

RUNNING HEAD: Rumination and suicidality

A systematic review of the relationship between rumination and suicidality

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ABSTRACT

Rumination has been persistently implicated in the etiology of hopelessness and depression: proximal predictors of suicidality. As a result, research has started to examine the role of rumination in suicidality. This systematic review aims to: (i) provide a concise synopsis of the current progress in examining the relationship between rumination and suicidality; and (ii) highlight areas for future research. To this end, a search of the international literature was conducted using the three main psychological and medical databases (Psych Info [1887-October 2007], Medline [1966-October 2007] and Web of Knowledge [1981-October 2007]). Eleven studies were identified providing evidence, with one exception, of a relationship between rumination and suicidality. This systematic review has highlighted a considerable dearth of studies, specifically of case-control and prospective, clinical studies, in the worldwide literature. Key areas for future research are discussed.

KEYWORDS: Rumination; response style; suicide; systematic review

The reduction of suicide is a public health priority for both the UK and US governments (Dept. of Health, 2002; US Public Health Service, 1999) and past suicidal behavior is the best predictor of completed suicide (e.g. O'Connor & Sheehy, 2000). Consequently, research aimed at reducing the incidence of suicide often focuses on individuals who engage in suicidal ideation or suicidal behavior to help identify predictors of completed suicide.

Research into the predictors of suicide often utilizes psychological diathesis-stress models to explain the suicidal mind (e.g. O'Connor & O'Connor, 2003). Diathesis-stress models are founded on the premise that predisposing (cognitive) vulnerabilities, when activated by stress, predict suicidal behavior. To this end, a number of vulnerabilities have been identified in the psychopathology literature, including hopelessness (Beck, Steer, Kovacs & Garrison, 1985), dichotomous thinking (Litinsky & Haslam, 1998), impaired problem solving (Pollock & Williams, 2004), overgeneral autobiographical memory (Williams, 1996), impaired positive future thinking (O'Connor et al., 2004) and perceived burdensomeness (Joiner et al., 2002). However, this review will focus on one such vulnerability factor: rumination.

Rumination, broadly defined as enduring, repetitive, self-focused thinking which is a frequent reaction to depressed mood (Rippere, 1977), has been frequently associated with the proximal predictors of suicidality: depression and hopelessness. Rumination has been persistently linked with depression. For example, rumination has been implicated in the onset of depression (Robinson & Alloy, 2003) and has been shown to be predictive of the maintenance of depression, even after twelve months (Nolen-Hoeksema, McBride & Larson, 1997). Recent research has also linked rumination to hopelessness (Lam, Schuck, Smith, Farmer, & Checkley, 2003). Furthermore, experimental research has highlighted the association between rumination and impaired problem solving ability (Lyubomirsky & Nolen-Hoeksema, 1995; Watkins & Baracaia, 2002; Watkins & Moulds, 2005), a characteristic also observed in suicidal individuals (Pollock & Williams, 2004). It is therefore unsurprising that,

during the last decade, the relationship between rumination and suicidality has generated research attention. This review, therefore, examines those studies which investigate the relationship between rumination and suicidality.

Rumination

Although various definitions of rumination have been suggested (Papageorgiou & Wells, 2004), a prominent theory has been proposed by Nolen-Hoeksema and colleagues: The Response Styles Theory (Nolen-Hoeksema, 1991). In short, Nolen-Hoeksema argues that rumination is the tendency to respond to distress by focusing on the causes and consequences of one's problems without moving into active problem solving. Indeed, the Response Styles Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991) has been developed to measure ruminative response style. When the scale was first developed, the ruminative component was usually operationalized on its own as a 22-item measure. However, in recent years, there have been concerns that the RSQ may be contaminated by items which are, in effect, assessing depressive symptoms rather than rumination (Treynor, Gonzalez & Nolen-Hoeksema, 2003). This led to re-analysis of the RSQ and (i) the subsequent removal of those items most closely associated with depression and (ii) the proposal that two components of rumination can be distinguished: reflection and brooding (Treynor et al., 2003). Reflection refers to self-focus aimed at problem solving in response to depressed mood. In contrast, brooding refers to ruminations comparing one's present situation with another unachieved benchmark.

Aside from Nolen-Hoeksema's work, a number of other definitions of rumination have emerged recently. For example, Conway and colleagues (2000) proposed a definition of rumination which describes sadness focused rumination. According to this perspective, rumination reflects repetitive thinking about one's current feelings of sadness and the situation(s) which led these feelings to arise. These ruminative thoughts do not stimulate individuals to change their present circumstances and, unlike Nolen-Hoeksema's theory, these

ruminations are not disclosed to others (Conway, Csank, Holm & Blake, 2000). Rumination on sadness is measured by the Rumination on Sadness Scale (RSS).

Another definition of rumination focuses on stress-reactive rumination (Robinson & Alloy, 2003). Stress-reactive rumination refers to ruminations *following* a stressful event, as opposed to rumination *in response* to depressed mood, as proposed by Nolen-Hoeksema. The content of stress-reactive ruminations focuses on negative inferences about a stressful event (Spasojević, Alloy, Abramson, Maccoon & Robinson, 2004). Stress-reactive rumination is highly correlated with Nolen-Hoeksema's response styles rumination (or depressive rumination); however, despite this overlap, there are a number of distinctions between the two conceptualizations (Robinson & Alloy, 2003). The main point of contention is that Nolen-Hoeksema posits that depressive rumination contributes to the maintenance of depressive symptoms *after onset*, whilst Robinson and Alloy argue that stress-reactive rumination *influences the onset* of depressive symptoms. The notion of stress-reactive rumination fits with diathesis-stress conceptualizations of the relationship between rumination and distress (e.g. Morrison & O'Connor, 2005). Stress-reactive rumination is measured by the Stress-Reactive Rumination Scale (Alloy, Abramson, Hogan, Whitehouse, Rose et al., 2000).

Beyond the theoretical and conceptual developments, the present article is important in establishing the clinical implications of a rumination-suicidality relationship. These would be particularly timely given the recent development of therapeutic techniques to modify rumination, thereby reducing suicidal risk (Watkins, Scott, Wingrove et al., in press). To summarize, we conducted a systematic review of the international literature to determine the nature of the relationship between rumination and suicidality.

METHOD

The three main psychological and medical databases, Psych Info (1887-October 2007), Medline (1966-October 2007) and Web of Knowledge (1981-October 2007) were reviewed to determine appropriate papers for selection, consistent with O'Connor (in press). Key word

searches using the following terms were employed: (i) suicid* and rumin*; (ii) self-harm and rumin*; self injur* and rumin*; (iv) parasuicid* and rumin*. The abstracts of all studies generated by these searches were read by the first author to select appropriate studies which met the inclusion criteria. These criteria were: (i) Only original and published journal articles were included in the review; (ii) the research must include a measure of rumination; (iii) the suicidal ideation and/or behavior of participants must have been chronicled for participants; (iv) the relationship between rumination and suicidal ideation and/or behavior had to be detailed in the study and; (v) the study must have been written in English. To ensure that other relevant studies were not missed, the reference sections of all studies were hand searched and followed up.

The search processes yielded eleven papers which met the eligibility criteria for inclusion in the review. These papers are presented in the proceeding sections using a framework similar to Speckens and Hawton (2005): (i) Cross-sectional studies examining the role of rumination in suicidal ideation / behavior; (ii) case-control studies comparing groups of individuals with suicidal behavior/ideation with control groups of clinical patients or non-clinical controls; (iii) longitudinal/prospective studies of rumination as a prospective predictor of suicidal ideation / behavior.

RESULTS

Cross-sectional Studies

[Insert Table 1 about here]

Around half of the studies (n=5) were cross-sectional (see Table 1) and three of these studies (Lyness, Conwell, King, Cox & Caine, 1997; Simon, Pollack et al., 2007; Ahrens & Linden, 1996) were conducted with adult psychiatric patients presenting with a range of clinical diagnoses (major depression; bipolar depression and; schizophrenia and affective disorders, respectively). The remaining cross-sectional studies sampled from the general population

(Fairweather, Anstey, Rodgers, Jorm & Christensen, 2007) and college students (Eshun, 2000).

Although three of the cross-sectional studies (Simon et al., 2007; Eshun, 2000; Fairweather et al., 2007) measured rumination via the rumination subscale of the Response Styles Questionnaire (Nolen-Hoeksema & Morrow, 1991), they used different versions of the scale. Simon and colleagues (2007) used the 22-item measure and Eshun (2000) used the 36-item measure, whilst Fairweather and colleagues do not report the number of items they used. Nonetheless, all three studies found ruminative response style significantly predicted suicidal ideation, despite employing different measures of ideation. First, Simon and colleagues used the Suicide Behaviors Questionnaire (SBQ; Addis & Linehan, 1989; Linehan & Addis, 1990) which is a self-report measure of past suicide ideation, future suicide ideation, past suicide threats, future suicide attempts and the likelihood of dying in a future suicide attempt. In Simon et al.'s sample of 98 outpatients diagnosed with bipolar depression, ruminative response style was predictive of total SBQ score, as well as those SBQ scores pertaining to present (as opposed to previously experienced) levels of suicidality, after controlling for age, gender, bipolar subtype and current bipolar status. Simon et al. also found the same pattern of results when the analyses were conducted separately for males and females. In contrast, Eshun (2000) utilized the Adult Suicide Ideation Questionnaire (ASIQ; Reynolds, 1991) which assesses suicide ideation and behaviors in the preceding month. Ruminative response style was predictive of ASIQ scores in both the American (n=105) and Ghanaian (n=89) college students sampled in this study, after controlling for sex. Finally, Fairweather and colleagues (2007) assessed suicide ideation through response to one item "In the last year, have you ever thought about taking your own life?" (p.131.) (Lindelow, Hardy & Rogers, 1997), from which general population participants were dichotomized as suicide ideators or non-ideators. Rumination was found to be predictive of suicide ideation in the sample as a whole (n=7485) and in each of the three age cohorts in this study.

The two remaining cross-sectional studies each employed different measures of rumination. Ahrens and Linden (1996) defined rumination as ‘an endless preoccupation or incessant concern with unpleasant thoughts’ (p.84) and measured it using the Association for Methodology and Documentation in Psychiatry (AMDP) system (Guy & Ban, 1982; Helmchen, 1985) which provides a dichotomous psychopathological assessment of 100 symptoms and 31 somatic signs. The AMDP system was also used to provide dichotomous ratings of suicidality which comprised ‘severe suicidal intention, plans, preparations and/or attempts’ (p.80) (Ahrens & Linden, 1996). Inter-rater reliability of the suicidality rating was not directly reported in this study, however the authors stated that inter-rater reliability training was conducted on a monthly basis. Nonetheless, rumination was found to be predictive of suicidality in both inpatient samples: those diagnosed with affective disorders (n=1920) and those diagnosed with schizophrenia (n=2383).

In the final cross-sectional study, Lyness and co-workers (1997) used a much broader definition of rumination in their sample of 124 older adult inpatients diagnosed with major depression. Rumination was defined, consistent with Nelson and Mazure (1985), as a propensity to ‘dwell on one idea to the exclusion of other thoughts’ (p.274). Observed ruminative thinking was then rated by researchers using a dichotomous scale. Reliability of these ratings was reported for observations of 7 patient interviews, with mean (SD) agreement at 89.5% (13.8%). Semi-structured interviews determined suicide ideation using one item from the Hamilton Rating Scale for Depression (Williams, 1988). Chi-square was used to examine differences between the proportion of ruminators and non-ruminators reporting suicidal ideation. No significant difference was found (however the different proportions were not reported).

Case-Control Studies

Only one case-control study met the criteria for inclusion (Crane, Barnhofer & Williams, 2007) (see Table 1). Crane and colleagues recruited community volunteers who had

previously experienced depression. Participants were divided into three groups: (i) those who had never been suicidal (n=11); (ii) previous suicide ideators (n=11) and; (iii) previous suicide attempters (n=10).

Crane and colleagues measured rumination through Nolen-Hoeksema's 22-item Ruminative Response Scale (RRS; Nolen-Hoeksema & Morrow, 1990), examining the brooding and reflective components separately. Suicidality was determined through the Mini International Neuropsychiatric Interview (Sheehan et al., 1998) which assessed prior depression and suicidality. Eight of these interviews were reviewed by a separate clinical psychologist and diagnoses were consistent for each case across raters.

Initial analyses found that no difference between groups on total RRS score. However, the never suicidal group had significantly higher levels of reflection than the suicide attempters and a similar (although non-significant) trend was observed between the never suicidal and the suicide ideators. No difference was observed on brooding ratings between the groups. Crane and colleagues also examined the balance of brooding compared to reflection scores within each group and found that suicide attempters had significantly higher scores for brooding items compared to reflective items. In contrast there was a trend approaching significance for the never suicidal group to have higher scores for reflective as opposed to brooding items. No difference between average scores for brooding compared to reflective items was observed for the suicide ideator group.

Longitudinal/Prospective Studies

[Insert Table 2 about here]

Five longitudinal/prospective studies met the criteria for inclusion (Smith, Alloy & Abramson, 2006; O'Connor, O'Connor & Marshall, 2007; O'Connor & Noyce, 2007; Morrison & O'Connor, 2007; Miranda & Nolen-Hoeksema, 2007) (see Table 2). Three of the studies employed samples of college students. Miranda and Nolen-Hoeksema (2007) and O'Connor and Noyce (2007) recruited (i) an adult community sample and (ii) a mixed

community and college student sample, respectively. Smith and colleagues (2006) tracked 138 college students over a 2.5 year period with information on suicidality and hopelessness being collected approximately every six weeks. O'Connor and colleagues (2007) followed up 151 participants over an eight week period with measures of rumination collected at the start of the study and measures of suicidality and hopelessness being collected at time two. O'Connor and Noyce (2007) recruited 153 participants who completed measures of rumination and suicidal ideation at time one and a measure of suicidal ideation at time two, approximately three months later. Morrison and O'Connor (2007) measured rumination, hopelessness and suicidal ideation at time one, followed by hopelessness and suicidal ideation at time two, approximately three weeks later in a sample of 73 participants. Miranda and Nolen-Hoeksema (2007) included 1134 participants in their study in which measures of rumination and suicidal ideation were taken at baseline and again at a one year follow up.

All studies conceptualized rumination in accordance with Response Styles Theory, however, a variety of different measures were employed. Both Miranda and Nolen-Hoeksema (2007) and O'Connor and Noyce (2007) used the 22-item Ruminative Response Scale (RRS). Smith and co-workers (2006) also employed the RRS, however they only used 21-items. Morrison and O'Connor (2007) used the short form 10-item measure of the RRS. Whilst O'Connor et al. (2007) only focused on the brooding component of rumination, using a 5-item measure derived from Treynor et al. (2003).

A variety of measures of suicidality were also utilized across the studies. In Smith et al.'s (2006) study, suicidal ideation and behavior were measured in two ways. First, a composite score of the suicide item from the Beck Depression Inventory (Beck, Rush, Shaw & Emery, 1979) and the two suicide related items from the Symptom Check-List-90 (Derogatis, 1977) was calculated. Participants completed this measure every six weeks, retrospectively for each two-week period in the 2.5 year follow up and the average score for each individual across this period was used. Second, diagnostic interviews using the suicide

items from the Schedule for Affective Disorders and Schizophrenia – Change (Endicott & Spitzer, 1978) were conducted every 6 weeks. This clinical interview was modified to provide a measure of the presence and duration of suicidal thoughts as well as any suicide attempts (Smith et al., 2006). Participants reporting any clinically significant suicide ideation across the 2.5 years of the project were dichotomized as suicide ideators – yes or no. The number of days, during which participants reported suicidal feelings in diagnostic interviews, were summed to provide an index of the duration of suicidal ideation. Similarly, Miranda and Nolen-Hoeksema also employed a composite measure of suicide ideation: The Structured Clinical Interview for DSM-IV (SCID; First, Spitzer, Gibbon & Williams, 1997) and the suicide item of the Beck Depression Inventory (BDI; Beck & Beck, 1972) were used to measure suicide ideation in the past month at both baseline and follow-up. Again this information was used to dichotomize participants as suicide ideators or non-ideators. In contrast, the remaining three studies (O'Connor et al., 2007; O'Connor & Noyce, 2007) and Morrison & O'Connor, 2007) all measured suicidal ideation via the 8-item subscale of the Suicide Probability Scale (Cull & Gill, 1982). This assesses suicidal cognitions, negative affect and plans of suicide in the preceding week.

Smith and colleagues (2006) found that rumination, after controlling for sex, age, ethnicity and cognitive risk for depression (determined by negative inferential style and dysfunctional attitudes), was not significantly associated with the presence or absence of suicidal thinking rated from the diagnostic interview. However, again after controlling for sex, age, ethnicity and cognitive risk, rumination was significantly associated with both the composite self-report score of suicide ideation and the duration of suicide ideation. Of particular interest, formal mediation analyses showed that rumination mediated the relationship between cognitive risk and suicide ideation. Furthermore, hopelessness partially mediated the relationship between rumination and suicide ideation (composite measure) and fully mediated the link between rumination and the duration of suicide ideation.

Miranda and Nolen-Hoeksema (2007) found that after controlling for demographic variables and initial distress, both brooding and reflective rumination were significant predictors of suicide ideation one year later. Additional analyses, also controlling for depression at follow-up, examined whether the relationship between rumination and suicide ideation resulted from the impact of brooding or reflection on future experiences of depressive symptoms. This was found to be the case for brooding, but not reflective rumination, thus the relationship between brooding and suicidal ideation was mediated by the effect of brooding on future depression.

O'Connor and colleagues (2007) found brooding rumination predicted suicidal ideation eight weeks later. In addition, they also found that brooding rumination partially mediated the relationship between socially prescribed perfectionism and suicidal ideation and fully mediated the relationship between self-oriented perfectionism and suicidal ideation.

O'Connor and Noyce (2007) found brooding, but not reflection, significantly predicted suicide ideation at time two, after controlling for demographic variables and initial suicidal ideation. In addition, brooding was also found to fully mediate the relationship between self-criticism and suicidality.

Morrison & O'Connor (2007) found that the interaction between rumination and stress significantly predicted suicide ideation at time two after controlling for initial levels of distress.

DISCUSSION

With one exception, all of the studies reported herein found rumination to be associated with suicidal ideation and/or behavior. Significantly, each of the studies which defined rumination according to response styles theory found that rumination was associated with suicidality despite different methodologies, samples and measures of suicidal ideation and/or behavior.

Measuring rumination

In addition to the fact that there were only a small number of studies eligible for inclusion in this review, it is unfortunate that most of the studies employed different measures of rumination. What is more, although the majority of the studies (O'Connor et al., 2007; Smith et al., 2003; Eshun, 2000; Simon et al., 2007; Fairweather et al., 2007; Morrison & O'Connor, 2007; O'Connor & Noyce, 2007; Miranda & Nolen-Hoeksema, 2007; Crane et al., 2007) measured rumination via the Response Styles Questionnaire, five different versions of this scale were employed. Consequently, this hinders comparison between studies as the longer version of the questionnaire contained more items which may be interpreted as "automatic negative thoughts" as opposed to the key features of a ruminative response style (Nolen-Hoeksema, personal communication).

Indeed, the RSQ has recently been criticized, with some authors arguing that it is contaminated with items reflecting depression as opposed to rumination (e.g. Conway, Csank, Holm, & Blake, 2000). Four studies in this review address this potential criticism by examining the sub-components of rumination (brooding and reflection) not contaminated by depressive content (see Treynor et al., 2003), with varying results. O'Connor and colleagues (2007), Miranda and Nolen-Hoeksema (2007) and O'Connor and Noyce (2007) all found brooding rumination to be associated with suicidality. O'Connor and colleagues (2007) did not measure reflective rumination, so can offer no insight into any relationship between the two. Whilst Miranda and Nolen-Hoeksema found reflective rumination was predictive of suicidality, O'Connor and Noyce did not find this relationship. Nonetheless, the latter authors' data were not incompatible with Miranda and Nolen-Hoeksema's findings and it may be that the large sample size employed by Miranda and Nolen-Hoeksema allowed the detection of a small effect which O'Connor and Noyce did not have the power to detect (O'Connor & Noyce, 2007).

The only case-control study in this review (Crane et al., 2007) provides interesting and unique data on reflection. These authors found significantly higher levels of reflection

reported by never suicidal individuals compared to those who had previously attempted suicide. This suggests a protective effect of reflective rumination, not observed in any of the other research. One possible explanation for this finding is that in Crane and colleagues' research, the protective effect is found in the comparison between the never suicidal and the previous attempters groups. None of the other studies in the review examined the components of rumination in relation to suicidal behavior, instead focusing on ideation only. A further explanation concerns the measurement of suicidality, whilst Crane et al.'s research centers on previously experienced suicidal ideation and behavior, Miranda and Nolen-Hoeksema's and O'Connor and Noyce's research both focus on prospective and current suicide ideation. It may be that any relationship between rumination and suicidality varies as a function of current suicide status (O'Connor & Noyce, 2007), this would be an interesting area for future research to address.

The two studies which did not use the Ruminative Response Scale to determine rumination (Ahrens & Linden, 1996; Lyness et al., 1997) failed to provide a detailed theoretical rationale for their definition of rumination. Furthermore, they each dichotomized participants into either 'ruminators' or 'non-ruminators' which may be a somewhat artificial distinction and, at the very least, reduces the sensitivity of the measures. In addition, Ahrens & Linden's (1996) definition of rumination as an 'endless preoccupation or incessant concern with unpleasant thoughts' (p.84), suggests that ruminative thinking need not focus on the self to be included in this definition. As a result, we believe that such a definition is inherently problematic. Lyness and colleagues' definition is broader still: a propensity to 'dwell on one idea to the exclusion of other thoughts' (p.274). This latter definition suggests again that the ruminations need not be self-focused. In addition, thoughts focusing on a positive or happy thought or idea would also be coded as ruminative thinking in Lyness et al.'s study. Unfortunately, neither Ahrens & Linden nor Lyness and colleagues gave examples of ruminative thinking, nor specific details of how rumination was determined within their

psychiatric assessment. Consequently, it is difficult to make a judgment about the validity of these methods of assessment. Finally, given that the all-encompassing definition of rumination used by Lyness and colleagues does not exclude people who ruminate over positive thoughts or ideas, it is perhaps unsurprising that this is the only study in the review which found no relationship between rumination and suicidality.

In short, this review highlights the paucity of research employing conceptualizations of rumination apart from Nolen-Hoeksema's. For example, none of the studies examined the relationship between the Rumination on Sadness Scale or the Stress-Reactive Rumination Scale and suicidality; clearly there is an urgent need for future research to address this dearth.

Measuring suicidality

Eight out of the eleven studies in this review employed different measures of suicidality, and with only two exceptions, all employed only one index of suicidality. Smith et al. (2006) and Miranda and Nolen-Hoeksema (2007), were the only studies to supplement their self-report measure with a clinician rating of suicidal ideation. Ahrens and Linden (1996), Lyness and colleagues (1997), Miranda and Nolen-Hoeksema, (2007) and Fairweather and colleagues (2007) all dichotomized participants as 'suicidal' or 'non-suicidal' according to psychiatric assessment, interview or self-report. This dichotomy results in an artificial distinction, for example Ahrens and Linden only classified participants as 'suicidal' if they displayed 'severe suicidal intention, plans, preparations and/or attempts' (p.80). However, this implies that individual's displaying 'moderate' suicide intention would have been classified as non-suicidal. No working definition is given to explain how 'severe' suicide intentions were distinguished from lesser intentions. Indeed, for the most part, the assessment of suicidality in the papers reviewed would not have met the standards outlined in O'Carroll et al.'s (1996) classic 'Tower of Babel' paper. In short, lethality and intent should be routinely assessed.

Disappointingly, only one case-control study, where levels of rumination were compared in suicidal individuals versus matched controls, was identified in this review (Crane

et al., 2007). However, as noted previously, Crane et al.'s study relied on recall of previously experienced suicidal ideation and behavior as opposed to current ideation or behavior meaning their results may have been affected by memory biases or distortions. More research using case-control methodology with actively suicidal participants would help to address the weaknesses associated with the correlational designs employed by the majority of studies under review. Furthermore, none of the longitudinal studies employed a clinical participant group – therefore caution is required until the rumination-suicidality relationship is demonstrated prospectively with a clinical population.

Sex Differences

Previous research has highlighted sex differences in rumination, with females being more likely to have a ruminative response style (Nolen-Hoeksema, 1987; Nolen-Hoeksema, Larson & Grayson, 1999). Nonetheless, there was no evidence of a sex difference in any of the studies under review. However, Ahrens and Linden (1996), Lyness et al. (1997) and Morrison and O'Connor (2007) did not report the effect of sex on their analyses, nor did they report the proportion of persons classified as ruminators by sex. Although O'Connor and colleagues (2007) found no sex differences in brooding rumination scores, they did not run the analyses separately for males and females nor did they control for sex in their analyses (Study 2). Fairweather and colleagues (2007) found no interaction between sex and rumination, so they did not conduct their analyses separately for males and females. Simon and colleagues (2007) were the only study to run analyses separately for males and females and they found no sex differences in the rumination-suicidality relationship. Crane et al. matched groups with regards to sex, whilst Eshun (2000), Smith et al. (2006), Miranda and Nolen-Hoeksema (2007) and O'Connor and Noyce (2007) all controlled for sex in their regression analyses; however none of these studies reported analyses separately for males and females. Given previous research suggests that sex differences in rumination may explain differences in the prevalence of depression (Nolen-Hoeksema et al., 1999), future work should examine whether

any observed relationships between rumination and suicidality hold for both males and females.

Theoretical Context

Much of the research in this review was atheoretical in focus and made no attempt to map findings onto theoretical accounts of suicidal behavior. Only Smith et al. (2006) and O'Connor and colleagues placed their research in a theoretical framework. Smith and colleagues examined rumination in the context of Attention Mediated Hopelessness Theory (AMHT: MacCoon, Abramson, Mezulis, Hankin & Alloy, 2005). This theory posits that the difference between sought after outcome and actual outcome, following a negative life event, triggers attention towards this discrepancy, in an attempt to decrease or resolve it. However, cognitive vulnerabilities can hinder this process of resolving or decreasing discrepancies and in these instances, a repetitive cycle of focusing on the discrepancy occurs – analogous to rumination. This cycle is predicted to increase hopelessness which in turn, increases suicidal ideation. Smith and colleagues found that, as predicted by AMHT, hopelessness mediated the relationship between rumination and the duration of suicidal ideation, in addition to partially mediating the relationship between rumination and self-reported suicidal ideation.

O'Connor et al. (2007) examined rumination as a mediator between perfectionism and suicidality. Despite the current debate as to the specific dimensional nature of perfectionism (see O'Connor, in press), accumulating evidence suggests a relationship between perfectionism and suicidality (e.g. Hunter & O'Connor, 2003). As a result, O'Connor et al. (2007) examined rumination as a potential mechanism to explain the deleterious effects of perfectionism in suicidality. Their results supported this interpretation, as brooding rumination partially mediated the relationship between socially prescribed perfectionism and suicidal ideation and fully mediated the relationship between self-oriented perfectionism and suicidal ideation. In a similar vein, O'Connor and Noyce examined rumination as a mechanism explaining the role of self-criticism in suicidality. Again their results support this

interpretation with brooding fully mediating the link between self-criticism and suicide ideation. The relevance of these findings is discussed in relation to the Cry of Pain model (Williams, 2001) which posits that feelings of both defeat and entrapment are precipitants to suicidal behavior. These authors suggest that self-criticism, or perfectionism may result in heightened perceptions of defeat, whilst brooding amplifies the feeling that a particular situation is inescapable.

Finally, Morrison & O'Connor (2007) place their data in the context of diathesis-stress conceptualizations of cognitive theory, which posit that cognitive vulnerabilities remain dormant until activated by stress. This diathesis-stress hypothesis is supported by their data where the *interaction* between rumination and stress was predictive of suicidal ideation, as opposed to the *direct effect* of rumination.

Conclusions

With one exception, all of the studies reported herein found that increased rumination was associated with increased suicidality. The one exception (Lyness et al., 1997) employed an all-encompassing definition of rumination, which may have included individuals with ruminations focused on a positive theme, and this may account for the failure to find a relationship between rumination and suicidal thinking.

Future research should attempt to test the relationship between rumination and suicidality using consistent measures of both constructs to facilitate study comparison. More longitudinal research in clinical populations is required to examine whether initial levels of rumination are predictive of changes in suicidal thinking and behavior over time. Finally, it is of paramount importance that the rumination-suicidality studies are placed within a theoretical context as this will facilitate the development of rumination-based clinical interventions.

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Table 1. Cross-sectional and case-control studies included in the systematic review

Study (Country)	Participants	Gender (Mean Age)	Suicidality Measure	Rumination Measure	Design	Results
Ahrens & Linden (1996) (Germany)	4303 Psychiatric Inpatients (2383 schizophrenics & 1920 affective disorder patients)	55.66% female	AMDP assessment (Guy & Ban, 1982; Helmchen, 1985)	AMDP assessment (Guy & Ban, 1982; Helmchen, 1985)	Cross-sectional	Rumination is predictive of suicidality
Eshun (2000) (USA & Ghana)	194 College students	51% female (21.61 years; range 17-24 years)	ASIQ (Reynolds, 1991)	RSQ 36-item (Nolen-Hoeksema & Morrow, 1991)	Cross-sectional	Significant positive correlation between rumination and ideation in both cultures. RSQ was a significant predictor of ideation in both cultures
Lyness, Conwell, King, Cox & Caine (1997) (USA)	124 Depressed psychiatric inpatients	Not reported (≥ 50 years)	Suicide item from Hamilton D (Williams, 1988)	Dichotomous rating of rumination (Nelson & Mazure, 1985)	Cross-sectional	Chi-square test found no difference in frequency of ruminators between suicide ideators and non-suicide ideators.
Simon, Pollack et al. (2007) (USA)	98 Bipolar patients	57.1% female (44.8 years; SD=13.9)	SBQ (Addis & Linehan, 1989; Linehan & Addis, 1990)	RSQ 22 item (Nolen-Hoeksema & Morrow, 1991)	Cross-sectional	Higher RSQ scores predicted greater SBQ scores.
Fairweather et al. (2007) (Australia)	7485 participants randomly sampled from community	50.9% female (Three age cohorts: 20-24 years, 40-44 years and 60-64 years)	"In the last year, have you ever thought about taking your own life?" (Lindelow et al., 1997)	RSQ (Nolen-Hoeksema & Morrow, 1991)	Cross-sectional	Rumination is predictive of suicide ideation.
Crane, Barnhofer & Williams (2007) (UK)	32 Previously depressed community volunteers	66% female (31.65 years; SD=13, range 18-64 years)	MINI (Sheehan et al., 1998)	RSQ 22 item (brooding and reflection considered separately)	Case control (3 groups: never suicidal (n=11; ideators only (n=11); previous attempters (n=10)	Significantly higher levels of reflection in the never suicidal group compared to the previous attempters. No difference in brooding between groups. Never suicidal group endorsed more reflective items compared to brooding items – the reverse trend was found for the previous suicide attempter group.

Note: AMDP= Association for Methodology and Documentation in Psychiatry; RSQ=Response Styles Questionnaire; SBQ=Suicide Behaviors Questionnaire; ASIQ=Adult Suicide Ideation Questionnaire; MINI=Mini International Neuropsychiatric Interview.

Table 2. Longitudinal/prospective studies included in the review

Study (Country)	Participants	Gender (Mean Age)	Suicidality Measure	Rumination Measure	Design	Results
O'Connor, O'Connor & Marshall, (2007) (UK)	211 college students at T1 (71.6% at T2)	73.5% female (24.05 years; range 17-54 years)	Suicide ideation subscale of SPS (Cull & Gill, 1982)	RSQ – 5 Brooding items (Treynor et al., 2003)	Prospective over 8 weeks	Brooding rumination significantly positively correlated with suicide ideation. Brooding rumination mediated relationship between self-oriented perfectionism and suicide ideation.
Smith, Alloy & Abramson (2006) (USA)	138 (11 excluded due to incomplete data) college students.	64.1% female (20.05 years)	#9 BDI (Beck, Rush, Shaw & Emery, 1979) #15 & #59 Symptom Checklist – 90 (Derogatis, 1977) SADS-C diagnostic interview (Endicott & Spitzer, 1978)	RSQ 21 item (Nolen-Hoeksema & Morrow, 1991)	Longitudinal over 2.5 years (assessments approx. every 6 weeks)	RSQ predicted self-reported suicide ideation and duration of suicide ideation. RSQ mediated the relationship between cognitive risk and suicide ideation. Hopelessness partially mediated the relationship between RSQ and suicide ideation & fully mediated the relationship between RSQ and suicide ideation duration RSQ not related to SADS-C measure of suicide thinking
O'Connor & Noyce (2007) (UK)	232 college students at T1 (66% at T2)	73.3% female (25.98 years, SD=14.36)	Suicide ideation subscale of SPS (Cull & Gill, 1982)	RSQ 22 item (brooding and reflection considered separately)	Prospective over 3 months	Brooding, but not reflection, significantly predicted suicide ideation. Brooding fully mediated the self-criticism – suicide ideation relationship.
Miranda & Nolen-Hoeksema (2007) (USA)	Community sample of adults (n=1324 at T1 and n=1134 at T2)	53.5% female (47.8 years, SD=15.1, range 25-82 years)	SCID (First et al., 1997) suicide item on BDI (Beck & Beck, 1972)	RSQ 22 item (brooding and reflection considered separately)	Longitudinal over 1 year	Brooding and rumination predicted suicide ideation at T2. Depressive symptoms at T2 mediated the brooding-suicide ideation relationship.
Morrison & O'Connor (2007) (UK)	81 college students at T1 (90.1% at follow-up)	71.6% female (22.09 years, SD=6.25, range 16-48 years)	Suicide ideation subscale of SPS (Cull & Gill, 1982)	RSQ Short Form (10 item)	Prospective over 3 weeks	Interaction between rumination and stress predicted suicidal ideation

Note: BDI=Beck Depression Inventory; SADS-C= Schedule for Affective Disorders and Schizophrenia – Change; RSQ=Response Styles Questionnaire; SPS=Suicide Probability Scale; SCID=Structured Clinical Interview for DSM-IV