

Running head: RUMINATION AND WORRY AS REPETITIVE NEGATIVE THINKING

UNIVERSITY OF LIVERPOOL

Doctorate in Clinical Psychology

Rumination and worry as repetitive negative thinking:

Do cognitive processes mediate the relationship between goal-linking and mental health and well-being?

Aimée McDevitt

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Supervised by:

Dr Joanne Dickson & Dr Catrin Eames

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INTRODUCTORY CHAPTER: THESIS OVERVIEW

The aim of this thesis was to explore the constructs of rumination and worry and investigate how they impact mental health. Rumination and worry have similar process characteristics and are collectively referred to as repetitive negative thinking (RNT). RNT is defined as recurring thoughts, about negative topics, that are experienced as difficult to control. This definition does not account for the observed variations between these processes such as differences in content. Rumination has been found to focus on past negative experiences whereas worry focuses on future concerns. These processes are considered to have a detrimental effect on mental well-being with rumination frequently associated with depression and worry with anxiety. Despite these negative associations, there is growing argument that rumination and worry are adaptive self-regulatory responses to perceived failure to achieve desired states or goals. They are problem-solving attempts to resolve discrepancies between current and desired status, and only become problematic in certain circumstances such as when goals are unattainable. Goal-linking is the degree to which people link the attainment of everyday goals with more salient personal strivings (e.g. to be happy) and may be one circumstance in which engaging in RNT has unconstructive consequences. People high on the tendency to goal-link are known as 'linkers'. Linkers are thought to spend more time ruminating because their goals are linked to higher-order personal strivings that hold more meaning, are more abstract, and tend to be more enduring. This increases the degree of discrepancy they experience because they are aiming for a reference value that is vague (e.g. happiness can occur in many forms) and makes it difficult to disengage from the goal due to its perceived importance. Being able to disengage from RNT would likely improve linkers mental health and well-being. Mindfulness is an alternative cognitive process associated with better well-being, and people who are more mindful ruminate less. It is proposed that mindful people are able to notice when they are ruminating and disengage from these thoughts if they are unhelpful. Training linkers to be more mindful could potentially reduce the

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degree to which they engage in RNT and subsequently improve their mental health and well-being.

Chapter 1 presents a systematic literature review of the studies that have directly compared rumination and worry. The aim of this review was to consider the evidence for rumination and worry being similar enough processes to be conceptualised within one overarching meta-process, namely RNT. A systematic search of the literature identified 15 studies that met specific inclusion criteria for comparing rumination and worry with one another. The methodological quality of the papers is assessed using a recently developed quality tool and the data are qualitatively analysed and presented. The review evaluates how rumination and worry are conceptualised and measured distinctly, and the degree of overlap found between them. Results are discussed in relation to the wider literature base and clinical implications for the measurement of rumination and worry are conveyed.

Chapter 2 is an empirical paper investigating the relationships between the key constructs relevant to this thesis in a non-clinical sample. The aim was to address some of the gaps in the literature and establish the impact of goal-linking and cognitive processes on mental well-being. Linkers have been found to ruminate more than non-linkers but, to the best of the author's knowledge, this relationship has not been investigated in relation to worry or RNT. A student sample completed an online survey of the constructs of interest. The differences between linkers and non-linkers with regards RNT, rumination, worry, and mindfulness, are examined using theoretically derived hypotheses. The mediating effect of RNT on goal-linking and depressive and anxious symptoms was assessed, in addition to, the mediating effect of mindfulness on goal-linking and well-being. The findings are discussed in the context of previous research, relevant literature and recommendations for future research. The chapter concludes with clinical implications of the study.

CHAPTER 1: SYSTEMATIC LITERATURE REVIEW1.1 Abstract¹

Rumination and worry have developed distinct conceptualisations but are considered to share common process characteristics and only differ on content. The argument for considering them collectively within a single process of repetitive negative thinking (RNT) remains inconclusive. This review aims to consider the evidence of whether rumination and worry are more similar or distinct, and conclude whether they can be conceptualised within a unitary construct. A systematic review of the literature resulted in 15 studies that directly compared the two constructs. Findings indicated that rumination and worry are consistently related but maintain a degree of distinctness. It is concluded that this distinction is due to methodological variations in measurement and when these confounds are removed, they appear more similar. Rumination and worry can plausibly be conceptualised and measured within a unitary construct of repetitive negative thinking but further research is warranted to strengthen this conclusion.

Keywords: Rumination, worry, repetitive negative thinking, measurement

Footnote

¹Systematic review paper to be submitted to Cognitive Therapy and Research.

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Ruminating and Worrying, or Repetitive Negative Thinking?: A Systematic Review of Whether Rumination and Worry are Similar or Distinct Processes

1.2 Introduction

Rumination is a multifaceted construct with multiple ways of defining it depending on the context of the theoretical viewpoint through which it is being observed (for a review see Smith & Alloy, 2009). According to Smith and Alloy (2009) the most prolific theory of rumination is Nolen-Hoeksema's (1991) response styles theory (RST). RST describes depressive rumination as a response to a negative emotional state which involves focusing one's attention on depressive symptoms and the implications of these symptoms (Nolen-Hoeksema, 1991). Goal progress theory (Martin, Tesser, & McIntosh, 1993) defines rumination more broadly as a mental activity, that revolves around a common instrumental theme, which occurs in response to threats regarding progression towards a desired goal or state (Martin & Tesser, 1996). In conclusion of their review, Smith and Alloy suggest that rumination should be characterised as: "a stable, negative, broadly construed way of responding to discrepancies between current status and target status" (Smith & Alloy, 2009, p.126). They propose that rumination is triggered by identifying a discrepancy between one's current and desired state, and the negative affect that typically accompanies perceiving such a discrepancy (Carver & Scheier, 1990). Smith and Alloy argue that rumination is an attempt to regulate emotions, driven by positive metacognitive beliefs about its effectiveness in resolving perceived discrepancies between actual and desired status, but that ruminative thinking is a form of avoidance that interrupts adaptive processing of negative emotions.

The definition of worry appears much less varied than rumination; it is most commonly defined as: "a chain of thoughts and images, negatively affect-laden and relatively uncontrollable" (Borkovec, Robinson, Pruzinsky, & Depree, 1983, p.10). Borkovec et al.

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suggest worry is a form of mental problem-solving when the outcome of something remains uncertain, but could potentially be negative; they note how closely worry relates to fear. It was subsequently found that worrying predominantly involves verbal thought, rather than imagery (Borkovec, Ray, & Stober, 1998). Borkovec's avoidance theory of worry (Borkovec, 1994; Borkovec et al., 1998) proposes that worry is a cognitive activity aimed at avoiding perceived threat. It denotes the focus on verbal activity as a means of allowing individuals to turn attention away from internally generated emotion-evoking imagery, which reduces the occurrence of somatic anxiety and hence worrying becomes negatively reinforced.

Additionally, the continued 'non-occurrence' of predicted negative events reinforces the belief that worry is an effective process for avoiding threats (Borkovec, Alcaine, & Behar, 2004).

This theory highlights how worry, like other avoidant responses, interferes with adaptive emotional processing and hence prevents extinction of the fear. In other words, the person does not experience the emotion associated with the feared event and therefore is still afraid of it occurring. This is still the case if the person actually experiences the feared event but engages in verbal activity throughout to draw attention away from the emotional experience (Borkovec et al., 2004).

Rumination and worry have been suggested to converge on three common characteristics: repetitive in nature, usually focus on negative content although may differ in the specificities of content, and are both perceived as uncontrollable (Ehring & Watkins, 2008). In light of these commonalities, rumination and worry, along with other cognitive activities defined as having similar qualities (e.g. post-event processing, obsessive cognition), are increasingly being conceptualised within one overarching meta-process commonly referred to as repetitive negative thinking (RNT). RNT has been defined according to the shared characteristics of the underlying processes it is intended to encompass: thinking repetitively about negative topics which is experienced as difficult to control (Watkins,

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2008). In his review of constructive and unconstructive repetitive thought (RT), Watkins (2008) suggests that rumination and worry are similar processes that only differ in terms of content, specifically their temporal orientation with rumination focusing on past negative events while worry focuses on future concerns. Segerstrom and colleagues (2003) attempted to test the conceptualisation of RT as a unitary process by considering a variety of defined repetitive cognitive constructs (including rumination and worry) collectively. They found that RT, including forms considered to be adaptive (e.g. reflection), appeared to vary along at least two dimensions: positive versus negative valence of thoughts, and a searching or a solving purpose for engaging in the process. Again these differences reflect the content of RT, and additionally the purpose of RT, but do not imply whether rumination and worry differ in terms of process.

Debate has grown over whether previously considered distinct types of RT (e.g. rumination, worry, post-event processing, obsessive cognition) can validly be conceptualised within one overarching meta-process that is transdiagnostic (i.e. spans multiple diagnoses of mental health difficulties; for a review see Ehring & Watkins, 2008; and, Harvey, Watkins, Mansell, & Shafran, 2004). Historically rumination has predominantly been considered in relation to depression and worry to anxiety, however, there is significant evidence that both rumination and worry are present across multiple disorders and can be viewed as transdiagnostic processes (McEvoy, Watson, Watkins, & Nathan, 2013; Mahoney, McEvoy, & Moulds, 2012; McEvoy, Mahoney, & Moulds, 2010; Ruscio et al., 2011). This has implications for the measurement of rumination and worry in clinical settings as currently they are typically measured separately and in relation to specific mental health diagnoses whereas perhaps a transdiagnostic measure may be more valid. Ehring and Watkins (2008) in their review of RNT as a transdiagnostic phenomenon suggest that rumination and worry have more similarities than differences but that there is still limited evidence to conclude

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whether they are part of one single process. They argue that the amount of similarity between rumination and worry allows for reasonable acceptance of the parsimonious hypothesis that they share an analogous process and only differ in terms of content, but it is questionable if there is sufficient evidence to draw this conclusion. One of the difficulties in answering this question is the limited validity in comparing rumination and worry due to methodological variation in their measurement. Rumination is commonly measured by the Ruminative Response Scale (RRS) of the Response Styles Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991) and worry by the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990). Both of these self-report measures were constructed from separate theoretical backgrounds and adopt different formats such as use of confounding or disorder-specific wording; the PSWQ includes some form of the term 'worry' in every item and the RRS has been shown to have significant overlap with items from the Beck Depression Inventory that measure depressive symptoms (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). A number of studies have tried to overcome this measurement confound by removing references to specific symptoms or processes (e.g. replacing the word 'worry' with a more generic reference to 'thoughts or images'; Watkins, Moulds, & Mackintosh, 2005; McEvoy et al., 2010). This is an important step in making a valid comparison between them but more examination is needed. While efforts have already been made to develop a unified measure of RNT (e.g. the Perseverative Thinking Questionnaire; Ehring et al., 2011), the evidence to support rumination and worry as comparable processes, when measured independently, still remains inconclusive. The aim of this systematic review is to consider the available evidence for whether rumination and worry, two of the most commonly investigated repetitive cognitions, are similar enough to be conceptualised within one overarching meta-process, namely RNT.

1.2.1 Aims

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To review all studies that compare rumination and worry directly with each other in order to examine the following: (a) how rumination and worry are conceptualised; (b) how rumination and worry are measured; (c) when compared, the degree of similarity or difference between these constructs; and (d) whether they can reasonably be conceptualised as part of a unitary process.

1.3 Method

1.3.1 Eligibility Criteria

Studies were included if they: (i) were published in English, in peer-reviewed journals; (ii) were conducted within any population or setting; (iii) used any conceptualisation of rumination or worry (e.g. post-event rumination); (iv) measured both rumination and worry as separate constructs (i.e. using distinct measures for each); (v) compared rumination and worry directly to one another.

Studies were excluded on the following basis: (i) a review or discussion paper rather than an empirical study; (ii) use of animal rather than human participants; (iii) rumination and worry were measured as a collective process (i.e. measured RNT/perseverative thinking/negative self-referential processing/negative emotionality/cognitive attentional syndrome); (iv) rumination and/or worry were measured qualitatively using subjective self-report; and (v) compared rumination and worry in relation to other third variables rather than directly to each other.

1.3.2 Information Sources

The following four major electronic databases were searched: Scopus; PsycINFO; Web of Knowledge; and MEDLINE. Bibliographies of previous reviews and retrieved articles were also examined.

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1.3.3 Search Strategy

The search intended to find studies that examined both rumination and worry so key search terms included 'rumination' and 'worry' within the same search. Wildcards were used to capture alternate terms; that is, ruminat* to include terms such as rumination, ruminating, ruminate, ruminator, ruminative, and worry* to include terms such as worry, worried, worrier, worrying. Additionally, alternative terms used to describe both rumination and worry as a collective process were included: any combination of 'repetitive'/ 'perseverative'/ 'recurrent' 'thinking'/ 'thought'/ 'cognition'; 'repetitive negative thinking'; 'negative' 'self-referential processing'; 'negative emotionality'; or 'cognitive attentional syndrome'. The initial search of the databases for 'rumination' or alternative terms, and 'worry' or alternative terms, returned 3,469 papers.

1.3.4 Study Selection

Duplicate papers were removed and study titles were screened for relevance, removing any that did not include key search terms in the title (see Figure 1). This left a total of 326 papers that were then screened for content relevance by applying inclusion and exclusion criteria. After these criteria were applied, 15 studies were included in the review (see Table 1 for details of included studies). A second researcher screened a subset (50%) of the 326 papers and substantial inter-rater reliability ($\kappa = .80$) was found between the papers selected from the screening and the papers included in the review.

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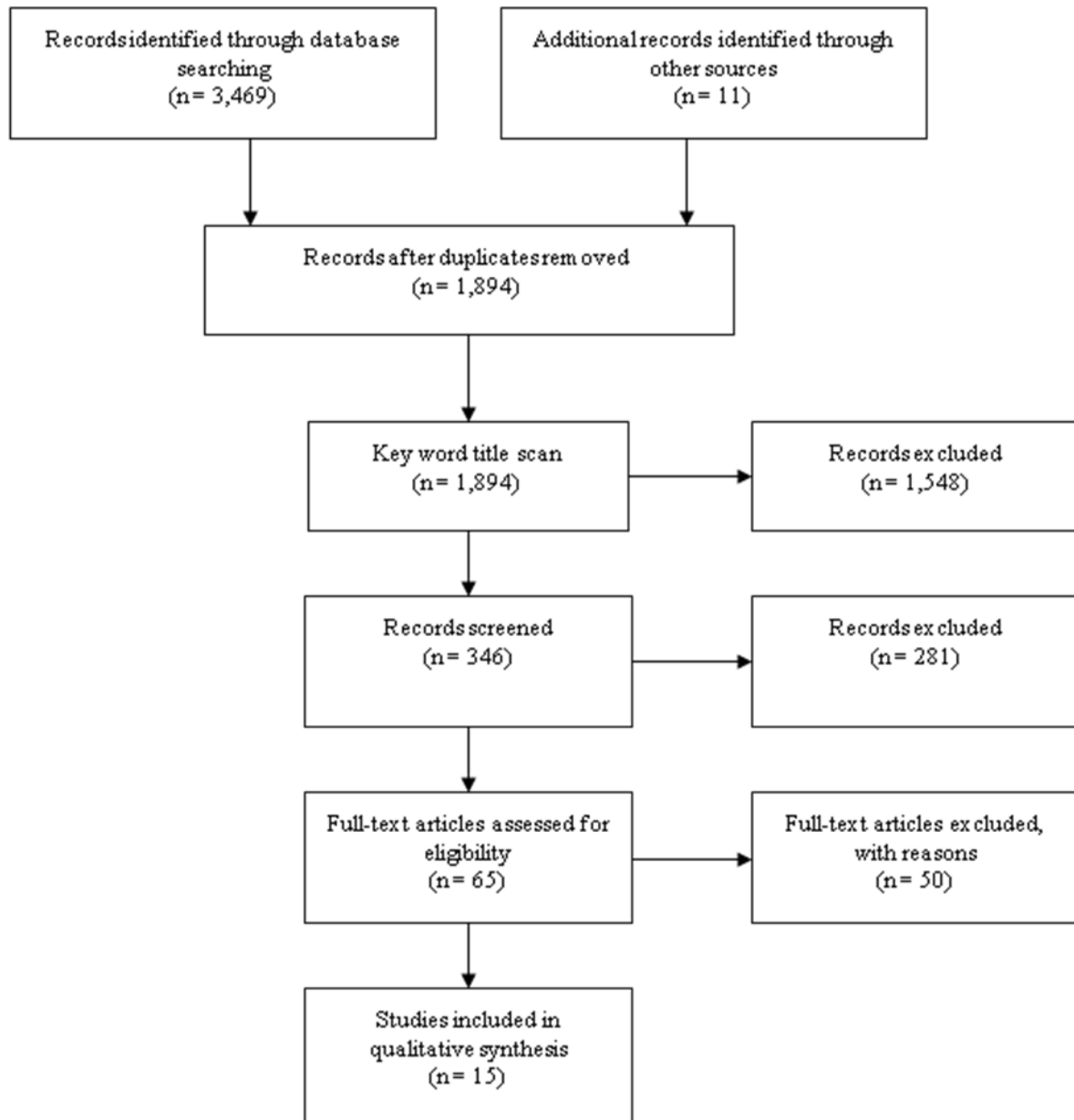


Figure 1: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow-diagram of number of studies included/excluded through different phases of the systematic review.

1.3.5 Data Analysis

Data extraction. A protocol was specifically developed in relation to the review aims to extract and record data from each paper (see Table 1). Due to the diverse range of methodologies and outcome measures, statistical methods of synthesising the data were not

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appropriate. Extracted data were collated and reported qualitatively for this review, producing a comprehensive narrative account of the findings.

Quality appraisal. The methodological quality of the included studies was assessed using the Quality Assessment Tool for Studies with Diverse Designs (QATSDD; Sirriyeh, Lawton, Gardner, & Armitage, 2012). The QATSDD consists of 16 criteria for assessing the quality of a research paper. Twelve criteria apply to all studies, two criteria apply specifically to quantitative studies and two criteria apply specifically to qualitative studies. This means that 14/16 criteria can be applied to either type of study (12 general criteria plus two specific to that particular methodology) and all criteria can be used with mixed-method designs. Criteria are scored on a scale from 0 to 3 and a total score is used to compare the quality of papers being reviewed, even if they use diverse research designs.

The QATSDD was utilised in this review because the studies being reviewed adopted a variety of methodological designs. The QATSDD has preliminarily shown good content validity, substantial inter-rater reliability ($\kappa = 71.5\%$), and good to substantial test-retest reliability ($\kappa = 51.7\text{-}100\%$; Sirriyeh et al., 2012). While studies were not excluded based on their quality rating, this information was considered when extracting the data in relation to the reliability and validity of each of the studies' findings and conclusions.

1.4 Results

1.4.1 Included Study Characteristics

The characteristics of all 15 studies included in the review are detailed in Table 1.

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Table 1

Summary of study characteristics with key findings and QATSDD quality assessment score

Authors	Sample	Measure(s)	α in sample	Data analytic method	Main finding	QATSDD Total score
Boschloo, Vogelzangs, van den Brink, Smit, Beekman, & Penninx (2012)	Clinical & non-clinical	LEIDS-R: Rumination reactivity subscale	.93	Factor analysis; correlation	2-factor model: Negative emotionality (inc. rumination & worry) & impulsivity	27
	2248 adults with & without a dx of depressive &/or anxiety disorders	PSWQ: Worry Engagement subscale	.96			
Carney, Harris, Moss, & Edinger (2010)	Clinical & non-clinical	RSQ: SYM subscale	.86	Factor analysis; correlation	3-factor model: Worry, rumination, & absence of worry	33
	210 adults with sleep problems	PSWQ-PW	.84			
Ciesla, Dickson, Anderson, & Neal (2011)	Non-clinical 447 students	RRS	.90	Factor analysis; generalizability analysis; correlation	4-factor model: Depressive rumination, angry-rumination, worry, & co-rumination	28
		ARS	.95			
		CoR	.96			
		PSWQ	.93			
D'Hudson & Saling (2010)	Non-clinical	aRRS: Rumination subscale	NR	Factor analysis	3-factor model: Brooding, reflection, & worry	31
	138 older adults	aRRS: Worry subscale	NR			
Fresco, Frankel, Mennin, Turk, & Heimberg (2002)	Non-clinical	RRS	.90	Factor analysis; correlation	4-factor model: Worry engagement, dwelling on the negative, active cognitive appraisal, & absence of worry	30
	784 students	PSWQ	.90			
Goring & Papageorgiou (2008)	Non-clinical	RRS	NR	Factor analysis; correlation	4-factor model: Tendency to worry, tendency to analyse feelings/self, dwelling on negative feelings, & absence of worry	30
	216 people from depression charities	PSWQ	NR			

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Authors	Sample	Measure(s)	α in sample	Data analytic method	Main finding	QATSDD Total score
McEvoy & Brans (2013)	Clinical	RRS (items confounded by symptoms removed)	NR	Factor analysis	4-factor nested model: Reflection, Brooding, Worry, & RNT	34
	450 patients with diagnosis of mood &/or anxiety disorder	PSWQ	NR			
McEvoy, Mahoney, & Moulds (2010)	Non-clinical	RRS	NR	Factor analysis; correlation	2-factor model: RNT & absence of RNT	27
	284 students	PSWQ (wording adjusted & items removed to reduce symptom confounds)	NR			
Muris, Roelofs, Meesters, & Boomsma (2004)	Non-clinical	CRSS	.71 - .95	Factor analysis; correlation	2-factor model: Rumination & worry	31
	337 adolescents	PSWQ-C	.71 - .95			
Rewston, Clarke, Moniz-Cook, & Waddington (2007)	Clinical & non-clinical	aRRS: Rumination subscale	NR	Factor analysis; correlation	3-factor model: Brooding, reflection, & worry	33
	92 older adults	aRRS: Worry subscale	NR			
Rood, Roelofs, Bogels, & Alloy (2010)	Non-clinical	CRSS	NR	Factor analysis	3-factor model: Worry, emotion-focused, & stress-reactive rumination	34
	779-805 children	SRRS-C	NR			
		PSWQ-C	NR			
Segerstrom, Stanton, Alden, & Shortridge (2003) - Study 1	Non-clinical	RRS	.91	Factor analysis; correlation; multi-dimensional scaling	Rumination & worry were more negative on a thought valence dimension; Worry was more problem-solving than rumination on a searching vs. solving dimension	19
	978 students	RRQ	.90 - .91			
		Rumination Scale	.70			
		PSWQ	.94			

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Authors	Sample	Measure(s)	α in sample	Data analytic method	Main finding	QATSDD Total score
Siegle, Moore, & Thase (2004)	Non-clinical 349 students	RRS	.89	Factor analysis; correlation	4-factor model: Negatively valenced trait rumination (inc. worry), rumination on a past negative event, neutral valenced reflection/reconsideration of negative event, & responses not clearly representing rumination	35
		RNE	.80			
		MRQ	.84 - .94			
		ROS	.90			
		SMRI	.88			
		RRQ	.88 - .89			
		PSWQ	.94			
van Rijsoort, Emmelkamp, & Vervaeke (2001)	Non-clinical 305 adults	Rumination subscale of the PI-R	NR	Factor analysis; correlation	Items from rumination and worry scales loaded on separate factors	26
		PSWQ	NR			
Watkins, Moulds, & Mackintosh (2005)	Non-clinical 175 female students	RRS	NR	Paired samples t-tests	Rumination & worry differed significantly on 7/53 variables	24
		WDQ	NR			
		(wording adjusted & items removed/added to reduce symptom confounds)				

Note. QATSDD = Quality Assessment Tool for Studies with Diverse Designs, LEIDS-R = Leiden Index of Depression Sensitivity Revised scale; PSWQ = Penn State Worry Questionnaire; RSQ = Response Style Questionnaire, SYM = Symptom focused, PSWQ-PW = PSWQ-Past Week, RRS = Ruminative Response Scale, ARS = Angry Rumination Scale, CoR = Co-Rumination Questionnaire, NR = Not reported, aRRS = Adapted RRS, CRSS = Children's RRS, PSWQ-C = Children's PSWQ, SRRS-C = Children's Stress Reactive Rumination Scale, RRQ = Rumination/Reflection Questionnaire, RNE = Rumination on a Negative Event, MRQ = Multidimensional Rumination Questionnaire, ROS = Rumination on Sadness Questionnaire, SMRI = Scott-McIntosh Rumination Index, PI-R = Padua Inventory Revised version, WDQ = Worry Domains Questionnaire.

1.4.2 Methodological Quality

All studies were rated on the 14 criteria from the QATSDD that are applicable to quantitative studies, as no qualitative studies were included in the review; this gave a total score range from 0-42 (for total scores see Table 1). The average total quality score for all 15 studies was 29.53 (SD = 4.29) ranging from the highest score of 35/42 (Siegle et al., 2004) to the lowest score of 19/42 (Segerstrom et al., 2003, Study 1).

Most studies demonstrated a good fit between the stated research question and the method of data collection and analysis used. One possible reason for this good fit is that the majority of studies were investigating how rumination and worry are measured. They often specified particular questionnaires they intended to examine or else were developing new measures that were adapted from existing ones. This resulted in studies either using the specified measures, the newly developed measure, or commonly used questionnaire measures of the construct of interest (either rumination or worry) and then using factor analysis on the response data. Both exploratory and confirmatory factor analysis have been identified as appropriate means to assess the construct validity of a measure (Lu, 2006); that is, factor analysis is a good test of whether the measure contains the hypothesised constructs that reflect the concept under investigation. Only four of the 15 studies (Goring & Papageorgiou, 2008; McEvoy & Brans, 2013; Segerstrom et al., 2003; Rood et al., 2010) considered the sample size required for the method of analysis being used. Reporting on the characteristics of the targeted sample and the representativeness of the collected sample was mixed with three studies (Boschloo et al., 2012; Carney et al., 2010; McEvoy & Brans, 2013) awarded the top rating for this criteria (3/3), three studies (McEvoy et al., 2010; van Rijsoort et al., 2001; Segerstrom et al., 2003) awarded the lowest rating for this criteria (0/3), and the remainder scoring in between (either 1/3 or 2/3). The studies that did not specify their target

sample may have failed to do so because they were aiming for a sample that represented the general population and possibly assumed that generality was difficult or not necessary to clarify for the reader.

There was a broad degree of variation in studies reporting the reliability and validity of the measures used, either previously reported psychometric properties or as found in the current study sample (see Table 1 for reported Cronbach Alpha of each measure). Of those that were reported, most measures demonstrated acceptable internal consistency (Alpha coefficients) with the exception of the 'worry' subscale of the Adapted RRS (aRRS; $\alpha = .55$); this was a newly constructed measure and hence still in developmental stages. Two studies (McEvoy & Brans, 2013; Watkins et al., 2005) did not report any reliability findings either from previous studies or from the current sample. Both of these studies adapted the RRS in different ways for the purposes of the research being carried out (they adjusted the wording and removed and/or added items). Additionally, Watkins et al. (2005) adapted the WDQ (adjusted the wording and removed one item). For all three of these adapted scales, previous reliability findings were not available as the measures had been uniquely adjusted for the study being carried out, however, they did not report any reliability analysis within their sample. Failing to assess and report the reliability of a newly developed measure limits the conclusions that can be drawn.

None of the 15 studies reported service user/carer-involvement in the design of the study, and only one reported gaining participant feedback (Siegle et al., 2004). This study corroborated their hypotheses about the impact of the wording of questionnaire measures through informal feedback from participants after completing measures. Service user/carer-involvement, as it has been phrased, is increasingly recognised as improving the quality and

applicability of research (Hanley, 2005), but this progress was not evident in the studies included in this review.

1.4.3 Conceptualisation of Constructs

Conceptualisation of rumination. Eleven of the 15 studies conceptualised rumination in terms of Nolen-Hoeksema's (1991) RST of depressive rumination. The predominance of this conceptualisation is reflected in the majority of studies using the RSQ (Nolen-Hoeksema & Morrow, 1991) to measure rumination. One study considered two distinct aspects of rumination; Segerstrom et al. (2003) considered both depressive rumination and rumination as conceptualised in goal progress theory (Martin, Tesser, & McIntosh, 1993). Van Rijsoort et al. (2001) specifically focused on obsessive compulsive disorder symptoms considering rumination as one such symptom in the form of obsessive cognition. Boschloo et al. (2013) considered rumination as one aspect of 'negative emotionality' which was described as a heterogeneous construct reflecting a trait tendency to experience negative emotional states. This study used the Leiden Index of Depression Sensitivity Revised scale (LEIDS-R; Van der Does & Williams, 2003). This scale considers rumination to be a form of cognitive reactivity in response to stressful situations which brings about the processes linked with onset, relapse, and recurrence of depression (Beck, 1967). This perspective is firmly rooted within a diathesis-stress perspective; it proposes that some individuals have a cognitive vulnerability to react more negatively in times of difficulty and this leaves them susceptible to developing depression (Scher, Ingram, & Segal, 2005). Siegle et al. (2004) specifically addressed the multifaceted nature of how rumination is conceptualised and measured. They used multiple measures of rumination-like constructs in an attempt to establish whether rumination is a general construct. They assessed whether the

variance on measurement tools is due to individual differences or different questionnaires measuring different constructs (i.e. there are multiple distinct rumination-like constructs).

Conceptualisation of worry. Ten of the studies make reference to Borkovec's definition of worry (Borkovec et al., 1983) encapsulating the perspective that worry is an avoidant coping strategy intended to solve problems (Borkovec, Ray, & Stober, 1998). Ciesla et al. (2011) refers to Watkins' (2008) definition of worry, however, this definition is comparable with that of Borkovec. In addition to Borkovec's definition: Segerstrom et al. (2003) acknowledge the association found with intolerance of uncertainty; Rewston et al. (2007) note there are pathological and non-pathological forms with the former arising when worry is perceived as uncontrollable and excessive; and, Goring and Papageorgiou (2008) propose multiple theoretical approaches to worry (including considering it as a form of avoidance, a means of problem-solving, a coping activity, and worry's link to intolerance of uncertainty).

The remaining five studies describe worry as a cognitive process that is comparable to some other form of cognitive process, namely rumination and obsessive cognitions. Four studies (Boschloo et al., 2013; Carney et al., 2010; Watkins et al., 2005; Siegle et al., 2004) consider worry as a process that is comparable to rumination. Siegle et al. (2004) considered worry as a subtype of rumination while Carney et al. (2010) noted how in the insomnia literature, worry and rumination are often grouped within the same process (termed 'ruminative worry'). Boschloo et al. (2013) consider worry as another aspect of 'negative emotionality' (as described above) and therefore a construct comparable with rumination. Watkins et al. (2005) note the overlap between depressive and anxious symptoms which are highly associated with rumination and worry respectively. They conclude that the frequent co-occurrence of both depression and anxiety suggests common aspects of both rumination

and worry, whilst acknowledging the extent to which rumination and worry are considered common or distinct, remains unresolved in the literature. Van Rijsoort et al. (2001) regard worry as a cognitive process comparable with, but distinct from, obsessive cognitions.

1.4.4 Measurement

Measuring rumination. Of the 15 studies, the most commonly used measure of rumination was the RRS of the RSQ (Nolen-Hoeksema & Morrow, 1991; see Table 2), utilised in some form in 13 studies. Five studies used the original version of the RRS (Nolen-Hoeksema & Morrow, 1991), two used a version for children (CRRS; Ziegert & Kistner, 2002), one study used a previously adapted version, while the other five adapted their own version.

Adapting the RRS. Watkins et al. (2005) adapted the wording format of the RRS to allow for consistency within the battery of measures being administered. This was so the cognitive processes being investigated (i.e. rumination, worry, and cognitive intrusions) could subsequently be compared. They adjusted RRS items so they all started with the phrase "Thoughts and images" and applied this format to every other measure being administered. They excluded any item from the RRS that did not represent an intrusive thought, e.g. "Go away by yourself and think about why you feel this way", and they added items previously found by Watkins and Baracaia (2001) to represent typical ruminative thoughts, e.g. "Thoughts and images about why am I such a failure".

Table 2

Summary of studies using the RRS, including various versions, and other scales used to measure rumination

Measure	No. of studies (%)	Studies
Used RRS = 13 (86.6%)		
Original version (Nolen-Hoeksema & Morrow, 1991)	5 (33.3%)	Ciesla et al. (2011); Fresco et al. (2002); Goring & Papageorgiou (2008); Segerstrom et al. (2003); Siegle et al. (2004).
Adapted for current study (wording adjusted and items removed/added)	5 (33.3%)	Carney et al. (2010); McEvoy & Brans (2013); McEvoy et al. (2010); Rewston et al. (2007); Watkins et al. (2005).
Previously adapted version (aRRS)	1 (6.7%)	Hudson & Saling (2010).
Children's version (CRRS)	2 (13.3%)	Muris et al. (2004); Rood et al. (2010).
Used other measure = 2 (13.4%)		
Rumination subscale of the PI-R (van Oppen et al., 1995)	1 (6.7%)	van Rijsoort et al. (2001).
Rumination reactivity' subscale of the LEIDS-R	1 (6.7%)	Boschloo et al. (2012).

Note. RRS = Ruminative Response Scale, aRRS = Adapted RRS, CRRS = Children's RRS, PI-R = Padua Inventory revised version, LEIDS-R = Leiden Index of Depression Sensitivity Revised scale.

Two studies adjusted the wording and the items included/excluded, to account for confounds between rumination and symptoms of depression (McEvoy & Brans, 2013; McEvoy et al., 2010). McEvoy and Brans (2013) used similar exclusion criteria as Treynor et al. (2003), despite employing a different version of the RRS (the original version by Nolen-Hoeksema & Morrow, 1991), in order to remove items from the scale related to depression symptoms. McEvoy and Brans (2013) additionally removed items containing the word 'depression' so as not to artificially inflate the relationship between the RRS and measures of depression; and so people without a history of depression could potentially endorse all items. McEvoy et al. (2010) adjusted the wording of the RRS using the same

strategy as Watkins et al. (2005) as described above. They also altered the instructions so that individuals answered items in relation to a specific situation. Similar to McEvoy and Brans (2013) and consistent with Treynor et al.'s (2003) approach, McEvoy et al. (2010) removed items that likely measured depressive symptoms. They also removed items that indexed physical symptoms because they were not cognitive in nature and the transdiagnostic applicability of physical symptoms was indeterminable. They included the adapted items from the RRS, with adapted items from a measure of worry and a measure of post-event processing, to form a new scale called the Repetitive Thinking Questionnaire (RTQ).

Rewston et al. (2007) adapted a 10-item version of the RRS (Treynor et al., 2003) which included a 'reflection' factor (5-items) and a 'brooding' factor (5-items). They included an additional five items intended to assess key dimensions of pathological and non-pathological worry. They reworded items to improve readability for an older British population (i.e. 'anglicised') and to reduce the level of abstraction (i.e. reworded to the first person). They named this 15-item scale the adapted Ruminative Response Scale (aRRS). The aRRS was used by Hudson and Saling (2010) as one of their measures.

Carney et al. (2010) used the Symptom-focused rumination subscale (SYM) of the RRS (Bagby, Rector, Bacchioni, & McBride, 2004). This includes eight items from the RRS previously found to assess the tendency to think about symptoms. Carney et al. (2010) used the SYM because it was the only measure of rumination which had previously been found to effectively distinguish between good and poor sleepers. They adapted the SYM instructions so that participants were asked to respond to items in relation to the past week, rather than the past two weeks, so it was consistent with other measures being used.

Measuring worry. The most frequently used measure of worry was the PSWQ (Meyer et al., 1990; see Table 3) which was used, either in its original format or an adapted

version, in 12 of the 15 studies. Seven studies used the PSWQ in its original format with no rewording or adaptations, two studies used the children's version of the PSWQ (PSWQ-C; Chorpita, Tracey, Brown, Collica, & Barlow, 1997), two studies used previously adapted versions, and one study adapted their own version. The two previously adapted versions of the PSWQ included the PSWQ-Past Week (PSWQ-PW; Stober & Bittencourt, 1998) and the worry engagement subscale of the PSWQ (Fresco et al., 2002). The PSWQ-PW contains 15-items from the PSWQ considered to assess state-dependent worry in relation to the past week. This version has adapted the instructions so individuals consider their responses in relation to the past week, the items are phrased in the past tense, it uses a 0-6 Likert scale response (rather than a 0-5), and one item was removed as it reflected a trait-like phrase that did not match with the new time frame. The worry engagement scale contains only the 11 positively- worded items of the PSWQ which were found to represent one 'worry engagement' factor (Fresco et al., 2002). The negatively coded items were removed as Fresco et al. (2002) found them to represent a separate factor described as the 'absence of worry'.

Adapting the PSWQ. McEvoy et al. (2010) used the original version of the PSWQ but adjusted the wording to reduce the confounding effect of the word 'worry' (this was replaced with references to 'thoughts' or 'thinking'). They altered the instructions so individuals answered items in relation to a specific situation, and removed two items as they could not be meaningfully related to a specific situation.

Table 3

Summary of studies using the PSWQ, including various versions, and other scales used to measure worry

Measure	No. of studies (%)	Studies
Used PSWQ = 12 (80.0%)		
Original version (Meyer et al., 1990)	7 (46.7%)	Ciesla et al. (2011); Fresco et al. (2002); Goring & Papageorgiou (2008); McEvoy & Brans (2013); Segerstrom et al. (2003); Siegle et al. (2004); van Rijsoort et al. (2001).
Adapted for current study (wording adjusted and items removed/added)	1 (6.7%)	McEvoy et al. (2010).
Previously adapted version (Worry engagement subscale, PSWQ-PW)	2 (13.3%)	Boschloo et al. (2012); Carney et al. (2010).
Children's version (PSWQ-C)	2 (13.3%)	Muris et al. (2004); Rood et al. (2010).
Used other measures = 3 (20.0%)		
Worry subscale of the aRRS	2 (13.3%)	Hudson & Saling (2010); Rewston et al. (2007).
Adapted WDQ for current study	1 (6.7%)	Watkins et al. (2005).

Note. PSWQ = Penn State Worry Questionnaire, PSWQ-PW = PSWQ Past Week, PSWQ-C = PSWQ for children, aRRS = Adapted RRS, WDQ = Worry Domains Questionnaire.

Other measures used to measure worry. One study developed a new measure of worry called the worry subscale of the aRRS (Rewston et al., 2007) and this was then subsequently used by one of the other studies (Hudson & Saling, 2010). The aRRS is a 5-item scale designed to assess key dimensions of pathological and non-pathological worry in older adults. The dimensions of worry assessed, and subsequent corresponding items, were derived through a review of theoretical and empirical literature concerning worry. These dimensions include: the reassurance-seeking element of worry, the problem-solving function of worry, the relationship between worry and uncertainty and the experience of anxious

physiological arousal, and the notion that worry might be characterised by attempts to predict, prepare for or avoid negative outcomes (Rewston et al., 2007).

One study (Watkins et al., 2005) used the worry domains questionnaire (WDQ; Tallis, Eysenck, & Mathews, 1992) which assesses the following 6 areas of typical worries: relationships, lack of confidence, aimless future, work incompetence, finances, and socio-political concerns. They adjusted the wording of the WDQ to be consistent with other measures of cognitive processes being administered (namely rumination and intrusive thoughts) and excluded one item that significantly overlapped with an item from the RRS.

Using multiple measures vs. single scales. Four studies (Ciesla et al., 2011; Rood et al., 2010; Segerstrom et al., 2003; Siegle et al., 2004) used multiple measures of rumination for comparison purposes whereas no studies used multiple measures of worry. This likely reflects the variation in how rumination is conceptualised in comparison to the more uniformly adopted concept of worry.

1.4.5 Overlap and Distinction Between Rumination and Worry

As reported in Table 1, all but one study used factor analysis to compare rumination and worry. In addition to factor analysis, one study (Segerstrom et al., 2003) used multidimensional scaling, one study used generalizability theory analysis (Siegle et al., 2004) and 11 reported correlation analysis results. Watkins, Moulds and Mackintosh (2005) used paired samples t-tests to compare rumination and worry along a number of dimensions.

Factor analysis results. Fourteen studies used factor analysis to compare the constructs of worry and rumination. Three studies (Boschloo et al., 2013; McEvoy et al., 2010; Siegle et al., 2004) found that rumination and worry loaded onto the same factor, five studies (McEvoy & Brans, 2013; Hudson & Saling, 2010; Goring & Papageorgiou, 2008;

Rewston et al., 2007; van Rijsoort et al., 2001) found mixed results, and six studies found that they loaded onto separate factors.

Rumination and worry loading on the same factor. Of the three studies that found rumination and worry to load onto the same factor: McEvoy et al. (2010) reported a two-factor model representing 'RNT' and 'absence of RNT'; Boschloo et al. (2012) reported a two-factor model representing 'negative emotionality' (including both rumination and worry) and 'impulsivity'; and Siegle et al. (2004) reported a four-factor model with Factor 1 representing 'rumination on sadness, worry and otherwise negatively valenced trait rumination', Factor 2 representing 'focus on a distant-past negative event', Factor 3 'valence-neutral reflection', and Factor 4 'alternate responses to rumination that do not clearly represent rumination'.

In conjunction with findings from generalizability analysis (discussed later), Siegle et al. (2004) conclude that rumination, including worry, can be conceived as one unitary construct. They state that different measures reflect different rumination-like constructs and the multiple factors they found, represent plausible clusters of correlated rumination measures. They highlight that the observed factors support the distinction between negative rumination and more reflective strategies but also suggest that some of the variation was accounted for by conceptual and stylistic differences between the measures. They draw parallels to the valence (positive/negative) and purpose dimensions found among repetitive thought measures by Segerstrom et al. (2003). Siegle et al. suggest that their findings fit with the valence dimension as scales that measured neutral reflection and alternate responses to emotional information, loaded on separate factors from negative rumination.

McEvoy et al. (2010) found an overlap between depressive rumination and worry measures using adapted versions of the RRS and the PSWQ; all positively worded items loaded on the same factor termed 'RNT'. The authors adjusted the wording of both the RRS

and the PSWQ to minimise potential sources of method variance that could artificially distinguish between the measures. They used general phrases like 'thoughts or images' for RRS items and references to 'thoughts' or 'thinking' for PSWQ items, and also adapted the instructions so that individuals answered all items in relation to a specific situation. All positively worded items of the PSWQ (e.g. "I knew I shouldn't have thought about the situation, but I couldn't help it") and the RRS (e.g. "You had thoughts or images about how alone you felt") loaded on the RNT factor. The second identified factor, the 'absence of repetitive thinking', contained all negatively worded items of the PSWQ (e.g. "I found it easy to dismiss distressing thoughts about the situation). They proposed that rumination and worry are less distinct than suggested by previous factor analytic studies as their findings imply that use of the term 'worry' in all PSWQ items may have been why PSWQ items and rumination measure items tended to load on separate factors.

Boschloo et al. (2013) also found a clear overlap between rumination and worry. They used a different measure of rumination (the 'rumination reactivity' subscale of the LEIDS-R) which measures ruminative response to sad mood and an adapted version of the PSWQ (the worry engagement subscale; Fresco et al., 2002) which only included positively worded PSWQ items. These measures were similar to those used by McEvoy et al. (2010). Boschloo et al. did not give sufficient detail on their method of factor analysis but they appeared to use total scores for the scales rather than individual items and found that both rumination and worry loaded on a factor identified as 'negative emotionality'. They described this as a homogenous factor as the constructs included (neuroticism, hopelessness, rumination, worry, and anxiety sensitivity) were highly interrelated (ranging from $r = 0.45$ to $r = 0.81$).

Rumination and worry loading partly on the same and partly on different factors.

McEvoy and Brans (2013) found that rumination (separated into brooding and reflection on an adapted version of the RRS) and worry (as measured by the PSWQ) loaded onto three distinct factors but the best fitting model was when the three components were nested in a 'general RNT' factor. They conclude that rumination and worry had both common and distinct variance and that this should be conceptualised as common variance rather than considering RNT as a higher-order factor. Worry was more strongly related to RNT than brooding or reflection suggesting these scales as more distinct from the underlying factor of RNT than worry. Van Rijsoort et al. (2001) reported that items from the rumination subscale of the PI-R and items from the PSWQ loaded onto separate factors because the difference between the eigenvalues of each item between its own assigned factor and the others were all greater than .10. They used multiple group method confirmatory analysis to investigate the proposed 5-factor structure of the PI-R in addition to the factor of worry as measured by the PSWQ; therefore confirming a 6-factor model. However, on inspection of the table reporting the eigenvalues, the majority of items from the PSWQ loaded onto the rumination factor (>.4) and conversely the majority of the items on the rumination measure loaded onto the worry factor (>.4). This is not explicitly discussed by the authors but has implications for the distinction between rumination and worry as measured by these scales.

Three studies reported rumination and worry loading onto multiple distinct factors but with some exceptions. Goring and Papageorgiou (2008) found a four-factor model including the following factors: 'tendency to worry', 'tendency to analyse feelings/self', 'dwelling on negative feelings', and 'absence of worry'. These represented a variation of scale items: tendency to worry was made up of 11 positively worded PSWQ items (these items correspond exactly to the worry engagement subscale of the PSWQ) and three RRS items; the second and third factors were both made up of different RRS items and could arguably be

conceived as neutral reflection and negative rumination; and the 'absence of worry' factor was made up of four reverse-scored items of the PSWQ (similar to Boschloo et al., 2013 and Fresco et al., 2002). Similarly, both Hudson and Saling (2010) and Rewston et al. (2007) found three-factor models of brooding, reflection, and worry but with some items loading on one of the other factors. Hudson and Saling (2010) used the aRRS and found that odd items from the brooding subscale and worry subscale loaded on the opposite factor, while the reflection subscale items all loaded on one factor. They found good internal consistency for each factor ($\alpha = 0.77-0.80$) and all three factors significantly and positively correlated with one another. Rewston et al. (2007) also used the aRRS and found some items from each of the brooding, reflection and worry subscales loading on opposite factors.

With the exception of van Rijsoort et al. (2001) who used the PI-R to measure rumination, all other studies who found mixed evidence for the degree of overlap between rumination and worry, used a version of the RRS. Similar to previous studies (Treyner et al., 2003), all those who used a version of the RRS reported a distinction between negative rumination or brooding, and reflection.

Rumination and worry loading on separate factors. Rood et al. (2010) found that PSWQ-C items measuring worry, CRSS items measuring rumination on sad mood, and SRRS-C items measuring negative thoughts about negative inferences following stressful events, all loaded on three separate factors distinctly representing each individual scale. Ciesla et al. (2011) found a four-factor model with items from each individual scale loading exclusively on factors specific to their corresponding construct; that is, all RRS items loaded on one factor, all PSWQ factors loaded on another, and so on for both angry rumination and co-rumination. Both of these studies report factors clearly represented by specific scale items yet only Rood et al. (2010) acknowledge that these differences could potentially be related to

methodological differences in the wording of the scales. This is likely to have been an issue as some items from the CRSS (e.g. "When I'm feeling sad, I think about something that happened and wish it had gone better") were relatively comparable with items on the SRRS-C (e.g. "I think about the stressful event and wish it had gone better"), yet they loaded on separate factors. All of the PSWQ-C items included a variant of the term 'worry' while none of the other scales did. All of the CRSS items started with the phrase "When I'm feeling sad, I...", while all of the SRRS-C items started with "I think about...", and then make reference to a particular stressful event identified by the child or adolescent. These methodological distinctions, use of the specific term that is being measured or assessing trait constructs versus mood- and situation-dependent states, are likely to result in different outcomes.

Segerstrom et al. (2003) found eight factors with each rumination-like construct scale forming its own factor. The only exceptions were the Rumination Scale (Martin, Tesser, & McIntosh, 1993) and the RRS which appeared to be internally multidimensional; both of these scales were individually factor analysed. The Rumination Scale loaded onto two factors: 'lack of control over thoughts and distractibility' and 'cognitive rehearsal and processing'. The RRS loaded onto three factors: 'focus on depressive symptoms', 'self-analysis', and 'self-reproach' with Factors 1 and 3 highly correlated ($r = .65$). Both of these scales appear to fit with a distinction between rumination and reflection. Muris et al. (2004) found that all PSWQ-C items loaded on one 'worry' factor while CRSS items either loaded onto one 'rumination' factor or two factors reflecting 'dwelling on negative feelings' and 'analysing what went wrong'. Again, this would appear to distinguish rumination from a more adaptive reflective cognitive approach.

Fresco et al. (2002) found that items from the RRS and the PSWQ, each loaded onto two separate factors. Positively worded PSWQ items loaded on one factor ('worry

engagement') and negatively worded items loaded on another ('absence of worry'). The RRS items loaded onto two factors identified as 'dwelling on the negative' and 'active cognitive appraisal'. There was no overlap between scale items on factors although one PSWQ item and three RRS items were dropped due to low factor loadings. Similarly Carney et al. (2010) found that all positively worded PSWQ items loaded onto one factor while all of the negatively worded PSWQ items loaded on a separate factor, but that all items from the Symptom-focused Rumination scale loaded on one third factor. As the Symptom-focused Rumination scale consists of items from the RRS that focus on depressive symptoms only and does not contain any reflection items, it is logical that rumination, as measured by these items, was found to load on one coherent factor. All studies that found rumination and worry to load on distinct factors, identified factors that matched, almost identically, to the separate scale items being analysed (i.e. RRS items loaded on one or more factor while PSWQ items loaded on separate factors).

Other methods of comparison. Eleven studies reported carrying out correlation analysis and all found significant positive relationships between measures of rumination and worry. Only one study (Siegle et al., 2004) reported no significant relationship between brooding and worry but did report a relationship between brooding and reflection, and between reflection and worry.

Watkins et al. (2005) used paired samples t-tests to compare worry and rumination across a number of variables. They found that, of 53 variables on an adapted version of the Cognitive Intrusions Questionnaire (CIQ; Freeston, Ladouceur, Thibodeau, & Gagnon, 1992), only seven showed a significant difference between worrisome thoughts and ruminative thoughts. The differences observed included: chronicity, with worry reported to be ongoing for a greater number of years; temporal orientation, with rumination more about

the past and worry more about the future; 'realness', with rumination viewed as being about a 'real' problem; distress, with worry rated as more upsetting and disturbing; and worry was associated with greater feelings of insecurity and worry than rumination.

Segerstrom et al. (2003) used multidimensional scaling to compare rumination and worry. They found that multiple measures of repetitive thought could be compared along two dimensions: 1. Valence - positive versus negative content valence; and 2. Purpose - searching for new ideas/experiences versus solving problems and improving certainty and predictability. Rumination and worry both fell on the negative end of the content valence dimension and both fell on the problem-solving end of the purpose dimension, however, worry appeared further towards problem-solving and improving certainty and predictability than rumination.

Siegle et al. (2004) conducted a generalizability theory analysis to examine the extent to which multiple measures of rumination-like constructs indexed the same construct. The analysis found that 22-30% of the variance was accounted for by stable differences between individuals, suggesting that some individuals scored high on the measures no matter how it was assessed. The majority of variance, 70-78%, was accounted for by individual by scale interactions, suggesting that individuals did not consistently score high or low on all questionnaires. Siegle et al. state that this indicates a low to moderate level of generalizability which implies that different measures probably assess different constructs because individuals tended to score differently on different scales. However, they also found a considerable level of between-scale consistency ($\alpha = .85$) and proposed that this was an indication that a mean of multiple rumination measures appear to index a single unitary construct. Siegle et al. highlighted multiple possible reasons why different questionnaires provoked different responses from the same individuals. Based on their findings, they

suggest the conceptual distinctions between measures are a likely explanation for observed variation in responses, as many of the scales took different approaches (e.g. rumination on internal vs. external events, state vs. trait variables). This view was supported by discussions with participants after testing which indicated that some individuals responded differently to measures depending on the event they chose to answer the questions in relation to (i.e. a particular stressful experience) and based on how the instructions and the question items were worded.

1.4.6 Rumination and Worry as Similar or Distinct Processes

Thirteen of the studies concluded that rumination and worry are similar processes that share a degree of overlap but are still distinguished from one another. Some suggest their distinctness to be related to the content of each thinking style, predominantly referencing that rumination and worry have repeatedly been evidenced to differ in terms of temporal orientation. One study (McEvoy & Brans, 2013) proposed that the shared variance between measures of rumination and worry is best conceptualised as common variance, rather than in relation to a higher order factor of RNT. McEvoy and Brans (2013) proposed partial support for the transdiagnostic hypothesis of repetitive thought, as rumination and worry measures had both common and distinct variance. Segerstrom et al. (2003), who compared the two constructs in terms of valence and purpose dimensions, concluded that rumination and worry could be conceptualised as a unified construct despite the finding that they differed somewhat in terms of their intended purpose (i.e. searching or solving).

Rewston et al. (2007) proposed that worry, brooding and reflection are separable factors that appear to fit with suggestions that worry and rumination are functionally distinct ways of thinking (Papageorgiou & Wells, 2004; Watkins, 2004). Conversely, Boschloo et al.

(2012) concluded that negative emotionality, consisting of both rumination and worry, formed a homogeneous dimension.

1.5 Discussion

The findings reported here highlight the difficulty in establishing how similar or distinct, the concepts of rumination and worry are from each other. The majority of studies directly comparing rumination and worry have reported inconclusive, or only partially supported, findings. One coherent message across studies is that, rumination and worry are definitely related in some way but also appear to maintain some degree of distinctness. What remains uncertain is the relationship between rumination and worry and why they sometimes appear similar and sometimes distinct. This adds to the difficulty in concluding whether they can be conceptualised within one unitary process (i.e. RNT).

The most frequent conceptualisation of rumination was Nolen-Hoeksema's (1991) RST of depressive rumination. This conceptualisation corresponds with the use of the RRS as a means of measuring rumination, although, two studies acknowledged that rumination has multiple definitions and therefore used multiple measures of rumination. Numerous studies considered rumination to be a multi-faceted construct that loads onto more than one factor. The most common pattern found was the distinction of rumination into a brooding-type construct and a reflective-type construct. As the majority of studies used the RRS, this distinction fits with previous findings (Treyner et al., 2003). A large proportion of studies used Borkovec et al.'s (1983) definition of worry or a congruent conceptualisation of the construct. This conceptualisation of worry was compatible with using the PSWQ as a measurement tool. Rewston et al. (2007) used a broader conceptualisation of worry that included a definition by Borkovec (1994), to develop a new measure of worry contained within the aRRS. Worry appeared to be a more coherent construct with studies only

reporting two distinct factors, at most, namely the presence or absence of worry. It was commonly noted that this distinction corresponded with positively and negatively worded items of the PSWQ. A small number of studies adopted a view from the outset, that worry was a cognitive process comparable with rumination (i.e. they could be conceptualised in similar ways).

Arguably Nolen-Hoeksema's RST of depressive rumination and Borkovec's definition of worry appear to be compatible conceptualisations. They both regard rumination and worry, respectively, as responses to negative affect. Depressive rumination is viewed as a response to low mood, while worry as a response to fear of potential negative outcomes (conceivably similar to anxiety). In keeping with the findings of a review of the constructs (Watkins, 2008), the conceptualisations only appear to differ in terms of their content: depressive rumination is purported to focus on depressive symptoms while worry is conceived of as focusing on any potential feared negative outcome. This indicates that, if measures of the constructs include reference to the content of ruminative or worry thoughts, then they are likely to find a difference between them. If they only focused on the process of both constructs, it is hypothesised that they would potentially appear more similar. The RRS contains items relating specifically to depressive symptoms (e.g. 'Think about your feelings of fatigue and achiness') and these have been found to overlap with items from the Beck Depression Inventory that measure depression (Treyner et al., 2003). The instructions also ask people to respond to items in relation to when they feel depressed. Items on the RRS are phrased so that they ask about the specific content of thoughts (e.g. 'Think "What am I doing to deserve this?"). Conversely, the PSWQ does not refer to the specific content of worry thoughts, but concentrates on the process of worrying (e.g. 'I find it easy to dismiss worrisome thoughts'); albeit they do use the term worry to describe this process. The reason for the PSWQ focusing on process rather than content, is likely due to the large number of

possible feared negative outcomes that people may hold and the difficulty in trying to account for such variability in the content of one scale. Depressive rumination on the other hand, refers to the process of ruminating but only in relation to one specific event, that is, when people are depressed. This is potentially why the RRS has developed more of a content-focus in its items. This distinction in the underlying conceptualisation of the RRS and the PSWQ, has implications for comparing rumination and worry as measured by these scales.

The finding by McEvoy and Brans (2013), that rumination factors from an adapted version of the RRS (i.e. brooding and reflection) were more distinct from a general RNT factor than worry, as measured by the PSWQ, is in keeping with this distinction. The PSWQ may have been more compatible with an overarching construct of RNT because it measures a compatible process, whereas the content of brooding and reflective type thinking, is harder to compare with a general process of RNT. Comparing the 'content' of rumination to the 'process' of worry, is likely to produce distinguishable results. As highlighted here, the majority of studies that found rumination and worry to load onto separate factors, used a version of the RRS and the PSWQ. Whereas, the studies that found rumination and worry to be comparable, either used adapted versions of these measures or else used entirely different measures. This finding supports the hypothesis that a large proportion of the variance observed between the constructs can be attributed to methodological variation in the scales rather than differences in rumination and worry per se (Watkins et al., 2005; McEvoy et al., 2010).

The studies that made attempts to address these methodological variations did observe more coherence between rumination and worry than those that didn't. This implies that rumination and worry could indeed be comparable constructs when measured in compatible ways, namely in terms of process rather than content. If rumination were measured in a more

similar way to how the PSWQ measures worry, although references to worry or rumination would need to be replaced with generic references to thoughts or thinking, it would allow for a more valid comparison. This hypothesis warrants further investigation to support the claim that when methodological variance is removed, rumination and worry appear to represent a similar construct. This view has already been accepted by some researchers and can be seen in more recently developed measures of RNT as a unitary process, for example the PTQ (Ehring et al., 2011). Ehring et al. have attempted to remove all diagnosis-specific content and develop a transdiagnostic measure of RNT. The 15-item measure is comprised of three items representing each of the five assumed characteristics of RNT; that is, RNT is repetitive, intrusive, difficult to disengage from, unproductive, and captures mental capacity (i.e. difficult to concentrate on other things). This measure adopts a universal approach to assessing RNT as a process and does not include disorder-specific content. This marks a shift away from the conceptualisation of rumination and worry as separate constructs, towards conceptualising RNT as a meta-process entailing all types of RT that are negative. In light of the findings from this review, this approach appears to be relatively valid but is not without some caution. The step of comparing rumination and worry on methodologically comparable scales has only been carried out in a few studies (McEvoy & Brans, 2013; McEvoy et al., 2010; Watkins et al., 2005) and further replication would strengthen the evidence for considering them as a unitary construct.

1.6 Clinical Implications

Rumination and worry are routinely measured in clinical settings. Rumination is considered to be a risk factor for developing depression (Spasojevic & Alloy, 2001) and worry is seen as an essential criteria in the diagnosis of generalised anxiety disorder (American Psychiatric Association, 2000). Measuring these constructs homogeneously

clearly has implications for the assessment and diagnosis of mental health problems. RNT is still considered to differ in terms of content (Watkins, 2008), even if the underlying process is proposed to be unitary. This disparity in content is likely to be seen across individuals and has been shown across different distinctions of mental health diagnoses (Ehring & Watkins, 2008). Considering the degree of variation in thought content, and the finding that rumination and worry are present across a range of emotional problems, having a uniform way of measuring the extent to which people engage in the process of RNT seems a more parsimonious approach. Additionally, some forms of RT have been found to have constructive consequences and are considered adaptive strategies (Segerstrom et al., 2003; Watkins, 2008); therefore, the need to distinguish between helpful and unhelpful RT appears more relevant to assessing such processes, and would likely hold more implications for clinical outcomes.

1.7 Limitations

This review has a number of methodological limitations. First, due to increasing interest in the constructs of rumination and worry, the initial search of the literature returned a large volume of studies. The extent of the research was too vast to be meaningfully compiled within one review. As a result, additional excluding criteria were imposed, namely the exclusion of studies that investigated rumination and worry in relation to a third variable. These studies would have likely increased the complexity of the findings while offering a more comprehensive overview. However, the difficulty of synthesising this quantity of data resulted in only including studies that directly compared rumination and worry with each other. This also had the consequence of most included studies using factor analytic methods to compare the constructs with one another. There does not appear to be a standardised way of comparing factor analytic results as there is for other methodological approaches (e.g.

effect size) and therefore, studies were compared on their methodological quality and the number of factors they reported.

1.8 Conclusions

This review tentatively concludes that when rumination and worry are measured by conceptually distinct scales, namely the RRS and the PSWQ respectively, this translates into differences observed in study findings. That is, when rumination is measured by the RRS and worry is measured by the PSWQ, they are found to be distinct constructs. However, on the few occasions when attempts have been made to remove methodological variations, rumination and worry appear to be similar processes. It is therefore feasible to conceptualise them within a unitary construct of RNT but further confirmatory research would strengthen this conclusion. A unitary measure of RNT has clinical implications in terms of assessing the extent to which people engage in the process of unhelpful, rather than helpful, RT.

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CHAPTER 2: EMPIRICAL PAPER

2.1 Abstract²

Rumination and worry are considered similar types of repetitive-negative-thinking (RNT) related to mental health difficulties. Ability to disengage from RNT is associated with mindfulness, which is related to greater well-being. Evidence suggests goal-linkers ruminate more, but the relationship between goal-linking and worry has not yet been investigated. The aim of this study was to investigate the relationship between goal-linking and RNT, and the impact on mental health/well-being. A non-clinical sample of 186 UK University students completed an online questionnaire survey. As predicted, goal-linking was significantly associated with RNT, mindfulness, anxious/depressive symptoms, and well-being. Goal-linkers showed significantly greater RNT than non-linkers, and were less mindful. Goal-linking predicted anxious/depressive symptoms and this prediction strengthened when people engaged in RNT. The relationship between goal-linking and anxious/depressive symptoms was mediated by RNT, while the relationship between goal-linking and well-being was mediated by mindfulness. Mindfulness training is suggested to help goal-linkers disengage from RNT.

Keywords: Goal-linking, repetitive negative thinking, rumination, worry, mindfulness, depression, anxiety, well-being

Footnote

²Empirical paper to be submitted to Cognitive Therapy and Research.

The mediating effect of repetitive negative thinking and mindfulness on the relationship
between goal-linking and mental health and well-being

2.2 Introduction

Rumination has received much attention in the clinical literature over the past two decades although there still appears to be no unified definition and no standard means of measurement (Smith & Alloy, 2009). In their extensive review of the construct, Smith and Alloy (2009) state that rumination is a cognitive process best characterised as "a stable, negative, broadly construed way of responding to discrepancies between current status and target status" (p.126). They suggest that rumination fits within the broader theoretical framework of emotion regulation in that ruminating is an attempt to resolve the perceived discrepancy between where one is (current status) and where one would like to be (target status) and the negative affect that is likely to accompany that state. Smith and Alloy conclude that positive metacognitive beliefs about the efficacy of rumination encourage engagement in this strategy but that ultimately, rumination serves to avoid processing negative emotion. According to Hayes and colleagues theory of avoidance (2004), avoiding negative affect paradoxically increases the experience of it. It is therefore not surprising that rumination has consistently demonstrated a strong relationship with depression (Mor & Winquist, 2002) and ruminating in response to distress is associated with increased severity and length of episodes of depressed mood (Nolen-Hoeksema, 1991).

Worry is most commonly defined as: "a chain of thoughts and images, negatively affect-laden and relatively uncontrollable" (Borkovec, Robinson, Pruzinsky, & Depree, 1983, p.10). Borkovec and colleagues (1983) suggest that worrying is a form of mental problem-solving when the outcome of something remains uncertain but has the potential to be negative; they note how closely worry relates to the fear process. Borkovec's avoidance

theory of worry (Borkovec, 1994; Borkovec, Ray, & Stober, 1998) proposes that worry is a mostly verbal, rather than imagery-based, cognitive activity aimed at avoiding perceived threat. Similar to the theory posited for rumination, Borkovec's theory argues that people hold positive metacognitive beliefs about the efficacy of worry in helping to avoid threat. However, by not processing the emotion related to the prospect of the feared negative outcome, the individual remains afraid of the outcome occurring and hence experiences increased persistent feelings of anxiety. Worry has most commonly been studied in relation to anxiety (Fresco, Frankel, Mennin, Turk, & Heimberg, 2002) and is seen as an essential feature of generalised anxiety disorder (American Psychiatric Association, 1994).

2.2.1 Rumination and Worry as RNT

Despite the established link between rumination and worry with depression and anxiety respectively, it is becoming more widely accepted that both processes are present across a range of mental health disorders (for a review see Ehring & Watkins, 2008). This has led to growing consideration of rumination and worry as part of the same overarching meta-process known as repetitive negative thinking (RNT). RNT is a term used to describe cognitive processes that involve recurring thoughts about negative topics that are experienced as difficult to control (Ehring & Watkins, 2008). Ehring and Watkins note that the content between rumination and worry only tend to differ specifically in relation to temporal orientation; that is, rumination appears to focus on past negative experiences while worry focuses on future concerns. Repetitive thought (RT) as a general, rather than a specifically negative, overarching process which includes both rumination and worry, has been found to vary along two dimensions: the valence of RTs can range from positive, to neutral, to negative, and people can engage in repetitive thinking for reasons that span from a searching to a solving purpose (Seegerstrom, Stanton, Alden, & Shortridge, 2003). These findings imply

that rumination and worry can theoretically be conceptualised as a unitary cognitive process and while they may differ in terms of content and purpose, they function in a relatively similar manner. Whilst some consider them to be part of the same construct (Boschloo, Vogelzangs, van den Brink, Smit, Beekman, & Penninx, 2013), others see them as distinct processes that share common variance (McEvoy & Brans, 2013). The differences observed between rumination and worry may be due to methodological variations in measurement tools as removing these methodological confounds can eliminate the differences detected (McEvoy, Mahoney, & Moulds, 2010). This has led to the development of transdiagnostic measures that assess RNT without reference to disorder-specific content or symptoms, such as, the Perseverative Thinking Questionnaire (PTQ; Ehring, Zetsche, Weidacker, Wahl, Schonfeld, & Ehlers, 2011) and the Repetitive Thinking Questionnaire (McEvoy, Mahoney, & Moulds, 2010). These measures show promising validity and reliability in measuring worry and rumination as a general construct.

2.2.2 Goal Progress Theory

Goal progress theory (Martin, Tesser, & McIntosh, 1993) states that rumination occurs in response to failure to progress, as expected, towards a significant goal. In his review of constructive and unconstructive RT, Watkins (2008) expands on goal progress theory and describes an integrative overview of control theory of RT. Control theory (Wiener, 1961) proposes that all behaviour, including mental activity, are part of a feedback process so that when a discrepancy is perceived between the current state, as compared to some reference value (e.g. goals, desired states), behaviour is modified to attempt to resolve this discrepancy (Carver & Scheier, 1982). Watkins (2008) argues that RT is one such self-regulatory attempt to resolve perceived discrepancies and that RT will continue until the desired progress is made or until the person disengages from the goal. He concludes that the

consequences of RT depend on three factors: thought valence (positive or negative thoughts), the context within which RT occurs (RT amplifies existing context such as beliefs, expectations, mood states), and the level of construal adopted during RT (higher level abstract representations vs. lower level concrete specificities; Watkins, 2008). Beliefs and expectations about the self play an important role in how people respond to perceived discrepancies between current and desired states (Carver & Scheier, 1990); whether these expectations are positive or negative will influence whether RT is helpful or not. For example, negative expectations about success may lead to reduced persistence at goal pursuit which will increase the discrepancy level and have a negative effect on mood. Mood states can also impact the consequences of RT as negative mood can lead to higher standards of success making it harder to resolve discrepancies (Cervone, Kopp, Schaumann, & Scott, 1994). Goals and behaviours are hierarchically organised with more abstract, superordinate levels influencing more concrete, subordinate levels (Martin et al., 1993). The former are hypothesised to be more helpful for goal progress in familiar, unproblematic, or positive situations and the latter in novel or problematic situations or with unattainable goals (Watkins, 2008; Watkins & Moulds, 2005; Watkins & Teasdale, 2001, 2004). Watkins concludes that RT can be adaptive but under certain conditions, it can have unhelpful consequences.

2.2.3 Goal-linking

Goal-linking is the concept that people vary on the degree to which they link lower-order goals to higher-order ones, with linkers (i.e. those high on this tendency) believing that higher-order goals are contingent on the outcome of lower-order goals (e.g. *'I must get that job in order to be happy'*; McIntosh & Martin, 1992). While goals are believed to be organised hierarchically, with lower-order goals contributing to higher-order goals

(McIntosh, 1996), non-linkers (i.e. those not high on the tendency) do not believe that goals higher up the hierarchy are dependent on the achievement of every lower-order goal beneath it (e.g. *'I can still be happy even if I don't get that job'*). McIntosh, Harlow, and Martin (1995) argue that linkers ruminate more because of their belief that all goals, even seemingly trivial ones, are instrumental in achieving more superordinate goals, referred to in the goal literature as personal strivings (Emmons, 1989). This influences linkers' interpretation and response towards threats to achieving their goals. In other words, linkers are more susceptible to responding to a discrepancy between their current and desired state because the desired state is likely to hold greater significance (e.g. to be happy). The higher a goal is in the hierarchy the more enduring it tends to be (Emmons, 1989) and the more abstract (McIntosh, 1996). One proposition for why higher-order goals tend to be more enduring is that their abstract nature makes it more difficult to ascertain whether progress is being made or whether the goal has been fulfilled (McIntosh, 1996). For linkers, this suggests they are unlikely to disengage from a goal because the reference value they are striving towards may be vague but very salient and their sensitivity to goal threat is high (McIntosh, 1996), so they ruminate more frequently and more continuously (McIntosh et al., 1995). This hypothesis is consistent with Watkins' (2008) control theory of RT. This implies that linkers may be more prone to negative consequences of RT because they hold negative beliefs about not attaining their goals as well as the tendency to set more abstract reference values that are likely to be enduring; this may lead to difficulty if goals are problematic or unattainable. By placing higher significance on achieving everyday goals to fulfil more meaningful personal strivings, it is conceivable that linkers would also be more likely to use worry as a problem-solving strategy, however, to the best of the author's knowledge, this relation is yet to be empirically explored. With increased engagement in worry, anxiety would also be expected to increase.

2.2.4 Goal-linking and Mindfulness

The tendency of linkers to focus on abstract personal strivings, while regularly noting discrepancies between current and target status, appears incongruous to accepting the present moment. The quality of 'non-striving', having no other goal than being yourself as you currently are (Kabat-Zinn, 1990), has been proposed to foster the ability to re-evaluate, or disengage from, problematic goals as a way of regulating discrepancies (Crane et al, 2008). 'Non-striving' is recognised as an essential attitudinal element of mindfulness (Kabat-Zinn, 1990). Mindfulness is described as 'paying attention in a particular way: on purpose, in the present moment, non-judgementally' (Kabat-Zinn, 1994). Being 'mindful' is being aware of present moment experiences, so that thoughts, feelings, or sensations that arise, are acknowledged and accepted rather than actively engaged with (Bishop et al., 2004); a concept often referred to in Mindfulness Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002) as decentering. Cultivating mindfulness through training is associated with promoting greater levels of well-being (Brown & Ryan, 2003), improving acute symptoms of anxiety and depression (for a review see Hofmann, Sawyer, Witt & Oh, 2010), reducing relapse rates of depression (for a review see Piet & Hougaard, 2011), and reducing the frequency of negative automatic thoughts as well as increasing perceived ability to disengage from negative thinking (Frewen, Evans, Maraj, Dozois, & Partridge, 2008).

Trait mindfulness has been associated with lower levels of rumination (Frewen et al., 2008; Raes, Dewulf, Van Heeringen, & Williams, 2009; Raes & Williams, 2010) and rumination has been found to decrease after engaging in mindfulness-based interventions (Deyo, Wilson, Ong, & Koopman, 2009; Raes et al., 2009). Based on their findings, Raes and Williams (2010) propose that greater skill in mindful awareness, either occurring naturally or cultivated through training, improves people's ability to notice when they are

ruminating, to decenter from their thoughts and feelings, and subsequently disengage from this maladaptive self-perpetuating reactive pattern. Higher levels of mindful awareness and accepting without judgement is associated with lower levels of brooding, and as a result lower levels of depressive symptomatology (Alleva, Roelofs, Voncken, Meevissen, & Alberts, 2014). Additionally, rumination and worry have been found to be more abstract forms of thinking (Goldwin & Behar, 2012), whereas mindfulness is paying attention to current experience in a concrete way. According to Watkins (2008), a concrete style of thought is more helpful when there is perceived threat to achieving a goal. This implies that linkers are less likely to be mindful or potentially the inverse, that being mindful reduces the tendency to link. While having a personally meaningful goal is related to better well-being, the discrepancy between current and desired states is considered to create negative affect (Carver & Scheier, 1998). If this discrepancy remains, as is suggested with linkers, it is likely to have a detrimental impact on mental well-being.

2.2.5 Aims and Hypotheses

This study aims to: 1. test the predicted relationships between the concepts of goal-linking, RNT (including rumination, worry, and RNT measured as a universal construct), and mindfulness; 2. examine if linkers are less mindful and engage in more RNT than non-linkers; and 3. investigate the hypotheses that goal-linking and RNT together are predictive of depressive and anxious symptoms, while goal-linking and mindfulness are predictive of well-being. The constructs of goal-linking, RNT (including both rumination and worry), and mindfulness, are all conceptualised as trait tendencies and thus are not limited to a clinical sample. Given the lack of consensus in the literature, and as some relationships have not previously been examined, the current study investigates the key considerations in a non-clinical adult population, in the absence of a diagnosis of mental health difficulties.

The hypotheses are seven-fold: First, goal-linking will be positively correlated with RNT, rumination, worry, depression, and anxiety; and second, will be negatively correlated with mindfulness and well-being. Third, linkers will engage in significantly more RNT than non-linkers; and fourth, linkers will be less mindful than non-linkers. Fifth, goal-linking will predict depression and this relationship will be mediated by RNT; sixth, goal-linking will predict anxiety and this relationship will be mediated by RNT; and finally, goal-linking will predict well-being and this relationship will be mediated by mindfulness.

2.3 Method

2.3.1 Participants

Two hundred and thirty four undergraduate and postgraduate students from four Universities in the UK consented to take part in the study. Thirty two people did not complete any further information and some only provided demographic information ($n=36$). There were no significant differences between completers and non-completers. After removing non-completers from the study, the total sample included in the analysis was $N=186$, although 23 of these only provided partial data. Of the total sample ($N=186$), 143 were female (76.9%) and 43 were male (23.1%). The mean age was 24.56 years ($SD=0.51$, range=18-67), with 36.0% aged 18-20 years, 51.6% aged 21-30 years, 9.2% aged 31-40 years, and 3.2% aged 41-67 years. The majority of the sample classified themselves as White ($n=153$, 82.3%), then Chinese ($n=13$, 7.0%), Mixed Race ($n=11$, 5.9%), Asian ($n=9$, 4.8%), and nobody classified themselves as Black. Students predominantly attended the main recruitment University based in the Northwest of England ($n=149$, 80.1%), followed by a University in Northern Ireland ($n=30$, 16.1%), and the remainder of people attended one of the other two recruitment Universities in the UK ($n=7$, 3.8%).

2.3.2 Sampling, Power Analysis, and Ethics Statement

A convenience sample of University students was used. The study was advertised to all undergraduate and postgraduate students via the intranet of the main recruitment University. The study was also advertised via email to psychology students of three other UK Universities. Institutional and ethical approval was obtained from the main recruitment University and permission granted from the Heads of Psychology Departments to advertise in the other Universities.

In the behavioural sciences, Cohen (1988) recommends researchers recruit sufficient participants to detect .80 power at an alpha of .05. Using these parameters a power analysis using G-Power (Faul, Erdfelder, Lang, & Buchner, 2007) was conducted to detect a medium effect for correlation analysis, independent samples t-test, and linear regression analysis. The power analysis calculations suggested that at least 38 participants were needed to have adequate statistical power for correlation analyses, at least 70 participants were needed for independent samples t-test, and at least 107 participants were needed for linear regression using two predictor variables. Using bootstrapped confidence intervals improves the power of mediation analysis and requires less assumptions about normal distribution (Hayes, 2013). As bootstrapping resamples the data within the available sample thousands of times, no agreement on the minimum required sample size to carry out this analysis has been met.

2.3.3 Design

This study was a cross sectional, online, internet study.

2.3.4 Measures

The internal consistency of all measures was assessed using Cronbach Alpha (Field, 2009). In the current study, Cronbach Alpha for all measures was above the acceptable cut-

off of 0.7 or above (DeVellis, 2003) and were consistent with values reported in existing research with non-clinical samples (see Table 4).

Goal linking: Linking Inventory (McIntosh, Harlow, & Martin, 1995). The linking inventory is a 22-item self-report measure that assesses the extent to which people believe their happiness is contingent on objective outcomes. It offers participants a forced-choice response to items, choosing between one answer that represents a belief that their happiness is conditional on the attainment of certain outcomes (a linker), and one that indicates that their happiness is not directly dependent on such an outcome (a non-linker). A linking response is scored 1 and a non-linking response is scored 0 giving a range from 0-22 with higher scores indicating a higher tendency to link. This scale has demonstrated reasonable internal consistency ($\alpha=.78$) and good test-retest reliability ($r=.78$; McIntosh, Harlow, & Martin, 1995).

Rumination: Ruminative Response Scale (RRS; Treynor, Gonzalez, & Nolen-Hoeksema, 2003). The RRS is a 22-item self-report measure that assesses the tendency to engage in rumination in response to low-mood. It measures frequency by asking respondents to rate how often they engage in each item on a Likert scale ranging from 1 (almost never) to 4 (almost always). Higher scores indicate a higher tendency to ruminate. The version of the RRS used in this study has five-items found to load onto a 'brooding' factor, five-items forming a 'reflection' factor, and 12-items considered to be confounded with depressive symptoms due to considerable overlap with items on the Beck Depression Inventory (Treynor et al., 2003). The total scale has demonstrated good internal consistency ($\alpha=.90$) and test-retest reliability ($r=.67$). The factor subscales of 'brooding' and 'reflection' have been found to have good construct validity with these factors being replicated in multiple studies

(Treyner et al., 2003). In the current study, subscale scores of brooding and reflection were used in addition to the total RRS score.

Worry: Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990). The PSWQ is a 16-item self-report measure that assesses trait tendency to engage in excessive and uncontrollable worry. Respondents rate the extent to which the items are typical of themselves on a Likert scale ranging from 1 (Not typical at all) to 5 (Very typical of me), with higher scores indicating a greater tendency to worry. The PSWQ has demonstrated convergent and divergent validity, internal consistency ($\alpha=.93$) and test-retest reliability ($r=.90$; Meyer et al., 1990).

RNT: Perseverative Thought Questionnaire (PTQ; Ehring, Zetsche, Weidacker, Wahl, Schonfeld, & Ehlers, 2011). The PTQ is a 15-item self-report measure that assesses RNT transdiagnostically (i.e. is not disorder-specific) by focusing on the process of thinking rather than the content of thoughts. It targets five identified characteristics of RNT: repetitive, involuntary, difficult to disengage from, unproductive, and that they capture mental capacity. Based on the way they tend to think about negative experiences or problems, respondents rate how much each item applies to them on a Likert scale ranging from 0 (never) to 4 (almost always). The scale has been shown to have good test-retest reliability ($r=.76$) and good concurrent validity with other measures of RNT (PSWQ, $r=.57$, and the RRS, $r=.65$; Ehring, 2007).

Mindfulness: Five Facet Mindfulness Questionnaire - Short Form (FFMQ-SF; Bohlmeijer, Klooster, Fledderus, Veehof, & Baer, 2011). The FFMQ-SF is a 24-item self-report measure that assesses five identified facets of mindfulness: observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience. Each item is rated on a Likert scale ranging from 1 (never/rarely true) to 5

(very/often true). The facets within the FFMQ were developed through factor analysis (Baer, Smith, Hopkins, Krietemeyer & Toney, 2006) and the FFMQ-SF has been shown to have a highly comparable factor structure (Bohlmeijer et al., 2011). The FFMQ-SF has demonstrated good internal consistency (.75-.87; Bohlmeijer et al., 2011).

The five subscales of the FFMQ are intended to be independent and are not typically summed to create a single mindfulness score. However, for the purpose of the mediation analysis, one mindfulness score was required. A sum score of the five subscales was calculated similar to that used by Carmody and Baer (2007) and Gard and colleagues (2012). The FFMQ-SF as a unitary measure of mindfulness showed high internal consistency (see Table 4), but inspection of inter-item correlations showed low correlations between some items suggesting multiple factors within the measure. Overall mean inter-item correlations for the FFMQ-SF ($r=.21$) were just within the recommended range of .2-.4 (Briggs & Cheek, 1986); this suggests a reasonable degree of relatedness between the items and therefore the total summed score was used for analysis.

Depression: Patient Health Questionnaire 9-item measure (PHQ-9; Kroenke, Spitzer, & Williams, 2001). The PHQ-9 is a self-report measure that assesses severity of depression symptoms. Respondents are asked to rate the frequency to which they endorse each item on a Likert scale from 0 (not at all) to 3 (nearly every day). Scores are summed with lower to higher scores interpreted as ranging from no depression, minimal, mild, moderate, moderately severe, or severe depression. It has been shown to have good internal consistency ($\alpha=.86-.89$) and test-retest reliability ($r=.84$; Kroenke et al., 2001).

Anxiety: Generalised Anxiety Disorder 7-item measure (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006). The GAD-7 is a self-report measure that assesses severity of anxiety symptoms. It asks respondents to rate, using a Likert scale, how

frequently they experience each item from 0 (not at all) to 3 (nearly every day). Scores are summed and can be interpreted as minimal, mild, moderate, or severe anxiety. It has been shown to have excellent internal consistency ($\alpha=.93$), good test-retest reliability ($r=.83$), and to have good procedural and construct validity (Spitzer et al., 2006).

Well-being: WHO Well-being Index (WHO-5; World Health Organisation, 1998). The WHO-5 is a five-item self-report measure of well-being. Respondents rate on a 6-point Likert scale how frequently they have experienced each item over the last two weeks ranging from 0 (At no time) to 5 (All of the time). Scores are summed and range from 0-25 with higher scores representing a higher quality of life. The WHO-5 has demonstrated good internal consistency ($\alpha=.84$) in a large representative non-clinical sample (Bech, Olsen, Kjoller, & Rasmussen, 2003).

Goal discrepancy: Difference between rating of goal level achieved and goal level expected (see Appendix A). Goal discrepancy was operationalised as the score difference between current rated level of progress achieved towards personal goals and rating of expected level of progress towards personal goals. This is a similar method of measurement as that employed by Donovan and Willims (2003) although the current study used the format of goal based outcomes (GBOs; Law, 2011). GBOs are used in clinical settings as a way of evaluating progress towards goals over different time points (e.g. beginning and end of therapy). Respondents describe their goal and then rate on a 0-10 scale, the level of progress achieved towards each goal; 0 rating for no progress towards the goal, 5 for half-way towards achieving the goal, and 10 for the goal having been achieved. This is then tracked over time, the difference between progress ratings are calculated to measure change over time. In the current study, participants were asked to list five personally meaningful goals and then rate to what extent they had achieved progress towards each goal on a 0-10 scale as outlined

previously. As the study was cross-sectional and progress could not be tracked over time, respondents were asked to rate on an identical scale, how much progress they had expected to make towards each goal by the present moment. The difference between scores was calculated as an indicator of discrepancy. Positive discrepancy scores indicate more progress than the respondent had expected whereas negative discrepancy scores indicate less progress than they expected.

2.3.5 Procedure

After gaining institutional and ethical approval, an online self-report questionnaire survey was developed. An online survey was selected to collect a large data sample. This method of data collection has been found to be as reliable as other methods (e.g. Granello & Wheaton, 2004). A pilot survey was given to 20 students and feedback was obtained regarding the suitability of written instructions for each measure and the ease of completion including the length of time it took to complete. The majority of students were able to generate five personal goals and understood the distinction between rating 'actual progress' and 'expected progress' towards these goals; for this reason no examples of typical personal goals were included in the instructions so as to reduce bias. All written instructions were considered clear and easy to follow. The length of time it took to complete the questionnaire was reported as approximately 20-minutes.

An advert for the study (see Appendix B) was placed on the student intranet of the main University recruitment site. The same advert, after receiving approval from the Head of each Psychology Department, was emailed to psychology students across another three Universities inviting them to participate. The advert contained a link to a web-page with information about the study and a consent page (see Appendix C and D respectively). Prior to completing the battery of measures, basic demographic information was collected (gender,

age, ethnicity, and University attended). The measures appeared in the following order: goal discrepancy, the Linking Inventory, the PTQ, the RRS, the FFMQ-SF, the PSWQ, the PHQ-9, the GAD-7, and the WHO-5. The measures were grouped by theme, that is, goal-based measures were together, different types of thinking style measures were together, and mental health and well-being measures were together. The questionnaire survey ended with the WHO-5 as it was thought to be a positive ending. Participants were given the option of entering a prize draw to win vouchers to thank them for taking part. The study was available online between September 2013 and March 2014.

2.3.6 Data Analytic Procedure

All data were anonymous. Data were converted and exported to the Statistical Package for Social Sciences (SPSS, version 21) and were screened and prepared prior to analysis. Data were collected, stored, and exported in line with the policies of the University in which the study took place.

Preliminary correlation analyses (Pearson's product moment correlations) were examined between all variables to test predicted relationships as theoretically suggested by the literature reviewed. To test the hypothesis that linkers engage in significantly more RNT, including both rumination and worry, and are less mindful than non-linkers, independent samples t-tests were utilised. For the purpose of carrying out t-test analysis, participants were divided into linkers and non-linkers on the basis of a median split; a score of 0-9 represented a non-linker and a score of 10-22 represented a linker. This is the same approach as used by McIntosh and colleagues (1997).

Mediation analysis was employed to investigate the hypothesis that goal-linking predicts mental health and well-being, and that this relationship is mediated by the type of

thinking style adopted. Three predictions were studied: 1. goal-linking positively predicts depression and this is mediated by RNT; 2. goal-linking positively predicts anxiety and this is mediated by RNT; and 3. goal-linking negatively predicts well-being and this is mediated by mindfulness. Baron and Kenny's (1986) mediational model has been superseded by Preacher and Hayes (2008; Hayes, 2009), who suggest that it is not necessary to find a direct effect of the predictor variable (goal-linking) on the outcome variables (depression, anxiety, and well-being) in order to test for other factors that might mediate the relationship. Hayes (2009) recommends the use of bootstrapped confidence intervals in order to test for indirect effects and this is the approach that has been used for this analysis. This approach focuses on the direction and size of indirect effects rather than the significance of direct effects (Preacher & Hayes, 2008). It has higher power and requires less assumptions than the causal steps method (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Mediation analyses were performed using the PROCESS tool for SPSS (Hayes, 2013).

2.4 Results

2.4.1 Response and Attrition Rates

Participant attrition from the point of viewing the participant information sheet, to completing all of the measures included in the questionnaire, is detailed in Figure 2. Feedback from some participants indicated that the online questionnaire webpage tended to crash on occasion; this could be the reason for some participants not completing the survey.

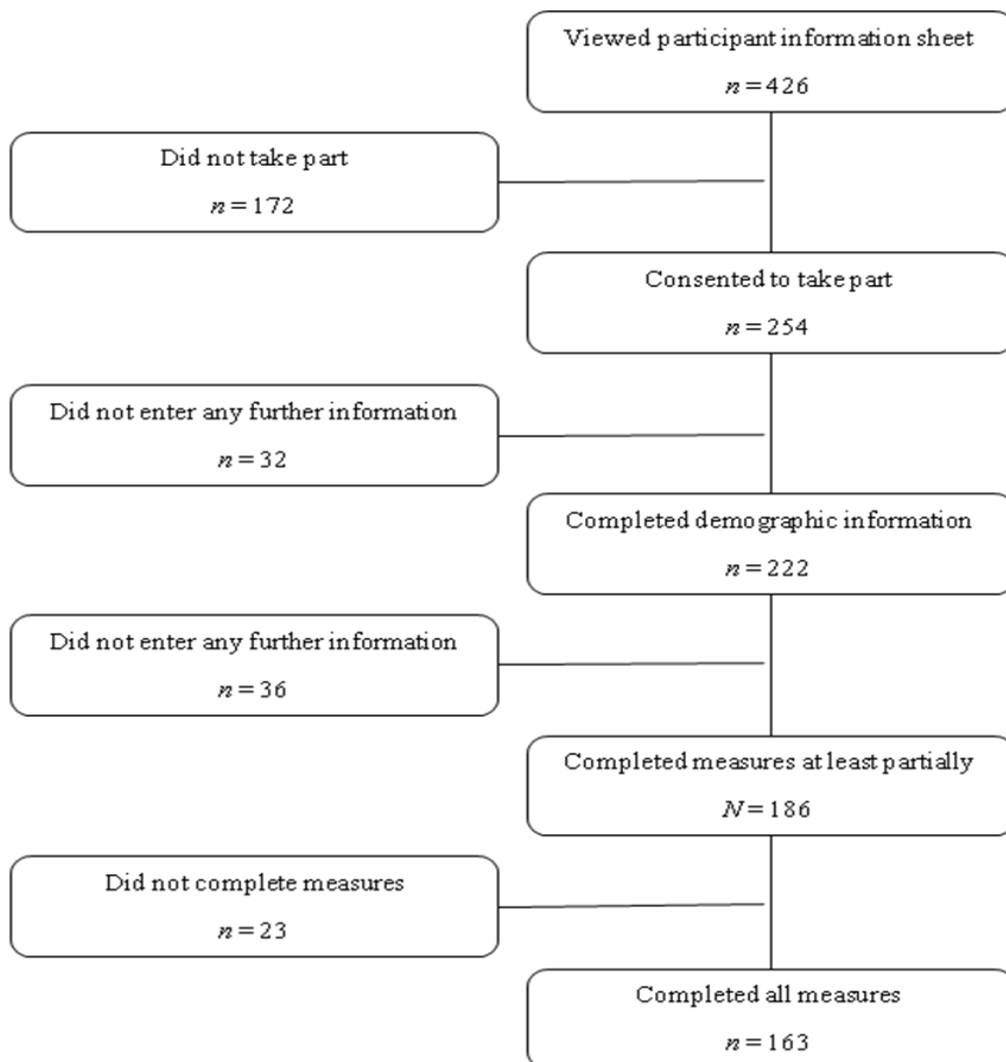


Figure 2: Flow-diagram of response and attrition rates through different stages of the online questionnaire.

2.4.2 Data Preparation

Data were initially screened for any errors that may have occurred during exportation to SPSS. The FFMQ-SF, the Linking Inventory, and the PSWQ all contained negatively worded items that were reverse scored prior to analysis. Total scale scores were computed including calculating the variable of 'linkers' and 'non-linkers' as based on a median split. The reliability of scales and subscales were checked and the appropriateness of using total scale or subscale scores for analysis was assessed.

Assessing normality. Prior to analysis, data were examined to ensure they met the assumptions of linearity, homoscedasticity, and normal distribution (see Appendix E). All variables appeared to meet the assumptions of linearity and homoscedasticity. Normality assumptions were violated on depression and anxiety variables, and so transformations were conducted to correct for issues of skewness and kurtosis. Data analysis were run with both transformed and non-transformed data and no differences were observed in findings (i.e. significant findings remained), and therefore transformed variables were used.

2.4.3 Descriptive Statistics

The means and standard deviations of all measures were found to be comparable to those reported by other studies in non-clinical samples (see Table 4).

2.4.4 Demographic Variables

Confounding effects of age, gender, and ethnicity, on the main study variables, were examined using correlation coefficients. Age was significantly correlated with most variables to a weak or moderate degree. It was negatively related to goal-linking, RNT, rumination (but not the reflection factor), worry, depression, and anxiety ($r = -.17$ to $-.31$, $p < .05$) with younger people scoring higher on these variables, and positively associated with mindfulness, including the facets of describing, non-judgement, and non-reactivity, but not the observing and acting with awareness facet, and with well-being ($r = .23$ to $.28$, $p < .001$). Younger people were lower on the mindfulness aspects of describing, being non-judgemental and non-reactive to inner experiences. Age was not significantly correlated with goal discrepancy. Gender was significantly correlated with worry ($r = .35$, $p < .001$), anxiety ($r = .16$, $p < .05$), and goal discrepancy ($r = .16$, $p < .05$), but not with any other variables. Females showed higher levels of worry, anxiety, and goal discrepancy than males. Ethnicity was only

significantly correlated with the describing facet of the FFMQ-SF ($r = -.18, p < .05$). Age, gender, and ethnicity were not significantly correlated with each other.

Table 4

Cronbach Alpha, score range, mean (M), standard deviation (SD), and comparative M and SD for all scales and subscales

Scales & Subscales	Cronbach Alpha (α)	Range	<i>M</i>	<i>SD</i>	Comparative <i>M</i>	Comparative <i>SD</i>
Goal-linking	0.79	0-22	9.66	4.44	6.52	NR
PTQ	0.93	0-60	27.77	11.99	28.14	13.23 ¹
RRS	0.92	22-88	43.87	11.41	40.8	10.8 ²
<i>Brooding</i> †	0.78	05-20	10.05	3.15	9.4	2.96 ²
<i>Reflection</i> †	0.75	05-20	9.37	2.99	9.83	3.11 ²
PSWQ	0.95	16-80	49.92	14.57	48.8	13.8 ³
FFMQ-SF	0.87	24-120	77.25	13.22	-	-
<i>Observing</i> †	0.77	04-20	13.32	3.61	13.86	3.21 ⁴
<i>Describing</i> †	0.85	05-25	17.23	4.55	16.28	3.91 ⁴
<i>Act aware</i> †	0.81	05-25	15.89	3.91	13.19	3.32 ⁴
<i>Non-judge</i> †	0.78	05-25	16.08	4.23	14.09	3.63 ⁴
<i>Non-react</i> †	0.75	05-25	14.73	3.7	13.47	3.07 ⁴
PHQ-9*	0.86	0-27	7.10 (2.42)	5.45 (1.11)	5.54	1.82 ⁵
GAD-7*	0.91	0-21	5.20 (1.98)	4.80 (1.14)	2.95	3.41 ⁶
WHO-5	0.88	0-25	13.7	5.11	68.7	19.0 ⁷
Goal disc.	-	-10-10	1.22	1.49	-	-

Note. NR = Not reported, Goal disc. = Goal discrepancy. ¹(McIntosh, Martin, & Jones, 1997); ²(Treyner et al., 2003); ³(Meyer et al., 1990); ⁴(Bohlmeijer et al., 2011); ⁵(Kroenke et al., 2001); ⁶(Löwe et al., 2008), ⁷(Bech et al., 2003).

**Denotes transformed variables: the bracketed number is the figure reflecting the transformed variable. Note that transformed variables were used in all analyses described below. † Denotes subscale.*

2.4.5 Examination of Relationships Between Variables

The first aim was to investigate the relationships between goal-linking, RNT (including RNT as a unitary construct, and rumination and worry separately), mindfulness, depression, anxiety, and well-being. Pearson's product moment correlations were calculated for all pairs of variables (see Table 5). All variables were correlated in predicted ways, although all were predominantly moderate correlations. Goal-linking was significantly positively correlated with RNT, rumination (but not the reflection component), worry, depression, and anxiety, and negatively correlated with mindfulness (including all five facets), and well-being. The reflection component of the RRS showed a similar pattern of relationships as the brooding component of the RRS but with much weaker correlations. The observing facet of the FFMQ-SF showed small positive correlations with the other facets of the FFMQ-SF. The observing facet was not significantly related with rumination, depression, or well-being, and was only weakly negatively correlated with worry and anxiety.

Goal discrepancy was not significantly related to RNT but was significantly positively related to rumination (not the reflection component) and worry. Goal discrepancy was also positively associated with depression and anxiety, and negatively with mindfulness and well-being. The strongest relationship observed with goal discrepancy was with the acting with awareness facet of the FFMQ-SF, with a higher goal discrepancy associated with lower levels of acting with awareness.

Table 5

Pearson's product moment correlations between study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.Goal-linking		.37**	.34**	.41**	.01	.45**	-.41**	-.20**	-.25**	-.21**	-.34**	-.35**	.45**	.41**	-.45**	.17*
2. RNT			.51**	.53**	.22**	.56**	-.55**	-.19*	-.31**	-.42**	-.53**	-.36**	.55**	.55*	-.45**	.10
3. Rumination				.82**	.75**	.50**	-.52**	-.06	-.30**	-.40**	-.56**	-.37**	.58**	.59**	-.54**	.19*
4. <i>Brooding</i> †					.49**	.53**	-.53**	-.10	-.33**	-.34**	-.57**	-.37**	.50**	.55**	-.45**	.20**
5. <i>Reflection</i> †						.17*	-.22**	.02	-.12	-.12	-.35**	-.11	.28**	.30**	-.20*	-.01
6. Worry							-.55**	-.15*	-.30**	-.35**	-.45**	-.55**	.46**	.60**	-.49**	.21**
7.Mindfulness								.53**	.72**	.67**	.74**	.63**	-.49**	-.50**	.54**	-.31**
8. <i>Observing</i> †									.21**	.16*	.20**	.25**	-.15	-.19*	.11	-.17*
9. <i>Describing</i> †										.39**	.38**	.28**	-.29**	-.30**	.33**	-.15*
10. <i>Act aware</i> †											.43**	.23**	-.37**	-.34**	.44**	-.33**
11. <i>Non-judge</i> †												.36**	-.43**	-.45**	.42**	-.19*
12. <i>Non-react</i> †													-.37**	-.37**	.45**	-.17*
13.Depression														.78**	-.72**	.21**
14. Anxiety															-.58**	.25**
15. Well-being																-.20*
16.Goal disc.																

Note. Goal disc. = Goal discrepancy.

* Correlation is significant at the $p < .05$ level. ** Correlation is significant at the $p < .01$ level. † Denotes subscale.

2.4.6 Examination of Differences Between Linkers and Non-linkers

Independent samples t-tests were employed to test the prediction that linkers would engage in more RNT, including rumination and worry, and would be less mindful, than non-linkers (see Table 6). Linkers reported significantly higher levels of RNT, including rumination (but not the reflection factor) and worry, than non-linkers. Linkers also reported being significantly less mindful overall and on the facets of observing, non-judging, and non-reactivity, but not on the facets of describing and acting with awareness of the FFMQ-SF.

Table 6

Difference between linkers and non-linkers on RNT, rumination, worry, and mindfulness; mean (M), standard deviation (SD), and t-value

Variable	Linkers <i>M</i> (<i>SD</i>) <i>n</i> = 103	Non-linkers <i>M</i> (<i>SD</i>) <i>n</i> = 73	Significant difference <i>t</i> -value
RNT	30.62 (11.81)	23.44 (11.04)	$t(174) = 4.09^{**}$
Rumination	45.74 (11.26)	41.12 (11.03)	$t(173) = 2.70^*$
Brooding [†]	10.80 (3.15)	8.97 (2.80)	$t(173) = 3.97^{**}$
Reflection [†]	9.28 (2.77)	9.52 (3.25)	$t(173) = 0.52$
Worry	53.58 (13.50)	44.97 (14.52)	$t(165) = 3.93^{**}$
Mindfulness	73.51 (11.39)	82.23 (13.96)	$t(167) = 4.46^{**}$
Observing [†]	12.80 (3.65)	13.93 (3.53)	$t(167) = 2.01^*$
Describing [†]	16.67 (4.37)	18.01 (4.66)	$t(167) = 1.92$
Acting aware [†]	15.39 (3.85)	16.51 (3.90)	$t(167) = 1.85$
Non-judge [†]	14.91 (3.62)	17.70 (4.47)	$t(167) = 4.48^{**}$
Non-react [†]	13.74 (3.20)	16.07 (3.91)	$t(167) = 4.25^{**}$

* Difference is significant at the $p < .05$ level. ** Correlation is significant at the $p < .01$ level.

[†] Denotes subscale.

2.4.7 Mediation Analysis

Mediation analyses were performed to test whether RNT mediated the relationships between goal-linking and depression, and goal-linking and anxiety, and whether mindfulness mediated the relationship between goal-linking and well-being.

RNT mediating the relationship between goal-linking and depression. Simple linear regressions showed that goal-linking was positively associated with depression ($\beta = .11$, $t(2,162) = 4.06$, $p < .001$; see Figure 3). Results also indicated that goal-linking was positively associated with RNT ($\beta = 1.05$, $t(1,163) = 5.49$, $p < .001$) and that RNT was positively associated with depression ($\beta = .04$, $t(2,162) = 6.52$, $p < .001$). As predicted, RNT mediated the relationship between goal-linking and depression ($\beta = .04$, 95%CI = .03 to .07). In addition, the direct effect of goal-linking on depression decreased ($\beta = .07$, $t(1,163) = 6.45$, $p < .001$) when RNT was included in the mediation model but did not reduce to zero indicating partial mediation. A partial mediator explains some of the variance in the regression equation but suggests that there are other mediators contributing to the indirect effects (Preacher & Kelley, 2011).

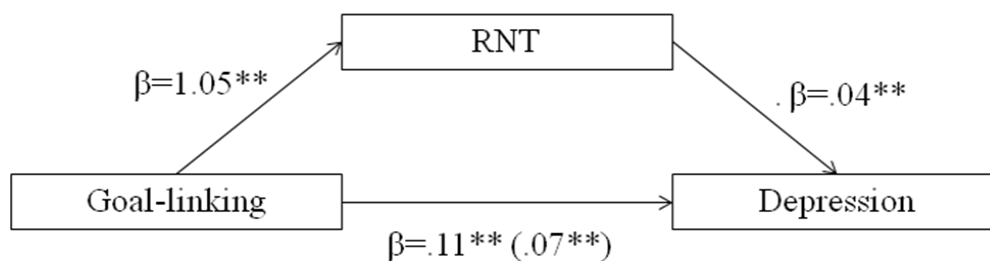


Figure 3: Un-standardised regression coefficients for the relationship between goal-linking and depression as mediated by RNT. The un-standardised regression coefficient between goal-linking and depression, controlling for RNT, is in parenthesis.

** $p < .001$.

RNT mediating the relationship between goal-linking and anxiety. Simple linear regressions found that goal-linking was positively associated with anxiety ($\beta = .10$, $t(2,162) = 3.24$, $p < .001$; see Figure 4). Results also indicated that goal-linking was positively associated with RNT ($\beta = 1.05$, $t(1,163) = 5.49$, $p < .001$) and RNT was positively associated with anxiety ($\beta = .04$, $t(2,162) = 6.65$, $p < .001$). As predicted, RNT mediated the relationship between goal-linking and anxiety ($\beta = .05$, 95%CI = .03 to .07) and the direct effect of goal-linking on anxiety decreased when RNT was included in the mediation model ($\beta = .06$, $t(1,163) = 5.68$, $p < .001$), indicating RNT is a partial mediator.

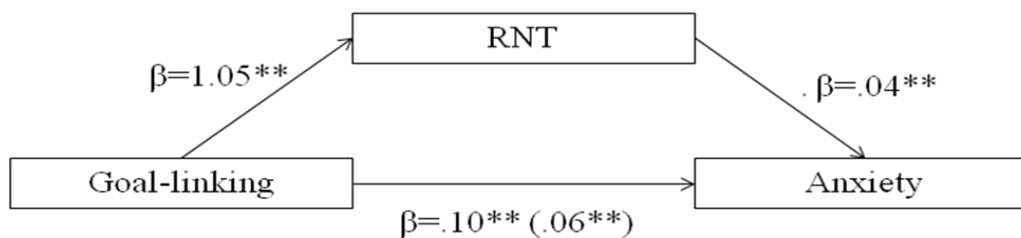


Figure 4: Un-standardised regression coefficients for the relationship between goal-linking and anxiety as mediated by RNT. The un-standardised regression coefficient between goal-linking and anxiety, controlling for RNT, is in parenthesis.

** $p < .001$.

Mindfulness mediating the relationship between goal-linking and well-being.

Simple linear regression indicated goal-linking was negatively associated with well-being ($\beta = -.51$, $t(2,160) = -3.70$, $p < .001$; see Figure 5). Results also showed that goal-linking was negatively associated with mindfulness ($\beta = -1.27$, $t(1,161) = -6.04$, $p < .001$) and mindfulness was positively associated with well-being ($\beta = .17$, $t(2,160) = 5.98$, $p < .001$). As predicted, mindfulness mediated the relationship between goal-linking and well-being ($\beta = -.21$, 95%CI = -.33 to -.12). In addition, the direct effect of goal-linking on well-being

decreased when mindfulness was included in the mediation model ($\beta = -.30$, $t(1,161) = 6.30$, $p < .001$) indicating partial mediation.

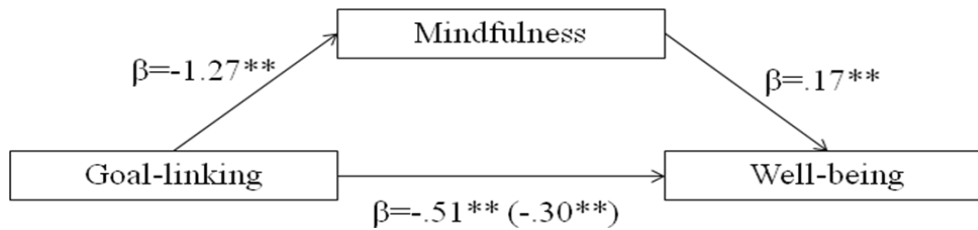


Figure 5: Un-standardised regression coefficients for the relationship between goal-linking and well-being as mediated by mindfulness. The un-standardised regression coefficient between goal-linking and well-being, controlling for mindfulness, is in parenthesis.

** $p < .001$.

2.5 Discussion

All constructs demonstrated predominantly moderate significant relationships with each other as predicted. Linkers engaged in significantly more RNT, including rumination (but not the reflection factor) and worry, than non-linkers. Linkers were significantly less mindful overall including the facets of observing, non-judging, and non-reactivity, but not the facets of describing and acting with awareness of the FFMQ-SF. RNT mediated the relationship between goal-linking and depressive symptoms, it mediated the relationship between goal-linking and anxious symptoms, and mindfulness mediated the relationship between goal-linking and well-being. Higher levels of goal-linking predicted depressive and anxious symptoms and this was partially explained by RNT. Lower levels of goal-linking predicted higher well-being and this was partially explained by mindfulness.

2.5.1 Relationships Between Goal-linking, RNT, mindfulness, and Depressive/Anxious Symptoms

Links between rumination and depression, and worry and anxiety, were observed with similar converse patterns (i.e. rumination and anxiety, and worry and depression), providing further support that rumination and worry are transdiagnostic processes. The relationships between these variables remained comparable when rumination and worry were measured collectively using a measure of RNT. This is in line with the growing recognition that both rumination and worry can be conceptualised and measured within one overarching meta-process of RNT. One exception is the reflection factor of the RRS, which showed weaker and more varied associations. These findings are in line with previous research suggesting the reflection factor of the RRS as a distinct construct from other aspects of rumination (Treyner et al., 2003). A relatively small association was observed between reflection and the PTQ, a unitary measure of RNT, suggesting the reflection construct is perhaps somewhat distinct from RNT and/or is not fully represented in the PTQ. Reflection was not significantly related to goal-linking, although, other measures of rumination (including brooding) and RNT were.

The findings that higher levels of goal-linking are related to engaging in more RNT, including rumination (but not reflection), and to experiencing increased symptoms of depression is in line with previous research (McIntosh et al., 1995). Lower levels of goal-linking appear to relate to being more mindful, particularly remaining non-judgemental and non-reactive to internal experiences, and to greater levels of well-being. The relations between goal-linking and rumination, and goal-linking and depression, had previously been observed (McIntosh et al., 1995) but those between goal-linking and worry, and goal-linking and anxiety were preliminary investigations that extend previous research.

2.5.2 Impact of Goal-linking and RNT on Mental Health and Well-being

Linkers were found to engage in significantly more RNT than non-linkers. This included RNT measured as a unitary construct, rumination (including the brooding but not reflection factor), and worry. This adds to previous findings that linkers engage in more rumination than non-linkers (McIntosh et al., 1995) and indicates a similar tendency for worry. McIntosh and colleagues (1995) did not distinguish between brooding and reflection when they measured rumination. This would seem an important distinction given the current findings indicate linkers and non-linkers differ in terms of brooding, but not reflection. As with rumination, linkers appear to engage in significantly more worry and RNT, measured as a unitary construct. This supports the hypothesis that rumination and worry operate in a similar manner in relation to how people regard their goals, that is, whether they link the attainment of lower-order goals to higher-order personal strivings in a dependant way. It is also in line with the proposal that linkers may engage in more RNT because they are more susceptible to perceiving goal discrepancy (McIntosh et al., 1995).

Higher goal-linking significantly predicted higher levels of depressive and anxious symptoms, and this relationship was mediated by RNT. RNT partially explained the effect of goal-linking on depressive and anxious symptoms suggesting that in addition to other factors, engaging in RNT accounts for some of the relationship between higher goal-linking and higher depressive and anxious symptoms. Linkers tend to hold higher expectations towards achieving their goals, and these often involve more abstract reference values (McIntosh, Martin, & Jones, 1997). Higher expectations are associated with increased goal commitment (Oettingen, Honig, & Gollwitzer, 2000) and may leave linkers committed to striving towards goals but the reference value may be relatively vague. They may exert high degrees of effort but struggle to recognise whether they have achieved their goal or not. In line with Watkins'

(2008) proposal, linkers may experience more negative thought from constantly perceiving a discrepancy between their current and target status, this discrepancy is likely to produce negative affect, and, they may focus on more abstract goals. Taken together, these conditions would be more likely to result in unconstructive consequences of RNT (Watkins, 2008), such as poorer outcomes for mental health. McIntosh (1996) advocates categorising people as linkers and non-linkers but suggests that this is not an individual difference per se, more accurately it is a belief system regarding the implications of goal attainment. Therapeutic approaches to unhelpful beliefs, such as Cognitive Behavioural Therapy, advise that maladaptive beliefs can be modified through challenging them (Beck, 2011). This implies that beliefs about goal attainment being crucial for achieving one's personal strivings, that is, the key distinguishing factor between linkers and non-linkers, is potentially open to adaptation and change.

Linkers appeared less mindful, especially on the facets of observing the present moment and not judging or reacting to their internal experiences. One interpretation is that linkers relate all goals to their higher-order personal strivings and, therefore, are responsive to any sense of threat towards these goals. Linkers may regard being observant, judgemental and reactive to their experience, as important ways of improving the potential for goal achievement. Mindfulness mediated the relationship between goal-linking and well-being suggesting that for non-linkers, mindfulness may be a protective factor that is associated with increased well-being, but for linkers, they may struggle to let go of reacting to their experience and this could have a detrimental impact on their well-being. In conjunction, these findings support the proposal that decentering could be a potential mechanism by which mindfulness helps people disengage from RNT (Raes & Williams, 2009). As linkers were less able not to judge or react to their thoughts and emotions, this increased the negative effect of goal-linking on well-being. This implies that if linkers could improve their ability to

non-judgementally accept their internal experiences, this could have a beneficial and protective impact on their well-being.

2.5.3 Confounds of Age and Gender

While the majority of this sample were within a limited age range (87.6% aged between 18-30 years), age was significantly correlated with a number of the study variables suggesting it may be a confounding factor. It has been suggested that engaging in rumination may vary across the lifespan, with the tendency reducing as people get older (Sutterlin, Paap, Babic, Kubler, & Voegle, 2012). Levels of anxiety and depression have also been shown to decrease with age, with reduced emotional responsiveness, increased emotional control, and psychological immunisation suggested as possible reasons for why this may be (Jorm, 2000). The association between goal-linking and age has not previously been reported. It requires replication in a more representative sample and further investigation to clarify the nature of the relationship.

There were more females than males in this study (76.9% female) and research has consistently shown that females have a higher prevalence of anxiety symptoms (McLean & Anderson, 2009) and engage in more worry than males (Robichaud, Dugas, & Conway, 2003). Gender role orientation theory (Block, 1983) has been used to interpret both of these findings. It is proposed that women are encouraged to be more expressive and seek social support in response to fears whereas men to be more instrumental in managing by themselves (Zalta & Chambless, 2012). Thought suppression and negative problem orientation (i.e. seeing a problem as a threat and perceiving it as being outside of one's control) are higher among women and have been found to mediate the relationship between gender and worry (Robichaud, Dugas, & Conway, 2003). These theories could similarly apply to the difference between males and females in the amount of discrepancy between current level of goal

progress and the expected level of progress (i.e. women may perceive themselves as being less able to control progress towards their goals). However, the impact of gender on goal discrepancy would require further investigation to draw such conclusions.

2.6 Clinical Implications

When linkers engage in RNT, which they appear more likely to do so, it has a detrimental effect on their mental health; they were more likely to experience anxious and depressive symptoms. Reducing RNT could potentially reduce the negative consequences associated with being a linker. Mindfulness-based interventions have been found to reduce the degree to which people engage in RNT such as rumination (Deyo, Wilson, Ong, & Koopman, 2009; Raes et al., 2009). Advocating mindfulness to help linkers disengage from unhelpful RNT is further supported by the current findings that mindfulness was negatively associated with RNT, anxiety, and depression, positively associated with well-being, and mediated the relationship between goal-linking and well-being. Striving towards more abstract higher-order goals has been shown to lead to increased psychological distress (Emmons, 1992). In light of this, it may be more adaptive for linkers to set more concrete and realistic goals so that they can easily assess their progress and ultimately get the sense of having achieved their goal. The GBO approach advocates the use of SMART goals (i.e. specific, measurable, attainable, realistic, and timely) to increase goal focus but warrants caution that this is not always necessary or desirable in all aspects of clinical work (Law, 2011). For linkers this approach may be beneficial, especially if they are currently experiencing problems, as concrete thinking is more adaptive in problematic situations (Watkins, 2008). This could also potentially reduce the extent of RNT linkers engage in as having a more concrete goal would arguably make it easier to measure progress and achieve the goal, hence reducing the degree of discrepancy experienced.

The current findings were within a non-clinical sample and therefore any implications drawn from this study would need to be tentative in relating them to clinical settings. Similar findings would need to be replicated in a clinical sample in order to draw more valid conclusions about mental health interventions with clinical populations. However, the implications of these findings are applicable within a student sample. There may be potential benefits for linkers in promoting mindfulness training to reduce engagement in RNT, and advocating setting more concrete and attainable goals. These could be offered through community interventions like educational posters, group mindfulness sessions, and offering counselling and advice in relation to goal setting. Promoting these interventions among students who are high on the tendency to goal-link could potentially reduce the risk of developing depressive and/or anxious symptoms, and would likely encourage better mental well-being.

2.7 Limitations and Future Research

The current study has a number of limitations. First, a convenience sample of University students was used as they were a readily accessible sample. While University samples are not wholly representative of the general population (Henreich, Heine, & Norenzayan, 2010), they are commonly used within social science research and reflected a reasonably heterogeneous sample. However, this limits the ecological validity of these findings in the general population. The majority of the sample were female, within a limited age range (18-30 years), classified their ethnicity as White, and all participants were educated to at least A-level standard or equivalent, as they were recruited through the University they were attending. Certain constructs measured in this study have been found to vary according to population, and in this sample, age and gender may have confounded the findings, limiting generalisability. Although means and standard deviations were comparable to previous

studies in non-clinical samples, any suggestion that similar relationships between study variables are universally common is hasty. These findings would need to be replicated in a broader more representative sample perhaps using stratified sampling. Alternatively, a similar study could be carried out with clinical populations to examine the applicability of these findings for those experiencing clinical levels of anxiety and depression.

The study relied on self-report measures and did not account for response bias. Self-report methodology is common among social science studies but can only be considered valid to the extent that participants can accurately assess each domain to which they are responding. While the self-report measures employed in the current study were considered to be the most appropriate to answer the research questions, they had some limitations. There remains some dispute over how rumination is conceptualised and measured (Smith & Alloy, 2009) and whether RNT can be measured as a unitary construct. Recommended subscales of the RRS were adopted for the current study and while brooding was consistent with the PTQ, reflection demonstrated much weaker associations. While measures of RNT included a unitary measure (the PTQ), and separate measures of rumination (the RRS including subscales of brooding and reflection), and worry (PSWQ), only the PTQ score was used for the mediation analysis. The PTQ may not accurately account for the reflection factor of rumination and therefore the use of a more comprehensive measure may be warranted. The observing facet of the FFMQ-SF has been highlighted as showing somewhat unpredictable relationships with other relevant variables (Baer, 2011; Baer et al., 2006) which has led to suggestions of excluding this facet from future measures of mindfulness (Baer, 2011). The Linking Inventory has had limited use in published studies and its validity and reliability merit further examination.

The mediation analyses demonstrated partial mediation suggesting that there are other factors contributing to the relationships between goal-linking and depressive and anxious symptoms and goal-linking and mindfulness, other than RNT. Further research is necessary to explore what these other factors may be and the role that they play in contributing to mental health and well-being.

2.8 Conclusions

Linkers engage in significantly more RNT than non-linkers and RNT mediates the relationship between goal-linking and depressive and anxious symptoms. Linkers are also significantly less mindful and mindfulness mediates the relationship between goal-linking and well-being. Goal-linking likely increases people's perception of discrepancy between current and target status, which increases the use of RNT as a self-regulation strategy. Linking everyday goals to personal strivings that are deemed as highly important and have more abstract reference values, produces unhelpful outcomes of RNT, such as increased anxious and depressive symptoms. Mindfulness training may reduce linkers engagement in RNT and have better outcomes for their well-being.

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Appendix A

Goal Discrepancy Measure

INSTRUCTIONS: Please list 5 personal goals that you are aiming to achieve. There are no right or wrong answers, a personal goal is any goal, big or small, which is meaningful to you.

For each goal, please rate between 0-10 how much progress you have currently made towards achieving the goal (*Rating A*). Please also rate how much progress you had expected to make towards this goal at this time (*Rating B*).

EXAMPLE: I am currently half-way towards achieving my goal (*Rating A* = 5). I would have expected to have nearly achieved this goal by now (*Rating B* = 9).

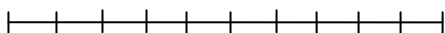
Goal 1

Please list your goal

Rating A

How much progress have you currently made towards achieving this goal?

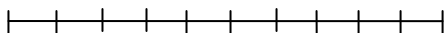
Use the slider to rate between 0='No progress' and 10='Goal achieved'



Rating B

How much progress had you expected to make towards this goal by now?

Use the slider to rate between 0='No progress' and 10='Goal achieved'



(Same format repeated for **Goal 2, Goal 3, Goal 4, & Goal 5**)

Appendix B

Advert for the Study

Seeking participants for research study

Study: The relationship between goals, thought processes and emotional wellbeing

Purpose of the study

Everyone has personally meaningful goals and the way they think about these goals can impact their emotional wellbeing. The purpose of this study is to investigate the relationship between people's beliefs about their goals, their thinking style, and how this effects emotional wellbeing.

You are invited to participate in this study which involves completing an anonymous online questionnaire survey. For everyone who completes the survey you will be entered into a prize draw to win Amazon vouchers.

For more information or to take part in the study then please go to the following link...

<http://survey.liv.ac.uk/GoalsThoughtsandMentalHealth>

Appendix C

Participant Information



PARTICIPANT INFORMATION SHEET

Study: The relationship between goals, repetitive thought processes and mental health

You are being invited to take part in a research study. Before deciding to participate, it is important that you are aware why the research is being done and what it will involve. Please read the following information carefully before proceeding.

What is the purpose of the study?

Everyone has personally meaningful goals and the way they think about these goals can have an impact on their emotional wellbeing. The purpose of this online study is to explore the link between these factors to identify the pathway between how people approach their goals and their emotional wellbeing.

What will happen if I take part?

You will be asked to answer a series of questionnaires about your goals, the way you think about your goals and your emotional wellbeing. It will take you approximately 50 minutes to complete all the questions.

Do I have to take part?

No, it is entirely your decision. If you decide to take part, you will be asked to confirm you have read this sheet and then tick the appropriate boxes in the consent section. You are free to withdraw from the study at any time and without giving a reason.

What about confidentiality?

The study is an online anonymous survey and all the information collected from you will be treated as confidential. Your data will be assigned a unique identity number and will be securely stored at all times. Only authorised persons will have access to your anonymous information. You will not be named or identified in any reports of the study.

What are the possible risks and benefits of taking part?

We do not anticipate any risks. As a thank you for completing the online survey you will be able to enter a prize draw to win one of thirty £5 vouchers. There are no other immediate benefits to you as a participant.

What if there is a problem?

Any query or complaint about the way you have been dealt with during this study will be addressed by the Principle Investigator (please see contact details below).

Participation is not expected to cause any distress but should you experience concern about your emotional wellbeing then please refer to the relevant information below or contact the Principal Investigator to seek advice in relation to accessing support.

How to access support in relation to emotional well-being

If you are concerned about your own mental health then it is recommended that you discuss these concerns with your GP in order to get advice or access to local services. If these concerns are urgent then please contact your local Accident & Emergency Service.

Your University is likely to provide a Counselling Service and details of this service are usually available on University websites.

For information on mental health and recommendations of how to get help please visit the following mental health charity organisations' websites:

www.mind.org and www.rethink.org

If you feel the need to talk to someone the Samaritans provide a 24hour emotional support helpline: 08457 90 90 90.

If you have any queries or require further information or advice, please contact the lead researcher at the below details.

Who can I contact for further information?

If you have any questions or need any further information please contact the Principle Investigator at the details provided below.

Contact details of the Principal Investigator are:

Ms. Aimee McDevitt, Trainee Clinical Psychologist, Tel: 0151 795 5530,

Email: a.mcdevitt@liv.ac.uk, Address: Doctorate of Clinical Psychology Programme, University of Liverpool, G05 Ground Floor of the Whelan Building, Brownlow Hill, Liverpool, L69 3GB.

Appendix D

Participant Consent Page

Consenting to participate

- I confirm that I have read and have understood the information sheet dated November 2012 for the above online study.
- I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without my University studies being affected.
- I understand that the data collected will be anonymous, it will be treated as confidential and will only be available to view by the research team members. The data collected and reported from this study will be analysed across the entire data set and not on an individual basis.
- I understand that to be entered into the prize draw I will have to complete the survey.

I agree to take part in the above study.*

Yes

No

Appendix E

Data Preparation

Linearity and homoscedasticity were assessed using residual plots and bivariate scatterplots between pairs of variables (Tabachnick & Fidell, 2007) and all variables appeared to meet these assumptions. As recommended by Field (2009), graphical methods of assessing normality, such as inspecting histograms, as well as statistical methods, such as examining the values of skewness and kurtosis (i.e. the shape of the distributions), were followed. There is a general rule of thumb that skewness and kurtosis values between -1 and +1 are acceptable for the assumption of normal distribution (Lei & Lomax, 2005). A review of the skewness and kurtosis values indicated that most were within acceptable limits with the exception of depression and anxiety scales which were above 1. Depression and anxiety were positively skewed (1.09 and 1.36 respectively) and leptokurtic (1.06 and 1.75 respectively). This is common when measuring anxiety and depression symptoms in a non-clinical sample as these would not be expected to be high (Field, 2009). Therefore, as per Tabachnick and Fidell (2001), square root transformations were applied to depression and anxiety scale scores. Post transformation skewness and kurtosis values indicated that these were acceptable for both depression (-0.18 and 0.05, respectively) and anxiety (-0.03 and -0.29, respectively). All analyses conducted with transformed variables, were also carried out with non-transformed variables, and no substantial difference between results was observed (i.e. no difference in significant and non-significant findings and correlation coefficients, t values, and beta values were comparable). Therefore, transformations did not change the results and transformed variables were therefore used in all further analysis.