HHS Public Access

Author manuscript

Psychiatry Res. Author manuscript; available in PMC 2017 February 28.

Published in final edited form as:

Psychiatry Res. 2016 February 28; 236: 15–21. doi:10.1016/j.psychres.2016.01.008.

Ruminative subtypes and impulsivity in risk for suicidal behavior

Jorge Valderrama[a,c], **Regina Miranda**[a,c], and **Elizabeth Jeglic**[b,c]

[a]Department of Psychology, Hunter College, City University of New York, NY, USA

[b]Department of Psychology, John Jay College of Criminal Justice, City University of New York, NY, USA

[c]Department of Psychology, The Graduate Center, City University of New York, NY, USA

Abstract

Rumination has been previously linked to negative psychological outcomes, including depression and suicidal behavior. However, there has been conflicting research on whether or not two different subtypes of rumination – brooding and reflection – are more or less maladaptive. The present research sought to (1) examine whether individuals high in brooding but lower in reflection would show higher trait and behavioral impulsivity, relative to individuals low in brooding and low in reflection; and (2) examine impulsivity as a mediator of the relation between ruminative subtypes and suicidal ideation. In Study 1, participants (N = 78) were recruited based on high, average, and low scores on a measure of brooding and reflective rumination. Individuals who scored high in brooding and average in reflection scored significantly higher in negative urgency, that is, in the tendency to act rashly in an attempt to reduce negative affect, than did those who scored low in brooding and low in reflection. Study 2 (N = 1638) examined the relationship between ruminative subtypes, impulsivity, and suicide risk. We found an indirect relationship between brooding and suicide risk through lack of premeditation and lack of perseverance, independently of reflection. These findings are discussed in relation to cognitive risk for suicide.

Keywords

rumination; negative urgency; suicidal ideation

1. Introduction

Rumination is a form of perseverative thinking involving continual thoughts about the causes, meaning and consequences of one's negative mood (Nolen Hoeksema et al., 2008). Rumination has been linked with the onset and maintenance of depressive symptoms and

*Address correspondence to Jorge Valderrama at Department of Psychology, Hunter College, CUNY, 695 Park Ave., Room 611HN, New York, NY 10065; (212-650-3883); jvalderr@hunter.cuny.edu.

also with suicidal ideation over time (Treynor et al., 2003; Miranda and Nolen-Hoeksema, 2007; Nolen-Hoeksema et al., 2008; Miranda et al., 2013). Furthermore, rumination is associated with other cognitive correlates of depression and suicidal behavior, such as impaired social problem solving (Lyubomirsky and Nolen-Hoeksema, 1995), overgeneral autobiographical memory (Williams, 2006), and impulsivity (Denson et al., 2011). Although originally considered maladaptive (Nolen-Hoeksema, 1991), recent studies suggest that how maladaptive rumination is depends on the type of rumination in which a person engages and on other individual characteristics (e.g., previous suicide attempt history) (Surrence et al., 2009). The present research sought to better understand the circumstances under which rumination is most maladaptive by examining whether two ruminative subtypes differentially relate to impulsivity and whether such links relate to risk for suicidal behavior.

Research conducted in the past decade has attempted to subtype rumination into more and less maladaptive forms of perseverative thinking, with two types identified. One is brooding, which involves dwelling on the reasons for one's negative mood. Brooding has been found to be associated with increases in depressive symptoms (Treynor et al., 2003) and suicidal ideation over time (Miranda and Nolen-Hoeksema, 2007; Miranda et al., 2013). On the other hand, reflection involves trying to understand the reasons for one's negative mood and is associated with decreases in depressive symptoms (Treynor et al., 2003) but with increased risk of suicidal ideation over time (Miranda and Nolen-Hoeksema, 2007). While the relationship between brooding and suicidal ideation has been found to be mediated by depressive symptoms, the relation between reflection and suicidal ideation seems to be independent of depression (Miranda and Nolen-Hoeksema, 2007). In contrast, a 3-month follow-up study of a community sample of 232 adults found that brooding was a significant predictor of future suicidal ideation, but reflection was not, adjusting for depressive symptoms (O'Connor and Noyce, 2008). Thus, while brooding has consistently been found to be maladaptive, there is inconsistent evidence on whether reflection is adaptive or maladaptive.

Whether or not reflection is more or less maladaptive (or adaptive) may depend partly on the characteristics of people who ruminate. One study found a positive relation between reflection and depressive symptoms among individuals low in active coping but not among those high in active coping (Marroquín et al., 2010). Another study found a positive relation between reflection and suicidal ideation among individuals with a suicide attempt history but not among individuals without a suicide attempt history (Surrence et al., 2009). Understanding the psychological correlates of brooding and reflection may shed light on this question. For instance, previous research suggests that impulsivity may exacerbate the deleterious nature of rumination (Dvorak et al., 2011). The present research seeks to build upon such previous work by examining the association between subtypes of rumination, impulsivity, and risk for suicidal behavior.

Impulsivity has been conceptualized as a trait involving 4 dimensions: lack of premeditation (i.e., not thinking through the consequences of one's actions), lack of perseverance (i.e., not following through with a task), sensation seeking (i.e., the tendency to seek excitement), and negative urgency (i.e., the tendency to act rashly when experiencing negative affect) (Whiteside and Lynam, 2001; Cyders et al., 2007). Both lack of premeditation and negative

urgency have been identified as potential risk factors for suicidal behavior (Yen et al., 2009; Anestis and Joiner, 2011; Klonsky and May, 2010; Bender et al., 2011; Miranda et al., 2013). Studies examining impulsivity among separate samples of high school and college students found that whereas suicide ideators and attempters had higher negative urgency scores than did non-ideators/non-attempters, suicide attempters had higher lack of premeditation scores than did both ideators and non-ideators/non-attempters (Klonsky and May, 2010, Studies 2 and 3). Such findings suggest that negative urgency may be associated with having thoughts about suicide, while lack of premeditation may be associated with actually engaging in suicidal behavior.

Impulsivity has also been conceptualized as a behavioral response. Dougherty et al. (2004) have operationalized behavioral impulsivity as involving disinhibited responding (i.e., difficulty inhibiting an already initiated response) and lack of sensitivity to consequences (i.e., inability to delay rewards) as measured by computer-based tasks. Both types of behavioral impulsivity have been associated with suicidal behavior (Dougherty et al., 2004; Westheide et al., 2008; Dougherty et al., 2009). For instance, a study of adolescents who had a history of both non-suicidal self-injury (NSSI) and a suicide attempt scored higher on a laboratory measure of behavioral impulsivity involving consequence insensitivity (i.e., a preference for an immediate, smaller reward over a delayed larger reward), compared to adolescents who had a history of NSSI without a suicide attempt history. Another study revealed that individuals with a previous suicide attempt history who reported current suicidal ideation had more disinhibited responses on laboratory measures compared to individuals with a previous suicide attempt history but no current suicidal ideation and also compared to healthy controls (Westheide et al., 2008). However, a recent meta-analysis (Hamza et al., 2015) found that laboratory measures of impulsivity are not consistently related to self-harm. Rather, individuals that engage in NSSI are more likely to self-report impulsivity, and specifically have high negative urgency scores. These results are consistent with research showing that different measures of impulsivity are likely assessing different characteristics of the trait and behavior (Dick et al., 2010; Cyders & Coskunpinar, 2011). Bagge et al. (2013) found that of four different computer-based measures of impulsivity, only the Go-Stop Impulsivity task (Dougherty et al., 2004), which measures disinhibited responding, was related to negative urgency in a community sample of adults. However, there was no overlap between the results of the Go-Stop task and lack of premeditation, lack of perseverance, and sensation seeking.

Previous research has linked general rumination and different dimensions of impulsivity with negative psychological outcomes. One study found that a negative mood induction resulted in a greater negative emotional response among individuals who exhibited both high trait impulsivity and high rumination than among those who exhibited low trait impulsivity and low rumination (Herrera and McChargue, 2011). Selby et al., (2008) found a positive association between rumination and negative urgency and have proposed the Emotional Cascade Model to explain this relationship. The model proposes that experiencing both rumination and negative emotions produces synergistic effects on subsequent ruminative thoughts and negative emotions. This positive feedback loop, in turn, leads to dysregulated behaviors, such as acting in a rash manner when experiencing negative emotions (i.e., negative urgency). Indeed, the combination of rumination and negative

emotions have been found to predict subsequent increases in rumination, negative emotions, and number of impulsive behaviors over a two week period in a sample of impulsive adults (Selby et al., 2015). Alternatively, other research suggests that rumination may lead to increased behavioral dysregulation through the reductions in executive control that characterize impulsivity. In attempting to explain the relationship between anger rumination and aggression, Denson et al. (2011) suggested that the self-regulatory efforts required by rumination deplete a person's self-control and thus increase the likelihood of behavioral dysregulation in the form of aggression. A series of 4 studies examining this possibility found that after an anger-inducing provocation, anger rumination did, in fact, increase aggression through reductions in self-control (Denson et al., 2011). Such findings suggest that rumination may not only act in combination with impulsivity to increase dysregulated behaviors, but that rumination may also increase such behaviors through the reductions in self-control that characterize impulsivity. When applied to suicide, perhaps one avenue through which rumination increases risk for suicidal behavior is by increasing impulsivity, as a result of depletions in cognitive resources.

At the same time, past research does not explain whether the rumination-impulsivity relationship may vary by ruminative subtype, and whether these relationships have different consequences for suicide risk. If reflection is more adaptive than brooding, we should expect that the presence of reflection should mitigate the impact of brooding on impulsivity and on the impulsivity-suicide risk relationship. Thus, we sought to examine, via two studies, whether level of brooding in relation to reflection would be differentially related to behavioral and trait measures of impulsivity and whether impulsivity would statistically mediate the relation between ruminative subtypes and risk for suicidal behavior. Study 1 involved four groups of young adults pre-selected based on their level of brooding and reflection. We hypothesized that an overreliance on brooding (i.e., high levels of brooding without correspondingly high levels of reflection) as a response style would be most strongly associated with impulsivity, such that individuals high in brooding—but not in reflection—would exhibit higher impulsivity than would individuals high in reflection, individuals high in both brooding and reflection, and also compared to individuals low in both brooding and reflection. Study 2 involved a larger sample of individuals who completed self-report measures of rumination, impulsivity, and risk for suicidal behavior. We expected that an overreliance on brooding would be most strongly related to impulsivity and to risk for suicidal behavior and that impulsivity would explain the relation between brooding and risk for suicidal behavior. We also sought to determine whether reflection would attenuate the indirect relationship between brooding and risk for suicidal behavior through impulsivity.

2. Method (Study 1)

2.1 Participants

Seventy-eight young adults (43 females), aged 18–24 (M = 18.5, SD = 1.2) recruited from a public university campus in New York City took part in this study for monetary compensation ($25). The racial/ethnic composition of the sample was 33% Asian, 19% Hispanic, 19% White, 9% Black, and 20% of other ethnicities (approximately representative

of the campus from which participants were recruited). Participants were recruited from a larger sample of 2423 individuals who took part in a study of cognitive risk factors associated with suicidal ideation and attempts.

2.2 Procedure

Individuals were selected based on their scores on the Ruminative Responses Scale (RRS) (see below) administered in the screened sample. An analysis of 1124 (from the sample of 2423 individuals) participants who had completed the RRS yielded the mean brooding and reflection scores that determined high and low values. High brooding scores were those greater than 14 (1 SD above the mean) and low brooding scores were those lower than 9 (1 SD below the mean). High reflection scores were those above 13 (1 SD above the mean) and low reflection scores were those below 8 (1 SD below the mean). Participants who scored high, average, or low on brooding and/or reflection alone or high/low on both brooding and reflection, and who gave their permission to be contacted for future studies, were recruited in person or via email after their participation in the initial study. The scores in our sample resulted in four different groups: low brooding/low reflection (n = 20), high brooding/high reflection (n = 18), high brooding/average reflection (n = 19), and high reflection/average brooding (n = 21). Initially, we intended to recruit a “high brooding” group consisting of individuals high in brooding and low in reflection, in addition to a “high reflection” group consisting of individuals high in reflection and low in brooding. However, there were insufficient numbers of individuals who met those criteria, and thus, the groups were modified to include high brooding/average reflection and high reflection/average brooding, respectively.

Participants completed two assessments – the initial screening and another study session within about 2 weeks of the screening, in which participants completed the RRS again, along with measures of behavioral and trait impulsivity. Baseline rumination scores were used to create groupings.

2.3. Measures

2.3.1. Rumination—Rumination was assessed via the brooding and reflection subscales of the Ruminative Responses Scale (RRS; Nolen-Hoeksema, Larson, and Grayson, 1999). The brooding subscale, consisting of 5 items (Cronbach’s alpha = .80 in the present sample), assesses the tendency to focus passively on the reasons for a person’s distress, while reflection, consisting of 5 items (Cronbach’s alpha = .79 in the present sample), assesses the tendency to engage in cognitive problem-solving to improve one’s mood (Nolen-Hoeksema et al., 1999; Treynor et al., 2003). The RRS was used to preselect participants and classify them based on levels of brooding and reflection, as described above, and was also re-administered at the time of the study. The test-retest reliability of RRS scores for the current study was .78 for brooding and .66 for reflection.

2.3.2. Trait impulsivity—Trait impulsivity was assessed via the UPPS Impulsive Behavior Scale-Short Form (UPPS-P SF) (Whiteside and Lynam, 2001; Cyders et al., 2007). The UPPS-P SF is a 31-item scale that assesses impulsivity across four different dimensions (as discussed above): sensation seeking, lack of perseverance, lack of premeditation, and

negative urgency. Participants are asked to rate how much they agree with each of the 31 items (1 = Agree Strongly, 4 = Disagree strongly). The UPPS-P SF has been correlated with other measures of clinical symptoms and measures that predict risky behavior (Cyders et al., 2009; Anestis et al., 2011) and has been shown to be internally consistent (Whiteside et al., 2005). Cronbach's alphas in the present sample were .78, .60, .74, and .70 for lack of premeditation, negative urgency, sensation seeking, and lack of perseverance, respectively.

2.3.3 Behavioral impulsivity—Behavioral impulsivity was assessed using the Two-Choice Impulsivity Paradigm (TCIP; Dougherty et al., 2004) and the Go-Stop Impulsivity Paradigm (GSIP; Dougherty et al., 2004). The TCIP assesses the degree to which individuals are able to tolerate delayed rewards. Participants are asked to click a button on one or the other side of a computer screen. One side is associated with a smaller reward after a brief delay, while the other is associated with a larger reward after a longer delay. Scores show the percentage of times a participant selects an immediate choice versus a delayed choice. A higher percentage of immediate choices indicates a lower tolerance for delayed awards. The TCIP has been validated in a sample of adolescents (Bjork et al., 2000).

The GSIP assesses an individual's ability to inhibit an already initiated behavior. Participants are presented with a series of 5-digit numbers and asked to respond when a "go" signal appears and to not respond when a "stop" signal appears. Disinhibition is conceptualized as difficulty inhibiting a response that has already been initiated (e.g., if presented with a series of "go" trials and then followed by a "stop" trial). The timing of the appearance of the "stop" signal varies and can occur 50, 150, 250, or 350-ms following the "go" stimulus onset. Disinhibited responses are most likely to occur after the 350-ms "stop" signal, as participants are less likely to inhibit a response that has been initiated in the quicker "stop" signal trials (Dougherty et al., 2003). Disinhibition scores (the percentage of disinhibited responses out of total responses) found in the 50, 150, and 250 ms trials indicate difficulty in inhibiting an already initiated response. The GSIP is significantly correlated with other tasks that measure response inhibition (Marsh et al., 2002).

3. Results and Discussion

3.1. Relationship between Ruminative Subtypes and Trait Impulsivity

One-way ANOVAs were conducted to examine differences across the 4 ruminative subtype groups in trait impulsivity (UPPS) scores. There was a statistically significant effect of group on the negative urgency dimension of the UPPS, $F(3, 74) = 3.67$, $p < .05$. Bonferroni-corrected comparisons revealed that the high brooding/average reflection group (i.e., overreliance on brooding relative to reflection) had significantly higher negative urgency scores than did the low brooding/low reflection group, $t(74) = 2.76$, $p < .05$. However, there were no significant differences in the other UPPS dimensions by rumination group (see Table 1).

3.2. Rumination and Behavioral Measures of Impulsivity

A one-way ANOVA did not reveal a significant difference among the four rumination groups (low brooding/low reflection, high brooding/high reflection, high brooding/average

reflection, high reflection/average brooding) in number of immediate and/or delayed choices made on the TCIP, $F(3, 74) = 1.82$, $p = .15$, nor were there any differences among groups in the number of disinhibited responses across the different intervals of stop signals in the go-stop task (see Table 1).

Findings from Study 1 suggest differential relationships between subtypes of rumination and one particular dimension of trait impulsivity: negative urgency. Individuals who scored high in brooding and had average reflection scores had significantly higher negative urgency scores than did those who scored low in brooding and low in reflection. However, there were no significant differences in behavioral measures of impulsivity. Study 2 sought to 1) replicate the finding of a relationship between an overreliance on brooding and negative urgency from Study 1 with a larger sample; 2) examine whether brooding and trait impulsivity would be associated with a measure of suicide risk; and 3) examine whether trait impulsivity – specifically, negative urgency and lack of premeditation (given Study 1 findings and previous research; Yen et al., 2009; Klonsky and May, 2010) – would statistically mediate the relationship between brooding and risk for suicidal behavior and whether this indirect relationship would be moderated by reflection.

1. Method (Study 2)

4.1 Participants

Participants were sixteen hundred and thirty-eight adults (1169 females), aged 18–61 ($M = 20.5$, $SD = 4.0$) recruited from a different public university campus in New York City and who took part in the study for research credit in introductory psychology courses. The racial/ethnic composition of the sample was 46% Hispanic, 21% White, 17% Black, 11% Asian, and 5% of other ethnicities (approximately representative of the campus from which the sample was recruited).

4.2 Procedure

Participants were selected from a larger sample of 1900 individuals who took part in an online survey examining risk factors associated with suicidal ideation and behavior. Individuals were selected based on whether they completed the RRS. There were no gender or racial/ethnic differences for those who did and did not complete the RRS.

4.3 Measures

The UPPS-P SF (Cronbach's alphas in the present sample: .84, .76, .77, and .79 for lack of premeditation, urgency, sensation seeking, and lack of perseverance, respectively) and RRS (Cronbach's alphas for brooding and reflection in the present sample: .85 and .78, respectively) were used to assess trait impulsivity and rumination, respectively. Descriptions of these measures can be found in the Measures section of Study 1. Suicide risk was assessed via the Suicidal Behaviors Questionnaire-Revised (SBQ-R) (Osman et al., 2001). The SBQ-R is a 4-item questionnaire that assesses risk for future suicidal behavior, based on whether an individual endorses a lifetime history of suicidal ideation or a suicide attempt, self-reported frequency of suicidal ideation in the previous 12 months, whether the individual has ever threatened to attempt suicide, and the person's self-reported likelihood of

making a suicide attempt in the future. Total scores range from 3 to 18. The questionnaire has been found to have good internal consistency reliability in an undergraduate sample and has been validated with other measures of suicide risk (Osman et al., 2001). Cronbach's alpha in the present study was .81, and total scores ranged from 3 to 16, with an average of 4.23 (SD = 2.26).

5. Results and Discussion

5. 1 Correlations among study measures

Given that participants in Study 2 were not pre-selected based on rumination scores, variables were examined as continuous scores rather than via group differences. Pearson correlations were conducted to assess relationships between ruminative subtypes, trait impulsivity (UPPS-P SF), and risk for suicidal behavior (SBQ). Brooding was positively associated with the negative urgency, lack of premeditation, and lack of perseverance dimensions of the UPPS-P SF. Reflection was positively associated with negative urgency. Both brooding and reflection were positively associated with total SBQ scores. In addition, negative urgency, lack of premeditation, and lack of perseverance were positively associated with suicide risk (see Table 2).

5.2. Examining impulsivity as a mediator of the relationship between brooding and risk for suicidal behavior and reflection as a moderator

Analyses were conducted to examine whether impulsivity mediated the relationship between brooding and risk for suicidal behavior and whether this relationship was moderated by reflection. We hypothesized that the relationship between brooding and risk for suicidal behavior would be mediated by impulsivity (particularly negative urgency and lack of premeditation), but that this indirect relationship would be attenuated at higher levels of reflection. Mediation may be tested when a predictor (brooding) relates to a mediator (impulsivity) and the mediator (impulsivity) relates to an outcome variable (suicide risk). A relation between the predictor (brooding) and outcome (suicide risk) may or may not be present (Mackinnon et al., 2002). We examined whether the relationship between brooding and suicide risk was mediated by the four dimensions of the UPPS-P SF and whether this indirect relationship was moderated by reflection (Figure 1). Moderated mediation conditional direct effects were estimated using model 8 of the PROCESS procedure (Hayes, 2012), and conditional indirect effects were tested using bias-corrected 95% confidence intervals calculated using a bootstrapping procedure (with n = 1000 resamples). Conditional indirect effects were considered statistically significant when their confidence intervals did not include zero. The following indirect effects were tested: (1) the indirect effect of brooding on suicide risk through negative urgency; (2) the indirect effect of brooding on suicide risk through sensation seeking; (3) the indirect effect of brooding on suicide risk through lack of premeditation; (4) the indirect effect of brooding on suicide risk through lack of perseverance (see Figure 1). There was an indirect effect of brooding (95% CI = 0.01 – 0.02) on suicide risk through lack of perseverance (standardized indirect effect = 0.31), along with an indirect effect of brooding (95% CI = 0.01 – 0.02) on suicide risk through lack of premeditation (standardized indirect effect = 0.33). No indirect effects were found

through negative urgency (95% CI = −0.01 – 0.01) nor sensation seeking (95% CI = −0.01 – 0.01).

We then examined whether reflection would moderate the mediating effect of lack of perseverance and lack of premeditation on the relation between brooding and suicide risk. First, we examined the indirect effect of lack of premeditation on the relation between brooding and suicide risk at low (1 SD below the mean), average, and high (1 SD above the mean) levels of reflection. We found a statistically significant indirect effect of brooding on suicide risk—through lack of premeditation at low, 95% CI [0.01, 0.03]; average, 95% CI [0.01, 0.02]; and high levels of reflection, 95% CI [0.01, 0.01]. Second, we examined the indirect effect of lack of perseverance on the relation between brooding and suicide risk at low (1 SD below the mean), average, and high (1 SD above the mean) levels of reflection. We found a statistically significant indirect effect of brooding on suicide risk through lack of perseverance at low, 95% CI [0.01, 0.03]; average, 95% CI [0.01, 0.02]; and high levels of reflection, 95% CI [0.01, 0.02]. Thus, reflection did not appear to moderate the indirect relation between brooding and suicide risk—through lack of premeditation or perseverance. It should be noted that the interaction between brooding and reflection was not significant as a statistical predictor of suicide risk ($b = .003$, $p = .38$), such that brooding predicted risk for suicidal behavior, regardless of reflection level.

Finally, we tested whether reflection predicted suicide risk at different levels of brooding. No conditional direct effects were found between reflection and suicide risk at low, average, and high brooding scores.

Our results provide further evidence of the maladaptive nature of brooding rumination. Brooding was associated with risk for suicidal behavior at low, average, and high reflection levels. However, contrary to our hypotheses, negative urgency did not mediate the relationship between brooding and suicide risk. The relationship between brooding and suicide risk was mediated by lack of premeditation (consistent with hypotheses) and lack of perseverance. Reflection did not statistically predict suicide risk independently of brooding.

6. General Discussion

Previous research has suggested that whether rumination is maladaptive depends on the type of rumination in which a person engages (e.g., Surrence et al., 2009). The present studies sought to examine how brooding and reflective rumination differed in their relationship to (trait and behavioral) impulsivity and risk for suicidal behavior. Our first study revealed that individuals who scored high in brooding and had average reflection scores (i.e., “high brooders”) had significantly higher negative urgency scores than did those who scored low in brooding and low in reflection. Importantly, both brooding and negative urgency have been previously linked to mood disorders, deficits in emotional regulation, and suicidal behavior (Treynor et al., 2003; Anestis and Joiner, 2011; Miranda et al., 2013). However, we found no differences between an overreliance on brooding, relative to low levels of brooding and reflection, and computer-based measures of impulsivity. These results are consistent with findings that show computer-based measures and self-report measures tap into different facets of impulsivity (Cyders & Coskunpinar, 2011). Indeed, self-report measures of

impulsivity are more likely to differentiate individuals at risk for self-injurious behavior than computer-based measures (Hamza et al., 2015).

Results from our second study revealed that brooding statistically predicted risk for suicidal behavior regardless of reflection levels, and this relationship was mediated by lack of premeditation and lack of perseverance. In contrast, reflection did not predict risk for suicidal behavior, when adjusting for brooding. The present studies are the first to establish a relationship between brooding, specifically, and trait impulsivity in the forms of negative urgency, lack of premeditation, and lack of perseverance.

While the present data are cross-sectional, thus limiting conclusions about directionality, they do lead to speculation about the direction of the relation between brooding and impulsivity. One possibility is that brooding – by preventing disengagement from a negative mood and depleting cognitive resources – leads individuals to respond rashly to negative affect, fail to consider the consequences of their actions, and fail to follow through with their actions in the face of obstacles. That is, brooding may prevent people from thinking about ways they can solve their problems, making them more vulnerable to perform actions without thinking during times of distress. Accordingly, reflection may either be benign or lead people to think about ways they can alleviate their distress. Indeed, rumination without negative emotion has been suggested to represent reflection and is less likely to predict subsequent impulsive behaviors than when both rumination and negative emotion are present (Selby et al., 2015). Reflection may potentially short circuit this emotional cascade and prevent dysregulated behaviors. At the same time, while the present findings suggest that brooding combined with average levels of reflection is associated with higher negative urgency than low levels of both brooding and reflection, whereas high brooding combined with high reflection is not, negative urgency does not explain the relationship between brooding and risk for suicidal behavior.

Future studies should examine potential mediators of the relation between brooding and impulsivity. Interestingly, recent research has revealed that ruminative thought and negative urgency are associated with the ventromedial prefrontal cortex, a brain area that is involved in decision making and memory recall (Bechara et al. 2000; Euston et al., 2012; Wang et al., 2013; Cyders et al., 2014). Future research should examine whether the impact of rumination on impulsivity and suicide risk might be explained by its effects on parts of the brain involved in memory and decision-making. Further, future studies should also investigate how lack of premeditation, lack of perseverance, and negative urgency differ in their association with suicide risk. These three aspects of impulsivity have recently been associated with self-injurious behavior, previous suicide attempts, and suicide potential in a sample of inpatients seeking help for substance use disorders (Anestis et al., 2014). Interestingly, our second study did not reveal an association between negative urgency and suicide risk. Given that both Studies 1 and 2 suggested a relationship between brooding and negative urgency, and that previous research suggests and association between negative urgency and suicidal ideation (Klonsky and May, 2010), further research is necessary to understand the circumstances under which negative urgency might also be associated with risk for suicidal behavior.

Some study limitations should be noted. Both samples were non-clinical and consisted primarily of females, and findings may not generalize to clinical samples nor to males. Second, the samples from both studies were racially and ethnically different, and it is unclear how this variability would affect results. Third, the relationships examined were concurrent rather than prospective, thus limiting any conclusions about causality. Fourth, we intended to examine a group of participants that scored high in brooding and low in reflection (Study 1), but no such group arose from either of our samples. A response style characterized by high brooding and low reflection may either be rare or not exist. In addition, Study 1 may have been limited in statistical power to detect group differences due to sample size. Finally, our measure of suicide risk combined suicidal ideation and attempt histories and thus did not differentiate between risk for suicidal ideation vs. attempts. Future research should use a more precise measure that makes this differentiation. Despite these limitations, the present study provides further evidence that subtypes of rumination are differentially related to cognitions and behavior known to be associated with suicidal ideation and attempts.

These findings have several clinical implications. Wenzel and Beck's (2008) cognitive model of suicidal behavior asserts that stress impacts the relationship between dispositional vulnerability factors and cognitive processes that can lead to a suicide attempt. Dispositional vulnerability factors include maladaptive cognitive styles (e.g., an overreliance on brooding), as well as behaviors (e.g., impulsivity). Cognitive processes associated with suicide attempts (e.g., hopelessness), may lead to biased information processing that can trigger suicidal ideation and eventually a suicide attempt (Wenzel and Beck, 2008). Cognitive therapy focused on limiting brooding may improve how people respond to their negative moods by decreasing their tendency to engage in impulsive behaviors. Decreased brooding may also increase the mental capacity necessary for individuals to think about solutions to problems in the face of distress. Such interventions may ultimately decrease the likelihood that stress will trigger cognitive processes associated with suicidal behavior. Clinical interventions may also encourage a low ruminative response style (brooding and reflection), in general. Importantly, these findings can guide future research to improve our understanding of how brooding may lead to higher suicide risk through impulsivity. Potential findings may aid in developing targeted approaches to suicide prevention.

Acknowledgments

This project was partially funded by NIH Grant 5SC1 MH091873 and by RISE Grant GM060665. Thanks to Alyssa Wheeler, Soumia Cheref, Xiao Feng, Erin Gadol, and Victoria Quinones for their assistance with data collection.

References

Anestis MD, Bagge CL, Tull MT, Joiner TE. Clarifying the role of emotion dysregulation in the interpersonal-psychological theory of suicidal behavior in an undergraduate sample. J Psychiatr Res. 2011; 45:603–611. http://dx.doi.org/10.1016/j.jpsychires.2010.10.013. [PubMed: 21092986]

Anestis MD, Joiner TE. Examining the role of emotion in suicidality: negative urgency as an amplifier of the relationship between components of the interpersonal-psychological theory of suicidal behavior and lifetime number of suicide attempts. J Affect Disord. 2011; 129:261–269. http://dx.doi.org/10.1016/j.jad.2010.08.006. [PubMed: 20825997]

Anestis MD, Tull MT, Lavender JM, Gratz KL. The mediating role of nonsuicidal self-injury in the relationship between impulsivity and suicidal behavior among inpatients receiving treatment for substance use disorders. Psychiatry Res. 2014; 218(1):166–173. [PubMed: 24768248]

Bagge CL, Littlefield AK, Rosellini AJ, Coffey SF. Relations among behavioral and questionnaire measures of impulsivity in a sample of suicide attempters. Suicide Life -Threat Behav. 2013; 43:460–467. [PubMed: 23601164]

Bechara A, Tranel D, Damasio H. Characterization of the decision-making deficit of patients with ventromedial prefrontal cortex lesions. Brain. 2000; 123:2189–2202. [PubMed: 11050020]

Bender TW, Gordon KH, Bresin K, Joiner TE. Impulsivity and suicidality: the mediating role of painful and provocative experiences. J Affect Disord. 2011; 129:301–307. http://dx.doi.org/10.1016/j.jad.2010.07.023. [PubMed: 20719393]

Bjork JM, Dougherty DM, Moeller FG, Harper RA, Scott-Gurnell K, Swann AC. Laboratory measures of impulsivity in hospitalized adolescents with disruptive behavior disorders. Biol Psychiatry. 2000; 47:S149.

Cyders MA, Smith GT, Spillane NS, Fischer S, Annus AM, Peterson C. Integration of impulsivity and positive mood to predict risky behavior: development and validation of a measure of positive urgency. Psychol Assess. 2007; 19:107–118. http://dx.doi.org/10.1037/1040-3590.19.1.107. [PubMed: 17371126]

Cyders MA, Flory K, Rainer S, Smith GT. The role of personality dispositions to risky behavior in predicting first-year college drinking. Addiction. 2009; 104:193–202. [PubMed: 19149813]

Cyders MA, Coskunpinar A. Measurement of constructs using self-report and behavioral lab tasks: is there overlap in nomothetic span and construct representation for impulsivity? Clin Psychol Rev. 2011; 31(6):965–982. http://dx.doi.org/10.1111/j.1360-0443.2008.02434.x. [PubMed: 21733491]

Cyders MA, Dzemidzic M, Eiler WJA, Coskunpinar A, Karyadi K, Kareken DA. Negative urgency and ventromedial prefrontal cortex responses to alcohol cues: fMRI evidence of emotion-based impulsivity. Alcohol: Clin Exp Res. 2014; 38:409–417. http://dx.doi.org/10.1111/acer.12266. [PubMed: 24164291]

Denson TF, Pedersen WC, Friese M, Hahm A, Roberts L. Understanding impulsive aggression: angry rumination and reduced self-control capacity are mechanisms underlying the provocation-aggression relationship. Pers Soc Psychol Bull. 2011; 37:850–862. [PubMed: 21421767]

Dick DM, Smith G, Olausson P, Mitchell SH, Leeman RF, O'Malley SS, Sher K. Review: understanding the construct of impulsivity and its relationship to alcohol use disorders. Addict Biol. 2010; 15(2):217–226. [PubMed: 20148781]

Dougherty, DM.; Mathias, CW.; Marsh, DM. GoStop Impulsivity Paradigm (Version 1.0) [Manual]. Neurobehavioral Research Laboratory and Clinic. University of Texas Health Science Center at Houston; Houston, Texas: 2003.

Dougherty DM, Mathias CW, Marsh DM, Moeller FG, Swann AC. Suicidal behaviors and drug abuse: impulsivity and its measurement. Drug Alcohol Depend. 2004; 76S:S93–S105. [PubMed: 15555820]

Dougherty DM, Mathias CW, Marsh-Richard DM, Prevette KN, Dawes MA, Hatzis ES, Nouvion SO. Impulsivity and clinical symptoms among adolescents with non-suicidal self-injury with or without attempted suicide. Psychiatry Res. 2009; 169:22–27. http://dx.doi.org/10.1016/j.psychres.2008.06.011. [PubMed: 19631392]

Dvorak R, Simons J, Wray T. Impulsivity moderates the association between depressive rumination and number of quit attempt failures by smokers. Addict Res Theory. 2011; 19(3):283–288.

Euston DR, Gruber AJ, McNaughton BL. The role of medial prefrontal cortex in memory and decision making. Neuron. 2012; 76:1057–1070. [PubMed: 23259943]

Hamza CA, Willoughby T, Heffer T. Impulsivity and nonsuicidal self-injury: a review and meta-analysis. Clin Psychol Rev. 2015; 38:13–24. [PubMed: 25779460]

Hayes, AF. PROCESS: A Versatile Computational Tool for Observed Variable Moderation, Mediation, and Conditional Process Modeling [White paper]. 2012. Available from: ⟨http://www.afhayes.com/public/process2012.pdfS⟩

Herrera MJ, McChargue DE. Mood and cue reactivity among smokers with a history of major depression: the role of rumination and impulsivity. Am J Addict. 2011; 20:161–165. [PubMed: 21314759]

Klonsky ED, May A. Rethinking impulsivity in suicide. Suicide Life -Threat Behav. 2010; 40:612–619. [PubMed: 21198330]

Lyubomirsky S, Nolen-Hoeksema S. Effects of self-focused rumination on negative thinking and interpersonal problem solving. J Pers Soc Psychol. 1995; 69:176–190. http://dx.doi.org/10.1037/0022-3514.69.1.176. [PubMed: 7643299]

MacKinnon DP, Lockwood CM, Hoffman JM, West SG, Sheets V. A comparison of methods to test mediation and other intervening variable effects. Psychol Method. 2002; 7(1):83.

Marroquín B, Scilletta BM, Miranda R. Ruminative subtypes and coping responses: active and passive pathways to depressive symptoms. Cogn Emot. 2010; 24:1446–1455.

Marsh DM, Dougherty DM, Mathias CW, Moeller FG, Hicks LR. Comparisons of women with high and low trait impulsivity using behavioral models of response-disinhibition and reward-choice. Pers Individ Differ. 2002; 33:1291–1310. http://dx.doi.org/10.1016/S0191-8869(02)00014-4.

Miranda R, Nolen-Hoeksema S. Brooding and reflection: rumination predicts suicidal ideation at 1-year follow-up in a community sample. Behav Res Ther. 2007; 45:3088–3095. http://dx.doi.org/10.1016/j.brat.2007.07.015. [PubMed: 17825248]

Miranda R, Valderrama J, Tsypes A, Gadol E, Gallagher M. Cognitive in- flexibility and suicidal ideation: mediating role of brooding and hopelessness. Psychiatry Res. 2013; 210:174–181. http://dx.doi.org/10.1016/j.psychres.2013.02.033. [PubMed: 23528518]

Nolen-Hoeksema S. Responses to depression and their effects on the duration of depressive episodes. J Abnorm Psychol. 1991; 100:569–582. [PubMed: 1757671]

Nolen-Hoeksema S, Larson J, Grayson C. Explaining the gender difference in depressive symptoms. J Pers Soc Psychol. 1999; 77:1061–1072. [PubMed: 10573880]

Nolen-Hoeksema S, Wisco BE, Lyubomirsky S. Rethinking rumination. Perspect Psychol Sci. 2008; 3:400–424. [PubMed: 26158958]

O'Connor RC, Noyce R. Personality and cognitive processes: Self-criticism and different types of rumination as predictors of suicidal ideation. Behav Res Ther. 2008; 46:392–401. http://dx.doi.org/10.1016/j.brat.2008.01.007. [PubMed: 18308293]

Osman A, Bagge CL, Gutierrez PM, Konick LC, Kopper BA, Barrios FX. The suicidal behaviors questionnaire-revised (SBQ-R): validation with clinical and nonclinical samples. Assessment. 2001; 8:443–454. [PubMed: 11785588]

Selby EA, Anestis MD, Joiner TE. Understanding the relationship between emotional and behavioral dysregulation: emotional cascades. Behav Res Ther. 2008; 46(5):593–611. [PubMed: 18353278]

Selby EA, Kranzler A, Panza E, Fehling KB. Bidirectional-comp sounding effects of rumination and negative emotion in predicting impulsive behavior: implications for Eemotional cascades. J Pers. (in press).

Surrence K, Miranda R, Marroquín BM, Chan S. Brooding and reflective rumination among suicide attempters: cognitive vulnerability to suicidal ideation. Behav Res Ther. 2009; 47:803–808. http://dx.doi.org/10.1016/j.brat.2009.06.001. [PubMed: 19577225]

Treynor W, Gonzalez R, Nolen-Hoeksema S. Rumination reconsidered: a psychometric analysis. Cognit Ther Res. 2003; 27:247–259. http://dx.doi.org/10.1023/A:1023910315561.

Wang L, Paul N, Stanton SJ, Greeson JM, Smoski MJ. Loss of sustained activity in the ventromedial prefrontal cortex in response to repeated stress in individuals with early-life emotional abuse: implications for depression vulnerability. Front Psychol. 2013; 4:1–9. [PubMed: 23382719]

Wenzel A, Beck AT. A cognitive model of suicidal behavior: theory and treatment. Appl Prev Psychol. 2008; 12:189–201. http://dx.doi.org/10.1016/j.appsy.2008.05.001.

Westheide J, Quednow BB, Kuhn K-U, Hoppe C, Cooper-Mahkorn D, Hawellek B, Wagner M. Executive performance of depressed suicide attempters: the role of suicidal ideation. Eur Arch Psychiatry Clin Neurosci. 2008; 258:414–421. http://dx.doi.org/10.1007/s00406-008-0811-1. [PubMed: 18330667]

Whiteside SP, Lynam DR. The five factor model and impulsivity: using a structural model of personality to understand impulsivity. Pers Individ Differ. 2001; 30:669–689.

Whiteside SP, Lynam DR, Miller JD, Reynolds SK. Validation of the UPPS impulsive behaviour scale: a four-factor model of impulsivity. Eur J Pers. 2005; 19:559–574. http://dx.doi.org/10.1002/per.556.

Williams JMG. Capture and rumination, functional avoidance, and executive control (CaRFAX): three processes that underlie overgeneral memory. Cogn Emot. 2006; 20:548–568. http://dx.doi.org/10.1080/02699930500450465. [PubMed: 26529222]

Yen S, Shea MT, Sanislow CA, Skodol AE, Grilo CM, Edelen MO, Gunderson JG. Personality traits as prospective predictors of suicide attempts. Acta Psychiatr Scand. 2009; 120:222–229. [PubMed: 19298413]

Author Manuscript

Author Manuscript

Author Manuscript

Highlights

- We examine ruminative subtypes, impulsivity, and risk for suicidal behavior.
- Overreliance on brooding associated with three dimensions of trait impulsivity
- Indirect effect of brooding on suicide risk via two dimensions of trait impulsivity.

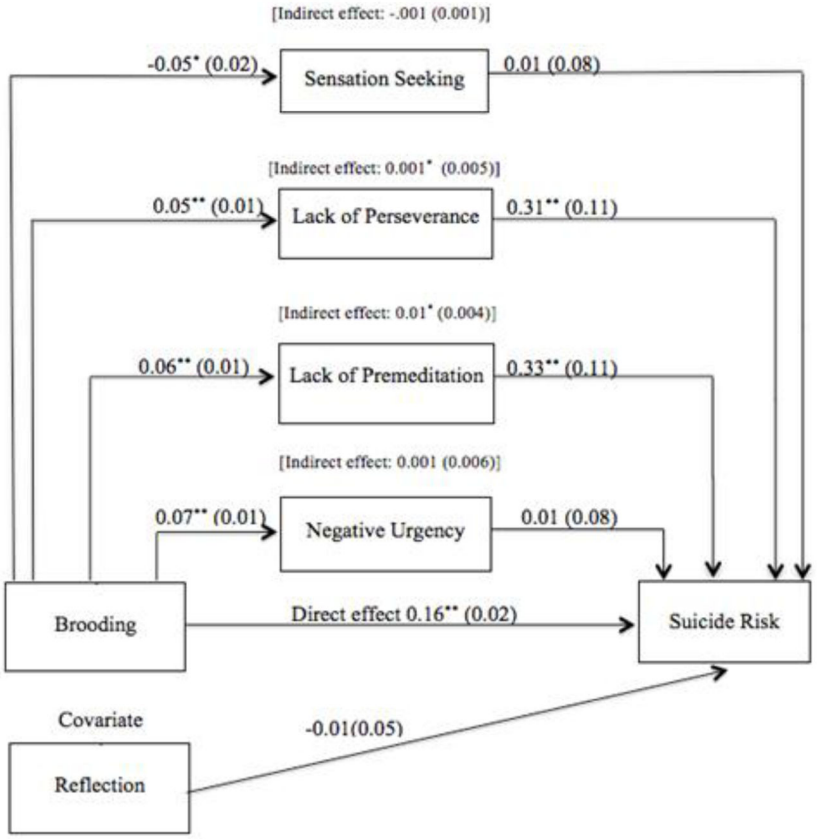

Figure 1.

Brooding is significantly associated with sensation seeking, lack of perseverance, lack of premeditation, and negative urgency. There was an indirect effect of brooding on suicide risk through lack of perseverance and lack of premeditation. Values shown are unstandardized regression coefficients, with standard errors in parentheses. $^{*}p < 0.05$; $^{**}p < 0.01$.

Table 1

Means and standard deviations of behavioral and self-report measures for the four ruminative subtypes in Study 1

	Group					
	Low Brood/Ref (n = 20)	**High Brood/Ref (n = 18)**	**High Brooding (n = 19)**	**High Reflection (n = 19)**		
Measures	**M (SD)**				**p**	**η^2**
Two-Choice Impulsivity						
Immediate Choice	24.35 (12.79)	18.00 (11.70)	16.84 (13.43)	16.48 (10.80)	.15	.07
Delayed Choice	25.65 (12.79)	32.00 (11.70)	33.16 (13.43)	33.52 (10.80)	.15	.07
Go-Stop Impulsivity						
50 Msec	20.39 (19.90)	18.59 (15.62)	15.79 (23.32)	19.96 (19.33)	.89	.01
150 Msec	41.54 (23.40)	34.19 (20.77)	34.41 (21.89)	36.81 (22.97)	.72	.02
250 Msec	53.27 (25.31)	53.21 (21.73)	54.86 (18.84)	54.40 (19.16)	.99	.001
350 Msec	68.65 (19.30)	73.07 (17.84)	74.90 (13.65)	74.73 (13.95)	.60	.03
UPPS-P SF Impulsivity Scale						
Lack of Premeditation	1.73 (0.43)	1.77 (0.70)	2.07 (0.65)	1.71 (0.51)	.19	.06
Negative Urgency*	2.39 (0.61)	2.83 (0.65)	2.92 (0.58)	2.48 (0.58)	< .05	.13
Sensation Seeking	2.73 (0.73)	2.83 (0.77)	2.74 (0.80)	2.82 (0.68)	.95	.004
Lack of Perseverance	1.68 (0.61)	1.74 (0.47)	1.82 (0.54)	1.64 (0.36)	.71	.02

*Univariate Analysis of Variance; Brood = Brooding; Ref. = Reflection

*$p < .05$

Table 2

Means, standard deviations, and correlations among Study 2 self-report measures

	M	SD	1	2	3	4	5	6	7
1. Brooding	10.61	3.83	…						
2. Reflection	10.26	3.46	.65**	…					
3. Lack of Premeditation	1.81	0.70	.11**	.03	…				
4. Negative Urgency	2.46	0.74	.29**	.13**	.05*	…			
5. Sensation Seeking	2.71	0.77	−.06*	−.01	−.06*	.23**	…		
6. Lack of Perseverance	1.73	0.66	.13**	.05	.66**	−.43	−.21**	…	
7. Suicide Risk	4.23	2.26	.32**	.22**	.17**	.10**	−0.02	.17**	…

* $p < 0.05$;

** $p < 0.01$.

Suicide Risk = Total score on Suicidal Behaviors Questionnaire (SBQ)