

Trajectories of Suicidal Ideation among Adolescents Following Psychiatric Hospitalization

Jennifer C. Wolff^{1,2,3} · Stephanie Davis^{1,2} · Richard T. Liu^{1,2} · Christine B. Cha⁴ ·
Shayna M. Cheek² · Bridget A. Nestor¹ · Elisabeth A. Frazier^{1,2} ·
Maya Massing Schaffer¹ · Anthony Spirito^{1,2}

Published online: 27 March 2017
© Springer Science+Business Media New York 2017

Abstract Suicidal ideation (SI) is a common presenting problem for psychiatric hospitalizations in adolescents and often persists following discharge. This study examines whether distinct trajectories of SI could be delineated following hospitalization and the risk factors most strongly related to these trajectories. Adolescents ($N = 104$; 76 females; 28 males) were followed for 6 months after discharge from inpatient or partial hospitalization. Semi-parametric group modeling identified SI trajectory group membership. In all, 33.7% of adolescents fell in a Subclinical SI group, 43.3% in a Declining SI group, and 23.1% in a Chronic SI group. Multinomial logistic regression was utilized to examine baseline predictors of group membership. Emotion dysregulation differentiated Chronic SI from Declining SI. In multivariate analyses, adolescents endorsing greater non-acceptance of emotional responses ($OR = 1.18$) and more limited access to emotion regulation strategies ($OR = 1.12$) were more likely to belong to the Chronic SI than Declining SI trajectory. Those in the Chronic SI group also had the greatest number of suicide attempts and hospitalizations in the 6 months post-discharge. These results suggest that clinicians should closely monitor and address emotion dysregulation when assessing suicide risk. Greater dysregulation may require more intensive services in order to have an effect on chronic SI.

Keywords Chronic suicidal ideation · Trajectories · Emotion regulation

Suicide is currently the second leading cause of death among adolescents and young adults (Centers for Disease Control and Prevention 2014), as the prevalence of suicidal ideation (SI), defined as serious thought or desire to kill oneself, sharply increases during adolescence (Nock et al. 2013). SI is one of the most common mental health presentations to emergency departments and predicts subsequent hospitalizations (Peterson et al. 1996). Typically, SI is not an isolated instance, and is in fact the most recurrent suicide-related outcome (Borges et al. 2008).

Despite the fact that the period following psychiatric hospitalization is an especially high-risk period for suicidal adolescents (Goldston et al. 1999), only a few studies have examined SI trajectories among adolescents following inpatient hospitalization. Czyz and King (2015) followed adolescents 12 months after their hospital discharge and identified three discrete SI trajectories. These three groups were categorized according to severity and persistence of subsequent SI: subclinical, elevated and fast declining, and chronically elevated. The subclinical group maintained below-threshold levels of SI up to 12 months after hospital discharge. The elevated and fast declining group endorsed clinically significant levels of SI, marked by a rapid decline within three months after discharge. The chronically elevated group featured a slowly decreasing severity of SI over the 12 months—approaching but consistently above the clinical cutoff. These three trajectories were similarly detected for suicidal thoughts and behaviors more broadly, from adolescence to adulthood (Goldston et al. 2016).

Compared to the relatively static outcome of SI occurrence, SI trajectories are a dynamic outcome and require more fine-grained examination. Prior work has also shown that fluctuation and recurrence of SI are common and clinically relevant

✉ Jennifer C. Wolff
jennifer_wolff@brown.edu

¹ Warren Alpert Medical School of Brown University, Providence, RI, USA

² Bradley Hospital, Riverside, RI, USA

³ Rhode Island Hospital, Providence, RI, USA

⁴ Teachers College, Columbia University, New York, NY, USA

(Czyz and King 2015; Prinstein et al. 2008). According to Czyz and King (2015), most adolescents fall in the elevated and fast declining group, and those adolescents in the chronically elevated group are at especially greater risk for subsequent rehospitalization and suicide attempts. The recurrence of SI and potential impact on other clinical outcomes (e.g., depression, suicide attempts; Lewinsohn et al. 1994; Vander Stoep et al. 2011) speaks to the importance of better understanding trajectories of SI over time.

Studies have begun to identify risk factors for more severe post-discharge trajectories of SI, including psychiatric factors such as depressive symptoms, anxiety, externalizing symptoms, and nonsuicidal self-injury (NSSI; Czyz and King 2015; Prinstein et al. 2008; Zhang et al. 2011). In addition to psychiatric factors, individual psychological processes, such as hopelessness, have been found to distinguish SI trajectories. In fact, Czyz and King (2015) found that the chronically elevated group of suicidal adolescents reported greater hopelessness (vs. elevated and fast declining, vs. sub-clinical), even after controlling for other risk factors including depressive symptoms and externalizing problems. Hopelessness has also been shown to characterize persistently suicidal adults (Zhang et al. 2011). The current study builds on this work by exploring other key psychological processes, specifically emotion dysregulation.

An understudied but promising risk factor of persistent SI among adolescents is emotion dysregulation defined as poorly modulated emotional responses. There is mounting theory and evidence in support of this possibility. Regarding theoretical and conceptual support, Linehan's (1993) Biosocial Theory emphasizes the central role of emotion dysregulation in the persistence of self-injurious thoughts and behaviors. The Biosocial Theory asserts that poor emotion regulation is marked by lower threshold of emotional activation, higher intensity of emotions, and slower return to baseline. When paired with an invalidating environment, poor emotion regulation perpetuates self-injury and suicidality as individuals desire to escape negative emotional states and cannot identify other coping strategies. In support of Linehan's theory, empirical findings suggest that emotion dysregulation helps perpetuate SI. Poor emotion regulation skills have been found to increase the odds of suicidal ideation, plans, and attempts in children (Tamás et al. 2007). Among adolescents, those who endorsed multiple suicide attempts reported greater emotion dysregulation than single attempters (Esposito et al. 2003). Recent studies have explored emotion regulation as a multifaceted construct and found that specific components of emotion dysregulation, such as lack of emotional awareness, poor coping regulatory strategies, and non-acceptance of emotions predict repeated self-harm (Gratz and Roemer 2004; Rajappa et al. 2012). In addition, lower thresholds to activate emotional states (i.e., affective sensitivity), have been shown to prospectively predict adolescent SI occurring at any week over the next 6 months (Selby et al. 2013). Moreover, weekly ratings of

affective sensitivity consistently predicted SI one week later. Despite these advances, it remains unknown whether specific components of emotion dysregulation characterize specific SI trajectories.

The current study focuses on SI trajectories during the high-risk period following inpatient hospitalization, and addresses two aims. First, we aim to replicate Czyz and King (2015) identification of three discrete SI trajectories. Aligned with recent research priorities on short-term risk factors for suicide (Glenn and Nock 2014), we focus on a shorter time frame of 6 months (vs. 12 months). Second, we aim to identify what risk factors differentiate membership in these groups. Because of the important clinical ramifications of identifying those at highest risk that do or do not remit over time, predictors differentiating the highest risk groups are examined. Here we test whether emotion dysregulation predicts discrete SI trajectories over and above traditional risk factors for SI (i.e., depressive and anxiety symptoms as well as hopelessness). This investigation not only builds on aforementioned theory and evidence, but offers a potential target for identifying and treating chronic SI trajectories in youth.

Method

Participants

The participants in this study were recruited at a university-affiliated adolescent psychiatric hospital for one of two different studies: a randomized outpatient clinical trial or a longitudinal naturalistic follow-up study. Studies did not differ with respect to participant age, $t(102) = 0.48$, $p = .629$, gender, $\chi^2(1, n = 104) = .89$, $p = .347$, depressive symptoms, $t(100) = 0.94$, $p = .352$, history of sexual abuse, $t(76) = -.745$, $p = .459$, non-suicidal self-injury (NSSI), $t(102) = -1.617$, $p = .109$, or SI at baseline, $t(102) = .49$, $p = .629$. The two studies had similar rates of recruitment (consenting 69% and 72% of those approached, respectively) and retention (93% and 98% at three months; 88% and 93% at 6 months). The final sample included 104 participants ($n = 67$ from the randomized clinical trial and $n = 37$ from the naturalistic study) between the ages of 12 and 18 ($M = 14.96$, $SD = 1.51$) who had reports of SI at three time-points (77% of those in the original dataset with no significant differences in missing data between the two studies). Participants were 73% female, 84% Caucasian, 8% Black, 3% other races, and 9% multiracial, and 20% identified as Hispanic/Latino. Of the participants in our study, 77% completed the suicidal ideation measure at all three time points, and 94% completed at least two time-points. Independent-samples t -tests and χ^2 analyses were conducted to compare individuals who had completed the assessment of SI at every time-point to those who did not ($n = 32$). These two groups did not differ with respect to age, t

(134) = 1.69, $p = 0.093$), gender, $\chi^2(1, n = 136) = .87$, $p = .350$, race, $\chi^2(3, n = 135) = .23$, $p = .973$, or depressive symptoms at baseline, $t(131) = -.18$, $p = .855$.

Adolescents were recruited from both an adolescent inpatient unit and partial hospitalization program. Participants were identified for the study through a medical record review. Eligibility criteria across both studies included: 1) English or Spanish speaking adolescent and parent; 2) adolescent assent (consent for 18 year olds); and 3) consent of a parent/legal guardian. Adolescents in the clinical trial also needed to meet criteria for: 1) evaluation due to SI or a suicide attempt; 2) major depressive disorder (MDD), dysthymia, depression or mood disorder not otherwise specified (NOS); and 3) at least one of the following co-occurring risk factors: NSSI, at least one prior suicide attempt, or a substance use disorder. Adolescents were excluded from both studies due to the presence of: 1) cognitive or development delays; 2) autism spectrum disorder; or 3) a psychotic disorder. In addition, youth were excluded from the clinical trial if they had: 1) used “hard” illicit substances, such as heroin and opiates, 13 or more times over the prior 90 days, or 2) whose primary diagnosis was either obsessive compulsive disorder (OCD) or an eating disorder.

Procedure

Across both studies, adolescents were administered a diagnostic interview and screened for cognitive disability ($IQ < 80$) using the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler 1999). Participants meeting study eligibility criteria then completed interviews and self-reports assessing for SI, suicidal events, depressive symptoms, anxiety symptoms, hopelessness, and emotion regulation. Participants were re-evaluated for SI three and 6 months following their discharge from the hospital.

Measures

Psychiatric disorders, including current depression diagnoses, were assessed at baseline using the Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS-PL; Kaufman et al. 1997). The K-SADS-PL is a semi-structured diagnostic interview that provides a reliable and valid measurement of DSM-IV diagnoses in children and adolescents. Ratings were based on child report of symptoms. Post-baccalaureate research assistants, masters-level clinicians, and post-doctoral fellows were trained in K-SADS administration by a clinical psychologist with extensive experience with this interview. Kappa coefficients of agreement were computed between these raters and an experienced, licensed psychologist who randomly selected and listened to 20% of audio-taped interviews. The mean Kappa across diagnoses was .90.

Suicidal ideation was assessed using the Suicide Ideation Questionnaire – Junior (SIQ-JR; Reynolds and Mazza 1999), a 15-item self-report measure used to assess SI in the past 30 days. All items were rated on a 7-point Likert scale ranging from 0 (*I've never had this thought*) to 6 (*almost every day*). Individual scores were summed, with higher total scores reflecting more severe SI. Total scores range from 0 to 90 with a clinical cutoff score of 31. The SIQ is a widely used and validated measure that has demonstrated good internal consistency, and adequate concurrent and construct validity for this population (Reynolds and Mazza 1999). Internal consistency in the current sample was high ($\alpha s = .94-.97$ across all time points).

Depressive Symptoms were assessed using the Children's Depression Inventory 2 (Kovacs 2010). The CDI-2 is a 28-item self-report measure of depressive symptoms over the last two weeks in children and adolescents aged 7–17, with higher total scores indicative of greater depressive symptom severity. The suicidality item was excluded from the original measure so as not to conflate this measure with the SIQ. The CDI-2 has demonstrated good reliability and validity in clinical samples (Figueras Masip et al. 2010; Hodges and Craighead 1990). In the current study, internal consistency was high ($\alpha = .90$).

Anxiety symptoms were assessed using the Screen for Child Anxiety Related Disorders (SCARED; Birmaher et al. 1999; Birmaher et al. 1997), a 41-item self-report questionnaire rated on a 3-point Likert scale. The total score ranges from 0 to 82. This measure has demonstrated good internal consistency and discriminant validity (Birmaher et al. 1997; Birmaher et al. 1999). In the current study, the alpha level was .96.

Hopelessness was measured using the Hopelessness Scale for Children (HSC; Kazdin et al. 1983; Kazdin et al. 1986), a 17-item true/false self-report questionnaire with each item scored 0 or 1. Total scores range from 0 to 17, with higher scores reflecting greater hopelessness. The HSC has been shown to have adequate reliability (Spirito et al. 1988). Internal consistency in the current sample was high ($\alpha = .89$).

History of sexual abuse was measured using the Childhood Trauma Questionnaire (CTQ; Bernstein and Bernstein and Fink 1998). The CTQ consists of 28 items that are rated on a 5-point scale ranging from *Never True* to *Very Often True*. For the purposes of the current study, only the sexual abuse measure was used and responses were dichotomized such that a positive endorsement of any history of sexual abuse was coded as a 1 and negative responses were coded as a 0.

NSSI was measured with the Self-Injurious Thoughts and Behavior Interview (SITBI, Nock et al. 2007). The SITBI is a structured interview that assesses the presence, frequency, and characteristics of a wide range of self-injurious thoughts and behaviors, both suicidal and NSSI. For the current study, NSSI was defined as any non-suicidal self-injury within the past 30 days.

Emotion Regulation was assessed using the Difficulties in Emotion Regulation Scale (DERS; Gratz and Roemer 2004). The DERS is a 36-item self-report questionnaire with items

rated on a 5-point Likert scale ranging from 0 (*Almost never*) or 4 (*Almost always*). The DERS has been shown to have acceptable test-retest reliability (Gratz and Roemer 2004). This measure yields a total score as well as six subscales including Nonacceptance of Emotional Responses ($\alpha = .89$), Difficulties Engaging in Goal Directed Behavior ($\alpha = .86$), Impulse Control Difficulties ($\alpha = .86$), Lack of Emotional Awareness ($\alpha = .79$), Limited Access to Emotion Regulation Strategies ($\alpha = .87$), and Lack of Emotional Clarity ($\alpha = .83$) (Gratz and Roemer 2004).

Suicide attempts were assessed using the Columbia-Suicide Severity Rating Scale (C-SSRS; Posner et al. 2011). Attempts between baseline and 6-month follow-up were dichotomized (yes/no) based on responses to the question, “in the past 6 months have you ever tried to kill yourself or make yourself not alive anymore or have you ever tried to hurt yourself on purpose with at least a part of you trying to die or end your life”? Attempts were considered as any self-injurious behaviors or potentially self-injurious acts committed with at least some wish to die as a result of that act. The C-SSRS has been validated for use with clinical adolescent and demonstrates strong psychometric properties (Posner et al. 2011).

Hospitalizations were coded based on a review of participants’ medical records. Any psychiatric hospitalization in the 6 months post-hospitalization was coded as *yes*.

Analytic Plan

We utilized Nagin’s (2005) semi-parametric group-based modeling procedures to identify trajectory group membership for SI across the 6-month follow-up period. This analytic approach identifies clusters of individuals who have distinct patterns of behavior

(Nagin 2005). The trajectory group analyses were completed in SAS (PROC TRAJ, SAS Institute Inc., Cary, NC) and analyses of baseline predictors of trajectory group membership were completed in SPSS (version 22). Given the clinical importance of differentiating between those who remain at high risk and those who do not, we chose to focus on the two trajectories that initially reported elevated suicidal ideation. Therefore, for these latter analyses, the Declining SI group was chosen as the reference group. A series of univariate multinomial regression analyses were first conducted, regressing trajectory group membership on hopelessness, emotion dysregulation, depressive symptoms, anxiety symptoms, history of sexual abuse, and NSSI. Predictors that were significant in these analyses at $p < 0.05$ were then entered into a multivariate multinomial regression analysis. For our predictor variables, missing data were handled by imputing the mean on scores in which participants had completed at least 75% of the measure.

Results

Descriptive Analyses

Table 1 presents mean SI scores at baseline, three months, and 6 months, and the correlations among SI and predictor variables. Depressive symptoms, hopelessness, anxiety, and emotion dysregulation were all positively associated with SI at all time points. Amongst these predictors, depressive symptoms were positively associated with hopelessness, anxiety symptoms, and emotion dysregulation. Levels of hopelessness were positively associated with anxiety symptoms and emotion dysregulation.

Table 1 Correlations between primary study variables ($N = 104$)

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Baseline SIQ-JR	47.37	23.52	-	.43**	.39**	−0.08	.20*	.57**	.39**	.53**	.30**	.40**	.32**	.41**	.55**	.41**
2. 3-month SIQ-JR	27.06	19.69		-	.52**	0.07	.17	.39**	.25*	.22*	.36**	.25*	.10	.10	.31**	.27**
3. 6-month SIQ-JR	21.58	20.35			-	0.08	.19	.36**	.37**	.33**	.42**	.22*	.16	0.07	.41**	.30**
4. Age	14.96	1.51				-	<−0.01	.17	0.04	−0.01	.23*	.13	−0.03	−.15	0.05	.10
5. Female	73.10%						-	.20*	.26*	.22**	0.09	0.01	0.03	.21*	.17	.17
6. CDI-2	24.13	10.50						-	.56**	.54**	.38**	.43**	.38**	.34**	.63**	.55**
7. SCARED	42.52	18.72							-	.30**	.51**	.29**	.32**	.12	.54**	.42**
8. HSC	7.00	4.76								-	.40**	.41**	.26**	.34**	.53**	.49**
9. DERS – non-acceptance	17.33	6.41									-	.46**	.30**	0.05	.60**	.37**
10. DERS – goals behavior	17.91	4.99										-	.45**	.18	.66**	.37**
11. DERS – impulse	17.53	6.08											-	0.07	.53**	.32**
12. DERS – Awareness	19.01	5.05												-	.31**	.48**
13. DERS – strategies	26.51	7.44													-	.58**
14. DERS – clarity	14.96	4.67														-

SIQ-JR, Suicidal ideation questionnaire JR; CDI-2, Children’s depression inventory – 2; SCARED, Screen for Child anxiety related disorders; HSC, Hopelessness Scale for children; DERS, Difficulties in Emotion regulation scale

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$

Trajectory Analyses

We first compared a two- and three-group model using the Bayesian Information Criterion (BIC) score, in which lower values indicate a more parsimonious model. The three-group model had a slightly lower BIC score (−1328.93) than the two-group model (−1338.12). We followed Nagin's (2005) recommended diagnostic procedures for determining model accuracy. Fit statistics can be seen in Table 2. In both the two- and three-group models, the average posterior probability for all groups was above the recommended 0.7 and the odds of correct classification (OCC) for all groups were greater than 5. Additionally, the actual proportion of individuals assigned to each group was similar to the probability of group membership. Given the comparable fit statistics, we selected the three-group model, as this allowed us to differentiate youth with chronic SI from youth with acute, transient SI, whereas the two-group model only distinguished youth who had high versus low SI.

Table 3 contains the parameter estimates for the final three-group model and Fig. 1 depicts this model. Individuals were classified into the group in which they had the largest posterior probability score. The first group, hereafter referred to as the Subclinical SI Group, included 33.7% of the sample ($n = 35$). The Subclinical SI Group included individuals with subclinical levels of SI at all three time points. The second group, which we labeled the Declining SI Group, included 43.3% ($n = 45$) of the sample. The Declining SI Group included individuals that had initial high levels of SI ($M = 61.38$, $SD = 12.71$) and whose SI declined over the three-month ($M = 22.47$, $SD = 13.65$) and six-month follow-up period ($M = 16.04$, $SD = 11.95$). The third group, hereafter referred to as the Chronic SI Group, included the remaining 23.1% ($n = 24$) of the sample. Individuals in the Chronic SI Group had consistently high levels of SI at baseline ($M = 60.79$, $SD = 16.92$), 3-month follow-up ($M = 53.13$, $SD = 13.80$), and 6-month follow-up ($M = 47.92$, $SD = 20.74$).

Table 2 Model fit statistics for two- and three-group models

	Probability of group membership	Proportion classified in group	Average posterior probability	Odds of correct classification
Two-group model				
Group 1	.47	.46	.89	9.29
Group 2	.53	.54	.90	7.60
Three-Group Model				
Group 1	.35	.34	.91	19.21
Group 2	.43	.43	.85	7.61
Group 3	.22	.23	.86	22.11

Multinomial Logistic Regression Analyses

Preliminary multinomial regression analyses examined whether age or sex predicted group membership. Age did not significantly differentiate the Subclinical SI group, $B = .12$, Wald $\chi^2(1) = .63$, $p = .426$, or the Chronic SI group, $B = 0.05$ Wald $\chi^2(1) = 0.09$, $p = .764$, from the Declining SI group. Sex also did not significantly differentiate the Subclinical SI group, $B = .25$, Wald $\chi^2(1) = .27$, $p = .606$, or the Chronic SI group, $B = -1.05$ Wald $\chi^2(1) = 2.23$, $p = .135$, from the Declining SI group. Therefore, age and sex were not included as covariates in subsequent analyses.

Univariate multinomial logistic regression analyses were run to examine whether baseline variables were predictors of group membership. Table 4 presents means and standard deviations for the predictor variables by trajectory group. Given our primary interest was in distinguishing the Chronic SI group from the Declining SI group, the Declining SI Group was the reference group for all analyses.¹ As shown in Table 5, youth who had higher levels of depressive symptoms, higher levels of anxious symptoms, higher levels of hopelessness, more difficulty engaging in goal directed behavior, greater lack of emotional awareness, more limited access to emotion regulation strategies, greater lack of emotional clarity, history of sexual abuse, and more NSSI were less likely to belong to the Subclinical SI group than the Declining SI group. Additionally, emotion dysregulation differentiated the Chronic SI group from the Declining SI group. Specifically, individuals with greater non-acceptance of emotional responses and more limited access to emotion regulation strategies were more likely to belong to the Chronic SI group than the Declining SI group.

Given our primary interest in differentiating the Chronic SI from the Declining SI group, predictors that significantly differentiated these two groups at the univariate level were included in a multivariate multinomial regression model. In this model (Table 5), youth who had higher levels of hopelessness were less likely to belong to the Subclinical SI group than the Declining SI group. Additionally, individuals with greater non-acceptance of emotional responses were more likely to belong to the Chronic SI group than the Declining SI group.²

Although the small sample size precluded analyses related to suicide attempts and re-hospitalizations, data collected

¹ Analyses using the Subclinical SI group as the reference group are available upon request.

² When all predictors were included in the multivariate model, a potential suppressor effect was observed for the emotion regulation variables, likely due to the high correlation between non-acceptance of emotional responses and limited access to emotion regulation strategies ($r = .60$, $p < .001$). Therefore, we ran the multivariate model twice, once including non-acceptance of emotional responses and once including limited access to emotion regulation strategies. The suppressor effect remained in the latter model, so our final model only includes the non-acceptance of emotional responses subscale. For more details regarding suppressor effects, see Cohen and Cohen (1983), Tzelgov and Avishai (1991), Tabachnick and Fidell (1996).

Table 3 Parameter estimates for trajectories of suicidal ideation

	Subclinical suicidal ideation (<i>n</i> = 35)		Declining suicidal ideation (<i>n</i> = 46)		Chronic suicidal ideation (<i>n</i> = 24)	
	B	SE	B	SE	B	SE
Intercept	22.03	3.14***	60.33	3.54***	61.03	3.32***
Linear Slope	−2.37	0.71**	−17.03	2.77***	−2.38	1.06*
Quadratic Slope			1.62	0.42***		

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$

between baseline and six-month follow-up demonstrated that youth in the Chronic SI Group had the highest rates of suicide attempts and re-hospitalizations. Specifically, 46% of youth in the Chronic SI Group reported a suicide attempt (with two individuals reporting two attempts, two individuals reporting three attempts, and one individual reporting four attempts) compared to 11% of youth in the Declining SI Group (including one individual reporting two attempts) and 3% of youth in the Subclinical SI Group. Similar patterns were found for re-hospitalizations. In the Chronic SI Group, 38% were re-hospitalized (with three individuals re-hospitalized on two occasions and one individual re-hospitalized on three occasions), 16% of the Declining SI Group were re-hospitalized (with one individual having been re-hospitalized twice), and 9% of the Subclinical SI Group were re-hospitalized.

Discussion

The current study employed a group-based trajectory methodology to identify trajectories of SI during the 6 month, high-risk period following inpatient hospitalization. Results indicated three distinct trajectories of SI post-hospitalization: 1) Subclinical, 2) Declining; and 3) Chronic. These results support previous findings that found distinct courses, rather than a uniform pattern, of suicidal ideation after discharge from an inpatient psychiatric hospital (Czyz and King 2015; Goldston et al. 2016). The Subclinical group included one-third of the sample. These adolescents reported low levels of SI at their baseline assessment that showed a slight improvement post-hospitalization. The Declining trajectory was the largest group, constituting over 40% of the sample. This group had clinically significant levels of SI at baseline (i.e., scores greater than 30) that decreased to a subclinical level by the 3-month follow-up assessment and remained low at the 6-month assessment. This pattern is consistent with the course described by Prinstein et al. (2008) suggesting that many youth exhibit a remission in SI in the 6 months following hospitalization. By contrast, the Chronic SI Group had severe, clinically significant levels of SI that were maintained throughout the 6-month follow-up period. These scores dropped only minimally over the entire 6-month post-hospitalization period.

As the Declining and Chronic SI groups had similarly elevated SI during their initial hospitalization, identifying predictors that differentiate these groups in terms of their eventual course is of particular clinical importance. To identify psychological factors that predict which adolescents continue to have chronic SI after hospitalization, symptoms of depression and anxiety were examined as well as hopelessness, emotion dysregulation, sexual abuse, and NSSI. Results showed that the three trajectories were similar in most of these areas. Surprisingly, and contrary to the findings of Czyz and King (2015), hopelessness did not differentiate the two clinical trajectories. This may be due to the slightly lower reports of baseline hopelessness in the current sample compared to that of the Czyz and King (2015) study.

In the current study, only emotion dysregulation significantly differentiated those with Chronic from Declining SI. Specifically, those who were more dismissive of emotional responses and had limited access to emotion regulation strategies were more likely to report Chronic SI. Such skills play a central role in adolescents' ability to adequately identify feelings and bolster the use of coping skills that can alleviate SI. The finding is also consistent with Linehan's (1993) prevailing Biosocial theory that suggests dysregulation plays a key role in the maintenance of suicidality as adolescents who do not accept their emotional states may experience more guilt or distress that they wish to escape. If they have poorer coping strategies, they may be more likely to think about suicide as a means of escaping these negative emotional states. It should

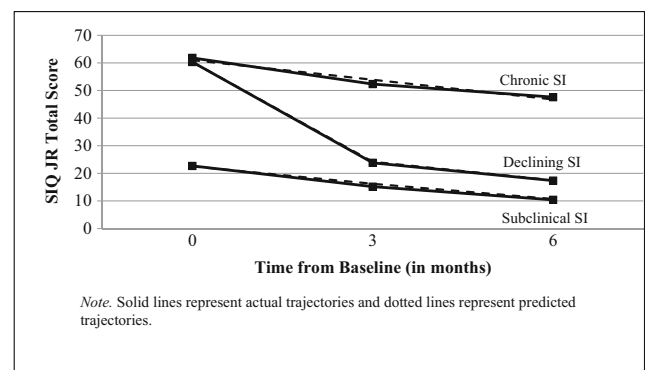
**Fig. 1** Trajectories of Suicidal Ideation (SI)

Table 4 Baseline mean and standard deviations of predictor variables by trajectory groups

	Subclinical suicidal ideation (<i>n</i> = 35) M (SD)	Declining suicidal ideation (<i>n</i> = 45) M (SD)	Chronic suicidal ideation (<i>n</i> = 24) M (SD)
CDI-2	17.18 (10.98)	27.04 (8.52)	28.70 (8.12)
SCARED	32.24 (18.87)	43.38 (17.19)	48.93 (17.79)
HSC	3.80 (3.77)	8.68 (4.96)	9.09 (3.88)
DERS – Non-Acceptance	15.17 (6.59)	16.76 (5.80)	22.18 (4.89)
DERS – Goals Behavior	15.30 (5.16)	18.84 (4.43)	20.24 (4.06)
DERS – Impulse	15.71 (5.95)	18.13 (5.88)	19.29 (6.21)
DERS - Awareness	16.20 (5.45)	21.05 (4.23)	19.19 (3.86)
DERS - Strategies	21.52 (7.77)	28.16 (5.86)	31.29 (4.96)
DERS – Clarity	12.64 (5.01)	15.83 (4.19)	16.96 (3.53)

CDI-2, Children's Depression inventory – 2; SCARED, Screen for child anxiety related disorders; HSC, Hopelessness Scale for children; DERS, Difficulties in emotion regulation scale

be noted that these same emotion dysregulation subscales have been identified as differentiating multiple suicide attempters from those with no suicidal ideation or history of attempts (Rajappa et al. 2012). The findings are also consistent with a study that found non-acceptance of emotions was predictive of subsequent self-harm (Gratz and Roemer 2004). To the best of our knowledge, this is the first study to examine this important risk factor in relation to SI trajectories, but the finding is consistent with studies that demonstrate that emotion dysregulation can compromise the ability to activate emotional states and is longitudinally related to SI (Selby et al. 2013).

It is also important to note that those in the Chronic SI Group had the highest rates of suicide attempts and re-hospitalizations. While each trajectory was associated with later attempts and re-hospitalizations, the Chronic SI group was the most at risk for psychiatric crises. This finding provides some confirmation of the validity of the trajectories and verifies the heightened level of risk related to Chronic SI over time.

Implications The current study on SI trajectories among adolescent inpatients post-hospitalization may have implications for clinicians making predictions regarding course of ideation

Table 5 Results of multinomial logistic regression analyses

	Subclinical suicidal ideation				Chronic suicidal ideation			
	Unadjusted Odds		Adjusted Odds		Unadjusted		Adjusted	
	Ratio ^{a, b}	95% CI	Ratio ^{a, c}	95% CI	odds ratio ^{a, b}	95% CI	odds ratio ^{a, c}	95% CI
Depressive symptoms	0.89***	0.85–0.95	0.95	0.89–1.02	1.02	0.97–1.08	1.01	0.94–1.09
Anxiety symptoms	0.97*	0.94–0.99	0.98	0.95–1.02	1.02	0.99–1.05	0.99	0.95–1.03
Hopelessness	0.77***	0.68–0.87	0.78**	0.67–0.92	1.02	0.91–1.14	0.99	0.86–1.14
Non-acceptance of emotional response	0.96	0.89–1.03	1.08	0.97–1.20	1.18**	1.06–1.30	1.18**	1.05–1.33
Difficulties engaging in goal directed behavior	0.86***	0.78–0.95			1.08	0.95–1.23		
Impulse control difficulties	0.93	0.86–1.00			1.03	0.95–1.13		
Lack of emotional awareness	0.80***	0.72–0.89			0.91	0.81–1.03		
Limited access to emotion regulation strategies	0.87***	0.81–0.94			1.12*	1.00–1.25		
Lack of emotional clarity	0.84**	0.75–0.94			1.06	0.94–1.20		
Sexual abuse	0.86	0.75–1.03			.93	0.82–1.04		
Non-suicidal self-injury	3.27*	1.29–8.30			.50	0.17–1.50		

^a Compared to Declining Suicidal Ideation Group

^b Association between each predictor and suicidal ideation with single predictor variable in the model

^c Association between each predictor and suicidal ideation when depressive symptoms, anxious symptoms, hopelessness, and non-acceptance of emotional responses included in the model

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$

over time and matching patients to treatment approaches. While greater psychological impairment in the domains of depression, anxiety, and hopelessness were associated with more severe courses of SI, only emotion dysregulation differentiated the Chronic SI trajectory from elevated SI that naturally resolved over the 6 months post-hospitalization. Thus, clinicians should not only consider the severity of ideation and psychological symptoms, but also closely assess and monitor emotion dysregulation. Greater dysregulation may reflect a need for more intensive services to combat the more chronic pathway associated with emotional dismissiveness and lack of strategies to modulate emotions. Because those in inpatient settings may be under particularly high stress and demonstrate unusually high levels of emotion dysregulation, it may be beneficial for clinicians to inquire about adolescents' typical regulatory skills as well as changes in emotion dysregulation leading up to hospitalization. Therapeutic approaches, such as Dialectical Behavior Therapy (DBT), which focus on affect regulation, may prove particularly useful in this regard.

Limitations and Directions for Future Research Several limitations of this research should be noted. First, this sample consisted of adolescent psychiatric inpatients from one facility. The inpatient setting represents a period of acute stress when adolescents are more likely to have higher levels of distress and poor emotion regulation capabilities. Thus, findings may not generalize to other populations or periods of less acute stress, including community-based samples of adolescents, adolescents who choose not to participate in research studies. Second, while a strength of the paper is the focus on short-term risk in the 6 months post-discharge, it should still be noted that three assessment points is the minimum for modeling trajectories and longer follow-up periods may yield additional information. For example, Prinstein et al. (2008) suggested that the course of ideation may be cyclical over time and additional changes may occur after 6 months. Thus, future studies should examine a longer period of time. Third, predictors in this study were assessed only at baseline and the study does not examine the fluctuations in these constructs over time and how these changes are related to suicidal ideation at corresponding time points. An additional limitation in methods is that the 6-month assessment only assessed symptoms within the last month (rather than over the duration of the past 6 months). Fourth, although our sample size falls within the range for conducting trajectory analyses (Curran et al. 2010), it should be noted that a main danger with small sample size studies, even when significant results are observed, is that the findings are false positives and capitalize on chance occurrence within the studied sample. Fifth, the use of mean substitutions to address missing data may contribute to underestimates of standard errors. Finally, future studies may be enhanced through a multi-method assessment of these constructs that may include behavioral or psychophysiological indices of risk (e.g., adolescent emotion regulation as

assessed by task-based measures of attentional or interpretative biases with emotionally valent stimuli, and physiological reactivity in response to an experimental stressor). Parent-teen and family factors that affect the course of SI following hospitalization will also be important to assess.

Conclusion Despite these limitations, the findings presented in this study add uniquely to the growing body of literature on trajectories of SI (Goldston et al. 2016; Czyz and King 2015). In addition to replicating previous findings, this study extends prior research by its finding that emotion dysregulation is a central construct differentiating trajectories. Understanding the role of this factor in SI trajectories may contribute to the advancement of clinical theory and the mitigation of SI over time in a high-risk population.

Compliance with Ethical Standards

Funding This study was funded by the National Institute of Mental Health (1R01MH099703-01).

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

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Ethical Approval: This article does not contain any studies with animals performed by any of the authors.

Informed Consent Informed consent was obtained from all individual participants in the study.

References

- Bernstein, D. P., & Fink, L. (1998). *Childhood trauma questionnaire: A retrospective self-report manual*. San Antonio: The Psychological Corporation.
- Birmaher, B., Brent, D. A., Chiappetta, L., Bridge, J., Monga, S., & Baugher, M. (1999). Psychometric properties of the screen for Child Anxiety related emotional disorders (SCARED): A replication study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 38, 1230–1236. doi:10.1097/00004583-199910000-00011.
- Birmaher, B., Khetarpal, S., Brent, D., Cully, M., Balach, L., Kaufman, J., & Neer, S. (1997). The screen for Child Anxiety related emotional disorders (SCARED): Scale construction and psychometric characteristics. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36, 545–553. doi:10.1097/00004583-199704000-00018.
- Borges, G., Angst, J., Nock, M. K., Ruscio, A. M., & Kessler, R. C. (2008). Risk factors for the incidence and persistence of suicide-related outcomes: A 10-year follow-up study using the National Comorbidity Surveys. *Journal of Affective Disorders*, 105, 25–33. doi:10.1016/j.jad.2007.01.036.

- Centers for Disease Control and Prevention (2014). Web-based injury statistics query and reporting system: 2014. National Center for Injury Prevention and Control.
- Cohen, J., & Cohen, P. (1983). *Applied multiple regression/correlation analysis for the behavioral sciences*. Hillsdale: Erlbaum.
- Curran, P. J., Obeidat, K., & Losardo, D. (2010). Twelve frequently asked questions about growth curve modeling. *Journal of Cognition and Development: Official Journal of the Cognitive Development Society*, 11, 121–136. doi:10.1080/15248371003699969.
- Czyz, E. K., & King, C. A. (2015). Longitudinal trajectories of suicidal ideation and subsequent suicide attempts among adolescent inpatients. *Journal of Clinical Child and Adolescent Psychology*, 44, 181–193. doi:10.1080/15374416.2013.836454.
- Esposito, C., Spirito, A., Boergers, J., & Donaldson, D. (2003). Affective, behavioral, and cognitive functioning in adolescents with multiple suicide attempts. *Suicide and Life-threatening Behavior*, 33, 389–399. doi:10.1521/suli.33.4.389.25231.
- Figueras Masip, A., Amador-Campos, J. A., Gomez-Benito, J., & del Barrio Gandara, V. (2010). Psychometric properties of the Children's depression Inventory in community and clinical sample. *Spanish Journal of Psychology*, 13, 990–999.
- Glenn, C. R., & Nock, M. K. (2014). Improving the short-term prediction of suicidal behavior. *American Journal of Preventative Medicine*, 47, S176–S180. doi:10.1016/j.amepre.2014.06.004.
- Goldston, D. B., Erkanli, A., Daniel, S. S., Heilbron, N., Weller, B., & Doyle, O. (2016). Developmental trajectories of suicidal thoughts and behaviors from adolescents through adulthood. *Journal of the American Academy of Child & Adolescent Psychiatry*, 55, 400–407.
- Goldston, D. B., Sergeant Daniel, S., Reboussin, D. M., Reboussin, B. A., Frazier, P. H., & Kelley, A. E. (1999). Suicide attempts among formerly hospitalized adolescents: A prospective naturalistic study of risk during the first 5 years after discharge. *Journal of the American Academy of Child & Adolescent Psychiatry*, 38, 660–671.
- Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*, 26, 41–54. doi:10.1023/B:JOBA.0000007455.08539.94.
- Hodges, K., & Craighead, W. E. (1990). Relationship of Children's depression Inventory factors to diagnosed depression. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*, 2, 489–492. doi:10.1037/1040-3590.2.4.489.
- Kaufman, J., Birmaher, B., Brent, D., & Rao, U. (1997). Schedule for affective disorders and schizophrenia for school-age Children-present and lifetime version (K-SADS-PL): Initial reliability and validity data. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36, 980–988.
- Kazdin, A. E., French, N. H., Unis, A. S., Esveldt-Dawson, K., & Sherick, R. B. (1983). Hopelessness, depression, and suicidal intent among psychiatrically disturbed inpatient children. *Journal of Consulting and Clinical Psychology*, 51, 504–510. doi:10.1037/0022-006x.51.4.504.
- Kazdin, A. E., Rodgers, A., & Colbus, D. (1986). The hopelessness scale for Children: Psychometric characteristics and concurrent validity. *Journal of Consulting and Clinical Psychology*, 54, 241–245. doi:10.1037/0022-006X.54.2.241.
- Kovacs, M. (2010). *Children's depression Inventory - second edition (CDI-2) manual*. North Tonawanda, NY: Multi-Health Systems Publishing.
- Lewinsohn, P. M., Clarke, G. N., Seeley, J. R., & Rohde, P. (1994). Major depression in community adolescents: Age at onset, episode duration, and time to recurrence. *Journal of the American Academy of Child and Adolescent Psychiatry*, 33, 809–818. doi:10.1097/00004583-199407000-00006.
- Linehan, M. (1993). *Cognitive behavioral treatment of borderline personality disorder*. New York: Guilford Press.
- Nagin, D. S. (2005). *Group-based modeling of development*. Cambridge, MA: Harvard University Press.
- Nock, M. K., Green, J. G., Hwang, I., McLaughlin, K. A., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. (2013). Prevalence, correlates, and treatment of lifetime suicidal behavior among adolescents: Results from the National Comorbidity Survey Replication Adolescent Supplement. *JAMA Psychiatry*, 70, 300–310. doi:10.1001/2013.jamapsychiatry.55.
- Nock, M. K., Holmberg, E. B., Photos, V. I., & Michel, B. D. (2007). Self-injurious thoughts and behaviors interview: Development, reliability, and validity in an adolescent sample. *Psychological Assessment*, 19, 309–317.
- Peterson, B. S., Zhang, H., Santa Lucia, R., King, R. A., & Lewis, M. (1996). Risk factors for presenting problems in child psychiatric emergencies. *Journal of the American Academy of Child and Adolescent Psychiatry*, 35, 1162–1173.
- Posner, K., Brown, G. K., Stanley, B., Brent, D. A., Yershova, K. V., Oquendo, M. A., Currier, G. W., Melvin, G. A., Greenhill, L., Shen, S., & Mann, J. J. (2011). The Columbia–suicide severity rating scale: Initial validity and internal consistency findings from three multisite studies with adolescents and adults. *American Journal of Psychiatry*, 168, 1266–1277. doi:10.1176/appi.ajp.2011.10111704.
- Prinstein, M. J., Nock, M. K., Simon, V., Aikins, J. W., Cheah, C. S. L., & Spirito, A. (2008). Longitudinal trajectories and predictors of adolescent suicidal ideation and attempts following inpatient hospitalization. *Journal of Consulting and Clinical Psychology*, 76, 92–103. doi:10.1037/0022-006x.76.1.92.
- Rajappa, K., Gallagher, M., & Miranda, R. (2012). Emotion dysregulation and vulnerability to suicidal ideation and Attempts. *Cognitive Therapy and Research*, 36, 833–839. doi:10.1007/s10608-011-9419-2.
- Reynolds, W. M., & Mazza, J. J. (1999). Assessment of suicidal ideation in inner-city children and young adolescents: Reliability and validity of the suicidal ideation questionnaire-JR. *School Psychology Review*, 28, 17–30.
- Selby, E. A., Yen, S., & Spirito, A. (2013). Time varying prediction of thoughts of death and suicidal ideation in adolescents: Weekly ratings over 6-month follow-up. *Journal of Clinical Child and Adolescent Psychology*, 42, 481–495. doi:10.1080/15374416.2012.736356.
- Spirito, A., Williams, C. A., Stark, L. J., & Hart, K. J. (1988). The hopelessness scale for Children: Psychometric properties with normal and emotionally disturbed adolescents. *Journal of Abnormal Child Psychology*, 16, 445–458. doi:10.1007/bf00914174.
- Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics*. New York: Harper Collins College.
- Tamás, Z., Kovacs, M., Gentzler, A. L., Tepper, P., Gadoros, J., Kiss, E., Kapomai, K., & Vetro, A. (2007). The relations of temperament and emotion self-regulation with suicidal behaviors in a clinical sample of depressed children in Hungary. *Journal of Abnormal Child Psychology*, 35, 640–652. doi:10.1007/s10802-007-9119-2.
- Tzelgov, J., & Avishai, H. (1991). Suppression situations in psychological research: Definitions, implications, and applications. *Psychological Bulletin*, 109, 524–536. doi:10.1037/0033-2909.109.3.524.
- Vander Stoep, A., Adrian, M., McCauley, E., Crowell, S. E., Stone, A., & Flynn, C. (2011). Risk for suicidal ideation and suicide attempts associated with co-occurring depression and conduct problems in early adolescence. *Suicide and Life Threatening Behavior*, 41, 316–329. doi:10.1111/j.1943-278X.2011.00031.x.
- Wechsler, D. (1999). *Wechsler abbreviated scale of intelligence*. San Antonio, TX: The Psychological Corporation.
- Zhang, Y., Law, C. K., & Yip, P. S. (2011). Psychological factors associated with the incidence and persistence of suicidal ideation. *Journal of Affective Disorders*, 133, 584–590. doi:10.1016/j.jad.2011.05.003.