Clinical and Psychosocial Characteristics of Young Children with Suicidal Ideation, Behaviors and Non-Suicidal Self-Injurious Behaviors

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Abstract

Objective: Based on previous findings that suicidal ideation (SI) and behavior (SB) arose in depressed preschoolers and showed stability into school age, we sought to investigate whether unique clinical and psychosocial correlates of SI/SB and non-suicidal self-injurious behaviors (NSSI) could be identified in young children recuited into a depression treatment study and healthy controls.

Method: Data from n=288 3.0-6.11 year-old children recruited for participation in a psychotherapy treatment study of depression and n=26 healthy control subjects (total N=314) were used. At baseline, subjects received a comprehensive assessment of psychopathology and suicidal ideation/suicidal behavior. Multinominal logistic regressions were conducted comparing those with no SI/SB/NSSI to those with SI/SB or NSSI. Those with SI/SB who also had NSSI were placed in the SI/SB group.

Results: In this sample of young children, the rates of NSSI, SI, and SB were 21.3%, 19.1% and 3.5% respectively. Children with SI/SB or NSSI experienced a greater frequency of violent life events than children with no SI/SB/NSSI. Children with SI/SB had significantly more preoccupation with death compared to subjects with NSSI and subjects with no SI/SB/NSSI. Children with SI/SB had more vegetative signs of depression and greater depression severity and those with NSSI were more irritable with higher depression severity than those with no SI/SB/NSSI.

Conclusion: Distinct characteristics of SI/SB and NSSI in early childhood were identified, informing high risk sub-groups. Findings suggest that clinicians should be aware of the potential for SI/SB and/or NSSI in young children and should directly address these symptoms in clinical interviews.

INTRODUCTION

The Centers for Disease Control (CDC) has issued recent reports demonstrating escalations in the rates of suicidal ideation (SI) and behaviors (SB) among school aged children[1]. Childhood suicide rates are at a 30 year high in the US based on CDC statistics. SI and SB rose by 50% in school age girls and death by suicide nearly doubled in children between the ages of 5-11 since the last reporting period. Sheftall et al[2] reported N=693 cases of children who died by suicide between the ages of 5-14 (n=87 in 5-11 year olds) in a multi-state data base ascertained from 2003 to 2012. Suicide is now classified as the third leading cause of death in children 14 and younger in the US.[3] This escalating death rate underscores the seriousness and urgency of this public health issue. Importantly, less than half of children and adolescents who die by suicide have received mental health care, demonstrating that critical opportunities for prevention are missed[4]. Evidence from longitudinal studies suggests that predictors of adolescent suicide might be identified as early as the preschool period[5].

SI in preschoolers has been described in case reports and identified in empirical studies[6]. In a large scale study,[7] passive suicidal ideation was manifest in preschoolers by expressions such as "I wish I was dead" or "I wish I had never been born." Active suicidal ideation was also observed in the form of statements of the intent to kill oneself such as "I am going to run in front of the car" or "I am going to jump out this window." Suicidal behaviors (SB) were observed in several depressed young children who wrapped things around their necks, in at least one case resulting in bruising. Importantly, in a longitudinal study of preschool depression, this early form of SI/SB showed stability into school age. In addition, NSSI has also been observed in preschool age children in the form of repeatedly scratching or hitting onself causing injury and bruising. In addition, rates of NSSI > 7% in a community sample of third graders has been reported[8]. These findings taken together underscore the importance and potential feasibility of targeting those at high risk for NSSI, SI and SB as early as the preschool period of development.

The expression of SI, SB and NSSI in early childhood raises important developmental questions concerning the age at which children understand the permanency of death as well as the intention behind SI, SB and NSSI. It remains unclear whether expressions of SI/SB by young children represent a serious wish to end one's life or a more non-specific expression of distress without intent to self-harm or die. Basic developmental studies addressing children's understanding of the "cessation of agency" suggest that across cultures, by age 4, children begin to show the ability to distinguish cues that signify death versus sleep[9]. Consistent with this, data suggests that children first conceptualize death as a biological event between the ages of 5 and 6[10]. Therefore, basic developmental findings support the

notion that even at young ages, children may understand the finality of death and therefore could theoretically experience true suicidal ideation/suicidal behavior. However, it remains unclear what individual, psychosocial and familial factors contribute to SI/SB risk and danger of self-harm and NSSI. Nonetheless, numerous cases of serious attempts and death by suicide in young children have been reported in the literature[11], making it necessary to take this clinical problem very seriously. Despite these concerns, there is little empirical data to inform clinical decision making when faced with a young child expressing SI/SB and or NSSI.

To date developmental studies of SI/SB and NSSI have focused on older children and adolescents [12] Numerous studies have examined the role of impulsivity and irritability in risk for SI/SB, suggesting that these features, combined with depressed mood, characterizes those at highest risk for attempts [13-17] Higher rates of abuse, neglect, and trauma have been reported in children and adolescents expressing SI and NSSI [18,19]. In a sample of young adolescents, self-reported depressed mood, negative thoughts, hopelessness, and anhedonia were significantly associated with risk for SI/SB. Further, these cognitive and affective variables remained predictive even after controlling for depressed mood[20]. Notably, in this latter study the number of prior attempts combined with anhedonia predicted the highest risk for a later attempt, again suggesting that SI/SB history is an important predictor of future suicide related behavior[20].

The current study aimed to investigate whether SI/SB and NSSI in a group of young children recruited for participation in a psychotherapy treatment study for depression and age matched healthy control subjects, was associated with specific clinical characteristics and psychosocial risk factors. An understanding of these characteristics and psychosocial correlates could inform how to identify young children at highest risk for onset and chronicity of SI/SB and NSSI as well as the design of early interventions for these groups. Based on the literature in older children and adolescents, we hypothesized that young children with SI or SB would have greater feelings of worthlessness, anhedonia, guilt, and impulsivity compared to preschoolers with NSSI and no SI/SB/NSSI. We also hypothesized that young children with NSSI would be more irritable and have greater exposure to traumatic life events when compared to the other two groups. To investigate these questions, we used baseline data from young children recruited for participation in a psychotherapy treatment study of depression and healthy control subjects. Subjects were comprehensively assessed for psychopathology, manifestations of SI/SB as well as a variety of risk factors thought to be related to SI/SB and NSSI.

METHOD

Study Sample

Children and their caregivers were recruited from community sites in St. Louis, using the Preschool Feelings Checklist (PFC)[21] to identify young children with depressive symptoms (PFC 3) interested in participating in a psychotherapy treatment study. Checklists were made available in daycare, preschool and primary care settings where educational lectures about preschool depression were given to providers. Those with PFC scores 3 who did not have a major chronic medical or neurological illness, and who were not currently receiving

an antidepressant medication or psychotherapy were then further screened for Major Depressive Disorder (MDD) using the Preschool Age Psychiatric Assessment (PAPA) depression module[22]. Children suspected of an Autistic Spectrum Disorder (either based on a prior clinical diagnosis or screen positive on the Social Reciprocity Scale [23]) were excluded. Those who remained eligible after these study phases were invited to participate in an in-person baseline assessment with their primary caregiver in the Early Emotional Development Program at the Washington University School of Medicine. In the current analyses, children who met all criteria for MDD or MDD not otherwise specified (NOS) and were randomized into the study and subjects who completed at least the MDD module of the Kiddie Schedule for Affective Disorders and Schizophrenia-Early Childhood (K-SADS-EC) at the baseline assessment but were not randomized into the study, as well as a group of age matched healthy controls were included in the analyses that follow.

The sample included N=314 children aged 3.0-6.11 and their primary caregivers. Of these subjects, n=288 were recruited for a psychotherapy depression treatment study. n=229 met all inclusion/exclusion criteria and were randomized into the study. n=59 completed early screening phases (described above) and then had all or part of the baseline assessment but were not randomized (reasons outlined below). n=26 were healthy controls subjects recruited as a comparison sample to further investigate SI and NSSI in early childhood. Healthy children were included based on scores below the clinical threshold on the Child Behavior Checklist and meeting all other study exclusion crtieria. All study procedures were approved in advance by the Washington University School of Medicine Institutional Review Board and informed consent and assent was obtain prior to all study procedures.

Psychopathology and Suicidal Ideation/Suicidal Behavior

A comprehensive age appropriate psychiatric interview that assessed for the presence of all relevant Axis I disorders, the Kiddie Schedule for Affective Disorders and Schizophrenia-Early Childhood (K-SADS-EC)[24] was administered to the parent/primary caregiver by a research assistant trained to reliability (kappa ranged from .74 to 1.0 for MDD). This measure generated Axis I diagnoses as well as dimensional scores of MDD severity, irritability and suicidal ideation/suicidal behavior (see below). The K-SADS-EC MDD module contains questions that assess parent report of child current and past suicidal ideation and behaviors, as well as NSSI. We defined SI as including both passive (e.g., expression of thoughts of one's own death such as "I wish I were dead," "I wish I were never born") and active (e.g., expression of thoughts or plans of ending one's life such as "I am going to kill myself," "I want to run in front of a car and die") expressions. SB included any suicidal behaviors (e.g. trying to choke self, etc.). Non-suicidal self-injurious behaviors (NSSI) were defined as self harm without intent to die (e.g., repeated acts of biting, hitting or scratching onself to the point of injury). MDD severity was defined as the number of core MDD symptoms endorsed, excluding the suicide symptom. Following published findings, the irritability/temper sum score was the sum of the following K-SADS-EC items: irritability/anger from the MDD section, explosive irritability/anger from the mania section, and loses temper from the oppositional defiant section[25]. Each of these items was on the scale of 1=not present, 2=subthreshold, and 3=threshold. Healthy control subjects were only administered the MDD module of the K-SADS-EC, and some non-randomized subjects did

not complete all sections of the K-SADS-EC, so the irritability/temper sum score was not calculated in these cases.

The Child Behavior Checklist (CBCL)[26] was used to recruit the healthy control subjects and those with scores well below the clinical threshold without standard study exclusions outined above were included.

Family History

The Family Interview for Genetic Studies (FIGS)[27] is a widely used, well-validated parent report measure assessing the presence of affective disorders and suicidal ideation/suicidal behavior in parents, siblings, and other household members. Healthy control subjects and most non-randomized subjects were not administered the FIGS.

Preoccupation with Death

The K-SADS-EC also assesses for preoccupation with death outside of SI. This would include children with preoccupation/excessive thoughts about the death of others such as "I don't want my mom to die," "What's going to happen when you die?," and/or with death-related play themes (e.g., cemeteries, heaven). Additionally, questions were included to assess for excessive or unconventional use of death and/or suicidal themes in play. Clinically concerning death themes would include children who are <u>exclusively preoccupied</u> with death themes in play (e.g., "The mom dies and they're all alone") that are not re-directable. Unconventional themes would include suicidal play such as drawing pictures of people who kill themselves. These criteria were not included in our definitions of SI, SB, and/or NSSI. Instead, they were used as predictors of SI/SB and NSSI group membership.

Life Events

Caregivers were administered the Life Events Checklist, a widely used measures with established favorable psychometric features to assess the child's exposure to traumatic and stressful life events[28,29]. Life events were not assessed in healthy control subjects.

Executive Functioning and Impulsivity

The Behavior Rating Inventory of Executive Function (BRIEF)[30] is a widely used and valid measure of the child's executive functioning completed by the parent/caregiver. It was not administered to healthy control subjects. The Behavioral Inhibition and Activation Scales (BIS-BAS)[31,32], a valid and reliable parent report measure, was also used to assess inhibition, drive, sensation seeking and reward responsiveness of the child.

Analyses

Subjects were classified into three groups based on endorsement of SI, SB, NSSI, or NO SI/SB/NSSI. The three groups were suicidal ideation and/or suicidal behaviors (SI/SB), non-suicidal self-injury (NSSI), and no suicidal ideation/behaviors or NSSI. Groups were created hierarchically such that if SI/SB was present, the subject was placed in that group even if the subject also had NSSI. Multinomial logistic regressions with pair-wise group comparisons (when omnibus tests were significant) were used to assess demographic and diagnostic characteristics, MDD symptoms, family history, life events, and subscales of the

BRIEF and BIS-BAS. Age, gender, and MDD severity were included as covariates in these models.

To correct for multiple comparisons, false discovery rate (FDR) p-values were calculated for each set of analyses (demographics, diagnoses, diagnostic severity, MDD symptoms, family history, life events, and executive function). For models with a significant omnibus test, the three p-values for the pair-wise group comparisons were used to compute the FDR p-values.

RESULTS

Demographic and Suicide Characteristics

A total of N=1378 subjects completed the initial screen for the therapy study. There were n=229 depressed children (n=215 had MDD and n=14 had MDD NOS) who completed the baseline assessment, met criteria for depression and were randomized into the study. There were n=59 subjects who completed at least the MDD module of the K-SADS-EC at the baseline assessment but were not randomized either due to not meeting criteria for MDD (n=47) or having other exclusion criteria (n=5 incomplete baseline assessment, n=1 speech delays, n=1 hearing impaired, n=1 neurological disorder, n=1 no longer interested, n=1 needing immediate treatment, n=1 with MDD who was not randomized in error). These subjects, along with n=26 healthy controls, give a total sample size of N=314 (Table 1). Subjects were categorized hierarchically (if both SI/SB and NSSI were present, a child was placed in the SI/SB group rather than the NSSI group. There were n=61 with SI/SB (19.4%), n=50 with NSSI (15.9%), and n=203 with NO SI/SB/NSSI (64.6%). The mean (SD) age of the sample was 5.15 (1.08) years, with subjects with SI/SB significantly older than subjects with NO SI/SB/NSSI (5.77 [0.79] vs. 5.03 [1.10], OR[95% CI]=2.01[1.46, 2.76], p<0.0001, FDR p<0.0001) and subjects with NSSI (5.77 [0.79] vs. 4.86 [1.07], OR[95% CI]=2.41[1.62, 3.59], p<0.0001, FDR p<0.0001). The sample was 64.0% male, and subjects with SI/SB were more likely to be male compared with subjects with NO SI/SB/NSSI (82.0% vs. 59.1%, OR[95% CI]=3.16[1.51, 6.62], p=0.0023, FDR p=0.0069). The sample was 11.2% Hispanic, and rates of Hispanic ethnicity did not differ in the three groups. The sample was 72.6% Caucasian, and race did not differ in the three groups.

Suicidal ideation, either passive or active, was endorsed in 19.1% (n=60) of subjects (including 5.4% [n=17] who also had NSSI) with 1.6% (n=5) making some kind of active "attempt." Table 2 provides the frequencies of NSSI, passive and active suicidal ideation (both classified as SI in this paper), and behaviors in the sample with rates of NSSI, SI, and SB at 21.3%, 19.1% and 3.5% respectively when each was considered separately.

Co-morbidity and Severity

Rates of diagnoses did not differ in the three groups (Table 3). Subjects with NSSI and SI/SB had higher MDD severity scores than subjects with NO SI/SB/NSSI (NSSI: 4.72 [1.93] vs. 3.92 [2.04], OR[95% CI]=1.25[1.05, 1.47], p=0.0105, FDR p=0.0263; SI/SB: 4.77 [1.83] vs. 3.92 [2.04], OR[95% CI]=1.25[1.07, 1.46], p=0.0062, FDR p=0.0263). Children with NSSI had a higher irritability/temper sum score than subjects with NO SI/SB/NSSI (7.50 [1.36] vs. 6.61 [1.74], OR[95% CI]=1.38[1.08, 1.76], p=0.0093, FDR p=0.0263).

Subjects with NSSI also had significantly higher CBCL externalizing scores than subjects with NO SI/SB/NSSI (69.53 [7.87] vs. 64.60 [10.45], OR[95% CI]=1.05[1.01, 1.09], p=0.0072, FDR p=0.0263).

Depression Symptoms

As detailed in Table 3, there were significant group differences for the depression symptoms of decreased concentration or indecision, appetite or weight change, recurrent thoughts of death, and death themes in play. The SI/SB group had significantly higher rates of decreased concentration or indecision (60.7% vs. 39.6%, OR[95% CI]=2.26[1.21, 4.19], p=0.0102, FDR p=0.0490) and appetite or weight change (45.9% vs. 25.7%, OR[95% CI]=2.74[1.44, 5.19]. p=0.0021, FDR p=0.0168) than the NO SI/SB/NSSI group. Children with SI/SB were more likely to have recurrent thoughts of death compared to children with NSSI (37.7% vs. 12.0%, OR[95% CI]=5.61[1.97, 15.99], p=0.0012, FDR p=0.0144) and children with NO SI/SB/NSSI (37.7% vs. 16.8%, OR[95% CI]=3.90[1.93, 7.86], p=0.0001, FDR p=0.0024). Death themes in play were significantly more common in subjects with SI/SB than in subjects with NO SI/SB/NSSI (23.0% vs. 7.4%, OR[95% CI]=3.16[1.35, 7.39], p=0.0078, FDR p=0.0468).

Family History

Family history of affective disorder (MDD or bipolar disorder) and suicide in parents, siblings, and other household members did not differ between the three groups although it was notable the the family history of bipolar disorder was trending higher in the NSSI group (Table 4).

Violence Exposure

As shown in Table 4, children with NSSI had a greater number of different violent life events than children with NO SI/SB/NSSI (0.55 [0.73] vs 0.25 [0.55], OR[95% CI]=2.15[1.29, 3.56], p=0.0031, FDR p=0.0155). Children with SI/SB also had a greater number of different violent life events than children with NO SI/SB/NSSI (0.56 [0.92] vs 0.25 [0.55], OR[95% CI]=1.96[1.19, 3.21], p=0.0081, FDR p=0.0203).

Executive Functioning

As shown in Table 5, there were no significant group differences on the BRIEF inhibit or emotional control subscales between groups. Children with SI/SB had significantly higher scores on the BAS fun seeking subscale, thought to be a measure of impulsivity, than children with NSSI (20.86 [3.29] vs. 18.53 [4.76], OR[95% CI]=1.17[1.05, 1.31], p=0.0041, FDR p=0.0164) and children with NO SI/SB/NSSI (20.86 [3.29] vs. 19.19 [4.48], OR[95% CI]=1.15[1.05, 1.26], p=0.0032, FDR p=0.0164), both of which passed FDR correction.

DISCUSSION

Study findings replicated and characterized the occurrence of NSSI and SI/SB in young children between the ages of 3 and 6.11 in this independent sample. Rates of NSSI, SI, and SB were 21.3%, 19.1% and 3.5% respectively in this treatment-seeking and healthy control sample (with 1.6% of these young children making an active suicide attempt). Study

findings suggest that young children who experience SI, SB and/or NSSI have distinct clinical and psychosocial characteristics. Children with SI/SB had more neurovegetative signs of depression and higher depression severity compared to those with no SI/SB/NSSI. They were rated by parents as exhibiting more impulsive "fun seeking." The finding of high impulsivity in SI/SB is consistent with well-established findings in the adolescent literature [13-17] However, the original hypothesis that those with SI/SB would have more anhedonia, worthlessness, and guilt was not confirmed by these analyses. An interesting finding from the current study was the children with SI/SB also displayed greater preoccupation with death themes in play and thoughts of death, suggesting that SI/SB is associated with death ideation and is not a non-specific expression of distress. Therefore, these features may be important markers of vulnerability to suicidal ideation and behaviors in young children and therefore should be a focus of clinical interviewing.

Children with NSSI were more likely to display more irritability, more externalizing behaviors and higher depression severity than children with NO SI/SB/NSSI. Importantly, children in both the SI/SB and NSSI groups experienced a greater number of violent life events than children with no SI/SB/NSSI. While inferences about causality cannot be made based on these data, the finding of increased exposure to violent life events and SI/SB, and NSSI in this population is consistent with the notion that these exposures may be having a negative effect on young children's coping. While further longitudinal study of this association is needed, clinicians should inquire about violence exposure when assessing suicidal ideation/suicidal behavior in early childhood. Study findings suggest that young children with a history of exposure to violence and those with high depression and irritability and preoccupation with death should be carefully questioned about suicidal ideation and behaviors in clinical interviews. This recommendation represents a shift from common practice where this subject is not generally addressed in clinical interviews with young children. Within this group, particular attention should be paid to young children's preoccupation with death and death themes in play as they may be markers of risk for SI/SB in young children that could distinguish them from those at risk for NSSI. The issue of addressing these thoughts and behaviors in clinical mental health interviews with young children is an important one, as many clinicians may avoid this domain based on the erroneous assumption that young children will not have such symptoms. Further, others may feel that the act of questioning a young child about these behaviors could be suggestive and therefore cause distress or increase these behaviors. The current data, combined with experimental findings showing that asking children about suicide does not increase distress or suicidal ideation,[33] suggest that clinicians should be aware of the possibility of suicidal ideation/suicidal behavior in young children and should be pro-active in questioning this targeted group of young children and their caregivers about SI/SB. If SI/SB are present, they should be directly addressed by both clinicians and caretakers, and alternative coping mechanisms should be introduced and reinforced. Safety measures should be put into place in the home, such as locking up knives or other objects of potential harm.

While the current study reports on a relatively large group of depressed preschoolers and healthy control subjects, rates of SB in particular were low, diminishing our ability to detect effects. Further, the study is also limited by the majority of the study sample being Causasian and treatment-seeking. In addition, these data rely largely on parent report of the

child's behaviors and expressions, a standard practice in the assessment of early childhood psychopathology but potentially limited by bias or inaccuracies of parent report.

Study findings confirm that SI/SB and NSSI may arise in early childhood. Clinical characteristics of high depression severity, impulsivity and neurovegetative signs as well as exposure to violence suggest that SI/SB should be carefully assessed in clinical interviews. Children with SI/SB and NSSI have high exposure to violent life events, suggesting that further study of the role of this psychosocial factor in early SI/SB/NSSI is now needed. Clinicians should be questioning depressed young children and their caretakers with these characteristics about suicidal ideation and any related exposure to violence when these behaviors are evident. Caregivers and clinicians should take immediate actions in an attempt to address these maladaptive coping styles. Future studies that investigate the etiology of these behaviors in early childhood are now needed.

Acknowledgments

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Table 1.

Multinomial Logistic Regression Models of Suicidal Ideaion (SI) or Suicidal Behaviors (SB) versus Non-Suicidal Self-Injury (NSSI) versus No SI/SB/ NSSI by Demographic Characteristics in Subjects Covarying for Age, Gender, and Major Depressive Disorder (MDD) Severity (N=314)

Demographics	Total (N=314)		No SI/SB/NSSI (n=203)		NSSI (n=50)		SI/SB (N=61)		Omnibus Test		SI/SB vs. No	NSSI vs. No	SI/SB vs. NSSI
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	χ^2	p	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age	5.15	1.08	5.03	1.10	4.86	1.07	5.77	0.79	22.63	<0.0001	2.01 (1.46, 2.76)[a]	0.83 (0.61, 1.13)	2.41 (1.62, 3.59)[a]
	Total (N=276)		No SI/SB/NSSI (n=174)		NSSI (n=45)		SI/SB (n=57)		Omnibus Test		SI/SB vs. No	NSSI vs. No	SI/SB vs. NSSI
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	χ^2	p	OR (95% CI)	OR (95% CI)	OR (95% CI)
Income-to-needs ratio	2.98	1.31	3.04	1.29	2.96	1.33	2.79	1.39	1.46	0.4830			
	Total (N=314)		No SI/SB/NSSI (n=203)		NSSI (n=50)		SI/SB (n=61)		Omnibus Test		SI/SB vs. No	NSSI vs. No	SI/SB vs. NSSI
	%	n	%	n	%	n	%	n	χ^2	p	OR (95% CI)	OR (95% CI)	OR (95% CI)
Male gender	64.0	201	59.1	120	62.0	31	82.0	50	9.34	0.0093	3.16 (1.51, 6.62)[a]	1.13 (0.59, 2.15)	2.80 (1.15, 6.85)
Non-Hispanic ethnicity	88.9	279	88.7	180	92.0	46	86.9	53	0.65	0.7221			
	Total (N=314)		No SI/SB/NSSI (N=203)		NSSI (N=50)		SI/SB (N=61)		Omnibus Test		SI/SB vs. No	NSSI vs. No	SI/SB vs. NSSI
Demographics	%	n	%	n	%	n	%	n	χ^2	p	OR (95% CI)	OR (95% CI)	OR (95% CI)
Race									5.67	0.2255			
Caucasian	72.6	228	75.4	153	74.0	37	62.3	38					
African-American	14.3	45	13.8	28	12.0	6	18.0	11					
Other	13.1	41	10.8	22	14.0	7	19.7	12					

Note: OR = odds ratio

[a] Significant after false discovery rate correction

Table 2.

Descriptive Characteristics of Non-Suicidal Self-Injury (NSSI), Suicidal Ideation (SI), and Suicidal Behaviors (SB)

| NSSI/SI/SB | n | Age | | Male Gender | |
		Mean	SD	%	n
NSSI	67	5.04	1.04	70.2	47
SI[a]					
Passive suicidal ideation	46	5.74	0.81	84.8	39
Active suicidal ideation	29	5.73	0.77	75.9	22
SB[b]					
Suicidal behaviors	10	5.86	0.58	70.0	7
Suicide attempt	5	5.95	0.64	80.0	4

Note:

[a] n=15 had both passive and active suicidal ideation

[b] n=4 had both suicidal behaviors and suicide attempt

Table 3.

Multinomial Logistic Regression of Suicidal Ideation (SI) or Suicidal Behaviors (SB) versus Non-Suicidal Self-Injury (NSSI) versus No SI/SB/NSSI by Psychopathology and Severity Characteristics Covarying for Age, Gender, and Major Deprssive Disorder (MDD) Severity

Diagnoses	Total (N=314)		No SI/SB/NSSI (n=203)		NSSI (n=50)		SI/SB (nN=61)		Omnibus Test		SI/SB vs. No OR (95% CI)	NSSI vs. No OR (95% CI)	SI/SB vs. NSSI OR (95% CI)
	%	n	%	n	%	n	%	n	χ^2	p			
MDD or MDD NOS	75.8	238/314	69.0	140/203	86.0	43/50	90.2	55/61	4.11	0.1278			
ADHD	28.0	72/257	27.9	44/158	24.4	11/45	31.5	17/54	0.68	0.7112			
ODD	48.2	123/255	42.3	66/156	65.9	29/44	50.9	28/55	5.89	0.0527			
CD	2.8	7/251	2.6	4/153	2.3	1/44	3.7	2/54	0.94	0.6247			
PTSD	2.8	7/251	2.6	4/153	2.3	1/44	3.7	2/54	1.01	0.6029			

Diagnostic Severity	Total (N=314)		No SI/SB/NSSI (n=203)		NSSI (n=50)		SI/SB (n=54)		Omnibus Test		SI/SB vs. No OR (95% CI)	NSSI vs. No OR (95% CI)	SI/SB vs. NSSI OR (95% CI)
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	χ^2	p			
MDD core score[a]	4.21	2.02	3.92	2.04	4.72	1.93	4.77	1.83	11.76	0.0028	1.25 (1.07, 1.46)[b]	1.25 (1.05, 1.47)[b]	1.00 (0.81, 1.23)
SI/Behaviors sum score	0.47	1.20	0.00	0.00	0.00	0.00	2.43	1.66	--	--			

Diagnostic Severity	Total (N=254)		No SI/SB/NSSI (n=156)		NSSI (n=44)		SI/SB (n=54)		Omnibus Test		SI/SB vs. No OR (95% CI)	NSSI vs. No OR (95% CI)	SI/SB vs. NSSI OR (95% CI)
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	χ^2	p			
Irritability/temper sum score	6.80	1.73	6.61	1.74	7.50	1.36	6.80	1.87	6.85	0.0326	1.08 (0.89, 1.30)	(1.08, 1.76)[b]	0.78 (0.59, 1.03)

Diagnostic Severity	Total (N=274)		No SI/SB/NSSI (n=169)		NSSI (n=47)		SI/SB (N=58)		Omnibus Test		SI/SB vs. No OR (95% CI)	NSSI vs. No OR (95% CI)	SI/SB vs. NSSI OR (95% CI)
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	χ^2	p			
CBCL Internalizing	66.54	8.41	66.34	8.71	67.66	6.98	66.21	8.65	0.97	0.6149			
CBCL Externalizing	65.95	10.19	64.60	10.45	69.53	7.87	66.95	10.43	7.74	0.0209	1.02 (0.99, 1.06)	1.05 (1.01, 1.09)[b]	0.97 (0.93, 1.02)

MDD Symptoms	Total (N=314)		No SI/SB/NSSI (N=203)		NSSI (N=50)		SI/SB (N=61)		Omnibus Test		SI/SB vs. No OR (95% CI)	NSSI vs. No OR (95% CI)	SI/SB vs. NSSI OR (95% CI)
	%	n	%	n	%	n	%	n	χ^2	p			
Depressed mood	86.6	272	82.8	168	94.0	47	93.4	57	7.74	0.0208	3.68 (1.19, 11.39)	3.13 (0.92, 10.68)	1.18 (0.24, 5.76)
Anhedonia, boredom, or amotivation	53.2	167	51.7	105	54.0	27	57.4	35	0.84	0.6561			
Boredom	26.8	84	23.2	47	26.0	13	39.3	24	3.75	0.1531			
Anhedonia	39.0	122	37.6	76	44.0	22	39.3	24	0.72	0.6967			

Diagnoses	Total (N=314) %	n	No SI/SB/NSSI (n=203) %	n	NSSI (n=50) %	n	SI/SB (nN=61) %	n	Omnibus Test χ^2	p	SI/SB vs. No OR (95% CI)	NSSI vs. No OR (95% CI)	SI/SB vs. NSSI OR (95% CI)
Amotivation	40.1	126	39.4	80	40.0	20	42.6	26	0.41	0.8153			
Insomnia or hypersomnia	55.4	174	53.2	108	68.0	34	52.5	32	3.13	0.2087			

MDD Symptoms	Total (N=314) %	n	No SI/SB/NSSI (n=203) %	n	NSSI (n=50) %	n	SI/SB (mm=61) %	n	Omnibus Test χ^2	p	SI/SB vs. No OR (95% CI)	NSSI vs. No OR (95% CI)	SI/SB vs. NSSI OR (95% CI)
Fatigue, lack of energy, or tiredness	32.2	101	31.0	63	38.0	19	31.2	19	1.10	0.5766			
Decreased concentration or indecision	45.4	142	39.6	80	50.0	25	60.7	37	7.44	0.0243	2.26 (1.21, 4.19) [b]	1.56 (0.83, 2.92)	1.45 (0.66, 3.20)
Appetite or weight change	31.6	99	25.7	52	38.0	19	45.9	28	10.56	0.0051	2.74 (1.44, 5.19) [b]	1.78 (0.92, 3.42)	1.54 (0.69, 3.44)
Psychomotor agitation/retardation	19.2	154	46.0	93	58.0	29	52.5	32	2.41	0.2994			
Feelings of worthlessness	57.5	180	53.0	107	52.0	26	77.1	47	5.51	0.0636			
Excessive/inappropriate guilt	44.4	139	41.6	84	54.0	27	45.9	28	2.74	0.2539			
Recurrent thoughts of death	20.1	63	16.8	34	12.0	6	37.7	23	16.90	0.0002	3.90 (1.93, 7.86) [b]	0.70 (0.27, 1.77)	5.61 (1.97, 15.99) [b]
Death themes in play	11.8	37	7.4	15	16.0	8	23.0	14	8.05	0.0179	3.16 (1.35, 7.39) [b]	2.39 (0.94, 6.09)	1.33 (0.47, 3.71)
Non-suicidal self-injurious behavior	21.3	67	0.0	0	100.0	50	27.9	17	--	--			

Note: OR = odds ratio

[a] MDD core score did not include suicide symptom; Models of MDD symptoms only covaried for age and gender.

[b] Significant after false discovery rate correction

Table 4.

Multinomial Logistic Regression of Suicidal Ideation (SI) or Suicidal Behaviors (SB) versus Non-Suicidal Self-Injury (NSSI) versus No SI/SB/NSSI by Family History and Life Events Covarying for Age, Gender, and Major Depressive Disorder (MDD) Severity

Family History	Total (N=232)		No SI/SB/NSSI (n=137)		NSSI (n=43)		SI/SB (n=52)		Omnibus Test		SI/SB vs. No	NSSI vs. No	SI/SB vs. NSSI
	%	n	%	n	%	n	%	n	χ^2	p	OR (95% CI)	OR (95% CI)	OR (95% CI)
Affective Disorder	73.3	170	73.7	101	69.8	30	75.0	39	0.32	0.8506			
Depression	72.8	169	73.7	101	67.4	29	75.0	39	0.79	0.6724			
Bipolar Disorder	13.8	32	13.1	18	23.3	10	7.7	4	5.48	0.0645			
Suicide	19.0	44	16.1	22	27.9	12	19.2	10	3.15	0.2072			

Life Events	Total (N=254)		No SI/SB/NSSI (n=156)		NSSI (n=44)		SI/SB (n=54)		Omnibus Test		SI/SB vs. No	NSSI vs. No	SI/SB vs. NSSI
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	χ^2	p	OR (95% CI)	OR (95% CI)	OR (95% CI)
Frequency of traumatic life events	2.86	5.04	2.74	5.57	2.36	1.93	3.61	5.18	0.94	0.6245			
Frequency of death life events	2.02	2.42	1.74	1.96	2.32	2.80	2.59	3.12	3.09	0.2128			
Number of different violent life events	0.37	0.69	0.25	0.55	0.55	0.73	0.56	0.92	11.05	0.0040	1.96 (1.19, 3.21)[a]	2.15 (1.29, 3.56)[a]	0.91 (0.53, 1.56)

Note: OR = odds ratio

[a] = Significant after false discovery rate correction

Multinomial Logistic Regression of Suicidal Ideation (SI) or Suicidal Behaviors (SB) versus Non-Suicidal Self-Injury (NSSI) versus No SI/SB/NSSI by Executive Function Covarying for Age, Gender, and Major Depressive Disorder (MDD) Severity

BRIEF Subscales	Total (N=281)		No SI/SB/NSSI (n=176)		NSSI (n=47)		SI/SB (n=58)		Omnibus Test		SI/SB vs. No	NSSI vs. No	SI/SB vs. NSSI
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	χ^2	p	OR (95% CI)	OR (95% CI)	OR (95% CI)
BRIEF inhibit T-score	66.35	11.87	66.07	12.60	65.60	10.85	67.81	10.33	1.59	0.4510			
BRIEF emotional control T-score	74.67	10.58	74.42	10.94	74.66	9.00	75.45	10.77	0.04	0.9791			

BIS-BAS Subscales	Total (N=269)		No SI/SB/NSSI (n=176)		NSSI (n=43)		SI/SB (n=50)		Omnibus Test		SI/SB vs. No	NSSI vs. No	SI/SB vs. NSSI
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	χ^2	p	OR (95% CI)	OR (95% CI)	OR (95% CI)
BAS drive	21.30	4.79	21.09	4.78	23.02	4.83	20.58	4.57	5.02	0.0811			
BAS reward responsiveness	28.42	4.30	28.81	4.13	26.95	4.57	28.34	4.46	4.50	0.1056			
BAS fun seeking	19.39	4.38	19.19	4.48	18.53	4.76	20.86	3.29	9.84	0.0073	1.15 (1.05, 1.26)*	0.98 (0.91, 1.06)	1.17 (1.05, 1.31)[a]
BIS total	35.29	7.21	35.34	7.23	34.05	8.04	36.22	6.33	3.04	0.2187			

Note: BIS-BAS = Behavioral Inhibition and Activation Scales; BRIEF = Behavior Rating Inventory of Executive Function; OR = odds ratio

[a]Significant after false discovery rate correction