



Rumination, Brooding, and Reflection: Prospective Associations with Suicide Ideation and Suicide Attempts

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Objective: Rumination is often cited as a risk factor for suicide, yet few studies of rumination have utilized clinical samples, and no studies have examined its prospective association with suicide attempts. The purpose of this study was to examine concurrent and prospective associations of brooding and reflection (the two components of rumination) with suicide ideation and suicide attempts among a high-risk clinical sample.

Method: Participants were 286 adolescents and young adults (77% Caucasian, 59% female) aged 13–25 seeking psychiatric emergency services. A majority (71%) were presenting with a primary complaint of suicide ideation or recent suicide attempt. Participants completed a baseline assessment at the index visit; 226 participants (79%) completed a 4-month follow-up assessment of suicidal thoughts and behaviors.

Results: Brooding was associated with lifetime history of one or more suicide attempts, but not concurrent suicide ideation. Reflection was not associated with lifetime suicide attempts or concurrent suicide ideation. Furthermore, prospective associations of brooding and reflection with suicide ideation and suicide attempts were weak-to-small in magnitude and statistically nonsignificant.

Conclusions: Rumination appears to have a limited association with suicide-related outcomes within a high-risk clinical sample. Additional longitudinal studies utilizing clinical samples are critically needed to better understand these associations.

Suicide is currently the second leading cause of death for adolescents and young adults aged 13–25, accounting for over 6,500 deaths

in the United States in 2015 (Centers for Disease Control and Prevention, 2017). While many risk factors for suicide have been

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identified (e.g., depression, hopelessness), few distinguish those with suicidal thoughts from those who engage in suicidal behavior (Klonsky & May, 2014). Further research is urgently needed to identify risk factors that aid in the prediction and prevention of suicidal thoughts and behaviors.

One promising candidate risk factor for suicidal thoughts and behaviors is rumination, defined as a repetitive, passive focus on the symptoms, causes, and consequences of one's problems or emotions without advancing to a problem-solving stage (Nolen-Hoeksema, 1991). Two components of rumination, brooding and reflection, were identified in a factor analysis (Treyner, Gonzalez, & Nolen-Hoeksema, 2003). Brooding refers to dwelling on the negative consequences of distress, whereas reflection pertains to analytically examining reasons for thinking or feeling a certain way. In Smith, Alloy, and Abramson's (2006) Attention Mediated Hopelessness theory of depression, rumination had direct and indirect (via increased hopelessness) associations with suicide ideation. Further, rumination fully mediated the relationship between cognitive vulnerability and suicide ideation. Indeed, extensive research has documented the relationship between rumination and suicide risk factors, such as suicidal thoughts, past suicide attempts, depression, and hopelessness in both clinical and community samples (e.g., Fairweather, Anstey, Rodgers, Jorm, & Christensen, 2007; Grassia & Gibb, 2009; Lyubomirsky & Nolen-Hoeksema, 1995; Simon et al., 2007). Additionally, longitudinal studies utilizing community and college samples have demonstrated prospective relationships between rumination and suicide ideation (e.g., Miranda & Nolen-Hoeksema, 2007; O'Connor, O'Connor, & Marshall, 2007).

A meta-analysis by Rogers and Joiner (2017) examined 29 studies that directly examined associations between rumination (and/or brooding, reflection) and suicide ideation and suicide attempt history across community, college, and clinical samples. Results indicated that brooding had a moderate effect size for suicide ideation ($g = .63$)

and history of suicide attempt ($g = .47$), but reflection was only associated with suicide ideation ($g = .38$). Studies examining full/global rumination scales reported a large effect size for suicide ideation ($g = .74$) and a small effect size ($g = .26$) for suicide attempts. Notably, this meta-analysis indicated that there were no published studies examining rumination, brooding, or reflection, in relation to future suicidal behavior.

Some studies have indicated sex differences in rumination, with a small effect for females being more likely to engage in rumination (e.g., Johnson & Whisman, 2013). This difference in rumination has been proposed as an explanation for sex differences in depression prevalence (e.g., Nolen-Hoeksema, 1987; Nolen-Hoeksema, Larson, & Grayson, 1999). Despite well-documented sex differences in rumination, the extent to which sex moderates the relationship between rumination and suicide risk-related outcomes (suicide ideation and behavior) has not been widely examined. Rogers and Joiner's (2017) meta-analysis concluded that sex was not a consistent moderator of these relationships, yet limitations of the studies included in the meta-analysis (e.g., cross-sectional designs, primarily nonclinical samples) suggest that further research is warranted.

The aims of this study were twofold. Our first aim was to examine associations of brooding and reflection with concurrent suicide ideation and history of suicide attempts. Our second aim was to examine brooding and reflection as longitudinal predictors of suicide ideation and suicide attempts assessed 4 months later. We also explored how these associations differed based on sex. Despite being an often cited risk factor for suicide, no studies have assessed prospective associations between rumination and suicide attempts, and no studies have assessed prospective associations between rumination and suicide ideation within a clinical sample. This study further adds to the literature by explicitly addressing these research gaps in a high-risk clinical sample of adolescents and young adults seeking psychiatric emergency services.

METHOD

Participants

Participants were 286 adolescents and emerging adults, aged 13–25 years, recruited from a psychiatric emergency department in the Midwestern United States. Of those eligible, 79.7% of patients consented to take part in the study. Exclusion criteria included severe cognitive impairment, active psychosis, and severe aggression or agitation. Participants had a mean age of 18.0 years (SD 3.5) and were 59% female. The racial/ethnic distribution was as follows: 77% Caucasian, 10% African American/Black, 4% Asian, 3% Hispanic, and 6% Multiracial. The most common reasons for the emergency visit included suicide ideation or attempt (71%) and depression/anxiety symptoms (14%). One hundred and three participants (36%) had a lifetime history of suicide attempt, including 27 (9%) who had a past week suicide attempt. There were 108 (38%) participants admitted for psychiatric hospitalization following their evaluation.

A total of 226 participants (79%) completed the 4-month follow-up assessment and were included in longitudinal analyses. Of these participants, 67 (30%) reported any suicide ideation in the month prior to the follow-up interview and 21 (9%) reported a suicide attempt since the index visit. A retention analysis indicated that those who completed the follow-up interview did not differ from those who did not complete the follow-up interview on age, sex, suicide ideation severity, depression and anxiety symptoms, brooding, reflection, or history of suicide attempt (p -value ranges of .20–.89).

Measures

Medical Chart Coding Form. Patient data from the emergency visit were collected from electronic medical records. Race/ethnicity, insurance, reason for visit, disposition, past visits, past hospitalizations, diagnoses, and suicide attempt histories were among coded variables. Records were checked for

supplemental follow-up data from visits occurring within 5 months of their index visit.

Depression and Anxiety Symptoms. The Patient Health Questionnaire-4 (Kroenke, Spitzer, Williams, & Lowe, 2009) was used to assess symptoms of depression and anxiety. It contains two items from the PHQ-2 depression screener and two items from the GAD-2 anxiety screener, which have shown comparable psychometric properties to the full-length PHQ-9 and GAD-7 scales (Kroenke, Spitzer, & Williams, 2003; Kroenke, Spitzer, Williams, Monahan, & Löwe, 2007). Symptoms are assessed for the last 2 weeks and are rated on a 4-point Likert scale ranging from “not at all” to “nearly every day.” Internal consistency for the PHQ-4 in this sample was good ($\alpha = .75$).

Rumination. The Ruminative Response Scale of the Response Style Questionnaire (Nolen-Hoeksema & Morrow, 1991) is a 22-item self-report inventory that assesses the extent to which individuals repeatedly focus on their negative mood. The Ruminative Response Scale was adapted to fit the recommendations of Treynor et al. (2003), resulting in a 10-item scale with subscales of “brooding” and “reflection.” Sample items include “Think ‘why can’t I handle things better’” (brooding), and “analyze recent events to try to understand why you are depressed” (reflection). These items are rated on a 4-point Likert scale ranging from “almost never” to “almost always” with regard to how they respond when feeling sad, down, or depressed. Internal consistency in this sample was adequate for the brooding ($\alpha = .75$) and reflection ($\alpha = .70$) scales.

Suicide Ideation and Suicidal Behavior. The Columbia-Suicide Severity Rating Scale (Posner et al., 2011) is a semi-structured interview that assesses a range of suicidal thoughts and behaviors. Suicide ideation severity in the past week is rated on a 6-point ordinal scale (0–5) including items such as a wish to be dead (1), suicidal thoughts with a method, but no intent (3), and suicidal intent with a specific plan (5). Suicidal behavior is assessed dichotomously (yes/no) for past

suicide attempts, interrupted attempts (e.g., pulled off ledge when attempting to jump), aborted attempts (e.g., placed loaded gun to head, but did not pull trigger), and suicide preparations (e.g., writing a suicide note, collecting pills). The C-SSRS has demonstrated strong reliability and validity (Posner et al., 2011) and predictive validity for future suicide attempts (Gipson, Agarwala, Opperman, Horwitz, & King, 2015; Horwitz, Czyz, & King, 2015). For the follow-up assessment, suicide ideation was assessed for worst past month ideation, and suicidal behaviors were assessed for events since the index visit.

Procedures

IRB approval was obtained for this study. Consecutively presenting eligible participants were approached for assent/consent (consent if 18 or older, assent and parental consent for minors) during recruitment, which took place 3–5 days per week during afternoon/evening shifts between June 2014 and January 2015. Participants were approached by research assistants for consent following their initial clinical interview with hospital staff. Participants who completed the baseline assessment received \$20 as remuneration for their time. The C-SSRS was administered as a part of the clinical protocol at the participating emergency site and was accessed via medical record review. Follow-up interviews, including the C-SSRS, were conducted by master's level clinicians over the telephone approximately 4 months [M (SD) = 110.6 (15.6) days] following the index visit. Participants completing the follow-up assessment received a \$25 gift card in the mail.

Data Analysis

Data were entered and stored using RedCap (Harris et al., 2009) and analyzed in SPSS version 21. Past week suicide ideation severity was analyzed using continuous scores (0–5) at baseline, with scores normally distributed. Due to a low endorsement at follow-up, C-SSRS suicide ideation severity was analyzed dichotomously as scores of 2+

(excludes passive morbid ideation). t -Tests and chi-square analyses were used to examine differences in demographic and clinical data by sex. Correlations examined univariate associations between clinical variables for the full sample and for groups separately by sex. Brooding and reflection were examined separately in multivariate analyses to further examine the reported differences in these rumination components in the literature. Linear and logistic regression analyses examined concurrent associations of brooding and reflection with suicide ideation and suicide attempts, controlling for age, sex, depression and anxiety symptoms, history of suicide attempt (for suicide ideation), and suicide ideation (for suicide attempts). t -Tests were utilized to examine longitudinal univariate associations of clinical variables with follow-up suicide ideation and actual suicide attempts, both in the full sample and separately by sex. Effect sizes were calculated using Hedge's g in order to correct for small and unequal sample sizes. Tests of multicollinearity indicated that collinearity assumptions were met ($VIF < 2.0$) for all covariates in regression analyses. The Hosmer–Lemeshow goodness-of-fit test indicated that data fit the logistic regression model well.

RESULTS

Sample Characteristics and Sex Differences

The sample mean scores for suicide ideation severity, depression/anxiety symptoms, and rumination scales, as well as differences between the scores of males and females for these variables, are presented in Table 1. Females reported significantly greater depression/anxiety symptoms than males, $t(228) = 3.86, p < .001$, but there were no differences in severity of suicide ideation, brooding, reflection, or history of attempt. Furthermore, there were no differences for females and males at follow-up for past month suicide ideation [30.2% vs. 28.9%,

TABLE 1
Descriptives with Comparisons by Sex

	Full sample N = 286 M (SD)	Females n = 168 M (SD)	Males n = 118 M (SD)	t-test	p
Age	18.0 (3.5)	18.1 (3.5)	17.9 (3.5)	0.35	.725
PHQ-4	8.0 (3.0)	8.6 (2.7)	7.2 (3.2)	3.86	<.001
SI severity	2.7 (1.7)	2.8 (1.7)	2.4 (1.7)	1.82	.069
Brooding	14.8 (3.5)	15.1 (3.3)	14.4 (3.8)	1.75	.082
Reflection	12.7 (3.4)	12.8 (3.3)	12.7 (3.6)	0.20	.844
SA Hx (% Yes)	36.0%	40.4%	29.7%	^a 3.52	.061

PHQ-4, depression and anxiety symptoms; SI, suicide ideation; SA Hx, history of suicide attempt. Ranges: PHQ-4 (0–12), SI Sev (0–5), brooding (0–20), reflection (0–20).

^aChi-square test value.

TABLE 2
Correlations Between Clinical Variables

	Brooding	Reflection	PHQ-4	SI severity
Reflection	.59***	–	–	–
PHQ-4	.34***	.23***	–	–
SI severity	.15**	.09	.28***	–
SA Hx (0–1)	.15***	.03	.20**	.38***

PHQ-4: depression and anxiety symptoms. SI: suicide ideation. SA Hx: history of suicide attempt (point biserial correlations). There were no significant differences in associations between clinical variables when examined separately by sex. **p* < .05 ***p* < .01 ****p* < .001.

$\chi^2(1) = 0.05, p = .824$ or suicide attempts since index visit [11.5% vs. 6.2%, $\chi^2(1) = 1.90, p = .169$].

Concurrent Associations between Rumination and Suicide Risk-Related Outcomes

Correlations between clinical variables are presented in Table 2. Associations between brooding and concurrent suicide ideation and history of suicide attempt were statistically significant, but weak in magnitude (*r* = .15 for each). Reflection was not significantly correlated with either concurrent suicide ideation or history of suicide attempt. Separate correlations were also examined for males and females, but there were no statistically significant differential associations between clinical variables based on sex (all associations within difference of *r* of .13). In a linear regression examining associations of brooding and

reflection with suicide ideation severity, controlling for age, sex, depression/anxiety symptoms, and history of attempt, depression/anxiety symptoms ($\beta = .208, p = .001$) and history of suicide attempt ($\beta = .327, p < .001$) were the lone independent significant predictors (see Table 3). In a logistic regression examining associations of brooding and reflection with history of suicide attempt, controlling for age, sex, depression/anxiety symptoms, and suicide ideation severity; brooding [OR (95% CI) = 1.11 (1.00, 1.23)]; and suicide ideation severity [OR (95% CI) = 1.65 (1.38, 1.98)] were the only significant independent predictors in the model (see Table 3).

Longitudinal Associations between Rumination and Suicide

Means, standard deviations, and effect sizes for differences in those with and without

TABLE 3
Linear and Logistic Regressions Examining Concurrent Associations

	B	SE(B)	β	R^2	
SI severity ^a				.174	
Age	-.029	.028	-.059		
Sex (1-F; 2-M)	-.079	.194	-.023		
PHQ-4	.119	.035	.207**		
SA Hx	1.17	.199	.328***		
Brooding	.013	.035	.026		
Reflection	.016	.034	.032		
	B	SE(B)	Wald χ^2	OR (95% CI)	^c R^2
SA Hx ^b					.220
Age	-.048	.041	1.33	.95 (.88, 1.03)	
Sex (1-F; 2-M)	-.191	.288	0.44	.83 (.47, 1.45)	
PHQ-4	.082	.053	2.37	1.09 (.98, 1.21)	
SI severity	.502	.094	28.84	1.65 (1.38, 1.99)***	
Brooding	.105	.052	4.01	1.11 (1.00, 1.23)*	
Reflection	-.064	.050	1.64	.94 (.85, 1.03)	

PHQ-4: depression and anxiety symptoms. SI: suicide ideation. SA Hx: history of suicide attempt. Wald chi-square values are degrees of freedom (1). R^2 = adjusted R -squared. cR^2 = Nagelkerke pseudo- R -squared. * $p < .05$, ** $p < .01$, *** $p < .001$.

^a $F(6,279) = 10.96, p < .001$.

^b $\chi^2(6) = 53.83, p < .001$.

suicide ideation within one month of follow-up and suicide attempts during the follow-up period are presented in Table 4. There were no significant associations for brooding and reflection with suicide ideation or suicide attempts. Corresponding effect sizes were weak for suicide ideation (g ranges from .08 to .24) and small for suicide attempts (g ranges from .33 to .42). In exploratory sex-stratified analyses, brooding had a large and significant effect size for suicide attempts in males ($n = 6$), $t(95) = 2.40, p = .018, g = 1.01$. All other sex-stratified analyses were consistent with full sample findings.

DISCUSSION

While previous studies have suggested strong relationships between rumination and suicide risk-related outcomes, these studies often relied on community or college student samples and many were cross sectional in

design (Rogers & Joiner, 2017). Findings from this longitudinal study, in which the majority of participants report some level of suicidal thoughts and/or previous behavior, suggest that associations between rumination and suicide ideation and attempts may be weak or negligible in high-risk clinical samples. The associations between rumination scales and suicide ideation and suicide attempts were weak-to-small in both concurrent and longitudinal analyses. Brooding was independently associated with history of suicide attempts and had a small effect size for future suicide attempts. Reflection had an even smaller effect size for future suicide attempts and was unrelated to history of suicide attempt or suicide ideation at both time-points. These findings suggest that rumination, brooding, and reflection may not be indicators of additional risk among individuals known to be at elevated risk for suicide, beyond known cognitive vulnerabilities such as depression, anxiety, and suicide

TABLE 4
t-Tests and Effect Sizes for Longitudinal Associations

Follow-up sample (<i>n</i> = 226)	No SI (<i>n</i> = 159)	SI (<i>n</i> = 67)	<i>t</i>	<i>g</i>
Age	18.00 (3.52)	17.97 (3.65)	-0.06	.01
PHQ-4	7.65 (3.17)	9.03 (2.55)	3.44**	.46
SI severity	2.43 (1.72)	3.12 (1.60)	2.90**	.41
Brooding	14.55 (3.65)	15.36 (2.86)	1.78	.24
Reflection	12.53 (3.55)	12.81 (3.12)	0.54	.08
	No SA (<i>n</i> = 206)	SA (<i>n</i> = 21)	<i>t</i>	<i>g</i>
Age	18.00 (3.53)	17.76 (3.83)	-0.29	.07
PHQ-4	7.94 (3.09)	9.33 (2.35)	2.00*	.46
SI severity	2.53 (1.72)	3.62 (1.40)	2.78**	.64
Brooding	14.65 (3.48)	16.10 (2.74)	1.85	.42
Reflection	12.51 (3.45)	13.62 (2.97)	1.42	.33

PHQ-4: depression and anxiety symptoms. SI: Severity: suicide ideation severity at index visit. SI: suicide ideation within past month of follow-up assessment. SA: suicide attempt during the 4-month follow-up period. * $p < .05$, ** $p < .01$, *** $p < .001$. [Corrections added on November 14, 2018, after first online publication: The values of “Brooding” and “Reflection” have been changed under the column heading – No SA ($n = 206$), SA ($n = 21$), t , and g .]

ideation. This was the first study to prospectively examine the association of rumination and suicide ideation within a clinical sample, and the first to examine rumination and future suicide attempts in any sample. Additional research studies utilizing longitudinal designs and clinical samples are needed to better understand the associations, or potential lack thereof, between rumination and suicide risk.

The exploratory examination of sex differences in this sample indicated very few disparities between males and females in the association between rumination and suicide risk-related outcomes. One preliminary finding that warrants additional examination was the large effect size for brooding in males in relation to future suicide attempts. As rumination is more common in females (Johnson & Whisman, 2013), males with high rates of brooding may represent a more extreme presentation. Furthermore, Horwitz et al. (2015) found that the duration of suicidal thoughts (hours per day thinking about suicide) was a unique predictor for future male suicide attempts in a high-risk clinical sample of adolescents. Taken together, there may be a suicide-specific ruminative or brooding

process that increases risk for suicide attempts in males. However, as there were only six males who made a suicide attempt in our sample, this finding is in need of replication prior to drawing any firm conclusions.

Limitations

While this study had notable strengths, such as a prospective design, utilization of a clinical sample, strong consent, and retention rates, findings should be interpreted in the context of several study limitations. Firstly, it is unclear whether findings from this study generalize to high-risk clinical samples from other geographic regions. Furthermore, high levels of distress across participants (limited variability) may have made it more difficult to predict outcomes at follow-up. Our measurement of suicide ideation at follow-up was coded dichotomously, which may have contributed to a smaller effect size than what might have been expected from a larger continuous measure of suicide ideation. While assessing for suicide attempts during an acute risk period was a strength, the

relatively short follow-up period resulted in a low incidence of suicide attempts. As such, there was insufficient power to examine multivariate models predicting suicide attempts. Similarly, only six males made suicide attempts during the follow-up period, so findings from the stratified analyses are exploratory and should be interpreted with caution.

CONCLUSIONS

While rumination has often been cited as a risk factor for suicide ideation

and suicide attempts, no studies had examined prospective associations with suicide attempts, and no studies had utilized clinical samples to explore prospective associations with suicide ideation. Our study provides initial evidence that brooding and reflection may not be robust predictors of future suicide ideation or suicide attempts in high-risk clinical samples. Additional research utilizing large clinical samples and longitudinal designs is greatly needed in this area to clarify the extent to which rumination, brooding, and reflection influence future suicide ideation and behavior.

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