospect of having to recall an angry memory. Therefore, the induction may not be sufficient to overcome people's natural responses to anger, such as suppression. Similarly, there are potentially strong social pressures, especially on women (e.g. Birnbaum, 1983; Fivush, 1991), not to get angry and it may be naive to assume that the experimental situation is immune to these contextual pressures. Also, the role of cultural differences may help account for some of the variability in participants' anger scores. Whilst this was not examined in the study,

there appeared to be some cultural patterns in the way in which participants responded on the mood questionnaire. For example, it seemed to be the case that Mediterranean cultures reported higher baseline anger scores and greater changes in anger following the anger induction.

2.2. Inducing Rumination

In addition to the methodological and conceptual issues regarding the anger induction, there were also a number of such issues with regards to the rumination induction. One of the key conceptual concerns that became apparent during the process of generating the items used to induce rumination was whether the rumination induction would genuinely mimic what people do when they engage in angry rumination. It was necessary to create a new set of rumination items for use in this study because the rumination items employed in the Rusting and Nolen-Hoeksema (1998) study were not made available. In order to do this, items from the ARS (Sukhodolsky et al., 2001) and attribution theory of anger (Averill, 1982, 1983; Frijda, 1986) were used to derive the rumination items. However, it quickly became clear that the theoretical conceptualisations of angry rumination (i.e. Sukhodolsky et al., 2001) were not supported by evidence. In particular, there appeared to be a distinct lack of qualitative analyses regarding the phenomenology of angry rumination. As such, there was a concern that the angry rumination items that were produced in this study were based upon untested suppositions, which raised uncertainty as to whether or not the angry rumination procedure was actually inducing authentic angry rumination.

As with the anger induction, there were similar issues with regards to the potentially transitory nature of angry rumination and how to sustain it. Following the pilot study, the procedure adopted in the Rusting and Nolen-Hoeksema (1998) study was modified in order to facilitate the prolongation of the angry mood and enhance the potency of the rumination induction. In particular, unlike Rusting and Nolen-Hoeksema (1998), participants were instructed to re-recall the angry memory they chose in the anger induction task with their eyes closed and with the experimenter reading the anger induction instructions aloud to them. The aim of this was to re-induce the angry mood in order to overcome any dissipation effects. Also, contrary to the procedure adopted by Rusting and Nolen-Hoeksema (1998), participants were asked to keep their eyes closed while the experimenter went on to read the rumination or distraction items aloud. The increased effectiveness of these modifications compared to the original protocol was supported by the feedback given in the pilot study. However, as this study failed to find that the rumination induction led to increased anger, as was found in the Rusting and Nolen-Hoeksema (1998) study, it suggests that this procedure may not have been as effective as theirs.

2.3. Measuring Interpersonal Problem Solving

The final area in which a number of methodological and conceptual issues were encountered was the measurement of interpersonal problem solving. The Means-Ends Problem Solving Procedure (MEPS; Platt & Spivack, 1975) was utilised in this study

because it is a performance measure of interpersonal problem solving. It was also chosen because it is the measure that has been used in all of the research into depressive rumination and interpersonal problem solving (Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky, Tucker & Caldwell, 1999; Watkins & Baracaia, 2002). However, a number of potential problems with this measure became apparent once it began to be used. Firstly, the MEPS employs rather straightforward hypothetical social scenarios because it was designed for use with a clinical sample (Lyubomirsky & Nolen-Hoeksema, 1995). Therefore, there was a concern that it might result in ceiling effects in our non-clinical sample. However, this worry was not borne out as there appeared to be a good degree of variability in the MEPS scores. The potentially simplistic scenarios used in the MEPS also led to concerns that it may not be sensitive enough to detect changes in interpersonal problem solving effectiveness from pre to post anger and response manipulation inductions. This lack of sensitivity may have been one of the reasons why no differences were found in this study between rumination and distraction groups on the MEPS. Finally, there was a concern about the potential subjectivity involved in scoring the responses to the MEPS. Whilst the high inter-rater reliability scores found in this study somewhat allayed that worry, there may still be room to query whether it relies on too high a degree of subjectivity.

A conceptual issue regarding the use of the MEPS was whether means-ends problem solving was the most appropriate aspect of interpersonal problem solving to measure. In retrospect, it is worth considering whether it would have been more useful to measure interpersonal problem solving in a different way, such as measuring the various stages

of interpersonal problem solving separately or asking participants to generate multiple alternative solutions to hypothetical scenarios. Also, there is some research to suggest that hypothetical scenarios have poor ecological validity (Butler & Michenbaum, 1981; Kendall & Fischler, 1984), which suggests that this approach to measuring interpersonal problem solving may not be very useful. In practice, the MEPS was chosen as the interpersonal problem solving measure employed in this study because of both the convention regarding what has been used in other studies of rumination and interpersonal problem solving and the lack of good alternative measures for interpersonal problem solving being readily available.

3. What Could Have Been Done Differently?

Given the methodological issues and potential limitations mentioned above, it becomes important to consider what could have been done differently in this study. If there had been greater resources and time available, there are a number of improvements that could have been made to the research project. Firstly, it would have been helpful to conduct more extensive pilot studies on the anger induction procedure. In particular, it might have been useful to compare different procedures, such as idiographic and hypothetical scenario procedures, to see which resulted in more potent effects. Similarly, having the opportunity to test out different aspects of the procedure, such as the length of time that participants spend on the anger induction procedure, would have potentially resulted in a more optimal outcome. With regards to the angry rumination induction procedure, it would have been valuable to have conducted qualitative analyses

first on the phenomenology of angry rumination and used the results of these analyses to generate items for the angry rumination induction. These items could then be subjected to further pilot work, in order to establish whether they are a reliable and valid means of eliciting angry rumination. In addition, the study could have been improved if participants had been pre-selected on the basis of being high or low on trait angry rumination on the ARS. However, in order to conceal the purpose of the study, it would be necessary uncouple the administration of the ARS from the study. For example, it might be possible to administer it as part of a wider battery of measures that are given to undergraduate psychology students in one of their laboratory sessions. Suitable participants could then be contacted at a later date without specifying that it was their responses on the ARS that qualified them for the study.

Other improvements to the study relate to the use of the MEPS. Firstly, it would have been better not to rely upon what has been used previously and to have done more research to see if a more suitable alternative to the MEPS exists. If such a suitable measure does not exist, it might have been helpful to use the MEPS in a different manner. For example, the scenarios could have been modified to make them more challenging, and more rigorous scoring procedures could have been adopted. Also, instead of asking participants to generate the steps involved in reaching a solution, they could be invited to produce a number of alternative solutions. This may have particular conceptual relevance to both anger and rumination, in that one study found that whilst the first solutions to hypothetical social problems did not differentiate aggressive and non-aggressive participants, the number of effective second solutions did (Evans &

Short, 1991). Also, one might hypothesise that, given its perseverative nature, rumination may lead to a narrowing of solutions that an individual is able to generate.

4. Discussion

During the process of conducting this research project, I have grappled with a number of methodological and conceptual issues. As with all research, this necessitated making difficult decisions and compromises that often seemed to solve one set of problems only to open up a different set of dilemmas. The process of conducting this research also gave me insight into the difficulty involved in studying anger, which may be one of the reasons why it has been relatively neglected by researchers. In particular, even if one bypasses the difficulty of identifying participants with 'anger problems' by using a non-clinical sample and inducing anger, as was done in this study, another set of difficulties arise. These include the practical problems of inducing and sustaining angry mood in participants, as well as the ethical implications of making people angry. The process of carrying out this research also highlighted gaps in the relevant literature. In particular, the lack of any qualitative research on the phenomenology of angry rumination or any standardised or empirically validated method of inducing angry rumination was particularly apparent and possibly limited the effectiveness of this study. Similarly, the lack of good quality alternatives to the MEPS meant relying on a potentially problematic measure of interpersonal problem solving, which was another weakness in the study. Given more time and resources, it would have been useful to redress these

limitations by, for example, conducting qualitative research to generate items for the angry rumination induction.

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Appendix 1

Ethical Approval Letter

Appendix 2

Information Sheet and Consent Form

Date: *Version Number 1*

Volunteer Information Sheet

Study title: "How Thinking Styles Influence Problem Solving"

Researchers: Dr Richard Stott (Clinical Psychologist), Dr Peter Scragg (Clinical Psychologist), and Eiryth Finnigan (Trainee Clinical Psychologist), Sub-Department of Clinical Health Psychology, 1-19 Torrington Place, London WC1E 6BT. **Telephone (Mobile): 07957 604 837 Email: eiryth@hotmail.com**

*You are being invited to participate in this study of how thinking styles influence problem solving. You do not have to take part in this study if you do not want to. If you do agree to participate, you are free to withdraw from the study at any time without having to give a reason.

*The purpose of this study is to investigate the impact of thinking and imagination on solving interpersonal problems. In particular, I am investigating how general thinking styles affect an individual's ability to solve specific social puzzles. It is hoped that this study will help us understand more about how general thinking styles relate to the way in which people approach interpersonal problems. This in turn, may help us to develop interventions that modify a persons habitual thinking patterns.

*The study will take about an hour and it involves completing a series of tasks and questionnaires. Firstly, you will be asked to perform three brief cognitive tasks, in which you will sort a deck of cards according to different rules, pronounce a list of words, and recall a series of numbers. You will also be given several different scenarios involving typical interpersonal problems for you to solve. In addition, you will be given an imagination exercise, in which you will imagine yourself in a particular situation, and then think about a series of statements. Finally, you will also be asked to fill out several questionnaires, including a questionnaire about your current state and one about how you tend to solve interpersonal problems.

*All information collected during this study will remain strictly confidential. In addition, your name will not appear on any data record gathered during this study, and no identifying information about yourself will be published in any form. The data will be collected and stored in accordance with the Data Protection Act 1998 and will be disposed of in a secure manner.

*If you have any questions regarding the research or would like further information, please contact one of the researchers at the number above.

*Please retain this information sheet and a copy of the signed consent form for your records.

Thank you for considering taking part in this study!

APPROVED BY UNIVERSITY COLLEGE LONDON'S COMMITTEE ON THE ETHICS OF NON-NHS HUMAN RESEARCH

Date:
Version Number 1

Volunteer Consent Form

Title of Study: "How Thinking Styles Influence Problem Solving"

***Have you read the Information Sheet on this study?** **YES/NO**

***Have you had the opportunity to ask questions and discuss the study?** **YES/NO**

***Have you received satisfactory answers to all of your questions?** **YES/NO**

***Have you received enough information about the study?** **YES/NO**

***Who have you spoken to?** .....

***Do you understand that you are free to withdraw from the study:**

at any time? **YES/NO**

without giving a reason for withdrawing? **YES/NO**

***Do you agree to the publication of the results of the study in a research journal and do you understand that you will not be identified in these publications?** **YES/NO**

***Do you agree to take part in the study?** **YES/NO**

Signed ..... **Date** .....

Full Name (Block Letters) .....

Signature of Researcher ..... **Date** .....

APPROVED BY UNIVERSITY COLLEGE LONDON'S COMMITTEE ON THE ETHICS OF NON-NHS HUMAN RESEARCH

Appendix 3

Anger Rumination Scale (Sukhodolsky, Golub & Cromwell, 2001)

Anger Rumination Scale (ARS) Sukhodolsky, D. G., Golub, A., & Cromwell, E. N (2001)

Date_____ **Name**_____ **Occupation**_____ **Years of Education** _____

Age_____ **Gender**___ **Ethnic/Racial background** _____ **Other Informtion** _____

Directions: Everyone gets angry and frustrated occasionally but people differ in the ways that they think about their episodes of anger. Statements below describe different ways that people may be recalling or thinking about their anger experiences. Please, read each statement and then respond by circling the appropriate number for each statement. There are no right or wrong answers in this questionnaire, and your honest responses that best describe yourself are very important. Please, respond to all items.

	Almost never	Some-times	Often	Almost always
1. I ruminate about my past anger experiences.	1	2	3	4
2. I ponder about the injustices that have been done to me.	1	2	3	4
3. I keep thinking about events that angered me for a long time.	1	2	3	4
4. I have long living fantasies of revenge after the conflict is over.	1	2	3	4
5. I think about certain events from a long time ago and they still make me angry.	1	2	3	4
6. I have difficulty forgiving people who have hurt me.	1	2	3	4
7. After an argument is over, I keep fighting with this person in my imagination.	1	2	3	4
8. Memories of being aggravated pop up into my mind before I fall asleep.	1	2	3	4
9. Whenever I experience anger, I keep thinking about it for a while.	1	2	3	4
10. I have times when I can not stop being preoccupied with a particular conflict.	1	2	3	4
11. I analyze events that make me angry.	1	2	3	4
12. I think about the reasons people treat me badly.	1	2	3	4
13. I have daydreams and fantasies of violent nature.	1	2	3	4
14. I feel angry about certain things in my life.	1	2	3	4
15. When someone makes me angry, I can't stop thinking about how to get back at this person.	1	2	3	4
16. When someone provokes me, I keep wondering why this should have happened to me.	1	2	3	4
17. Memories of even minor annoyances bother me for a while.	1	2	3	4
18. When something makes me angry, I turn this matter over and over again in my mind.	1	2	3	4
19. I re-enact the anger episode in my mind after it has happened.	1	2	3	4

Notes: _____

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Appendix 4

Mood Questionnaire

Please rate your current state on the following items. Please circle the number that best describes your current state from 1 = "not at all" to 9 = "extremely".

Currently, I am:

	Not at all								**Extremely**
* Happy	1	2	3	4	5	6	7	8	9
* Curious	1	2	3	4	5	6	7	8	9
* Irritable	1	2	3	4	5	6	7	8	9
* Anxious	1	2	3	4	5	6	7	8	9
* Excited	1	2	3	4	5	6	7	8	9
* Sad	1	2	3	4	5	6	7	8	9
* Angry	1	2	3	4	5	6	7	8	9
* Creative	1	2	3	4	5	6	7	8	9
* Nervous	1	2	3	4	5	6	7	8	9
* Bored	1	2	3	4	5	6	7	8	9
* Shy	1	2	3	4	5	6	7	8	9
* Hostile	1	2	3	4	5	6	7	8	9
* Depressed	1	2	3	4	5	6	7	8	9
* Worried	1	2	3	4	5	6	7	8	9
* Disgusted	1	2	3	4	5	6	7	8	9
* Frightened	1	2	3	4	5	6	7	8	9
* Pleased	1	2	3	4	5	6	7	8	9
* Annoyed	1	2	3	4	5	6	7	8	9
* Confident	1	2	3	4	5	6	7	8	9

Appendix 5

Rumination and Distraction Items

Rumination Items:

Think About:

1. **why the event happened**
2. **what you thought about at the time**
3. **how you felt at the time**
4. **why the person treated you the way they did**
5. **why what happened to you was unfair**
6. **how you'd like to get back at them or get even**
7. **why the event should not have happened**
8. **memories you have of similar events that have happened in the past**
9. **why this happened to you**
10. **why it was wrong for them to treat you as they did**
11. **what you wanted to say or do but didn't**
12. **how the other person should have acted**
13. **why you did not deserve what happened to you**
14. **whether you'd like to take revenge**
15. **why the other person should not have treated you that way**
16. **other times people have treated you unfairly**
17. **how unjust the whole situation was**

Distraction Items:

Think About:

1. **imagine a boat slowly crossing the Atlantic**
2. **the layout of a typical classroom**
3. **the shape of a large black umbrella**
4. **the movement of an electric fan on a warm day**
5. **raindrops sliding down a windowpane**
6. **picture a full moon on a clear night**
7. **clouds forming in the sky**
8. **the layout of the local shopping centre**
9. **imagine a plane flying overhead**
10. **fire darting around a log in a fire-place**
11. **two birds sitting on a tree branch**
12. **the layout of the local post office**
13. **the pattern on an Oriental rug**
14. **the shape of the continent of Africa**
15. **a band playing outside**
16. **the way the ocean looks at sunset**
17. **a train stopped at a station**