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Rumination and Pessimistic Certainty as Mediators of the Relation Between Lifetime Suicide Attempt History and Future Suicidal Ideation

Marta Krajniak, Regina Miranda, and Alyssa Wheeler

*This study examined whether rumination and certainty about pessimistic future-event predictions (P-Certainty) would mediate the relation between lifetime suicide attempt history and future suicidal ideation. Young adults, ages 18–25 (*N = *143), with a suicide attempt history (*n = *32) or no previous suicide attempt history (*n = *111) at baseline, were followed up 2–3 years later and completed measures of rumination, depressive symptoms, hopelessness, suicidal ideation, and pessimistic future-event certainty. Lifetime suicide attempts at baseline were associated with higher suicidal ideation at follow up, and this relation was mediated by rumination and P-Certainty. Suicide attempters may be vulnerable to later ideation due to higher levels of rumination and also certainty in their pessimistic future expectations.*

Keywords future-event predictions, rumination, suicidal ideation, suicide attempts

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INTRODUCTION

Suicide is a leading cause of death among adolescents and young adults in the United States and worldwide (CDC, 2007; Wasserman, Cheng, & Jiang, 2005). For instance, suicide rates among teenagers and young adults in the United States nearly tripled between the early 1950s and mid-1990s and remained relatively constant after leveling off around 1999 (CDC, 2012; United States Public Health Service, 1999). Among college students, rates of suicide attempts while attending school are between 1% (ACHA, 2012; Furr, Westefeld, McConnell et al., 2001) and 5% (Westefeld, Homaifar, Spotts et al., 2005). A history of a suicide attempt is one of the best predictors of future suicidal behavior (Lewinsohn, Rohde, & Seeley, 1994; Wichström, 2000). However, there is insufficient research on cognitions that increase vulnerability to suicidal behavior among individuals with a history of suicide attempts. The current study sought to address this gap in the literature by examining cognitions that might account for the relation between past suicide attempts and future suicidal ideation.

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Future-Oriented Cognitions and Risk for Suicidal Ideation and Attempts

There is empirical support for the idea that biased future-oriented cognition is associated with suicidal ideation and behavior (Beck, 1986; Beck, Brown, Berchick et al., 1990; Beck, Steer, & Brown, 1993; Beck, Steer, Kovacs et al., 1985; Smith, Alloy, & Abramson, 2006), even after adjusting for depression (Abramson, Alloy, Hogan et al., 1998; Beck, Steer, Beck et al., 1993; Kuo, Gallo, & Eaton, 2004). For instance, Abramson and colleagues found that hopelessness predicted suicidality (defined as behaviors ranging from suicidal ideation to attempted suicide) in non-depressed college students even after adjusting for prior history of depression (Abramson, Alloy, Hogan et al., 1998). Comparable results have been found in a 13-year follow-up study of a community sample (Kuo, Gallo & Eaton, 2004).

Further research suggests that it is not merely the specific pessimistic content of future expectations, but also the degree of likelihood with which individuals rate the occurrence of these future events that is related to hopelessness and risk for suicidal thinking and behavior (MacLeod, Tata, Tyrer et al., 2005; Sargalska, Miranda, & Marroquín, 2011). Drawing on the hopelessness model of depression (Abramson, Metalsky, & Alloy, 1989), Andersen and colleagues proposed that individuals become hopeless at the point at which they make their pessimistic predictions about the future with absolute certainty—termed *depressive predictive certainty* (Andersen, 1990; Andersen & Lyon, 1987). The *certainty* with which college students make pessimistic future-event predictions involving the anticipation of a lack of positive future outcomes has been found to statistically predict suicidal ideation, even beyond simple pessimism, general hopelessness, and symptoms of depression (Sargalska, Miranda, & Marroquín, 2011), suggesting a direct link between certainty about pessimistic expectancies and risk for suicidal behavior. Thus, understanding how individuals become certain about their pessimistic anticipations of the future may be one way of understanding how suicidal thoughts may originate.

Rumination and Suicidal Ideation and Attempts

Another recently studied cognitive factor linked to suicidal ideation and attempts is rumination—the tendency to repetitively focus on one's negative mood and on the causes, meanings, and consequences of that mood (Nolen-Hoeksema, 1991). Studies have demonstrated a relation between rumination and depression (Nolen-Hoeksema, 2000; Robinson & Alloy, 2003; Spasojevic & Alloy, 2001), rumination and hopelessness (Lam, Schuck, Smith et al., 2003), and rumination and suicidal ideation and attempts (Miranda & Nolen-Hoeksema, 2007; Morrison & O'Connor, 2008; Smith, Alloy, & Abramson, 2006). For example, a 2.5-year follow-up study of a college-student sample found that ruminative thinking predicted the presence and duration of suicidal ideation, and that this relation was mediated by hopelessness (Smith, Alloy, & Abramson, 2006). Furthermore, rumination—particularly the type of rumination involving a person's tendency to dwell on the reasons for his or her negative mood—distinguishes individuals with a suicide attempt history from those without a history of an attempt, with suicide attempters scoring higher than non-attempters (Crane, Barnhofer, & Williams, 2007; Grassia & Gibb, 2009; Surrence, Miranda, Marroquín et al., 2009), and even rumination involving trying to understand reasons for one's negative mood is associated with suicidal ideation among individuals with a suicide attempt history (Surrence, Miranda, Marroquín et al., 2009), independently of hopelessness and symptoms of depression.

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Integrating Cognitive Models of Suicide

Cognitive models specific to suicide have also sought to explain the types of cognitions that may predispose individuals to attempt suicide. However, most research examining these models fails to address the path through which such thoughts develop or account for the increased risk of future suicidal ideation among individuals with a past history of suicidal behavior. For instance, Williams's Cry of Pain model posits that suicide is a reaction to a situation in which an individual is trapped without an opportunity to escape (Williams, 1997; Williams, 2001) and that this feeling of entrapment may arise from increased hopelessness about the future (Williams & Pollock, 2000, 2001). Similarly, Joiner's model of suicide suggests that cognitive rehearsal, or repeated thoughts about or mental visualizations of suicide, may make individuals more vulnerable to future suicide attempts (Joiner, 2002, 2005). However, the cognitive mechanisms leading to such vulnerability have not been explained. Drawing on the work of Beck (1996), Rudd (2000) theorized that previous suicidal behavior sensitizes individuals to suicide-related cognitions, making them more accessible. Thus, the more an individual thinks about suicide or engages in suicidal behavior, the lower the threshold to trigger further suicidal thoughts and behavior, but the thoughts that promote such sensitization remain unexamined.

The Integrated Motivational-Volitional (IMV) Model of suicidal behavior (O'Connor, 2011) attempts to synthesize the various theories of suicide to elucidate potential paths leading to suicidal behavior. The IMV model posits that an individual at risk for suicidal behavior progresses from feelings of defeat or humiliation to feelings of entrapment, followed by suicidal ideation and intent, and that different factors (including biased cognitions) may affect the transition through these stages. For instance, this model suggests that cognitive factors such as rumination may facilitate the progression from feelings of defeat and humiliation to feelings of entrapment, while factors such as cognitions about the future may impact the progression from feelings of entrapment to suicidal ideation and intent (O'Connor, 2011). In line with Joiner's (2005) and Williams's (1997, 2001) theories, and drawing upon the work of Andersen and colleagues (Andersen & Limpert, 2001; Andersen, Spielman, & Bargh, 1992) we suggest that rumination is a form of mental rehearsal involving preoccupation with cognitions that precede suicidal behavior—such as pessimistic anticipations about the future. Such rumination may ultimately lead to feelings of hopelessness and entrapment.

Andersen and Limpert (2001) theorized that fluency in making predictions about the future may be acquired through rumination. As suggested by Andersen and colleagues, perhaps individuals who ruminate about the future become certain in their pessimistic anticipations about the future, via cognitive rehearsal, and develop certainty in their pessimistic future-event predictions (Andersen & Limpert, 2001; Andersen, Spielman, & Bargh, 1992; Miranda & Andersen, 2008). Perhaps this *certainty* increases their vulnerability to suicidal ideation and attempts and accounts for the progression from feelings of entrapment and hopelessness to suicidal ideation and intent, as per the IVM model. Moreover, if suicide attempters experience elevated ruminative thinking, they may be at an increased risk for future attempts. Increased fluency in making pessimistic predictions about the future might explain how individuals with a history of suicide attempts become "sensitized" to future suicidal ideation and attempts, as per Rudd's (2000) model. We seek to examine one cognitive path that may explain how a history of one or more suicide attempts

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increases risk for future suicidal ideation and behavior.

THE PRESENT STUDY

This study sought to examine cognitions that may help to explain why a history of previous suicide attempts elevates risk for future suicidal behavior (Lewinsohn, Rohde, & Seeley, 1994; Miranda, Scott, Hicks et al., 2008). First, we examined whether a suicide attempt history would be positively associated with measures of rumination, certainty about pessimistic future-event predictions (P-Certainty), and suicidal ideation. Secondly, we sought to determine whether rumination and P-Certainty would partially explain the relation between number of previous lifetime suicide attempts and future suicidal ideation. We hypothesized that rumination and P-Certainty would statistically mediate the relation between lifetime suicide attempt history, measured at baseline, and future suicidal ideation.

METHOD

Participants

Participants were 143 young adults (114 female), ages 18–25 ($M = 18.5$, $SD = 1.1$), who were screened for a suicide attempt history at baseline and who later took part in a 2–3-year follow-up of a study of social-cognitive predictors of suicidal ideation and behavior among young adults. Individuals were recruited from 1011 undergraduates (69% female) from a public college in the northeastern United States who completed a measure inquiring about their history of suicide attempts (Chan, Miranda, & Surrence, 2009; see below for a description of the screening measure). Of the 143 participants in the present study, 56 individuals were recruited from a group of 96 of the original 1,011 participants, oversampled for a history of suicidal ideation and attempts, who took part in another study session about 3 weeks after the initial screening (Rajappa, Gallagher, & Miranda, 2012; Surrence, Miranda, & Marroquín et al., 2009). These individuals returned 2–3 years later to take part in the present study. In addition, 87 participants were recruited from the remaining 915 individuals via random selection from a database of individuals who matched the other group of 56 participants by age, sex, and race/ethnicity, to take part in this study 2–3 years later. The racial/ethnic composition of the final sample was 34% Asian, 29% White, 17% Latino/a, 11% Black, and 10% other ethnicities. Participants were categorized as suicide attempters and non-attempters based on their endorsement of lifetime suicide attempt history at baseline. One hundred eleven participants reported no previous history of a suicide attempt (19 of whom reported suicidal ideation in the previous 2 weeks at baseline, as assessed by item 9 of the PHQ-9; see below), and 32 reported a history of a suicide attempt, at baseline. Five out of 143 participants reported attempting suicide during the 2–3-year follow-up period (none of whom had reported a suicide attempt at baseline).[1]

[1]We did not examine predictors of a suicide attempt at follow up due to the small number of individuals who actually endorsed an attempt at follow up ($N = 5$ out of 143; 3 participants who endorsed an attempt within the previous 2 years, and 2 individuals who did not endorse an attempt at baseline but who did so at follow up, and who were followed up more than 2 years after their initial study session). Furthermore, given that all attempters at follow up had not endorsed an attempt at baseline, there was not enough variability in the data to enable inclusion of variables such as suicide attempt history in a model predicting future attempts. However, both rumination, $r(141) = .28$, $p < .01$, and predictive certainty, $r(139) = .29$, $p < .01$, at follow up were positively associated with having made a suicide attempt during the follow-up period, suggesting that there may be a relation between these variables and risk for suicidal behavior.

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Measures

Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001). The PHQ-9 is a 9-item self-report measure developed to screen for symptoms of depression according to the *Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition* (DSM-IV; American Psychiatric Association, 1994) as part of the Primary Care Evaluation of Mental Disorders (Spitzer, Kroenke, Williams et al., 1999). Participants indicate how much they have been bothered by each of nine symptoms over the previous 2 weeks on a scale of 0 (*not at all*) to 3 (*nearly every day*). Item 9 on the PHQ-9 inquires about suicidal ideation ("... thoughts that you would be better off dead or of hurting yourself in some way"). Total score on the PHQ-9 was calculated by adding items 1–8. Item 9, which inquires about thoughts of self-harm, was excluded from calculation of the total depression score to reduce overlap with the BSS (see below), as the correlation between item 9 and total score on the BSS at follow-up was 0.71. The PHQ-9 has been found to be reliable and valid in screening for depression, with a test-retest reliability of .89 (Kroenke, Spitzer, & Williams, 2001). Cronbach's alpha in the current sample at follow-up was .82 for items 1–8 and .83 for items 1–9.

Suicidal Behavior Screening (SBS). The SBS was administered at baseline and at 2–3-year follow-up and contains 6 questions assessing the individual's lifetime suicide attempt history derived from the Diagnostic Interview Schedule for Children (Shaffer, Fisher, Lucas et al., 2000). Participants were asked "Have you ever, in your whole life, tried to kill yourself or made a suicide attempt?" If they answered "yes" they were also asked to indicate the number of previous suicide attempts they had made, whether they were made in the previous year, and whether they visited a doctor, emergency room, or hospital after their attempt. Participants were also asked whether they received mental health treatment. The version of the SBS used at follow-up also asked participants if they had made an attempt in the previous 2 years. Individuals were classified as having made a suicide attempt at follow up if they reported an attempt in the previous 2 years or if they had not reported an attempt at baseline but reported an attempt at follow-up, and if their follow up occurred more than 2 years after their baseline study session. Number of lifetime suicide attempts at baseline ranged from 0 to 4, with 17 individuals reporting one previous attempt, 8 individuals reporting 2 previous attempts, and 7 individuals reporting 3 or 4 previous attempts. Among the 32 individuals who reported a suicide attempt history at baseline, average number of attempts was 1.8, ($SD = 1.0$), with a median of 1.0. Method reported for the most recent attempt included cutting ($n = 11$), ingestion ($n = 8$), both cutting and ingestion ($n = 3$), both ingestion and another method ($n = 1$), or another method of attempt ($n = 7$), such as jumping ($n = 3$) or attempted strangulation or suffocation ($n = 3$). Two participants did not report a method.

Beck Scale for Suicidal Ideation (BSS; Beck & Steer, 1991). The BSS, administered only at follow-up, contains 21 items assessing suicidal ideation, plans, and access to means over the previous week. Individuals were asked to respond to five questions about their desire to die (e.g., "I have no wish to live") and then to respond to additional items if they endorsed any wish to die. The BSS also includes two questions inquiring about past suicide attempts. Total scores are calculated by summing the first 19 items, and scores can range between 0 and 38. The BSS has shown good concurrent validity in clinical samples, with correlations of between .90 and .94 with clinician ratings (Beck, Steer, & Ranieri,

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1988). In the present sample, Cronbach's alpha was .98 at follow-up.

Beck Hopelessness Scale (BHS; Beck & Steer, 1988). The BHS, administered at follow-up, is a 20-item self-report measure assessing general hopelessness, with items addressing feelings about the future, loss of motivation, and expectations. The BHS includes 11 negatively worded statements (e.g., "my future seems dark to me"), and 9 positively worded statements (e.g., "I look forward to the future with hope and enthusiasm") to which individuals answer with "true" or "false." The scores can range between 0 and 20, with some items reverse-scored. The BHS has demonstrated good concurrent, discriminant, and predictive validity (Beck & Steer, 1988). Cronbach's alpha in the current sample was .91 at follow-up.

Ruminative Responses Scale (RRS; Nolen-Hoeksema & Morrow, 1991). The RRS, administered at baseline and follow up, is a 22-item scale that assesses the extent to which individuals repeatedly focus on the causes, meanings, and consequences of their negative mood. Individuals rate the frequency with which they generally respond to a negative mood in certain ways (e.g., "think about how alone you feel") on a Likert scale from 1 (*almost never*) to 4 (*almost always*). Total scores were computed by summing the 10 items from the scale that do not overlap with symptoms of depression, as per Treynor and colleagues (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Cronbach's alpha in the present sample was .81 at follow-up.

Future Events Questionnaire (FEQ; Miranda & Mennin, 2007). The FEQ, administered at follow-up, is a 34-item self-report questionnaire consisting of 17 positive (e.g., "be admired by people") and 17 negative (e.g., "regret a major life decision") future events presented in mixed order. Individuals indicate, by circling "yes" or "no," if a particular event is likely to happen to them in the future and also indicate on a 1 to 5 Likert scale from 1 (*not at all*) to 5 (*as certain as one can be*) how certain they are of their prediction. Predictive certainty (P-Certainty) was calculated as the number of times an individual indicated that a negative event would happen in the future with the highest degree of certainty or that a positive event would not occur with the highest certainty. The FEQ has an internal consistency of between .65 and .70 for yes/no responses and between .87 and .91 for ratings of certainty (Miranda & Mennin, 2007; Miranda, Scott, Hicks et al., 2008; Sargalska, Miranda, & Marroquín, 2011). Cronbach's alpha in the current sample was .65 for yes/no responses and .91 for certainty ratings at follow-up.

Procedure

First- and second-year college undergraduates ($N = 1{,}011$) completed the PHQ-9, SBS, and RRS as part of a research participation requirement in their introductory psychology course (Chan, Miranda, & Surrence, 2009). Those who indicated that they were willing to be contacted for future research were recruited 2–3-years later ($M = 2.6$ years, $SD = 0.5$) via electronic mail or phone to take part in the present study. While a 2-year follow up was targeted, the follow-up period spanned up to approximately 3 years due to the length of time it took to successfully contact some participants. After providing informed consent, participants who took part in the follow-up study completed a battery of self-report measures that included the PHQ-9, BSS, BHS, SBS, RRS, and FEQ, either individually or in small groups. Individuals who reported four or more symptoms of depression or

that they had been bothered by thoughts of hurting themselves "more than half the days" in the previous 2 weeks, as indicated on the PHQ-9, were provided with a referral to the counseling center, and in some instances were also contacted by a licensed clinical psychologist via electronic mail to encourage them to make an appointment with the college counseling center. At the end of the study, individuals were debriefed and given $25 for their participation.

Statistical Analyses

Differences between suicide attempters (N = 32) and non-attempters (N = 111) on study measures at baseline (time 1) and follow up (time 2) were examined via independent samples t-tests. Associations among lifetime history of suicide attempts (time 1), rumination (times 1 and 2), depressive predictive certainty (time 2), and suicidal ideation (time 2) were examined via Pearson correlations.

Multiple linear regressions were conducted to examine whether rumination (time 2) and P-Certainty (time 2) would mediate the relation between number of previous lifetime suicide attempts (time 1) and future suicidal ideation (time 2). Mediation was established according to the guidelines suggested by Baron and Kenny (1986). In the proposed model, lifetime attempts (time 1; predictor variable) must be related to rumination and P-Certainty (time 2; mediators), and also to suicidal ideation (time 2; outcome variable). Additionally, rumination and P-Certainty (mediators) must be related to suicidal ideation (outcome variable). Complete mediation is achieved when adjusting for the mediators decreases the relation between the predictor and outcome to zero, and partial mediation is achieved when the relation is significantly diminished but not approaching zero. The significance of the effect of the mediators on the relation between the predictor and outcome was tested via bias-corrected confidence intervals, using a bootstrapping procedure with $n = 1000$ resamples, given the skewed distribution for suicide attempts and suicidal ideation in the sample, as bootstrapping does not assume a normal distribution (Preacher & Hayes, 2008). Confidence intervals that did not include zero indicated statistically significant indirect effects. Bootstrapped confidence intervals were computed using PROCESS for SPSS (Hayes, 2013).

RESULTS

Group Differences and Associations among Study Variables

Means and standard deviations for study measures are presented in Table 1. There were significant differences between groups on baseline rumination, $t(141) = 2.84$, $p < .01$, and symptoms of depression, $t(141) = 2.74$, $p < .01$, with attempters scoring higher on these measures than individuals with no suicide attempt history. On the follow-up measures, suicide attempters had significantly higher scores on rumination, $t(65.1) = 2.58$, $p < .05$, depressive symptoms, $t(141) = 2.88$, $p < .01$, P-Certainty, $t(39.8) = 2.27$, $p < .05$, and hopelessness, $t(141) = 2.38$, $p < .05$, compared to non-attempters. About 27% of participants reported a lifetime history of mental health treatment, with a higher proportion of suicide attempters than non-attempters reporting a lifetime history of mental health treatment, $\chi^2 = 8.71$, $p < .01$ (see Table 1).

Correlations among study variables are presented in Tables 2a and 2b. Number of lifetime suicide attempts (time 1) was significantly and positively associated with all other study variables, including rumination (times 1 and 2), P-Certainty

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TABLE 1. **Demographic Characteristics and Means and Standard Deviations on Study Measures for Non-Attempters and Attempters**

	All		Non-Attempters ($n = 111$)		Attempters ($n = 32$)			
	M	***SD***	***M***	***SD***	***M***	***SD***	***t***	***p***
Age	18.5	1.1	18.5	1.0	18.7	1.5	0.95	.34
	N	**%**	***N***	**%**	***N***	**%**	χ^2	***p***
Sex								
Female	114	80	89	80	25	78	0.07	0.80
Male	29	20	22	20	7	22		
Race/Ethnicity								
Asian	48	34	36	32	12	38	2.80	0.59
Black	15	11	13	12	2	6		
Hispanic	24	17	20	18	4	13		
White	42	29	33	30	9	28		
Other	14	10	9	8	5	16		
Mental health treatment history (lifetime)	38	27	23	21	15	47	8.71	<.01
	M	***SD***	***M***	***SD***	***M***	***SD***	***t***	***p***
Rumination (1) (RRS)	21.51	5.84	20.78**	5.66	24.03**	5.86	2.84	<.01
Rumination (2) (RRS)	20.18	5.69	19.62*	5.89	22.13*	4.48	2.58	.01
P-Certainty (2) (FEQ)	1.43	2.53	1.12*	2.21	2.50*	3.23	2.27	.03
Hopelessness (2) (BHS)	4.36	4.58	3.88*	4.34	6.03*	5.05	2.38	.02
Depressive Sxs (1) (PHQ-9, excluding #9)	7.77	4.67	7.21**	4.35	9.72**	5.26	2.74	<.01
Depressive Sxs (2) (PHQ-9, excluding #9)	5.70	4.26	5.16**	4.13	7.56**	4.21	2.88	<.01
Suicidal Ideation (2) (BSS)	1.20	3.36	0.93	3.20	2.13	3.77	1.64	.11

Note. $^*p < .05$, $^{**}p < .01$ (1) Indicates measures at baseline. (2) Indicates measures at follow-up.
P-Certainty = Certainty about Pessimistic Future-Event Predictions; Depressive Sxs = Depressive Symptoms, measured by items 1–8 on the PHQ-9.

TABLE 2a. **Pearson Correlations among Study Measures**

	1	2	3	4	5	6	7	8
1. Lifetime attempts (1)	—							
2. Rumination (1)	.27**	—						
3. Rumination (2)	.24**	.54**	—					
4. P-Certainty (2)	.23**	.15	.40**	—				
5. Hopelessness (2)	.18*	.34**	.55**	.45**	—			
6. Depressive Sxs (1)	.26**	.56**	.36**	.18*	.31**	—		
7. Depressive Sxs (2)	.21*	.35**	.54**	.40**	.57**	.48**	—	
8. Suicidal Ideation (2)	.21*	.14	.46**	.56**	.51**	.15	.37**	—

Note. $^*p < .05$, $^{**}p < .01$.
(1) Indicates measures at baseline.
(2) Indicates measures at follow-up.

TABLE 2b. **Pearson Correlations among Study Measures by Attempt Status**

	1	2	3	4	5	6	7
1. Rumination (1)	—	.50**	.11	.29	.55**	.41*	.07
2. Rumination (2)	.53**	—	.39*	.42*	.33	.39*	.52**
3. P-Certainty (2)	.09	.39**	—	.38*	−.03	.19	.48**
4. Hopelessness (2)	.32**	.57**	.46**	—	.36*	.38*	.55**
5. Depressive Sxs (1)	.53**	.35**	.22*	.24*	—	.48**	.11
6. Depressive Sxs (2)	.28**	.55**	.44**	.61**	.45**	—	−.04
7. Suicidal Ideation (2)	.13	.44**	.59**	.47**	.13	.48**	—

Note. $^{**}p < .01$; $^{*}p < .05$.
(1) Indicates measures at baseline.
(2) Indicates measures at follow-up.
Correlations for suicide attempters ($n = 32$) are reported above the diagonal and for non-attempters ($n = 111$) are reported below the diagonal.

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(time 2), and suicidal ideation (time 2). P-Certainty was significantly and positively correlated with rumination, hopelessness, depressive symptoms at baseline and follow up, and suicidal ideation at follow-up but not with rumination at baseline. Hopelessness was significantly and positively correlated with all other variables.[2]

Rumination and P-Certainty as Mediators of the Relation between Suicide Attempt History and Suicidal Ideation

Two regression analyses were conducted to examine the paths from predictor to mediators. In the first regression, lifetime suicide attempts (time 1) was examined as a predictor of rumination at follow up (time 2). In the second regression, lifetime suicide attempts (time 1) was examined as a predictor of P-Certainty at follow up (time 2). Suicide attempts at baseline was associated with rumination at follow up, ($\beta = 0.24, p < .01$) and also with P-Certainty at follow up ($\beta = 0.23$, $p < .01$). Next, a hierarchical linear regression was conducted in which lifetime suicide attempts (time 1), rumination (time 2), and P-Certainty (time 2) were examined as predictors of suicidal ideation (time 2). Lifetime suicide attempt history (time 1) was entered into the first step of the analysis, and rumination (time 2) and P-Certainty (time 2) were entered in step 2. Suicide attempts at baseline predicted suicidal ideation at follow up, ($\beta = 0.22, p < .01$), but not after adjusting for rumination and P-Certainty ($\beta = 0.06$, $p = .41$). Rumination at follow up ($\beta = 0.26$, $p < .01$) and P-Certainty at follow up ($\beta = 0.45$, $p < .01$) concurrently predicted suicidal ideation, adjusting for lifetime suicide attempt history. The 95% CI for the indirect relation between lifetime suicide attempt history and suicidal ideation through rumination (95% CI = 0.10–0.57) and P-Certainty

[2]Lifetime history of mental health treatment was also significantly and positively correlated with study variables, including number of previous lifetime suicide attempts, $r(141) = .24$, $p < .01$, rumination at baseline, $r(141) = .29$, $p < .01$, and follow up, $r(141) = .29$, $p < .01$, and depressive symptoms at baseline, $r(141) = .35$, $p < .01$, and follow up, $r(141) = .23$, $p < .01$. However, it was not significantly associated with predictive certainty at baseline, $r(141) = .15$, $p = .08$, or suicidal ideation at follow up, $r(141) = .14$, $p = .09$.

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TABLE 3. **Multiple Linear Regressions of Suicidal Ideation on Lifetime Suicide Attempts, Rumination, and P-Certainty**

Block		*b*	*S.E.*	*β*	Partial *r*	Model *F*
1	Lifetime attempts (1)**	0.85	0.32	0.22	.22	7.16**
2	Lifetime attempts (1)	0.22	0.27	0.06	.07	28.34**
	Rumination (2)**	0.15	0.04	0.26	.29	
	P-Certainty (2) **	0.58	0.10	0.45	.46	
3	Lifetime attempts (1)	0.22	0.26	0.06	.07	21.06**
	Rumination (2)	0.08	0.05	0.14	.14	
	P-Certainty (2)**	0.49	0.10	0.37	.39	
	Hopelessness (2)**	0.23	0.06	0.31	.29	
	Depressive Sxs (2)	−0.04	0.07	−0.05	−.05	

Note. $^{*}p < .05$, $^{**}p < .01$.
(1) Indicates measures at baseline.
(2) Indicates measures at follow-up.
b = unstandardized regression coefficient.
β = Standardized regression coefficient.

(95% CI = 0.05–1.14) did not include zero.[3] This model accounted for 37% of the variability in suicidal ideation. Analyses are presented in Table 3 (Blocks 1 and 2), and the final model is presented in Figure 1.

A third regression analysis was conducted to determine whether rumination (time 2) and depressive predictive certainty (time 2) would remain statistically significant predictors of suicidal ideation (time 2) even after adjusting for general hopelessness (time 2) and symptoms of depression (time 2) at follow-up (see Table 3, Block 3). P-Certainty, $\beta = 0.37$, $p < .01$, but not rumination, $\beta = 0.14$, $p = .10$, continued to predict suicidal ideation, even after hopelessness, $\beta = 0.31$, $p < .01$, and depressive symptoms, $\beta = -0.05$, $p = .56$, were added

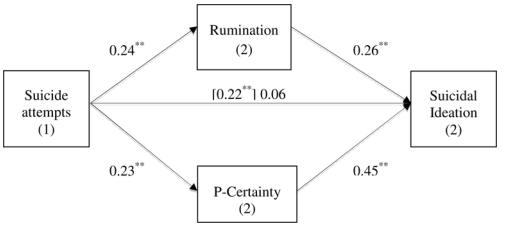

FIGURE 1. *Rumination and P-Certainty as mediators of the relation between previous lifetime suicide attempts and future suicidal ideation. Note.* $^{*}p < .05$, $^{**}p < .01$; *[ ] Prior to adjusting for Rumination and P-Certainty. Coefficients shown are standardized regression coefficients. (1) Indicates measures at baseline. (2) Indicates measures at follow-up.*

[3]We also conducted the same analyses by splitting total P-Certainty scores into predictive certainty about the presence of negative outcomes and certainty about an absence of positive outcomes, and these were included as separate mediators (along with rumination). We found that predictive certainty when anticipating negative future outcomes (95% CI = 0.04–0.97), but not certainty when anticipating an absence of positive future outcomes (95% CI = −0.02–0.32), mediated the relation between number of previous suicide attempts and future suicidal ideation. However, because there was little variability in predictive certainty about an absence of positive outcomes ($M = 0.28$, $SD = 0.78$, range = 0–5), relative to certainty about negative outcomes ($M = 1.15$, $SD = 2.06$, Range = 0–9), the present analyses used the total score for predictive certainty involving both the anticipation of negative future outcomes and an absence of positive future outcomes.

as predictors, with this third model accounting for a total of 42% of the variability in ideation.

DISCUSSION

This study sought to investigate whether rumination and certainty about pessimistic future-event predictions would be associated with lifetime suicide attempt history, and to test whether rumination and P-Certainty would explain the prospective relation between number of previous lifetime suicide attempts and future suicidal ideation, to begin to elucidate the cognitive processes that increase vulnerability to suicidal thinking among individuals with a history of suicidal behavior. Consistent with our predictions, rumination and P-Certainty mediated the relation between number of previous lifetime suicide attempts and future suicidal ideation, and P-Certainty was associated with ideation even after adjusting for hopelessness and symptoms of depression. These findings suggest that ruminative thinking and certainty when making pessimistic predictions about the future are independently associated with suicidal ideation, and that P-Certainty is associated with ideation, beyond general hopelessness. These variables may explain why suicide attempts confer risk for continued suicidal ideation.

Rumination, Predictive Certainty, and Suicide Attempts

Individuals who reported, at baseline, having made a previous suicide attempt scored higher on rumination and predictive certainty than individuals with no previous attempts, but they did not have higher suicidal ideation. Thus, while individuals with a history of a suicide attempt, generally, did not appear to be more vulnerable than non-attempters to suicidal ideation years later, they were more vulnerable to cognitions that are associated with suicidal ideation—specifically to rumination and to being certain about their pessimistic future-event anticipations. However, number of lifetime suicide attempts was positively associated with rumination, P-Certainty, and suicidal ideation, suggesting that the more suicide attempts an individual has made in the past, the more vulnerable an individual might be to experience not only cognitions that are associated with suicidal ideation but also to suicidal ideation, itself. These findings are consistent with our suggestion of a cognitive path to increased risk among past suicide attempters and with previous research suggesting that individuals with a history of more than one suicide attempt are more clinically impaired (Rudd, Joiner, & Rajab, 1996) and at higher risk for future suicidal behavior (Miranda, Scott, Hicks et al., 2008) than are individuals with a history of one or no attempts.

In contrast to previous research (e.g., Miranda & Nolen-Hoeksema, 2007), rumination at baseline was not directly associated with suicidal ideation at follow up, and P-Certainty was only assessed at follow up, making it difficult to draw conclusions about the direction of the relation among rumination, P-Certainty, and suicidal ideation. However, rumination at follow up and P-Certainty at follow up were associated with suicidal ideation, and they explained the relation between lifetime suicide attempts and suicidal ideation. Thus, perhaps having a suicide attempt history increases risk for future suicidal thoughts and behavior because it leads to ruminative thinking and also to increased certainty about pessimistic future-event predictions.

Such an explanation would be consistent with other models of suicide risk, such as the Integrated Motivational-Volitional (IMV) Model of suicidal behavior (O'Connor, 2011), which attempts to account for the progression from experiences of defeat and humiliation to suicidal ideation and intent, and with models suggesting that

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previous suicidal behavior sensitizes individuals to future suicidal ideation and behavior (Joiner, 2005; Rudd, 2000). Perhaps previous suicide attempters are more vulnerable to responding to negative experiences with ruminative thinking, which, in turn, leads to increased feelings of entrapment through both an increased expectation of being unable to escape unwanted future outcomes or of being unable to attain desired outcomes (see also Abramson, Alloy, Hogan et al., 1989).

These findings are also consistent with previous research suggesting that a ruminative cognitive style (Miranda & Nolen-Hoeksema, 2007) and certainty about pessimistic future-event predictions (Sargalska, Miranda, & Marroquín, 2011) are important risk factors for suicidal ideation, and thus for suicidal behavior, given that suicidal ideation is a strong predictor of future suicide attempts (Brown, Beck, Steer, & Grisham, 2000; Lewinsohn, Rohde, & Seeley, 1994). Moreover, this study expanded previous research by suggesting that rumination and pessimistic certainty may explain why previous suicide attempts confer risk for future suicidal behavior. Collectively, these findings support our model of an indirect association between lifetime suicide attempts and suicidal ideation through rumination and predictive certainty. Finally, the fact that predictive certainty was statistically associated with suicidal ideation beyond hopelessness and depressive symptoms suggests that being *certain* about one's pessimistic future-event anticipations contributes to suicidal ideation beyond general negative future expectancies and may do so independently of level of depression.

Limitations and Future Directions

This study has several limitations, including the relatively low number of individuals with a previous suicide attempt history, the assessment of a suicide attempt history via one question that was not confirmed by interview (nor was "suicide attempt" defined for participants, so that we were not able to rule out non-suicidal self-injury), and the assessment of predictive certainty and suicidal ideation at follow-up but not at baseline (thus limiting our ability to draw conclusions about the direction of the relation between certainty and suicidal ideation). In addition, suicidal ideation at follow up was assessed with respect to a 1-week period, and thus, suicidal ideation that may have been experienced at other times during the follow-up period was not captured. Finally, this was a non-clinical sample of college students that was oversampled for a suicide attempt history. Oversampling for a suicide attempt history may have introduced more variability in suicidal ideation than would have been present in a representative sample. Future research should be conducted with community and clinical samples.

Previous research has suggested that certainty in pessimistic future-event predictions might develop through rumination—specifically, through rumination about the future (see, e.g., Andersen & Limpert, 2001), and that rumination leads to such certainty via increased cognitive fluency in making future-event predictions (Andersen & Limpert, 2001; Andersen, Spielman, & Bargh, 1992; Miranda & Andersen, 2008). The present study examined self-focused rumination and did not assess future-oriented rumination. Future research should specifically examine other types of rumination (e.g., rumination about the future) that might be implicated in risk for suicidal ideation and should better-specify the mechanisms (e.g., development of cognitive fluency) through which individuals become certain about their pessimistic anticipations of the future and thus are at increased risk of suicidal ideation. In addition, while rumination was concurrently and positively associated with suicidal ideation in the present

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study (implying that individuals who more frequently engage in rumination may experience higher predictive certainty than individuals lower in rumination), rumination measured at baseline was not associated with predictive certainty at follow up. Future research should examine whether certainty about a pessimistic future develops through rumination or whether rumination is a consequence of pessimistic certainty. For instance, Nolen-Hoeksema and colleagues suggest that rumination enables individuals to avoid taking action in situations that they experience as hopeless (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Additional research in which rumination and predictive certainty are measured at multiple points in time would help to answer this question.

Conclusion

To our knowledge, this is the first study investigating whether rumination and certainty about pessimistic future-event predictions account for the relation between lifetime suicide attempts and future suicidal ideation. Our findings suggest that a history of suicide attempts may confer risk for suicidal ideation (and thus behavior) through rumination and certainty in pessimistic future-event predictions. Addressing ruminative thinking in treatment may be one way of reducing hopelessness-related cognitions that give rise to suicidal ideation, particularly among individuals who have previously made a suicide attempt. Treatment should also directly address individuals' pessimistic future expectancies, for instance, by elevating clients' certainty about *positive* future events or simply by decreasing their certainty in their pessimistic anticipations.

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