



# Social Rejection and Suicidal Ideation and Attempts among Adolescents Following Hospitalization: a Prospective Study

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## Abstract

Despite research indicating that stressful life events are associated with subsequent suicidal ideation (SI) and behavior, there is a lack of clarity regarding whether specific types of life events are differentially related to SI and attempts. The current prospective study examines whether social rejection related life events are proximally related to SI and suicide attempts in a clinically acute sample of adolescents. Adolescents aged 12 to 18 ( $n = 219$ ) were followed for 6 months after discharge from inpatient hospitalization. A contextual threat interview of stressful life events between index admission and 6-month follow-up was administered. Participants were also assessed for current SI and suicide attempts at baseline and 6-month follow-up. Results from a multiple linear regression model indicated a significant prospective association between number of social rejection stressors and SI, even after controlling for baseline depressive symptoms, SI at study entry, gender, age, and number of non-social rejections stressors. An Anderson-Gill recurrent events model was conducted to examine the relationship between SR stressors and suicide attempts. Results demonstrated that the 31 days following a major social rejection stressor were associated with heightened risk for prospective suicide attempts. However, social rejection stressors were not more strongly related to risk for suicide attempt than non-social rejection stressors. These findings help clarify the role of social rejection as a precipitant of suicidal crises and have potential to inform more accurate, targeted risk assessment.

**Keywords** Life stress · Social rejection · Adolescents · Suicidal ideation · Suicide attempts

Suicide is the second leading cause of death in the United States among individuals between the ages of 12–24 (Stone et al. 2018). Suicidal ideation (SI) and suicide attempts are key risk factors for suicide death (Ribeiro et al. 2016). Thus, arriving at a better understanding of underlying factors associated with the development and maintenance of SI and suicidal behavior is crucial for the development of novel interventions

and prevention strategies. Although research investigating risk and protective factors for suicidal thoughts and behavior has been conducted for many years and intervention efforts have been increasing, no corresponding decrease has been observed in the prevalence of SI, suicide attempts, or suicide death (Kessler et al. 2015; Nock et al. 2008; Stone et al. 2018). This difficulty predicting and intervening on suicidal thoughts and behavior is likely because they are multi-determined and influenced by a convergence of psychological, biological, and environmental factors (Cha et al. 2017). As such, it is crucial to develop a better understanding of the context and precipitants of suicidal events and crises. Negative life events have received substantial empirical and theoretical attention in the literature because of their association with suicidal thoughts and behaviors.

Recent systematic reviews suggest that negative life events, particularly of an interpersonal nature, predict many forms of self-injurious thoughts and behaviors including SI, suicide attempts, non-suicidal self-injury (NSSI), and death by suicide (Franklin et al. 2016; Liu et al. 2016; Liu and Miller 2014). However, there is a need for studies with greater specificity in the types of stressful life events assessed in relation to suicidal

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thoughts and behaviors. That is, many studies assess stressful life events as a broad, general construct, leaving unclear the types of life events that are most highly associated with suicidal thoughts and behaviors. This lack of specificity presents a problem identifying the contexts in which suicidal thoughts and behaviors most often occur in adolescence; understanding the specific types of life stressors most etiologically relevant to such outcomes is important for its potential to inform intervention efforts (Liu and Miller 2014). Interpersonal life events and major loss life events are the most specific categories of stressful life events that have been shown to be associated with risk for suicidal thoughts and behaviors in adolescents (Daniel et al. 2017; Mackin et al. 2017). However, interpersonal life events in themselves constitute broad categories of stressors that commonly occur.

We propose that life events characterized by the experience of rejection may play an important role as a precipitant of suicidal thoughts in adolescence. Rejection events characterized by the active, exclusive, and intentional social rejection of an individual (e.g., romantic partner initiated break-up of relationship, end of friendship initiated by close friend) by another have been found to predict onset of depression three times faster than similarly stressful negative life events in adults (Slavich et al. 2009). There are theoretical and empirical reasons to suspect that rejection events may be of relevance to suicide thoughts and behaviors, particularly in adolescence. Given that this period of development is associated with higher susceptibility to peer influence and sensitivity to peer rejection (Sebastian et al. 2010; Somerville 2013), it is likely that exclusion from social relationships or interactions is of particular etiological relevance to development of SI. As such, it is important to assess the construct of social rejection as it relates to recurrence of suicidal thoughts and behavior.

In addition, the interpersonal theory of suicide (IPTS; Joiner 2005) offers a compelling conceptual framework for why rejection may be particularly relevant to increases in SI. The IPTS posits that a thwarted need for belongingness and perceived burdensomeness proximally predict the desire for suicide (Joiner 2005; Van Orden et al. 2010), and significant research supports this assertion (Ma et al. 2016; Van Orden et al. 2010). Perceived burdensomeness refers to the belief that people important to the individual would be better off if the individual were dead, while thwarted belongingness refers to the unmet evolutionarily driven need to belong to a social group. Events threatening an individual's sense of belongingness may contribute to increased desire for suicide. Rejection, inasmuch as it relates to the intentional severing of relational ties and relational devaluation, may also impact an individual's sense of belongingness and perhaps their burdensomeness. This relationship suggests that rejection may be a powerful precipitant to suicidal thoughts, presenting a period of increased vulnerability for suicidal desire, particularly among individuals already at heightened risk for

suicidal thoughts. However, the IPTS suggests that an additional construct, capability for suicide, is necessary for increasing risk for lethal suicide attempt. Whereas rejection would theoretically increase suicidal desire, the IPTS would suggest that an additional construct, suicide capability, would be necessary to increase proximal risk for engagement in suicidal behavior. As such, while rejection may lead to increases in SI, it would, by itself, not be sufficient to predict increases in the likelihood of suicide attempts.

Many studies have found chronic, self-reported feelings of parental or peer rejection to be associated with suicidal thoughts and behaviors among adolescents and young adults (Chiodo et al. 2012; Cruz et al. 2015; Fotti et al. 2006; Heilbron and Prinstein 2010; Klimes-Dougan et al. 1999; Meza et al. 2016; Prinstein et al. 2000; Ross et al. 1983; Sobrinho et al. 2016). These studies, however, relied on self-reported subjective feelings of rejection, which may be unreliable. Specifically, the participant's report of rejection may reflect a mood-congruent bias associated with the suicidality in itself or reflect increased levels of rejection sensitivity for emotionally vulnerable adolescents rather than objectively occurring stressors characterized by social exclusion and demotion. (Chango et al. 2012). Although the former certainly is important for understanding the context of suicidal thoughts and behavior, a stressful life event marked by objective indicators of social rejection has unique clinical value as a discretely observable precipitant of suicidal thoughts or behavior. Thus, research is needed to investigate the relationship between objective occurrence of social rejection (SR) stressors and suicidal thoughts and behaviors.

In addition to the lack of specificity among interpersonal stressors present in the literature on negative life events, there are important methodological considerations in terms of the assessment of life stress that challenge the quality of the research conducted in this area. First, the measures used to assess the presence of stressful life events vary significantly in quality. Self-report measures of life stress, used in the majority of studies, often confound psychopathology (e.g., depression), or characteristics associated with psychopathology (e.g. cognitive distortions), with the construct they are intended to assess (Hammen 2005; Kessler 1997; Monroe 2008). Contextual threat interviews, which consist of a systematic identification of event occurrences and subsequent probing for objective contextual information, were developed to address the limitation that the endorsement of life events on a checklist may be caused by idiosyncratic judgments potentially biased by emotional states (Brown and Harris 1978; Hammen 2005). These interviews are more effective in predicting outcomes, more precise in dating of events and general recall of events, and less affected by mood-congruent biases (Mcquaid et al. 2000; Simons et al. 1993). However, only 3.2% of studies in this area utilize the contextual threat interview, constituting a significant limitation in the literature (Liu and Miller 2014).

In addition, the life event recall periods employed in previous studies tended to be quite long, with less than 25% of studies assessing life events in a period of less than 12 months (Liu and Miller 2014). The length of recall periods is an important concern given evidence that for adolescents, the recollection of major life events tends to fade after seven months (Monck and Dobbs 1985). Furthermore, there is also considerable temporal overlap in the assessment of stressful life events and suicide related outcomes in prior studies. Approximately 90.5% of studies in the literature employ a cross-sectional design, which makes it more difficult to establish temporal precedence of life stress and suicidal thoughts or behavior or to rigorously assess the degree to which recent stressful life events are associated with subsequent suicidal behavior after considering prior suicidal thoughts or behaviors (Liu and Miller 2014). Addressing these limits is important for understanding precisely the temporal nature of the relation between these constructs.

The objective of the current study is to examine SR life stressors prospectively in relation to SI and suicide attempts among a sample of adolescent psychiatric inpatients. The current study addresses previously discussed limitations by using a contextual threat interview to test the relationship between stressors and SI and suicide attempts in a longitudinal design, and by examining the association of suicidal thoughts and attempts with both SR and non-SR stressors. We hypothesize based on the IPTS and previous empirical work that SR stressors will be prospectively associated with SI among psychiatrically acute adolescents when controlling for non-SR stressors. Additionally, we do not hypothesize that SR stressors will be a stronger predictor of suicide attempts than non-SR stressors.

## Method

### Participants

Participants were 219 adolescents between the ages of 12 and 17 recruited from an adolescent psychiatric facility in the northeastern United States. The mean age was 14.88 (SD = 1.49) and 74.3% were female. Participants were 81.9% White, 6.5% Black, 2.8% Asian, 8.3% multiracial, 0.5% other, and 16.4% identified as Hispanic/Latino. Participants were recruited as a part of two different studies: a randomized controlled trial (RCT) evaluating the efficacy of a tailored intervention for high-risk suicidal adolescents ( $n = 120$ ), and a naturalistic longitudinal study ( $n = 99$ ). Participants were eligible for participation in the naturalistic longitudinal study if they had been admitted to an inpatient psychiatric facility for any reason within a month of consent. Exclusion criteria for this study were minimal, and only those who were unable to speak English, were acutely psychotic, had an IQ below 80, or fell

outside of the established age range were excluded from the study. Adolescents were eligible for the RCT if suicidal thoughts or behaviors were the primary reason for hospitalization, and they met full criteria for major depressive disorder (MDD), dysthymia, or mood disorder not otherwise specified. Participants eligible for the RCT must have also experienced one of the following three co-occurring risk factors: 1) non-suicidal self-injury (NSSI) on at least 5 occasions in the past 6 months 2) a suicide attempt or 3) recurrent substance abuse. Further exclusion criteria from the RCT included a primary diagnosis of either obsessive-compulsive disorder or an eating disorder. The intervention for the RCT had been completed prior to final data being collected for this study. Studies did not differ with respect to participant age,  $t(217) = -1.30$ ,  $p = .582$ , sex,  $\chi^2(1) = 0.28$ ,  $p = 0.600$ , number of SR events between baseline assessment and 6-month follow-up,  $t(217) = 0.79$ ,  $p = 0.191$ , or SI at baseline,  $t(217) = -1.77$ ,  $p = 0.084$ . Participants in the RCT reported more severe depressive symptoms,  $t(217) = -4.13$ ,  $p < 0.001$ ; however, both samples reported well above clinical levels of depressive symptoms. The study samples also did not differ in relation to SI at 6-month follow-up,  $t(217) = -0.69$ ,  $p = 0.126$ , or with respect to whether a suicide attempt was reported between the baseline assessment and 6-month follow-up,  $\chi^2(1) = 1.47$ ,  $p = 0.225$ . Participant characteristics and diagnoses are presented in Table 1.

### Procedures

Trained master's and doctoral level clinicians and advanced post-baccalaureate research assistants assessed all potential participants for eligibility. Potentially eligible participants and their families were approached by trained study staff, and those willing to participate provided informed consent. Rhode Island Hospital institutional review board study approval was obtained for the study. Subsequently, participants were administered a comprehensive assessment battery consisting of semi-structured interviews and self-report questionnaires. At baseline assessment, participants were administered a semi-structured diagnostic interview to assess for eligibility, semi-structured interviews assessing depressive symptoms and suicidal behavior, and a self-report questionnaire assessing SI. In addition to the baseline assessment measures, participants were assessed six months following their discharge from the hospital. At the six-month follow-up, participants were administered semi-structured interviews assessing suicidal behavior, and life stress since baseline assessment in addition to the questionnaire assessing SI. The six-month follow-up interval was chosen based on prior evidence that the recollection of major life events tend to fade in adolescents after approximately seven months (Monck and Dobbs 1985). The naturalistic follow up study and RCT

**Table 1** Descriptive characteristics of study sample

Variables	Distribution	
	Randomized Controlled Trial ( <i>n</i> = 120)	Naturalistic Longitudinal Study ( <i>n</i> = 99)
Baseline Characteristics ( <i>m</i> / <i>SD</i> )		
Age	15.01 (1.48)	14.75 (1.48)
Baseline suicidal ideation	47.61 (21.75)	41.89 (26.16)
Baseline depressive symptoms	76.55 (7.68)	70.79 (12.75)
Baseline Diagnoses, <i>n</i> (%)		
Major Depressive Disorder	108 (90.0%)	62 (62.6%)
Bipolar Disorder	2 (1.7%)	5 (5.15)
Generalized Anxiety Disorder	50 (41.7%)	34 (34.7%)
Social Anxiety Disorder	44 (36.7%)	32 (32.3%)
Obsessive Compulsive Disorder	9 (7.5%)	10 (10.1%)
Panic Disorder	18 (15.0%)	16 (16.2%)
Attention Deficit Hyperactivity Disorder	30 (25.0%)	26 (26.3%)
Oppositional Defiant Disorder	22 (18.3%)	13 (13.1%)
Conduct Disorder	3 (2.5%)	4 (4.0%)
Post-traumatic Stress Disorder	22 (18.3%)	16 (16.2%)

reported similar rates of retention by the follow-up assessment (90% and 86% respectively).

## Measures

**Depressive Symptoms** Depressive symptoms were assessed using the Children's Depression Rating Scale – Revised (CDRS-R; Poznanski and Mokros 1996), a 17-item rating scale administered by interview, adapted from the adult Hamilton Depression Rating Scale. Responses range from a scale of 1 to 5 or 1 to 7, and higher total scores indicate higher levels of past two-week depressive symptom severity. Total scores of 44 or above indicate clinical levels of depressive symptoms. The CDRS-R is a widely used measure with good reliability and validity within adolescent samples (Mayes et al. 2010).

**Stressful Life Events** Stressful life events were measured using the UCLA Life Stress Interview (LSI), modified for use with adolescents (Hammen and Brennan 2001). The LSI is a semi-structured interview utilizing the contextual threat method of life stress assessment (Brown and Harris 1978), which emphasizes the context-dependent nature of stressful life events in terms of their impact on mental health. Interviewers systematically assessed the presence of any event reported by the adolescent that occurred within the time between the baseline assessment and the 6-month follow-up date, and collected information on the context, specific date, and nature of the life event. Structured initial probes, temporal anchors, and monthly calendars were used as aids to assist in the accurate recall of life event dates. After the administration of the LSI to the

adolescent participant, interviewers then presented the narrative form of the events, including the context surrounding the nature of the event, but excluding the subjective reactions from the participants, to a team of trained coders blind to psychopathology of the participants. The coding team, which consists of 3 or more trained assessors, then determined the objective impact score on a scale of 1 (*no significant threat or negative impact*) to 5 (*maximal negative impact or threat*) for each event based on relevant contextual details. Details relevant for coding include the nature of the event, consequences, expectedness, duration, and chronicity, among other relevant contextual factors. Given that events with objective impact scores of 1 constitute no significant threat or negative impact, these events were not included in our study. Stressful life events between baseline and 6-month assessment were used for the purposes of the current study.

In addition to objective stress ratings for each life event, narrative forms of the events were reviewed and coded to determine whether they met criteria for social rejection. Any event initiated by an individual other than the participant that is characterized by exclusion from a social relationship or social interaction is defined as an SR stressor. The operationalization of an SR stressor in this study included any life event characterized by social exclusion by someone with whom the participant had any existing relationship. Life events characterized by social exclusion that appear to be intentional rejection, but were not explicitly or clearly communicated to be intentional rejection were also coded as SR stressors. These stressors occurred across family, peer, and romantic domains. Examples of SR stressors in our study included partner initiated break-ups, non-custodial parents

ending familial relationships, and end of friendships where the friend initiated the dissolution of the relationship. In order to determine reliability of the SR stressor coding, 20% of participants had their life stress interviews coded twice by two independent coders, and inter-rater reliability was assessed. Reliability was excellent for SR stressors ( $\kappa = 0.90$ ). For the purpose of data analyses predicting SI, the number of life events meeting criteria for social rejection were summed for each participant and used as a predictor in our model. Further, the number of negative life events not characterized by rejection were summed for each participant and used as a covariate in analyses to control for overall life stress not attributable to rejection related life events. Examples of non-SR stressors include death of a family member, failing classes, and parental divorce.

**Suicidal Ideation** Suicidal ideation was assessed with the Suicidal Ideation Questionnaire – Junior (SIQ-JR; Reynolds and Mazza 1999), a continuous measure of SI specifically developed for youth consisting of 15 self-report items. The SIQ-JR was administered at both baseline and 6-month follow up time-points. This measure assesses suicidal thoughts in the past 30 days using a 7-point Likert scale ranging from 0 (“*I’ve never had this thought*”) to 6 (“*Almost every day*”) assessing frequency of various thoughts related to death and suicide. The sum of all individual items reflects the severity of SI over the past 30 days. Scores range from 0 to 90, with a score of 31 reflecting clinically elevated SI. This measure has demonstrated adequate concurrent and construct validity and good internal consistency with a clinical sample of adolescents (Reynolds and Mazza 1999). Internal consistency in the current sample was high at baseline ( $\alpha = 0.94$ ) and six-month follow up ( $\alpha = 0.96$ ).

**Suicide Attempts** Suicide attempts were defined in the current study as any self-injurious behavior or potentially self-injurious act associated with any intent to die as a result of that behavior. The Columbia Suicide Severity Rating Scale (C-SSRS; Posner et al. 2011) was administered to assess the occurrence of suicide attempts. The C-SSRS is a semi-structured interview demonstrating strong psychometric properties and validated with clinical adolescent samples (Posner et al. 2011). Specifically, the questions used to assess the presence of suicide attempts in the past 6 months were as follows: “Have you ever tried to kill yourself or make yourself not alive anymore?” and “Have you ever tried to hurt yourself on purpose with at least a part of you trying to die or end your life?” If a participant indicated a suicide attempt at the 6-month follow up, the date of the attempt was recorded, using the same procedures above involving calendar aids and temporal anchors to enhance accuracy. If a participant endorsed multiple suicide attempts at the 6-month follow up, the date of the first attempt after the time of discharge from the index

admission was used in analyses. A rigorous protocol was implemented, with an average training period of three to four months before interviewers administered the measure independently. Given the centrality of this measure to the studies, each interview was reviewed shortly after assessment by the senior author, while blind to all other study data, and individualized feedback was provided as needed. Interviewers conferred with the senior author whenever coding questions arose.

## Data Analysis

As an initial analytic step, we examined means, standard deviations, and variability of all study variables. Due to the skew of the SIQ-JR scores at 6-month follow up, a square root transformation of the dependent variable was used for subsequent analyses. The square root transformation adequately reduced the non-normality of the distribution, with skewness of 0.07 and kurtosis of  $-0.36$ .

To assess whether the number of rejection life events is associated with SI at 6-month follow-up, a multiple linear regression was conducted. In this model, baseline SI, depressive symptoms, number of SR stressors, and number of non-SR stressors were examined as predictor variables of SI at six-month follow-up. The total number of non-SR stressors excluded all stressors that met criteria for social rejection. In our first model, we included all stressors with impact scores above 1 to examine the additive effect of SR stressors, regardless of objective stress level, on adolescent SI at 6-month follow up. Previous research also has used sum of objective impact scores or only the number of moderate to severe stressors (i.e. only stressors with objective impact scores between 3 and 5) to operationalize episodic life stress (Hammen 2005). As such, we ran two additional models to determine whether the pattern of results held despite the operationalization of stressors. In the second model, the sum of objective impact scores for all SR stressors and for all non-SR stressors were used. In the third model, the number of SR stressors and non-SR stressors with objective impact scores 3 or higher were included. Given that sex, age, depressive symptoms, and previous SI have been shown to predict future SI (Nock et al. 2008; Ribeiro et al. 2016), we included these covariates in all of our models.

To examine the relationship between SR stressors and suicide attempts, we used an Andersen-Gill recurrent events model (Andersen and Gill 1982). Andersen-Gill models are an extension of Cox Regression survival analysis models ideal for modeling repeated events and accommodating time-varying covariates. In our longitudinal models of time to attempts, we focused on the 31-day period of time triggered by the occurrence of an SR stressor as time-varying covariates. Several studies have indicated that major life events increase the likelihood of future suicide primarily in the 1–3 months

following the stressful life events (Cooper et al. 2002; Foster 2011). Consistent with these findings, descriptive statistics indicated that for participants who experienced a stressful life event preceding their suicide attempt, 75% of those life events occurred within 31 days preceding the attempt. Whereas it is possible that events prior to the 31-day period of time influence risk for suicide attempt, it may be redundant to look at longer periods of time preceding suicide attempts as the majority of life events occur within one month. Further, given the purpose of the study was to assess short-term precipitants and the context surrounding suicidal ideation and suicide attempts, a shorter time period was chosen.

In Anderson Gill models of suicide attempts, we also examined only stressors that were moderate to severe in impact. This was done both for practical and conceptual reasons. Practically, it was difficult to model the multiple periods of time following SR and non-SR stressors of any level of impact because of the frequency of occurrence of all stressors. Conceptually, there is a body of research that suggests that moderate to severe life stress, relative to mild life stress, may be more etiologically relevant to stress related psychopathology (Hammen 2005; Paykel et al. 1975). In other studies examining the role of life stress in depression and suicidal thoughts and behaviors, there is a precedent for examining stressful life events of moderate and severe impact with objective ratings of 3 and higher (Hammen 2005; Paykel et al. 1975; Slavich et al. 2009; Uliaszek et al. 2012; Vrshek-Schallhorn et al. 2015).

For this study, we focused only on time to first post-index-hospitalization attempt because of the limited number of individuals with multiple attempts in the follow-up. The Anderson-Gill model was used to accommodate both fixed, time-invariant covariates and time varying covariates in predictive models. The time varying covariates included in the model were the 31-day periods of time following either a non-SR or SR stressor. The fixed covariates were sex, age, baseline suicide-attempt status, baseline SI, and baseline depressive

symptoms. Time to suicide attempt, the dependent variable in the survival model, had a start date equivalent to the date of discharge at the index hospitalization. The Anderson-Gill model was conducted through Statistical Analysis System (SAS).

## Results

### Preliminary Analyses

Means, standard deviations, and bivariate correlations between study variables are presented in Table 2. At baseline, 58.0% ( $n = 127$ ) of the sample had previously made a suicide attempt at least once in their life, and 26.9% ( $n = 59$ ) of the overall sample had attempted more than once. Between the baseline assessment and six-month follow-up, 18.3% ( $n = 40$ ) of participants made a suicide attempt, and 59.8% ( $n = 131$ ) of participants experienced at least one SR stressor. The average number of SR stressors experienced was 1.09, whereas the average number of non-SR stressors was 4.74 indicating very high levels of episodic stress in this sample. The number of non-SR stressors was significantly correlated with number of SR stressors. SI at six-month follow up was positively correlated with baseline depressive symptoms, baseline SI, sex, and all stressor variables. Baseline depressive symptoms, SI at both baseline and the follow-up assessment, and all stressor variables were positively correlated with whether a participant had engaged in a suicide attempt by the 6-month follow-up.

### Longitudinal Associations between Social Rejection and Suicidal Ideation

In order to examine whether the number of SR stressors was uniquely associated with SI at 6-month follow up, we conducted a linear regression analysis. This procedure allows for

**Table 2** Correlations between primary study variables

	Mean/ %	SD	1	2	3	4	5	6	7	8
1. Baseline suicidal ideation	45.02	23.96	–							
2. 6-month suicidal ideation	21.06	19.60	0.48**	–						
3. Baseline depressive symptoms	73.95	10.66	.54**	0.30**	–					
4. Age	14.89	1.48	–0.07	0.02	0.15*	–				
5. Female	74.4%		0.26**	0.24**	0.25**	–0.07	–			
6. Baseline lifetime suicide attempt	58.0%		0.35**	0.06	0.26*	–0.02	0.33**	–		
7. 6-month suicide attempt	18.3%		0.19*	0.29**	0.16*	0.03	0.17*	0.12	–	
8. Social rejection stressors	1.09	1.19	0.23**	0.33**	0.15*	–0.02	0.16*	0.06	0.15*	–
9. Non-social rejection stressors	4.74	2.79	0.02	0.15*	0.09	0.15*	0.14*	0.10	0.23**	0.20**

$N = 219$ , \*  $p < 0.05$ , \*\*  $p < 0.01$

an examination of the whether rejection related stressors predict SI above and beyond other covariates potentially related to SI. In addition, given the significant positive correlation between number of SR stressors and number of non-SR stressors ( $r = 0.20, p < 0.01$ ), non-SR stressors were added as a covariate to control for the potential effect of overall stress. Sex was also included as a moderator variable, but was not retained in the final model as the interaction effect was not statistically significant ( $\beta = -1.61, p = 0.26$ ).

In the final model, results indicated the included predictors explained 31.6% of the variance in SIQ-JR scores at 6-month follow up ( $R^2 = 0.316, F(6,211) = 17.74, p < 0.001$ ). The total number of SR stressors significantly predicted SI ( $\beta = 0.38, p < 0.01$ ) over and above all other covariates, including total non-SR life stress count. This indicates that the total number of SR stressors over the follow-up was related to the severity of SI, even after controlling for the number of non-SR stressors. Non-SR stressors were included in the model as a covariate but were not significantly related to SI. These results are presented in Table 3. The sensitivity analyses examining SR stressors and non-SR stressors using the sum of total objective impact ratings revealed the same pattern of results, with the sum of objective stress ratings for SR stressors significantly associated with SI at 6 months ( $\beta = 0.12, p < 0.01$ ). As well, in the third model examining only the number of moderate to severe SR stressors, SR significantly predicted SI at 6 months ( $\beta = 0.85, p = 0.05$ ), indicating this pattern holds regardless of operationalization of stressful life event.

### Longitudinal Associations between Social Rejection and Suicide Attempts

The results of the Andersen-Gill recurrent event model are presented in Table 4. In the survival analysis evaluating time to first prospective suicide attempt, the 31-day periods of time following SR stressors were associated with increased likelihood of attempts  $\chi^2(1) = 5.01, HR = 0.33, p = 0.03$ . However, there was no difference in time to suicide attempt between SR stressors and non-SR stressors. Higher reported SI at baseline

**Table 3** Linear regression model of the association between SR stressors and suicidal ideation at 6-month follow up

Predictor	<i>B</i>	<i>SE</i>	<i>t</i> <sup>a</sup>	<i>p</i>	<i>f</i> <sup>2</sup>
Male	-0.80	0.31	-2.56	0.01	
Age	0.17	0.09	1.87	0.06	
Baseline suicidal ideation	0.04	0.01	5.96	<0.001	
Baseline depressive symptoms	0.00	0.02	0.11	0.91	
Non-social rejection stressors	0.04	0.05	0.87	0.38	
Social rejection stressors	0.38	0.11	3.37	0.001	0.05

*N* = 219

<sup>a</sup> *df* = 1

**Table 4** Andersen-Gill recurrent events model predicting time to prospective suicide attempt

Predictor	<i>B</i>	<i>SE</i>	$\chi^2$ <sup>a</sup>	HR	<i>p</i>
Male	-1.16	0.59	3.87	0.31	0.05
Age	-0.05	0.13	0.12	0.96	0.73
Baseline suicidal ideation	0.03	0.01	6.60	1.03	0.01
Baseline depressive symptoms	0.02	0.02	0.45	1.02	0.50
No baseline suicide attempts	0.52	0.47	1.23	1.68	0.27
Stressor type*					
No stressor	-1.12	0.50	5.01	0.33	0.03
Non-social rejection stressor	0.26	0.25	1.08	1.30	0.30

*N* = 219, \* Reference group = Social rejection stressors; HR = hazard ratio

<sup>a</sup> *df* = 1

was associated with quicker time to suicide attempt,  $\chi^2(1) = 6.60, HR = 1.03, p = 0.01$ . Further, male participants had lower likelihood of suicide attempts over the follow-up,  $\chi^2(1) = 3.87, HR = 0.31, p = 0.05$ . Age, baseline depressive symptoms, and baseline lifetime suicide attempt status were not found to be related to time to suicide attempt (Table 4).

### Discussion

Understanding the context of suicide ideation and attempts, particularly as it relates to stressful precipitants, among vulnerable adolescents is critical for the development of novel prevention efforts. Unfortunately, very little is understood about time-sensitive or temporally delimited risk factors leading up to suicidal events (Glenn and Nock 2014). To address various methodological issues and increase understanding of the most common precipitants to increases in SI, we examined whether rejection-related stressors occurring within a six-month follow up period are associated with late SI, or hasten time to suicide attempt. Consistent with our study hypothesis, the number of rejection life events was associated with SI at six-month follow-up, even after considering other potent risk factors such as baseline SI, depressive symptoms, sex, age and number of stressors not characterized by rejection. In fact, when both number of SR life events and number of other life events were included in the model, only SR life events were associated with increased SI, suggesting they may be a powerful driver of SI among adolescents most vulnerable to fluctuations in risk for this outcome.

Also consistent with theoretical work (Van Orden et al. 2010), SR stressors were not associated with significantly higher likelihood of suicide attempt than were other stressors. However, SR stressors were related to time to suicide attempt when compared to no occurrence of moderate to severe stressor. This finding suggests that SR life events are associated

with increased engagement in suicide attempts, but not more so than any other major stressors. A better understanding of the content of life events that incur the greatest risk for suicidal behavior will improve clinicians' ability to assess high-risk periods for engagement in imminent suicidal behaviors.

These findings provide support for the IPTS, which claims that suicidal ideation and behavior are associated with distinct factors in accordance with the ideation-to-action framework (Klonsky and May 2015). This framework suggests that stress exposure contributes to the development, worsening, and eventual transition from thoughts to suicidal behavior, but that the development of suicidal thoughts and the transition from thoughts to behavior are distinct processes with distinct explanations (Klonsky and May 2015). More specifically, the IPTS posits that perceived burdensomeness and/or thwarted belongingness are necessary for increases in suicidal desire, but that a capability for suicide is necessary for the transition from ideation to attempts (Van Orden et al. 2010). As such, acute life events that activate or increase these key cognitive-affective states would be most likely to proximally increase SI, although they may not proximally increase risk for suicide attempts. The results of the current investigation support the ideation-to-action framework by suggesting that SR stressors are proximally related to increases in SI, but do not specifically predict the transition from ideation to behavior.

Research has previously established a relationship between self-reported feelings of rejection and suicidal thoughts and behaviors (Fotti et al. 2006; Prinstein et al. 2000), and also a temporal relationship between interpersonal life stressors and suicidal thoughts and behaviors among adolescents (Daniel et al. 2017; Mackin et al. 2017). The only other study to investigate the relationship between life events characterized by active, exclusive and intentional social rejection and SI or suicide attempts failed to find a temporal association between the two when controlling for other predictors of SI (Massing-Schaffer et al. 2018). These findings do not necessarily conflict with those of the present study. One potential explanation for the differences in findings may have to do with important differences in the time frame adopted in each study. That is, whereas the earlier study assessed the association of rejection life events with suicidal ideation up to 18 months later, the current investigation evaluated the etiological role of more proximal stressors. Collectively, these studies are complementary in delimiting the potential temporal window (i.e., six months or shorter) in which rejection life stressors may have an etiological effect on suicidal ideation. As a recent meta-analysis has identified the three months following psychiatric hospitalization as the most critical risk period for suicide death (Chung et al. 2017), the current findings are able to differentiate, among a very high-risk group, those that will experience maintenance of these distressing symptoms in the most critical time for risk identification.

In addition, the current investigation utilized a contextual threat measure of life stress, which is relatively immune to mood-congruent, subjective description or endorsement of various life events based on participant report that may confound results (Monroe 2008). The majority of previous studies investigating life events and suicidal thoughts and behaviors relied on self-report measures, making the current study one of the very few utilizing the gold-standard assessment of life stress, particularly with adolescents (Liu and Miller 2014; McQuaid et al. 2000). Due to the longitudinal nature of the study, we were able to establish a clean temporal relationship between rejection-related life events and SI, which is important given the paucity of research with clinical samples with clear separation between stressful life events and subsequent SI (Liu and Miller 2014). Given that previous research has established that a six month time frame is ideal for accurate recall of life events for adolescents (Monck and Dobbs 1985), baseline SI was controlled for, and SI at follow up was measured assessing the last 30 days specifically, there is a particularly low chance that SI temporally preceded rejection life events. For suicide attempts, our examination of the 31-day windows of time immediately following stressors as a period of time for increased attempts, explicitly helped us to ensure that any attempts occurred after the stressors. Lastly, and in contrast to cross-sectional studies prevalent in the existing literature, we were able to control for other potential confounding factors such as depressive symptoms, and demographic characteristics, lending greater confidence to the unique role of rejection stressors as a risk factor for SI in particular among high-risk adolescents.

The present findings should be interpreted with consideration of the following limitations. While we suspect that perceived burdensomeness and thwarted belongingness mediate the association between rejection life events and SI, the current analyses did not directly assess this relationship. Theoretically, it is likely that rejection specifically activates key cognitive-affective states, namely perceived burdensomeness and thwarted belongingness, that have been shown to be associated with increases in SI (Van Orden et al. 2012). Yet, it is possible that other mechanisms may mediate the relationship between objective indicators of rejection and increases in SI. Similarly, in the current study, we did not directly assess capability for suicide, which could theoretically moderate the relationship between rejection life events and suicide attempts. Suicide attempt history, sometimes used as a proxy indicator of capability for suicide, was not used as a moderator in analyses due to the complications of utilizing this variable as a measurement of suicide capability in the current study. Given that a requirement for eligibility for a subset of the sample was repeated NSSI or suicide attempt history, suicide attempt status would likely serve as a poor indicator of capability for suicide in the sample (i.e., it would fail to reflect the theoretically elevated capability for suicide in



those who had no suicide attempt history but have engaged in NSSI). Future studies should further examine intrapersonal mechanisms underlying the relationship between objective, acute SR stressors and subsequent SI and potential theoretically important moderators of the relationship between SR stressors and suicide attempts among adolescents.

Second, despite the importance of identifying objective SR stress as a factor associated with increases in SI, many adolescents who experience SR stressors will not experience a corresponding increase in ideation. There are likely key vulnerability factors that predict which adolescents experiencing SR will experience a contemporaneous increase in SI. A possible vulnerability may be an adolescent's interpretation of stressors as rejecting and hurtful. More specifically, previous work has shown that following a rejection manipulation, individuals demonstrating high levels of rejection sensitivity have been shown to have higher levels of self-directed hostile cognitions (Breines and Ayduk 2015). Thus, future studies should assess rejection sensitivity among adolescents as a potential moderator of the association between SR stressors and subsequent increases in SI.

The current study employed a six-month follow up period, which is much shorter than the average of 52 months in most studies of risk factors for suicidal thoughts and behaviors (Ribeiro et al. 2016). However, given that the SIQ-JR was administered six months following psychiatric hospital discharge and only assesses SI in the month prior to the follow up assessment, no information is available with regard to SI throughout the assessment period. As such, the current study does not reflect fluctuations in SI over time, or the immediate impact of acute, rejection related stressors on SI. Ecological momentary assessment (EMA) allows for intensive and repeated assessment of behavior in real-time, which would provide an important complement to the current study by allowing for the examination of fluctuations of SI in real time. Previous research suggests that this method of assessment yields higher endorsement of SI than traditional assessment (Czyz et al. 2018). As such, the use of this methodology could be used in future investigations to further understand rejection as a proximal risk factor for increases in SI. That caveat notwithstanding, the results of the current study are the first to demonstrate that among high-risk adolescents, social rejection related events are particularly related to increased risk for SI in the weeks or months following the event. As well, the SIQ-JR measures intensity and frequency of SI over the past 30-days, which overlaps slightly with the timeframe in which life events were measured. As such, it is possible that some SR stressors could have occurred in the window of the time referenced by the SIQ-JR, rather than the preceding five months. Last, it should be acknowledged that although this study sheds light on a theoretically and clinically important precipitant of suicidal ideation and attempts, suicidal behavior is multiply determined and associated with a variety of contexts.

In conclusion, results suggest that the experience of acute, rejection related life events might be particularly important in the context of increases in SI among adolescents at high risk for recurrence of suicidal thoughts and behaviors. As such, the results of the current study provide evidence for the potential role of rejection related life events in understanding the context of increases in suicidal desire among adolescents following psychiatric hospitalization.

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## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

**Ethical Approval and Informed Consent** All participants provided informed consent under an approved IRB study protocol.

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