Clinical and Psychosocial Characteristics of Young Children With Suicidal Ideation, Behaviors, and Nonsuicidal Self-Injurious Behaviors

Joan L. Luby, MD, Diana Whalen, PhD, Rebecca Tillman, MS, Deanna M. Barch, PhD

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 nonsuicidal self-injurious behaviors (NSSI) could be identified in young children recuited into a depression treatment study and healthy controls.

Method: Data from 288 children 3.0 to 6.11 years of age who were recruited for participation in a psychotherapy treatment study of depression and 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 subgroups. 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.

Clinical trial registration information: A Randomized Controlled Trial of PCIT-ED for Preschool Depression. https://clinicaltrials.gov/; NCT02076425.

Key words: depression, young children, suicidality, risk

The Centers for Disease Control and Prevention (CDC) has issued recent reports demonstrating escalations in the rates of suicidal ideation (SI) and suicidal behaviors (SB) among school-aged children.[1] Childhood suicide rates are at a 30-year high in the United States based on CDC statistics. SI and SB rose by 50% in school-aged girls, and death by suicide nearly doubled in children between the ages of 5 and 11 years since the last reporting period. Sheftall *et al.*[2] reported 693 cases of children who died by suicide between the ages of 5 and 14 years (n = 87 in 5- to 11-year-olds) in a multistate database ascertained from 2003 to 2012. Suicide is now classified as the third leading cause of death in children aged 14 years and younger in the United States.[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-aged 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 nonspecific 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 years, children begin to show the ability to distinguish cues that signify death versus sleep.[9] Consistent with this, data suggest that children first conceptualize death as a biological event between the ages of 5 and 6 years.[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 are few 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, characterize 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. Furthermore, 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 autistm 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 314 children aged 3.0 to 6.11 years and their primary caregivers. Of these subjects, 288 were recruited for a psychotherapy depression treatment study. A total of 229 individuals met all inclusion/exclusion criteria and were randomized into the study. Of these, 59 completed early screening phases (described above) and then had all or part of the baseline assessment but were not randomized (reasons outlined below). Twenty-six were healthy control 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 failing to meet exclusion criteria. All study procedures were approved in advance by the Washington University School of Medicine Institutional Review Board, and informed consent and assent was obtain before 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 (κ value ranged from 0.74 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 (eg, expression of thoughts of one's own death such as "I wish I were dead," "I wish I were never born") and active (eg, 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 (eg, trying to choke oneself). Nonsuicidal self-injurious behaviors (NSSI) were defined as self harm without intent to die (eg, 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 administered only the MDD module of the K-SADS-EC, and some nonrandomized 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; individuals 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 nonrandomized 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 (eg, cemeteries, heaven). In addition, 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 exclusively preoccupied with death themes in play (eg, "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.

Data Analyses

Subjects were classified into three groups based on endorsement of SI, SB, NSSI, or no SI/SB/NSSI. The

TABLE 1 Multinomial Logistic Regression Models of Suicidal Ideation (SI) or Suicidal Behaviors (SB) Versus Nonsuicidal 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	<.0001	2.01 (1.46, 2.76)[a]	0.83 (0.61, 1.13)	2.41 (1.62, 3.59)[a]

Demographics	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	.4830			

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	%	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	.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	.7221			

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
	%	n	%	n	%	n	%	n	χ^2	p	OR (95% CI)	OR (95% CI)	OR (95% CI)
Race									5.67	.2255			
White	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.

three groups were suicidal ideation and/or suicidal behaviors (SI/SB), nonsuicidal 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 pairwise 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 pairwise group comparisons were used to compute the FDR p values.

RESULTS

Demographic and Suicide Characteristics

A total of 1,378 subjects completed the initial screen for the therapy study. There were 229 depressed children (215 had MDD and 14 had MDD NOS) who completed the baseline assessment, met criteria for depression, and were randomized into the study. There were 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 26 healthy controls, give a total sample size of 314 individuals (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 61 with SI/SB (19.4%), 50 with NSSI (15.9%), and 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] versus 5.03 [1.10], OR [95% CI] = 2.01 [1.46, 2.76], p < .0001, FDR p < .0001) and subjects with NSSI (5.77 [0.79] versus 4.86 [1.07], OR [95% CI] = 2.41 [1.62, 3.59], p < .0001, FDR p < .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% versus 59.1%, OR [95% CI] = 3.16 [1.51, 6.62], p = .0023, FDR p = .0069). The sample was 11.2% Hispanic, and rates of Hispanic ethnicity did not differ in

TABLE 2 Descriptive Characteristics of Subjects With Nonsuicidal Self-Injury (NSSI), Suicidal Ideation (SI), and Suicidal Behaviors (SB)

NSSI/SI/SB	n	Age Mean	Age SD	Male Gender %	Male Gender 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]*Fifteen subjects had both passive and active suicidal ideation.* [b]*Four subjects had both suicidal behaviors and suicide attempt.*

the three groups. The sample was 72.6% white, and race did not differ in the three groups.

Suicidal ideation, either passive or active, was endorsed in 19.1% of subjects (n = 60) (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 article), 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.

Comorbidity 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] versus 3.92 [2.04], OR [95% CI] = 1.25 [1.05, 1.47], p = .0105, FDR p = .0263; SI/SB: 4.77 [1.83] versus 3.92 [2.04], OR [95% CI] = 1.25 [1.07, 1.46], p = .0062, FDR p = .0263). Children with NSSI had a higher irritability/temper sum score than subjects with no SI/SB/NSSI (7.50 [1.36] versus 6.61 [1.74], OR [95% CI] = 1.38 [1.08, 1.76], p = .0093, FDR p = .0263). Subjects with NSSI also had significantly higher CBCL externalizing scores than subjects with no SI/SB/NSSI (69.53 [7.87] verus 64.60 [10.45], OR [95% CI] = 1.05 [1.01, 1.09], p = .0072, FDR p = .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

TABLE 3 Multinomial Logistic Regression of Suicidal Ideation (SI) or Suicidal Behaviors (SB) Versus Nonsuicidal Self-Injury (NSSI) Versus No SI/SB/NSSI by Psychopathology and Severity Characteristics Covarying for Age, Gender, and Major Depressive Disorder (MDD) Severity

Diagnoses	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)
MDD or MDD NOS	75.8	238/314	69.0	140/203	86.0	43/50	90.2	55/61	4.11	.1278			
ADHD	28.0	72/257	27.9	44/158	24.4	11/45	31.5	17/54	0.68	.7112			
ODD	48.2	123/255	42.3	66/156	65.9	29/44	50.9	28/55	5.89	.0527			
CD	2.8	7/251	2.6	4/153	2.3	1/44	3.7	2/54	0.94	.6247			
PTSD	2.8	7/251	2.6	4/153	2.3	1/44	3.7	2/54	1.01	.6029			
Diagnostic Severity	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	χ^2	p	OR (95% CI)	OR (95% CI)	OR (95% CI)
MDD core score[a]	4.21	2.02	3.92	2.04	4.72	1.93	4.77	1.83	11.76	.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	–	–			

	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)
Irritability/temper sum score	6.80	1.73	6.61	1.74	7.50	1.36	6.80	1.87	6.85	.0326	1.08 (0.89, 1.30)	1.38 (1.08, 1.76)[b]	0.78 (0.59, 1.03)

	Total (N = 274)		No SI/SB/NSSI (n = 169)		NSSI (n = 47)		SI/SB (n = 58)		Omnibus Test		SI/SB vs. No	NSSI vs. No	SI/SB vs. NSSI
Diagnostic Severity	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	χ^2	p	OR (95% CI)	OR (95% CI)	OR (95% CI)
CBCL internalizing	66.54	8.41	66.34	8.71	67.66	6.98	66.21	8.65	0.97	.6149			
CBCL externalizing	65.95	10.19	64.60	10.45	69.53	7.87	66.95	10.43	7.74	.0209	1.02 (0.99, 1.06)	1.05 (1.01, 1.09)[b]	0.97 (0.93, 1.02)

	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
MDD Symptoms	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	χ^2	p	OR (95% CI)	OR (95% CI)	OR (95% CI)
Depressed mood	86.6	272	82.8	168	94.0	47	93.4	57	7.74	.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	.6561			
Boredom	26.8	84	23.2	47	26.0	13	39.3	24	3.75	.1531			
Anhedonia	39.0	122	37.6	76	44.0	22	39.3	24	0.72	.6967			

TABLE 3 Continued

MDD Symptoms	Total (N = 314) %	n	No SI/SB/NSSI (n = 203) %	n	NSSI (n = 50) %	n	SI/SB (n = 61) %	n	Omnibus Test χ²	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	.8153			
Insomnia or hypersomnia	55.4	174	53.2	108	68.0	34	52.5	32	3.13	.2087			
Fatigue, lack of energy, or tiredness	32.2	101	31.0	63	38.0	19	31.2	19	1.10	.5766			
Decreased concentration or indecision	45.4	142	39.6	80	50.0	25	60.7	37	7.44	.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	.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	.2994			
Feelings of worthlessness	57.5	180	53.0	107	52.0	26	77.1	47	5.51	.0636			
Excessive/inappropriate guilt	44.4	139	41.6	84	54.0	27	45.9	28	2.74	.2539			
Recurrent thoughts of death	20.1	63	16.8	34	12.0	6	37.7	23	16.90	.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	.0179	3.16 (1.35, 7.39)[b]	2.39 (0.94, 6.09)	1.33 (0.47, 3.71)
Nonsuicidal self-injurious behavior	21.3	67	0.0	0	100.0	50	27.9	17	—	—			

Note: ADHD = attention-deficit/hyperactivity disorder; CD = conduct disorder; NOS = not otherwise specified; ODD = oppositional defiant disorder; OR = odds ratio; PTSD = post-traumatic stress disorder.
[a]MDD core score did not include suicide symptoms; models of MDD symptoms covaried only 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 Nonsuicidal 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 OR (95% CI)	NSSI vs. No OR (95% CI)	SI/SB vs. NSSI OR (95% CI)
	%	n	%	n	%	n	%	n	χ^2	p			
Affective disorder	73.3	170	73.7	101	69.8	30	75.0	39	0.32	.8506			
Depression	72.8	169	73.7	101	67.4	29	75.0	39	0.79	.6724			
Bipolar disorder	13.8	32	13.1	18	23.3	10	7.7	4	5.48	.0645			
Suicide	19.0	44	16.1	22	27.9	12	19.2	10	3.15	.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 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			
Frequency of traumatic life events	2.86	5.04	2.74	5.57	2.36	1.93	3.61	5.18	0.94	.6245			
Frequency of death life events	2.02	2.42	1.74	1.96	2.32	2.80	2.59	3.12	3.09	.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	.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.

indecision (60.7% versus 39.6%, OR [95% CI] = 2.26 [1.21, 4.19], *p* = .0102, FDR *p* = .0490) and appetite or weight change (45.9% versus 25.7%, OR [95% CI] = 2.74 [1.44, 5.19], *p* = .0021, FDR *p* = .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% versus 12.0%, OR [95% CI] = 5.61 [1.97, 15.99], *p* = .0012, FDR *p* = .0144) and children with no SI/SB/NSSI (37.7% versus 16.8%, OR [95% CI] = 3.90 [1.93, 7.86], *p* = .0001, FDR *p* = .0024). Death themes in play were significantly more common in subjects with SI/SB than in subjects with no SI/SB/NSSI (23.0% versus 7.4%, OR [95% CI] = 3.16 [1.35, 7.39], *p* = .0078, FDR *p* = .0468).

Family History
Family history of affective disorder (MDD or bipolar disorder) and suicide in parents, siblings, and other household members did not differ among 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* = .0031, FDR *p* = .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* = .0081, FDR *p* = .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] versus 18.53 [4.76], OR [95% CI] = 1.17 [1.05, 1.31], *p* = .0041, FDR *p* = .0164) and children with no SI/SB/NSSI (20.86 [3.29] versus 19.19 [4.48], OR [95% CI] = 1.15 [1.05, 1.26], *p* = .0032, FDR *p* = .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 6.1 years in this independent sample. Rates of NSSI, SI, and SB were 21.3%, 19.1%, and 3.5%, respectively, in this

TABLE 5 Multinomial Logistic Regression of Suicidal Ideation (SI) or Suicidal Behaviors (SB) Versus Nonsuicidal 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	.4510			
BRIEF emotional control T-score	74.67	10.58	74.42	10.94	74.66	9.00	75.45	10.77	0.04	.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	.0811			
BAS Reward responsiveness	28.42	4.30	28.81	4.13	26.95	4.57	28.34	4.46	4.50	.1056			
BAS Fun seeking	19.39	4.38	19.19	4.48	18.53	4.76	20.86	3.29	9.84	.0073	1.15 (1.05, 1.26)[a]	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	.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.

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 neuro-vegetative 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 pre-occupation with death themes in play and thoughts of death, suggesting that SI/SB is associated with death ideation and is not a nonspecific expression of distress. Thus 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. Although 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. Further longitudinal study of this association is needed, and 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, in which 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. Furthermore, 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 proactive 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.

Although 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. Furthermore, the study is also limited by the majority of the study sample being white 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 caregivers 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.

REFERENCES

1. Xu J, Kochanek KD, Murphy SL, Tejada-Vera B. Deaths: final data for 2014. 2016.<<?
2. Sheftall AH, Asti L, Horowitz LM, et al. Suicide in elementary school-aged children and early adolescents. Pediatrics. 2016;138. e20160436.
3. Dervic K, Brent DA, Oquendo MA. Completed suicide in childhood. Psychiatr Clin N Am. 2008;31:271-291.
4. Pelkonen M, Marttunen M. Child and adolescent suicide. Pediatr Drugs. 2003;5: 243-265.
5. Chronis-Tuscano A, Molina BS, Pelham WE, et al. Very early predictors of adolescent depression and suicide attempts in children with attention-deficit/hyperactivity disorder. Arch Gen Psychiatry. 2010;67:1044-1051.
6. Whalen DJ, Dixon-Gordon K, Belden AC, Barch D, Luby JL. Correlates and consequences of suicidal cognitions and behaviors in children ages 3 to 7 years. J Am Acad Child Adolesc Psychiatry. 2015;54:926-937.
7. Luby JL, Barch DM, Whalen D, Tillman R, Freedland KE. A randomized controlled trial of parent-child psychotherapy targeting emotion development for early childhood depression. Am J Psychiatry. 2018. appi. ajp. 2018.18030321.
8. Barrocas AL, Hankin BL, Young JF, Abela JR. Rates of nonsuicidal self-injury in youth: age, sex, and behavioral methods in a community sample. Pediatrics. 2012;130:39-45.
9. Barrett HC, Behne T. Children's understanding of death as the cessation of agency: a test using sleep versus death. Cognition. 2005;96:93-108.
10. Slaughter V. Young children's understanding of death. Australian Psychologist. 2005;40: 179-186.
11. Tishler CL, Reiss NS, Rhodes AR. Suicidal behavior in children younger than twelve: a diagnostic challenge for emergency department personnel. Acad Emerg Med. 2007;14: 810-818.
12. Pfeffer CR. Suicide in children and adolescents. In: King RA, Apter A, eds. Cambridge University Press; 2003:212-226.
13. Jollant F, Bellivier F, Leboyer M, et al. Impaired decision making in suicide attempters. Am J Psychiatry. 2005;162:304-310.
14. Nock MK, Borges G, Bromet EJ, et al. Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. Br J Psychiatry. 2008;192:98-105.
15. Dougherty DM, Mathias CW, Marsh DM, Papageorgiou TD, Swann AC, Moeller FG. Laboratory measured behavioral impulsivity relates to suicide attempt history. Suicide Life-Threat Behav. 2004;34:374-385.
16. Saffer BY, Klonsky ED. Do neurocognitive abilities distinguish suicide attempters from suicide ideators? A systematic review of an emerging research area. Clin Psychol. 2018;25: e12227.
17. Conner KR, Meldrum S, Wieczorek WF, Duberstein PR, Welte JW. The association of irritability and impulsivity with suicidal ideation among 15- to 20-year-old males. Suicide Life-Threat Behav. 2004;34:363-373.
18. Cero I, Sifers S. Moderating factors in the path from physical abuse to attempted suicide in adolescents: application of the interpersonal-psychological theory of suicide. Suicide and life-threatening behavior. 2013;43:296-304.
19. Kim YS, Leventhal B. Bullying and suicide. A review. Int J Adolesc Med Health. 2008; 20:133-154.
20. Nock MK, Kazdin AE. Examination of affective, cognitive, and behavioral factors and suicide-related outcomes in children and young adolescents. J Clin Child Adolesc Psychol. 2002;31:48-58.
21. Luby J, Heffelfinger A, Koenig-McNaught A, Brown K, Spitznagel E. The preschool feelings checklist: a brief and sensitive screening measure for depression in young children. J Am Acad Child Adolesc Psychiatry. 2004;43:708-717.
22. Egger HL, Ascher AA. Preschool Age Psychiatric Assessment (PAPA). Durham, NC: Duke University Medical Center; 1999.
23. Constantino JN, Gruber CP. Social Responsiveness Scale (SRS). Los Angeles, CA: Western Psychological Services; 2007.
24. Gaffrey MS, Luby JL. Kiddie-Schedule for Affective Disorders and Schizophrenia—Early Childhood Version, 2012 Working Draft (KSADS-EC). St. Louis, MO: Washington University School of Medicine; 2012.

25. Dougherty LR, Smith VC, Bufferd SJ, et al. Preschool irritability: longitudinal associations with psychiatric disorders at age 6 and parental psychopathology. J Am Acad Child Adolesc Psychiatry. 2013;52:1304-1313.

26. Achenbach TM, Ruffle TM. The Child Behavior Checklist and related forms for assessing behavioral/emotional problems and competencies. Pediatr Rev. 2000;21: 265-271.

27. Maxwell ME. Manual for the Family Interview for Genetic Studies (FIGS). Bethesda, MD: Clinical Neurogenetics Branch, Intramural Research Program, National Insititute of Mental Health; 1992.

28. Johnson JH, McCutcheon SM. Assessing life stress in older children and adolescents: preliminary findings with the Life Events Checklist. Stress Anxiety. 1980;7: 111-125.

29. Weathers F, Blake D, Schnurr P, Kaloupek D, Marx B, Keane T. The Life Events Checklist for DSM-5 (LEC-5). 2013. National Center for PTSD. Available at: at www ptsd va gov.

30. Gioia GA, Isquith PK, Guy SC, Kenworthy L. Behavior Rating Inventory of Executive Function: BRIEF. Odessa, FL: Psychological Assessment Resources; 2000.

31. Carver CS, White TL. Behavioral inhbition, behavioral activation and affective responses to impending reward and punishment: the BIS/BAS scales. J Personal Soc Psychol. 1994;67: 319-333.

32. Pagliaccio D, Luking KR, Anokhin AP, et al. Revising the BIS/BAS to study development: metric invariance and normative effects of age and sex from childhood through adulthood. In submission.

33. Gould MS, Marrocco FA, Kleinman M, et al. Evaluating iatrogenic risk of youth suicide screening programs: a randomized controlled trial. JAMA. 2005;293:1635-1643.