










NEW RESEARCH

Preadolescent Suicidal Thoughts and Behaviors: An Intensive Longitudinal Study of Risk Factors

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Objective: Dramatic increases in rates of suicidal thoughts and behaviors (STBs) among youth highlight the need to pinpoint early risk factors. This study used intensive longitudinal sampling to assess what the concurrent associations were between risk factors and STB status, how proximal changes in risk factors were related to STB status, and how risk factors prospectively predicted changes in STB status in a preadolescent sample enriched for early childhood psychopathology.

Method: A total of 192 participants were included from the Parent-Child Interaction Therapy-Emotional Development (PCIT-ED) Study, a longitudinal study of children with and without preschool depression. Participants 7 to 12 years of age completed a diagnostic interview, followed by 12 months of intensive longitudinal sampling, assessing experiences of suicidal ideation and 11 psychosocial variables with known links to STBs in adolescents and adults. Preadolescents with STB history (high-risk) received surveys weekly, and those without STB history (lower-risk) received surveys monthly.

Results: Female sex, elevated depressive symptoms, greater use of expressive suppression and rumination, emotional clarity, and perceived burdensomeness were uniquely concurrently associated with the likelihood of STB endorsement. Within the high-risk group, (1) increases in depression, expressive suppression, rumination, and perceived burdensomeness, and decreases in positive affect from week_t to week_{t+1} were associated with a higher likelihood of a positive STB status at week_{t+1}; and (2) higher expressive suppression, perceived burdensomeness, and caregiver criticism and conflict at week_t compared to participants' mean levels prospectively predicted increases in the likelihood of a positive STB report from week_t to week_{t+1}.

Conclusion: Psychosocial factors influencing STBs in adolescents and adults also affect preadolescents in day-to-day life. Expressive suppression and perceived burdensomeness consistently emerged as novel risk indicators and potential targets for treatment. In addition, increases in depression, rumination, and caregiver criticism and conflict, as well as decreases in positive affect, might prompt heightened STB screening and assessments for preadolescents with a history of STBs.

Key words: suicidal thoughts; suicide behavior; children; intensive longitudinal methods; depression

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In the United States, there have been alarming increases in the rates of suicidal thoughts and behaviors (STB), particularly among preadolescents.^{1,2} Because STB research to date has largely focused on adolescent and adult samples (eg, meta-analysis/review),³ research is needed to examine STBs specifically at this earlier developmental stage to address the current crisis. Here we examined STBs in 8- to 12-year-old preadolescents, many of whom had preschool depression, a relevant focus given the high prevalence of major depressive disorder (MDD) in youth suicide.^{4,5} We focus on demographic (ie, age, gender/sex) and psychosocial predictors that have been implicated in adolescent and adult STB theory and research, including dimensions of emotional

experience,⁶⁻¹⁵ perceived burdensomeness and thwarted belongingness,¹⁶ as well as relationship criticism and conflict.^{17,18} We used an intensive longitudinal design to repeatedly examine how levels of these risk factors were associated with STB status over 1 year. This allowed for contemporaneous (concurrent) and dynamic (lagged) analysis. Identifying specific risk factors of STBs in preadolescence could guide targeted, early clinical interventions.

Increased negative affect and decreased positive affect are central to depressive psychopathology and linked to STBs in adolescents and adults. For example, adolescent neuroticism, the tendency to experience negative affect, predicted suicidal ideation post treatment¹⁰ and risk for STBs in young adulthood.¹¹ Greater anhedonia has been

linked to suicidal thoughts in depressed adolescents¹⁹ and to suicidal behaviors in adults with affective disorders²⁰; however, evidence linking anhedonia to suicidal behaviors in adolescents is mixed.²¹ Thus, shifts in affect could signal more imminent STB risk in preadolescents.

Impaired emotion regulation is also linked with greater suicidal ideation and attempts in adolescents and adults,⁸ and treatments such as dialectical behavior therapy²² have shown effectiveness in this population. Emotion regulation strategies of cognitive reappraisal (reframing the current experience),²³ emotion suppression (inhibiting emotional expression),²³ and rumination (preoccupation with the causes and consequences of one's current state)²⁴ are the most widely studied strategies. Research demonstrates that greater momentary expressive suppression mediates the relation between adolescent life events and suicidal ideation and attempts.¹³ Rumination also prospectively predicts suicidal ideation and attempts in adults^{12,14} and adolescents.⁹ Despite this evidence, little is known about how these strategies relate to STBs in preadolescents' everyday lives.

Emotional clarity, the ability to identify and describe one's feelings,²⁵ is another dimension of emotional experience associated with STBs.²⁶ Low emotional clarity is associated with negative outcomes in children²⁷ and with suicidal ideation and attempts in an inpatient adolescent sample.¹⁵ In a longitudinal study with adolescents who underwent a treatment focused on emotional intelligence, levels of suicidal ideation decreased and levels of emotional clarity increased from pre- to post-treatment,⁷ linking emotional clarity with decreases in STBs. Thus, it is important to examine emotional clarity in preadolescents.

The Interpersonal Theory of Suicide²⁸ suggests that perceived burdensomeness and thwarted belongingness increase suicidal ideation. Thwarted belongingness captures a sense of loneliness and isolation or not fitting in with peers and community. Perceived burdensomeness is characterized by the feeling of being a burden to others and the feelings that one's death would be a relief to others. Meta-analytic evidence indicates that both constructs are significantly associated with adult suicidal ideation,¹⁶ and individual studies demonstrate similar associations in adolescents²⁹; however, their relevance in preadolescents is unexplored.

Turbulent relationships with caregivers or peers are linked to STBs in youth,^{17,18} whereas positive relationships with parents, family, and peers may confer resilience.³⁰ Specifically, criticism and conflict have been identified as salient risk factors for psychopathology³¹ and STBs in youth.³² Arguments (ie, conflict) with parents and peers are well-researched risk factors for STBs and are among the most common precipitants of suicide attempts and suicide in youth.³³

To understand which psychosocial risk factors for STBs might be of import in preadolescence, we took a naturalistic approach, repeatedly sampling across 1 year to assess risk factors for STBs in a sample of preadolescents enriched for early childhood depression, aiming to identify modifiable risks amid sharply rising rates in this age group. We examined contemporaneous and dynamic associations between psychosocial risk factors and STBs. For the dynamic associations, we examined (1) how changes in risk factors (week_t to week_{t+1}) predicted STB status (week_{t+1}) and (2) how levels of risk factors (week_t) prospectively predicted changes in STB status (week_t to week_{t+1}).

METHOD

Participants

Participants included 192 children (age at assessment: mean = 10.13, SD = 1.02; age at final survey: mean = 11.02, SE = 1.06; 37% female) who participated in the Pediatric Suicidality Study (PED-SI). PED-SI is a multi-visit longitudinal study that is a follow-up to the Parent Child Interaction Therapy-Emotional Development (PCIT-ED) Study randomized controlled trial for preschool-onset major depressive disorder (PO-MDD; clinicaltrials.gov NCT02076425). To be eligible for PED-SI, participants, some of whom were community controls, needed to complete the baseline assessment of PCIT-ED (N = 385). A total of 210 youth participated in the PED-SI assessment either at the laboratory or remotely during the COVID-19 pandemic, when they were 7 to 12 years old (mean = 10.08, SD = 1.00). A total of 194 participants (92.4%) agreed to participate in the electronic surveys (e-surveys), with 192 preadolescents completing at least one survey over the year after the assessment. Demographic and clinical characteristics of the 192 participants are presented in Table 1.³⁴ A more detailed procedural overview is provided in Supplement 1 (available online). Child assent and caregiver written consent were obtained, and the Institutional Review Board pre-approved all procedures (#201306070).

Measures

Psychiatric Diagnoses. Psychiatric diagnoses were assessed using the Schedule for Affective Disorders and Schizophrenia for School-Age Children—Present and Lifetime Version (K-SADS-PL),³⁵ a semi-structured diagnostic clinical interview for *DSM-5* disorders. Trained researchers administered the diagnostic interview separately to the caregiver and preadolescent. Caregivers reported on their child's lifetime and current (over the prior month) symptoms. Children reported on their current symptoms.

TABLE 1 Demographic and Clinical Characteristics of the Sample at PED-SI Assessment and Suicidal Thoughts and Behaviors Experiences Over the Year of Surveys

Demographic characteristics	n	Mean	SD	Min-max
Age at assessment	192	10.13	1.02	7.06-12.27
Age at final completed survey	192	11.02	1.06	7.92-13.19
Income-to-needs ratio	189	3.06	1.02	0.23-4.64
	Participants, N	Participants, %	Participants, n	
Sex, female	192	37.0	71	
Hispanic ethnicity	192	7.3	14	
Race	192			
Asian		2.1	4	
Black		8.9	17	
More than 1 race		9.9	19	
White		79.2	152	
PCIT-ED participation	Participants, n	%	Participants, n	
Participant group	192			
Community control		26.6	51	
Baseline assessment, not randomized		9.4	18	
Randomized		64.1	123	
Completed therapy	123	74.0	91	
Clinical characteristics				
Disorder	Participants, n	Participants, %	Participants, n	
MDD or MDD not otherwise specified	192	30.7	59	
Externalizing diagnoses	192	19.8	38	
ADHD	192	18.2	35	
ODD	191	6.8	13	
Conduct	191	0.5	1	
Internalizing diagnoses	191	37.7	72	
Generalized anxiety	191	33.0	63	
Social phobia	191	7.3	14	
Separation anxiety	191	2.6	5	
Posttraumatic stress Disorder	191	2.6	5	
Obsessive-compulsive disorder	191	0.5	1	
Panic disorder	183	0.0	0	
Agoraphobia	183	0.0	0	
Symptoms	Participants, n	Mean	SD	Min-max
Depressive symptoms (<i>t</i> score)	177	44.01	8.34	35-84
STB experiences	Participants, %	Participants, n		
Negative on all e-surveys	63.5	122		
Non-acute positive screen (never acute positive)	20.8	40		
Non-acute positive and acute positive	11.5	22		
Acute positive screen (never non-acute)	4.2	8		
			e-Surveys, %	e-Surveys, n
Negative screen			93.7	5,063
Non-acute positive screen			5.2	282
Acute positive screen			1.1	60

(continued)

TABLE 1 Continued

Demographic characteristics	n	Mean	SD	Min-max
Completed e-surveys with positive STB status, n				
Participants, n (%)	Mean	SD	Median	Min-max
70 (36.5)	4.89	6.94	2.00	1-38
Completed e-surveys with positive STB status, %				
Participants, n (%)	Mean	SD	Median	Min-max
70 (36.5)	14.8	20.5	8.2	1.9 -100.0

Note: Depressive symptoms assessed via the CDI-2.³⁴

ADHD = attention-deficit/hyperactivity disorder; max = maximum; MDD = major depressive disorder; Min = minimum; ODD = oppositional defiant disorder; STB = suicidal thoughts and behaviors.

Children were considered to meet criteria for a given symptom if endorsed by either the caregiver or the child. Licensed clinicians served as the master raters and held weekly case conferences.

Depressive Symptoms. Preadolescents' depressive symptoms were assessed at laboratory sessions using the Child Depression Inventory—2 (CDI-2),³⁴ a self-report measure for children and adolescents 7 to 17 of age. Table 1 reports the prevalence of diagnostic disorders and depression symptoms.

e-Survey Procedure

For the e-surveys, researchers first guided participants through an interactive tutorial. Caregivers and preadolescents were informed at multiple timepoints (eg, during consent/assent, during the tutorial) that no team member would be monitoring responses to the surveys. Researchers encouraged preadolescents to tell a trusted adult immediately if they experienced STBs. A message at the end of each survey reiterated this and provided mental health resources.

Participants completed surveys at a weekly frequency (n = 124; if their caregiver reported STBs or non-suicidal self-injury [NSSI] during PCIT-ED or if they or their caregiver reported STBs or NSSI at assessment) or a monthly frequency (n = 68; if their caregiver did not report STBs or NSSI during PCIT-ED and if they or their caregiver did not report ever experiencing STBs or NSSI at assessment). Hyperlinks to surveys were sent to a caregiver's email address (n = 81) or cellphone number (n = 71) or the child's email address (n = 9) or cellphone number (n = 13), with 18 participants switching methods over the year. Preadolescents were compensated \$10 for each survey.

Surveys, beginning the Tuesday after the laboratory session, were administered through the Health Insurance Portability and Accountability Act (HIPAA)-compliant

Research Electronic Data Capture (REDCap) platform. Participants had 2 days (weekly) or 6 days (monthly) to complete each survey. Surveys were completed on average within 1.3 days (SD = 1.1 days). A total of 7,188 surveys were administered, with 5,446 surveys completed (mean = 76.7%, SD = 27.5%). Participants reported whether they completed each survey alone or with a caregiver's help. A total of 56 preadolescents (29.2%) received help with at least 1 survey, with caregivers only helping with 358 surveys (6.6%). Five of the 56 participants had caregiver help with all surveys. Levels of some psychosocial risk factors differed based on whether caregivers helped (Table S1, Supplement 1, available online), but results for the contemporaneous model did not differ when controlling for caregiver help (Table S2, Supplement 2, available online).

The following risk factors were assessed at each survey, with all but 1 STB Item instructing participants to consider the timeframe of "the past week."¹ Participants rated all items except the depressive symptoms and STB items using a visual analog scale, from "never" to "all the time," that was quantified from 0 to 100. Depressive symptom responses used a radio button and STB responses used a checkbox format. Means, within- and between-person standard errors, within- and between-person reliabilities, and intraclass correlation coefficients (ICCs) for each risk factor are presented in Table S3 (Supplement 2, available online). To assess construct validity for constructs that measured at the PED-SI assessment and the weekly assessments, we conducted a series of multi-level models in which the original (ie, nonmodified) measure administered at the PED-SI assessment was entered as a Level 2 predictor (grand mean centered) of its respective version at the weekly level (results reported below).

Suicidal Thoughts and Behaviors Status. STB status was assessed using a 4-item Ask Suicide-Screening Questions,³⁶

a measure with high sensitivity and negative predictive value in determining risk of suicide, modified for the e-surveys. Participants were asked to answer “yes” or “no” to the original first 3 items but regarding the past week: (1) Have you wished you were dead? (2) Have you felt that you or your family would be better off if you were dead? and (3) Have you been having thoughts about killing yourself? The fourth item, also with a yes-or-no response option, was modified from “Have you ever tried to kill yourself?” to “Are you having thoughts of killing yourself right now?”. An acute positive STB screen was defined as a participant responding “yes” to item 4, a non-acute positive STB screen was defined as a participant responding “no” on item 4 but “yes” on at least 1 other item, and a negative STB screen was defined as a participant responding “no” on all 4 items.

Depressive Symptoms. Depressive symptoms were assessed through the CDI-2,³⁴ omitting 2 items (thinking bad things happen to me, and thinking about killing myself). A total score was created by averaging responses at the survey level. Depression (CDI-2)³⁴ at the PED-SI assessment was positively associated with weekly depressive symptoms (estimate = 0.0127, SE = 0.0016, $p < .0001$).

Affect. Affect was assessed using a subset of items from the Positive Affect and Negative Affect Schedule—Child.³⁷ Mean levels of negative affect (sad, lonely, bored, frustrated, scared, nervous) and positive affect (calm, interested, cheerful, happy, excited, proud) were computed for each survey.

Emotional Clarity. Emotional clarity was assessed with 2 items from the Emotional Clarity Questionnaire (ECQ)²⁷: “I knew how I was feeling,” and “I was confused about my feelings” (reverse scored). These items reflect the highest face validity of the original items. These items were moderately correlated ($r = 0.42$) at the within-person level and were averaged at the survey level. Emotional clarity assessed at the PED-SI assessment by the ECQ²⁷ (with higher scores reflecting less emotional clarity) was significantly negatively associated with weekly emotional clarity (estimate = -7.77 , SE = 1.57, $p < .0001$).

Thwarted Belongingness. Thwarted belongingness was assessed using 2 items from the Interpersonal Needs Questionnaire (INQ-10)³⁸: “I felt disconnected or like I was an outsider” and “I have felt that I had many caring and supportive friends or family members” (reverse scored). These items load highly onto the thwarted belongingness factor³⁸ and were significantly correlated ($r = 0.24$) at the within-person level. Responses were

averaged at the survey level. Thwarted belongingness (INQ-10)³⁸ at the PED-SI assessment was positively associated with weekly thwarted belongingness (estimate = 0.76, SE = 0.19, $p = .0001$).

Perceived Burdensomeness. Perceived burdensomeness was assessed using 1 item from the INQ-10³⁸: “I felt that the people in my life would be better off if I were gone.” This item had the highest loading on the perceived burdensomeness factor in Van Orden *et al.*³⁸ Perceived burdensomeness (INQ-10)³⁸ at the PED-SI assessment was positively associated with weekly perceived burdensomeness (estimate = 0.63, SE = 0.19, $p = .0014$).

Criticism and Conflict. Caregiver–child and peer criticism and conflict were each assessed with 2 items from the Perceived Criticism Scale³⁹: “How often has your [relation] criticized you?” and “How often have you argued with your [relation]?” For caregiver items, relation was “parent/caregiver(s),” and peer items were populated with “friends or classmates.” The 2 caregiver items were moderately associated ($r = 0.50$), as were the 2 peer items ($r = 0.61$) at the within-person level, and these associations were stronger than associations between other item pairs (ie, r values were < 0.32). The 2 caregiver items and the 2 peer items were averaged at each survey. Caregiver PCS scores³⁹ at the PED-SI assessment were positively associated with weekly parent criticism and conflict (estimate = 1.55, SE = 0.61, $p = .0122$).

Emotion Regulation. Cognitive reappraisal was assessed using 2 items from the Emotion Regulation Questionnaire for Children and Adolescents,⁴⁰ including “When I wanted to feel less bad (eg, sad, angry, worried) about something, I thought about something different,” and “When I wanted to feel happier about something, I changed the way I was thinking about it.” These items were moderately correlated ($r = 0.41$) at the within-person level. Reappraisal (ERQ-CA)⁴⁰ at the PED-SI assessment was positively associated with weekly reappraisal (estimate = 3.52, SE = 0.69, $p < .0001$). Expressive suppression items were from the ERQ-CA and included the following: “I kept my feelings to myself” and “I controlled my feelings by not showing them to others” (within-person $r = 0.41$). Suppression (ERQ-CA)⁴⁰ at the PED-SI assessment was positively associated with weekly suppression (estimate = 4.88, SE = 0.62, $p < .0001$). Rumination items were from the Children’s Response Style Questionnaire⁴¹ and included, “When I was sad, I thought about how sad I felt,” and “When I was sad, I thought that there must be something wrong with me.” Because the variability between the 2 rumination items was

large, we present results using data from the first item, chosen for its face validity and having a higher factor loading on the original scale.

Statistical Plan

Hierarchical generalized linear models (HGLM) with binomial distribution and logit link function were conducted to model the likelihood of positive STB report (ie, an acute positive or non-acute positive screen) as a function of risk factors assessed via surveys. HGLMs were performed in SAS version 9.4 using the PROC GLMIMIX procedure (2016; SAS Institute Inc). These models account for multiple surveys per participant and allow for missing surveys and varying time between assessments. All surveys with non-missing data on all variables were included. Intercept and age at the time the survey was completed were modeled as both fixed and random effects with a variance components covariance structure. Risk factors were fixed effects in the model and were centered within-person, and sex was included as a between-person variable.

The primary HGLM included data from all 192 participants who completed at least 1 survey and assessed associations between risk factors and positive STB report contemporaneously. Next, we ran 2 HGLM models examining week-to-week changes. These models included only the high-risk preadolescents because they completed surveys on a weekly basis (vs lower-risk participants who completed surveys monthly). The first dynamic model examined how changes in risk factors from week_t to week_{t+1} predicted STBs at week_{t+1}. To generate residuals, we ran multi-level models for each risk factor using SAS PROC MIXED, with person-centered risk factors at week_{t+1} as the dependent variable and the corresponding person-centered risk factor at week_t as the independent variable. Residuals were extracted from these models and then included as the independent variables in the HGLM of STB status at week_{t+1} as the dependent variable. The second model examined how week_t levels of risk factors and STB status predicted STB status at week_{t+1}.

RESULTS

Participants were on average 10.13 years of age ($SD = 1.02$) and were primarily non-Hispanic White, male (63%), and living with a family income approximately 3 times above the federal poverty line based on family size. The sample was clinically heterogeneous, with 30.7% meeting criteria for MDD or MDD—not otherwise specified, 19.8% meeting criteria for at least 1 externalizing disorder, and 37.7% meeting criteria for an internalizing disorder other than MDD (diagnoses could overlap). Across the year of surveys,

40 participants (20.8%) endorsed a non-acute positive screen for STBs, 22 (11.5%) reported both non-acute and acute positive STB screens, and 8 (4.2%) endorsed an acute positive STB. Table 1 presents descriptive details of STB reports.

Correlation coefficients at the within-person and between-person levels are presented in Table 2. At the within-person level, no associated greater than an effect size of 0.46, suggesting that each measure was assessing a dissociable construct. Notable within-person associations include that depressive symptoms were related to greater negative affect and lower positive affect, meaning that on weeks when a preadolescent reported greater depressive symptoms, they tended to report more negative and less positive affect relative to weeks in which they report lower depressive symptoms. Perceived burdensomeness and thwarted belongingness were moderately positively associated, as were caregiver criticism and conflict and peer criticism and conflict. Several variables were highly correlated at the between-person level in directions consistent with past research. For example, rumination was strongly associated with depressive symptoms, negative affect, and suppression.

For our contemporaneous model, as shown in Table 3, female sex, higher levels of depressive symptoms, greater use of expressive suppression and rumination, higher emotional clarity, and higher perceived burdensomeness were reported on weeks in which preadolescents were more likely to report positive STBs (p values $< .05$) compared to weeks with no STBs. The Supplemental Materials present results from models that (1) excluded participants younger than 12 years (Table S4, Supplement 3, available online), (2) excluded participants in the low-risk group (Table S5, Supplement 4, available online); (3) excluded depressive symptoms as a risk factor (Table S6, Supplement 5, available online); (4) examined whether the risk factors differentiated the likelihood of an acute positive STB screen (excluding non-acute positive screens) vs negative STB screen (Table S7, Supplement 6, available online); and (5) examined whether the risk factors differentiated the likelihood of a non-acute positive vs acute positive STB screen (Table S8, Supplement 7, available online).

For the first dynamic model that focused on the high-risk preadolescents, we examined how change in risk factors from week_t to week_{t+1} were associated with the likelihood of a positive STB report at week_{t+1} (Table 4). Findings demonstrated that change in several risk factors predicted the likelihood of a positive STB report above and beyond the child's sex. Increases in depressive symptoms, expressive suppression, rumination, and perceived burdensomeness, and decreases in positive affect from week_t to

TABLE 2 Estimated Correlations Coefficients at the Between-Person (Below Diagonal) and Within-Person (Above Diagonal) Levels

e-Surveys	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Depressive symptoms	—	0.40	-0.36	-0.10	0.05	0.08	-0.21	0.37	0.41	0.31	0.24	0.00
2. Negative Affect	0.56	—	-0.41	0.04	0.08	0.14	-0.25	0.33	0.37	0.32	0.23	0.07
3. Positive Affect	-0.45	-0.51	—	0.13	-0.06	-0.06	0.15	-0.22	-0.28	-0.35	-0.15	0.05
4. Cognitive reappraisal	-0.18	-0.09	0.28	—	0.14	0.14	0.04	-0.05	-0.07	0.04	0.04	0.00
5. Expressive suppression	0.13	0.14	-0.07	0.11	—	0.07	-0.03	0.03	0.01	0.04	0.06	-0.06
6. Rumination	0.54	0.61	0.60	0.62	0.63	—	-0.06	0.11	0.09	0.13	0.11	
7. Emotional clarity	-0.36	-0.45	.24	.05	-0.09	.47	—	-0.25	-0.29	-0.13	-0.19	-0.04
8. Perceived burdensomeness	0.52	0.49	-0.28	-0.04	0.11	0.42	-0.41	—	0.45	0.27	0.28	-0.07
9. Thwarted belongingness	0.54	0.56	-0.36	-0.13	0.13	0.44	-0.48	0.62	—	0.29	0.28	-0.09
10. Caregiver criticism and conflict	0.34	0.48	-0.28	-0.09	0.07	0.09	-0.31	0.36	0.45	—	0.36	0.05
11. Peer criticism and conflict	0.34	0.41	-0.18	0.00	0.09	0.10	-0.35	0.41	0.46	0.50	—	-0.08
12. Completing surveys with caregiver or on own ^a	-0.03	0.06	0.04	0.03	-0.13	0.00	-0.07	0.01	0.03	0.06	0.06	—

Note: ^aFor completing e-surveys with caregiver vs alone: 0 = on own; 1 = with caregiver's help.

week_{t+1}, were significantly associated with the likelihood of a positive STB report at week_{t+1} (p values <.01).

For the second dynamic model, we examined how risk factors at week_t were associated with the likelihood of a positive STB report at week_{t+1} after accounting for STB status at week_t and child's sex (Table 5). Higher expressive suppression, perceived burdensomeness, and caregiver criticism and conflict compared to participants' average levels were significantly prospectively associated with increases in the likelihood of a positive STB report (p values <.01).

DISCUSSION

Using a rigorous longitudinal design, we examined psychosocial risk factors for STBs in preadolescents. We examined how levels of risk factors were concurrently related to STB status: female sex, increased depressive symptoms, greater use of expressive suppression and rumination, increased emotional clarity, and increased perceived burdensomeness (compared to participants' own mean levels) were each concurrently associated with the increased likelihood of STB endorsement. Then, in the high-risk subset of the sample (ie, those with a history of STBs),

TABLE 3 Contemporaneous Model Predicting Likelihood of Positive Suicidal Thoughts and Behaviors Status by Age, Sex, and Risk Factors

	Estimate	SE	t	p	OR (95% CI)
Intercept	-5.2070	0.3256	-15.99	<.0001	—
Age at e-survey	-0.4670	0.3159	-1.48	.1410	0.63 (0.336, 1.169)
Female sex	1.4562	0.4215	3.46	.0006	4.29 (1.878, 9.801)
Depressive symptoms	2.3131	0.4152	5.57	<.0001	10.11 (4.477, 22.809)
Negative affect	0.0052	0.0067	0.78	.4340	1.01 (0.992, 1.018)
Positive affect	-0.0112	0.0066	-1.70	.0895	0.99 (0.976, 1.002)
Cognitive reappraisal	-0.0059	0.0037	-1.56	.1177	0.99 (0.987, 1.001)
Expressive suppression	0.0072	0.0036	2.02	.0440	1.01 (1.000, 1.014)
Rumination	0.0078	0.0032	2.40	.0165	1.01 (1.001, 1.014)
Emotional clarity	0.0101	0.0047	2.13	.0332	1.01 (1.001, 1.020)
Perceived burdensomeness	0.0277	0.0039	7.06	<.0001	1.03 (1.020, 1.036)
Thwarted belongingness	-0.0000	0.0055	-0.00	.9971	1.00 (0.989, 1.011)
Caregiver criticism and conflict	0.0071	0.0047	1.51	.1321	1.01 (0.998, 1.016)
Peer criticism and conflict	-0.0091	0.0048	-1.89	.0594	0.99 (0.982, 1.000)

Note: Number of participants = 192; number of e-surveys = 5327. Data in boldface type are significant. OR = odds ratio.

TABLE 4 Dynamic Model Predicting Likelihood of Positive Suicidal Thoughts and Behaviors Status at Week_{t+1} by Age, Sex, and Current Week Risk Factors at Week_{t+1}, Controlling for Week_t Risk Factors

	Estimate	SE	t	p	OR (95% CI)
Intercept	-5.4023	0.3982	-13.57	<.0001	—
Age at e-survey	-0.7047	0.4328	-1.63	.1062	0.49 (0.210, 1.165)
Female sex	2.6725	0.5576	4.79	<.0001	14.48 (4.852, 43.192)
Depressive symptoms _{resid}	2.3329	0.4890	4.77	<.0001	10.31 (3.952, 26.891)
Negative affect _{resid}	0.0072	0.0076	0.96	.3391	1.01 (0.992, 1.022)
Positive affect _{resid}	-0.0242	0.0079	-3.07	.0021	0.98 (0.961, 0.991)
Cognitive reappraisal _{resid}	-0.0067	0.0045	-1.48	.1385	0.99 (0.985, 1.002)
Expressive suppression _{resid}	0.0118	0.0046	2.58	.0098	1.01 (1.003, 1.021)
Rumination _{resid}	0.0108	0.0041	2.65	.0080	1.01 (1.003, 1.019)
Emotional clarity _{resid}	0.0102	0.0061	1.67	.0957	1.01 (0.998, 1.022)
Perceived burdensomeness _{resid}	0.0214	0.0046	4.60	<.0001	1.02 (1.012, 1.031)
Thwarted belongingness _{resid}	0.0034	0.0065	0.52	.6008	1.00 (0.991, 1.016)
Caregiver criticism and conflict _{resid}	0.0035	0.0059	0.59	.5542	1.00 (0.992, 1.015)
Peer criticism and conflict _{resid}	-0.0023	0.0064	-0.36	.7199	1.00 (0.985, 1.010)

Note: Number of participants = 117; number of e-surveys = 3862. Data in boldface type are significant. OR = odds ratio; *resid* = residuals obtained from multi-level models of current week risk factor predicted by prior week risk factor (ie, current week controlling for past week).

we examined dynamic associations between risk factors and STB status. First, we examined how proximal changes in risk factors were associated with STB status, finding that decreases in positive affect, as well as increases in depressive symptoms, expressive suppression, rumination, and perceived burdensomeness were associated with an increased likelihood of reporting STBs. Second, we tested how risk factors prospectively predicted changes in STB status, finding that greater expressive suppression, perceived

burdensomeness, and caregiver criticism and conflict prospectively predicted increases in the likelihood of having a positive STB screen. These findings provide valuable information about psychosocial risks most salient for clinicians to assess when making STB risk determinations, and suggest unique risk factors in preadolescents with STB history (Table S9, Supplement 7, available online, presents a summary of findings, including findings from the 3 main models).

TABLE 5 Dynamic Model Predicting Likelihood of Positive Suicidal Thoughts and Behaviors (STB) Status at Week_{t+1} by Age, Sex, and Week_t Risk Factors Controlling for Week_t STB Status

	Estimate	SE	t	P	OR (95% CI)
Intercept	-5.0540	0.3629	-13.93	<.0001	—
Age at e-survey	-0.4062	0.4137	-0.98	.3281	0.67 (0.294, 1.511)
Female sex	2.6024	0.5112	5.09	<.0001	13.50 (4.954, 36.771)
Positive STB report _t	0.7653	0.2400	3.19	.0014	2.15 (1.343, 3.442)
Depressive symptoms _t	-0.3946	0.4444	-0.89	.3746	0.67 (0.282, 1.611)
Negative affect _t	0.0125	0.0071	1.75	.0796	1.01 (0.999, 1.027)
Positive affect _t	0.0141	0.0072	1.95	.0508	1.01 (1.000, 1.029)
Cognitive reappraisal _t	-0.0054	0.0040	-1.35	.1759	1.00 (0.987, 1.002)
Expressive suppression _t	0.0092	0.0040	2.31	.0208	1.01 (1.001, 1.017)
Rumination _t	-0.0016	0.0036	-0.44	.6579	1.00 (0.992, 1.005)
Emotional clarity _t	-0.0022	0.0049	-0.45	.6545	1.00 (0.988, 1.007)
Perceived burdensomeness _t	0.0095	0.0044	2.16	.0309	1.01 (1.001, 1.018)
Thwarted belongingness _t	-0.0055	0.0061	-0.89	.3728	1.00 (0.983, 1.007)
Caregiver criticism and conflict _t	0.0137	0.0050	2.74	.0062	1.01 (1.004, 1.024)
Peer criticism and conflict _t	-0.0058	0.0052	-1.11	.2680	0.99 (0.984, 1.004)

Note: Number of participants = 118; number of e-surveys = 3,892. Data in boldface type are significant. OR = odds ratio.

Two emotion regulation strategies—higher expressive suppression and rumination—were contemporaneously associated with an increased likelihood of STBs. Furthermore, proximal increases in expressive suppression and rumination were associated with an increased likelihood of reporting STBs, and increased expressive suppression (compared to participants' average levels) prospectively predicted an increased likelihood of having a positive STB screen. In contrast, cognitive reappraisal was not associated with STBs in any models. This pattern of findings is consistent with meta-analytic work demonstrating that these putatively maladaptive ER strategies show stronger links to psychiatric illness than increased use of putatively adaptive strategies.⁴²

Surprisingly, on weeks when preadolescents were more likely to report STBs, they tended to report higher emotional clarity compared to weeks when they did not, contrasting with research showing that lower emotional clarity is consistently associated with negative psychological outcomes.⁴³ Research has found that preadolescents exhibit higher abilities to differentiate their emotional experience,⁴⁴ partly because they tend to report feeling one emotion vs multiple emotions compared to adolescents.⁴⁴ This suggests that preadolescents with high emotional clarity might be at greater risk, possibly because of their clearer identification of singular negative emotions. Consequently, lower emotional clarity may be implicated in STB only in adolescence when there is also increased ability to differentiate emotional complexity. Such findings could have clinical implications, but warrant replication because emotional clarity was not significant in either dynamic model.

From the Interpersonal Theory of Suicide, perceived burdensomeness, but not thwarted belongingness, showed robust associations with STB status. Perceived burdensomeness was significantly concurrently associated with STB reports. Furthermore, proximal increases in perceived burdensomeness were associated with an increased likelihood of a positive STB status, and perceived burdensomeness prospectively predicted increases in STB status. This mirrors work in both youth and adults, which demonstrates stronger relationships of burdensomeness (vs thwarted belongingness) with STBs. Indeed, recent efforts have specifically targeted perceived burdensomeness in clinical youth to aid in decreasing ideation.⁴⁵

In contrast to expectations, neither peer nor caregiver criticism and conflict showed a concurrent association with STBs. Similarly, neither changes in peer nor caregiver criticism and conflict were significantly associated with an increased likelihood of a positive STB status. Consistent with expectations, however, caregiver criticism and conflict prospectively predicted changes in STB status. This finding provides novel insights into the temporal dynamics of the

relation between caregiver criticism and conflict and STB experiences in preadolescents. The prospective impact of caregiver criticism and conflict on changes to STB status indicates a potential window of opportunity for intervention: implementing targeted interventions following increases in caregiver criticism/conflict may mitigate the risk of increasing STB severity. Clinicians may wish to directly address and closely monitor the impact of caregiver criticism and conflict on their clients, particularly given the prospective nature of the relations that we found. Future research should continue to explore the temporal dynamics of caregiver criticism and conflict and related implications for preventive and treatment.

Consistent with extant research in adults⁴⁶ and youth, depressive symptoms were concurrently associated with positive STB reports. On weeks when preadolescents were more likely to report a positive STB, their levels of depressive symptoms were higher on average than on weeks when they were more likely to report no STBs. In addition, in the high-risk subset with a history of STB, increases in depressive symptoms over the previous week were associated with an increased likelihood of a positive STB report. However, depression did not prospectively predict changes in STB status. Although research suggests that depressive symptoms may be less common in children who die by suicide than in adolescents who die by suicide,⁴⁷ these findings provide more detailed evidence when increased depressive symptoms are associated with heightened risk of STBs and underscore the importance of tracking depressive symptoms in preadolescents at risk for STBs.

We found some evidence that positive affect was associated with preadolescents' STB status. Proximal decreases were significantly associated with the likelihood of a positive STB status. This pattern of findings is consistent with theory, whereas the null findings involving negative affect were not. Because of conceptual overlap between depression and affect, we ran the contemporaneous model with all risk factors except depressive symptoms (Table S6, Supplement 5, available online). Greater negative affect and lower positive affect explained unique variance in weekly STB status, suggesting that it is not that negative and positive affect are unimportant in understanding preadolescent STB experiences, but that the broad construct of depression appears to capture these constructs. Depression may have greater predictive power of weekly STB due to other symptoms of depression (eg, loss of appetite).

We clarified the associations between several psychosocial risk factors of STBs in preadolescents, but research is required to examine other possible risk factors (eg, child abuse, bullying). It will be important to examine interactions between risk factors and changing STB

experiences. For example, lower emotional clarity was more strongly associated with suicidal ideation at higher (not lower) levels of distress tolerance in trauma-exposed adolescents.⁴⁸ In addition, preadolescents who experience greater depression may be more likely to engage in STB if they have conflict with parents.

There are several study limitations worth acknowledging. First, although the present research was guided by Joiner's Interpersonal Theory of Suicide²⁸ model and other risk factors validated in the extant literature, we did not test a single superseding theoretical model, as it is not yet available for this age range. Despite this, the study generated useful data for understanding and assessing STBs in preadolescents, and can inform projects that will generate and test conceptual theories of suicide. Second, our sample was predominantly White and living above the poverty line, so findings may not generalize to more representative samples or non-Western cultures. For example, risk factors for suicide have been found to differ between White and Black youth.⁴⁹ Third, survey frequency occurred once per week, a lower sampling frequency than sometimes used in intensive longitudinal designs. Although this improved the study's feasibility, it is likely that a range of risk factors and STB states occurred throughout the week.

Fourth, most preadolescents in the sample experienced depression during preschool, raising questions about the extent to which findings generalize to preadolescents without a history of earlier psychopathology or prior STBs. However, it is unlikely that these children differ in meaningful ways from those with a school-age onset (and may, in fact, have an early undetected preschool episode).⁵⁰ Regardless, empirical studies comparing the 2 groups prospectively are needed to address this issue definitively. Importantly, our study demonstrates the feasibility and relatively safety (eg, no indication of increasing STBs with increasing e-survey completion, no serious injuries or deaths by suicide) of collecting intensive longitudinal data on preadolescents' STB experiences over the course of a year, providing a foundation with this methodology for future research to build on.

Preadolescent STBs are dramatically increasing,^{1,2} and it is critical to identify risk factors that can be clinically assessed and modified with treatment. The risks identified in the present study meet these criteria and may be useful to clinicians and important for future research to consider as

potential targets for prevention and treatment aimed at decreasing STB risk. Expressive suppression and perceived burdensomeness emerged as novel risk indicators and potential targets for treatment. In addition, clinicians may wish to monitor increases in depression, rumination, and caregiver criticism and conflict as well as decreases in positive affect in their young patients, as changes these factors may signal an increased risk for STB onset and warrant focused clinical attention.

CRediT authorship contribution statement

Renee J. Thompson: Conceptualization, Methodology, Writing – original draft, Writing – review & editing. **Diana J. Whalen:** Writing – review & editing, Conceptualization, Methodology, Writing – original draft. **Kirsten Gilbert:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing. **Rebecca Tillman:** Writing – original draft, Writing – review & editing, Data curation, Formal analysis. **Laura Hennefield:** Methodology, Writing – original draft, Writing – review & editing. **Meghan Rose Donohue:** Methodology, Writing – original draft. **Caroline P. Hoyniak:** Writing – review & editing, Writing – original draft. **Deanna M. Barch:** Methodology, Funding acquisition, Conceptualization, Supervision, Writing – review & editing. **Joan L. Luby:** Conceptualization, Funding acquisition, Methodology, Supervision, Writing – review & editing.

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Ms. Tillman served as the statistical expert for this research.

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