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Preliminary Validity for a Brief Caregiver-Report Screener for Suicidal Thoughts and Behaviors in Children Under Age 8

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Objective: Children as young as preschool age can experience suicidal thoughts and behaviors (STBs). Despite calls for increased youth suicide risk screening and assessment, we lack tools for identifying the youngest children experiencing STBs who might be at heightened risk for suicide, self-harm, and related distress. Clinician and caregiver skepticism about children's ability to self-report STBs and concerns about negative effects of directly asking children about STBs contribute to this gap. A caregiver-report measure for STBs can address these concerns, offering providers a much-needed tool for assessing STBs in young children.

Method: A 4-item caregiver-report suicide risk screener was developed and administered by phone to caregivers of 80 children ages 4 to 7 years (mean [SD] age =6.06 [1.12] years) from diverse sociodemographic backgrounds. Approximately 3 weeks later, caregivers and children independently completed in-person age-appropriate clinical diagnostic interviews to assess STBs. Children with a history of STBs were oversampled. Sensitivity and specificity of positive screens (caregiver endorsed at least 1 item), relative to STBs detected in the diagnostic interview, were calculated to assess the psychometric properties of the screen.

Results: Of the 80 suicide risk screeners administered, 18 were positive. Relative to diagnostic interviews with caregivers, the caregiver-STBs screener showed 85% sensitivity and 98.3% specificity for detecting STBs risk. Relative to diagnostic interviews with either caregiver or child, the screener showed 68% sensitivity and 98.2% specificity, and relative to child-only interviews, the screener showed 50% sensitivity and 80% specificity.

Conclusion: The caregiver-STBs screener for children under age 8 demonstrates favorable psychometric properties compared with a reference standard. If further validated, this screener could offer clinicians a new brief tool to assess suicide risk in young children. Its high specificity suggests that positive screens should be taken seriously as indicators of risk, warranting further follow-up.

Plain language summary: Suicidal thoughts and behaviors (STBs) can occur in children as young as preschool age, yet there are few tools to identify those at risk. This study assessed a new 4-item caregiver-report screener for suicide risk in 80 children aged 4 to 7, comparing results to clinical diagnostic interviews. The screener showed high specificity (98%) and good sensitivity (85%), meaning positive screens should be taken seriously as indicators of STB risk. If further validated, this tool could help clinicians identify young children at risk for suicide to ensure they receive appropriate support and intervention.

Diversity & Inclusion Statement: We worked to ensure sex and gender balance in the recruitment of human participants. We worked to ensure race, ethnic, and/or other types of diversity in the recruitment of human participants. We worked to ensure that the study questionnaires were prepared in an inclusive way. One or more of the authors of this paper self-identifies as a member of one or more historically underrepresented racial and/or ethnic groups in science. One or more of the authors of this paper self-identifies as a member of one or more historically underrepresented sexual and/or gender groups in science. One or more of the authors of this paper received support from a program designed to increase minority representation in science. We actively worked to promote sex and gender balance in our author group. We actively worked to promote inclusion of historically underrepresented racial and/or ethnic groups in science in our author group. While citing references scientifically relevant for this work, we also actively worked to promote sex and gender balance in our reference list. While citing references scientifically relevant for this work, we also actively worked to promote inclusion of historically underrepresented racial and/or ethnic groups in science in our reference list.

Key words: pediatric; screening; self-harm; suicide

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There is increasing evidence that children as young as preschool age can experience suicidal thoughts and behaviors (STBs)[1,2] and that these early-onset STBs often continue into adolescence and are linked to other mental health problems.[3] For example, 1 study on preschool-onset depression found that 19.1% of children with depression had experienced STBs,[1] with 83.1% continuing to experience STBs into preadolescence.[3] Population-based data indicate that by ages 9 to 10 years, 14.5% of children in the United States have experienced STBs.[4] Death by suicide, although rare in children, has increased over the past decade in children

5 to 11 years of age and is often preceded by escalating suicidal behaviors and mental health symptoms.[5] Furthermore, there has been a marked increase in emergency department visits for STBs in children,[6] straining health care systems and further highlighting child STBs as an urgent public health concern. Early detection of STBs may be a key way to reduce both near-term risk behaviors and distress associated with STBs and to alter negative mental health trajectories, improving long-term mental health outcomes.

Although there have been calls for increased suicide risk screening and assessment for at-risk children,[7] we currently lack tools to identify the youngest children experiencing STBs who might be at heightened risk for suicide or related mental health problems. This is due at least in part to clinician and caregiver skepticism regarding how well younger children can report on their own experiences of STBs alongside concern about any negative effects of asking children directly about STBs. A caregiver-report suicide risk screening tool would sidestep many of these concerns and give child health clinicians a brief, low-cost, pragmatic, and much-needed tool for assessing STBs risk in young children.

Obtaining caregiver or multi-informant reports is a key component of assessing psychopathology in young children.[8,9] In pediatric settings, numerous validated caregiver-report survey measures are routinely administered to broadly assess emotional and behavioral problems in young children, with parallel versions available for older youth. However, no validated caregiver-report measures are currently available to directly assess STBs risk in early childhood. For example, the widely used Pediatric Symptom Checklist (PSC)[10] screens for emotional and behavioral problems in children ages 4 to 16 years, with the caregiver checklist applicable from age 4 and the youth self-report starting at age 11, but neither version asks about STBs. Similarly, the more extensive Child Behavior Checklist (CBCL)[11] has versions spanning infancy through adolescence, including the caregiver-report CBCL/1.5-5 for young children up to age 5, parent-report CBCL for youth ages 6 to 18, and youth self-report CBCL for adolescents ages 11 to 18. Despite its broad coverage of mental health symptoms, the CBCL does not systematically assess STBs. For example, the CBCL/1.5-5 does not include any items related to STBs, and although the CBCL for ages 6 to 18 includes 2 items related to active suicidal ideation (SI) and self-harm, it fails to capture passive SI, which is often endorsed more frequently than active SI on suicide-specific screeners.[12] Moreover, the American Academy of Pediatrics (AAP) guidelines suggest reviewing sum scores from measures such as the CBCL to determine if further evaluation of a patient is warranted,[13] rather than focusing on individual item responses. Thus, whereas these existing checklists are useful for discerning whether a child exhibits general emotional or behavioral symptoms, they do not assess STBs risk thoroughly or efficiently.

A recent systematic review of youth suicide risk screening tools identified 13 studies that have examined psychometric properties of brief self-report STBs screeners in nonpsychiatric medical settings.[14] These studies included youth ages 8 to 22 years, with average age ranging from 14 to 19 years. Most studies used the Ask Suicide-Screening Questions (ASQ),[15] although other tools including the Computerized Adaptive Screen for Suicidal Youth (CASSY),[16] Patient Health Questionnaire-9 (PHQ-9),[17] Behavioral Health Screen (BHS),[18] and Risk of Suicide Questionnaire (RSQ)[19] were also used. The most common reference standard was the Suicidal Ideation Questionnaire (SIQ/SIQ-JR),[20] although several studies used a suicide attempt 3 months post screen as the reference. Across studies, sensitivity ranged from 50% to 100% and specificity ranged from 59% to 96% to detect suicide risk.[14] The ASQ, a 4-item self-report measure, demonstrated the strongest psychometric properties across multiple contexts, including outpatient primary care with children as young as 10 years.[21] Although not included in this review, the Columbia–Suicide Severity Rating Scale (C-SSRS) has been used to assess suicide risk in children ages 6 to 12 years[22] and has demonstrated favorable psychometric properties in adolescents and adults.[23] Thus, developing a brief caregiver-report suicide risk screener that integrates key components of established tools with a track record of use with youth, such as the ASQ and the C-SSRS, covering passive SI, active SI, and suicidal behaviors, and is simple enough to be administered without specialized training, has the potential to bridge the gap in assessing suicide risk in young children.

Importantly, research indicates that information provided by caregivers in the context of a semistructured interview administered by a trained rater can effectively capture STBs in young children, as demonstrated by studies using the Schedule for Affective Disorders and Schizophrenia for School-Age Children–Early Childhood (K-SADS-EC)[1] and the Preschool Age Psychiatric Assessment (PAPA) and Child and Adolescent Psychiatric Assessment (CAPA).[2] For example, Hennefield *et al.*[3] demonstrated that rater-determined STBs for children ages 3 to 7 years obtained via the K-SADS-EC (ie, a caregiver interview) predicted STBs reported independently by both caregiver and child in a follow-up assessment when the children were ages 8 to 12 years. Additionally, a longitudinal study by Whalen *et al.*[24] developed a 3-class model to represent trajectories of

STBs from early childhood through adolescence using rater-determined STBs obtained via the PAPA or CAPA caregiver interviews in children ages 3 to 8 years and combined CAPA interviews with caregiver and child when children turned 9. These studies underscore the validity of using caregiver-reported information obtained through clinical diagnostic interviews to assess STBs in young children. Such diagnostic interviews are lengthy, often lasting 2 to 3 hours, and require trained professionals, which is neither feasible nor desirable for screening purposes. However, the validity of caregiver report of STBs obtained in clinical interviews in this age group supports the potential value of developing a brief, pragmatic, caregiver-report measure. Such a measure could then be used to efficiently flag children at risk for STBs, who might then be in need for further work-up.

Present Study

The primary goal of this study was to develop and assess the psychometric properties of a brief caregiver-report screener for STBs (caregiver-STBs screener) in a sample of children ages 4 to 7 years enriched for a history of STBs. The 4-item screener was modeled on self-report screeners commonly used with youth (eg, ASQ, C-SSRS) and includes items on passive and active SI and suicidal behaviors. In addition, as this study is the first to our knowledge to systematically assess STBs in children between the ages of 4 and 7 via clinical interview, secondary goals included addressing the feasibility of obtaining direct child reports via clinical interview and exploring how caregiver and child reports of STBs relate across measures. This article presents data from the first 80 participants in an ongoing study to disclose early findings on the feasibility and preliminary validity of screening young children for STBs given the pressing public health importance of this problem.

METHOD

Participants

Participants were 80 children 4 to 7 years of age (mean [SD] age = 6.06 [1.12] years; range 4.02-7.99) and a primary caregiver. The sample consisted of 36 (45%) girls, 43 (53.8%) boys, and 1 child who identified their gender as nonbinary (1.3%). In addition, 41 (51.2%) children identified as White, 24 (38.8%) identified as Black, 7 (8.8%) identified as biracial/multiracial, and 1 (1.3%) identified as Asian; 1 (1.6%) child identified as Hispanic. Across the sample, there were roughly the same number of children at each age. Nearly all primary caregivers (97.5%) were mothers. Demographic details for the full sample and by caregiver-STBs screen status (ie, positive or negative screen) are presented in Table 1.

TABLE 1 Sociodemographic Characteristics of Child Participants

	Total (N = 80)		Positive screen (n = 18)		Negative screen (n = 62)			
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Statistic	p
Age at screen, y	6.06	(1.15)	6.65	(.97)	5.89	(1.15)	$F_{1,78}$ = .655	.012
Income-to-needs ratio[a]	2.12	(1.32)	2.04	(1.23)	2.23	(1.14)	$F_{1,76}$ = .495	.484
Days between screen and interview	25.17	(16.12)	24.33	(20.18)	25.42	(14.98)	$F_{1,78}$ = .063	.803
	n	(%)	n	(%)	n	(%)		
Gender							χ^2 = 0.185	.668[b]
Female	36	(45.0)	9	(50.0)	27	(43.5)		
Male	43	(53.8)	9	(50.0)	34	(54.8)		
Other/nonbinary	1	(1.3)	0		1	(1.6)		
Race							χ^2 = 0.032	.858[b]
Asian	1	(1.3)	0		1	(1.6)		
Biracial/multiracial	7	(8.8)	1	(5.6)	6	(9.7)		
Black	31	(38.8)	7	(38.9)	24	(38.7)		
White	41	(51.2)	10	(55.6)	31	(50.0)		
Ethnicity								
Hispanic	1	(1.3)	0		1	(1.6)		

Note: [a]*Two families did not report income.*
[b]*The χ^2 analyses included only female/male for gender and Black/White for race based on cell size.*

Participants were recruited from a variety of community and clinical sites, including schools, primary care facilities, and mental health and developmental service sites across the St. Louis, Missouri, metropolitan area. Recruitment procedures were designed to oversample for children with a history of STBs with recruitment materials targeting children with and without a history of STBs. Exclusion criteria were confirmed or suspected diagnosis of autism spectrum disorders, severe speech or developmental delays, or serious chronic medical illness. Children with active SI and a suicide plan were referred for immediate care and not eligible to participate while in crisis. All caregivers participated in an initial phone screen to determine eligibility.

Procedure

The caregiver-STBs screener was administered via phone at the time of study enrollment with in-person clinical interviews conducted approximately 3 weeks later (median = 22 days, mean [SD] = 25.17 [16.12] days between screen and interview). All caregivers who consented to the phone screen completed the caregiver-STBs screener. Three caregivers who were screened >90 days before their appointment were rescreened before their clinical interview with their rescreen scores included in the present analyses (there were no changes in their endorsements across this time period).

At the in-person session, interviews were administered independently to caregivers and children to assess children's thoughts, behaviors, and experiences related to STBs. Screen items were assessed against rater-determined STBs obtained from reference standard clinical diagnostic interviews conducted by trained interviewers independently with caregivers (full interviews) and children (select interview items). Additional measures, including caregiver and child surveys, behavioral tasks, and an electroencephalogram to assess children's reward responsivity, were administered as part of a larger study to understand early-onset STBs and will be reported elsewhere. Data were collected between September 2022 and April 2024. All study procedures were approved by the Washington University School of Medicine Institutional Review Board. Caregiver consent and child assent was obtained for all participants.

Measures

Suicide Risk Screener. The Brief Caregiver-Report Screener for Suicidal Thoughts and Behaviors in Children Under Age 8 (caregiver-STBs screener) consisted of 4 items:

1. Has your child ever said they wished they were dead or never born?
2. Has your child ever said they wanted to kill themselves?
3. Has your child ever threatened suicide?
4. Has your child ever attempted to kill themselves?

These items were selected to cover passive SI, active SI, and suicidal behaviors using short and direct language. Of note, the wording of item 2 was updated from "said they want to die" to "kill themselves" partway through the study to ensure that active SI was being fully captured. Items were administered to caregivers verbally via phone by a researcher, which served as the first point of contact with families, ensuring that caregivers reported on their child's STBs before the session in the laboratory. The caregiver-STBs screener was considered positive if the caregiver endorsed any item on the screener, with all administered items included in this determination and subsequent analyses.

Screen items were chosen by examining and adapting items common across existing screeners used with youth, including the ASQ and C-SSRS, to emphasize observable behaviors (eg, "has your child said they wanted to kill themselves" vs "have you had thoughts about killing yourself") and refining those items through expert consensus (discussions between the lead and senior authors). This process led to the retention of 3 modified ASQ/C-SSRS items to cover passive SI (item 1), active SI (item 2), and suicide attempts (item 4). In addition, an item to cover threatened suicide (item 3) was included based on expert consensus, acknowledging that caregivers frequently describe children's STBs in terms of threats in both clinical and research settings.

STBs (Caregiver Interview). The K-SADS-EC,[25] a semi-structured age-appropriate diagnostic interview for *DSM-5* disorders in preschoolers, was administered to caregivers by a trained researcher. The same researcher who administered the caregiver-STBs screener also conducted the K-SADS-EC interview. Modules administered included major depressive disorder, mania, anxiety disorders, posttraumatic stress disorder, obsessive-compulsive disorder, attention-deficit/hyperactivity disorder, oppositional defiant disorder, and conduct disorder. Within the major depressive disorder section, all 3 suicide-related items were administered to all caregivers and directly probed passive SI (eg, a wish to be dead), active SI (eg, wanting to kill themselves), and suicidal acts (eg, jumping from a high place, wrapping toy around neck). Caregivers provided information about lifetime symptoms, with additional details including recency and frequency queried for all STBs-related content that arose in the interview. Specific examples of STBs were also elicited

from the caregiver to help the interviewer determine whether the thoughts and behaviors being reported on align with the constructs the study is trying to capture.

All information obtained throughout the K-SADS interview, which typically takes 2 to 3 hours to complete, was used to determine the presence of STBs. The determination of the presence of any STBs construct (ie, passive SI, active SI, suicide acts) comprised the rater-determined STBs based on caregiver report scores for the present analyses. All K-SADS interviews (caregiver and child) were reviewed in case conference by the research team, and STBs endorsement was determined by consensus. Interrater reliability for caregiver report was substantial ($\kappa = 0.74$) for presence or absence of STBs coded from video for 20% of cases by an independent masked researcher and compared with case conference endorsements.

STBs (Child Interview). A short interview (approximately 5-10 minutes) comprising select depression screen items from the K-SADS–Present and Lifetime (K-SADS-PL) version[26] was administered to children by a second trained researcher. The K-SADS-PL, validated for use in children as young as age 6, contains interview-based STBs probes that largely parallel those in the K-SADS-EC. Specific topics queried included recurring thoughts of death, 3 suicide-specific items, and nonsuicidal self-injuries (NSSIs). The researcher who conducted the child interview was masked to caregiver responses on the caregiver-STBs screener and K-SADS-PL interview at the time of the child interview. Children were asked about lifetime symptoms of passive and active SI (eg, "Sometimes children who get upset or feel bad think about dying or even killing themselves. Have you ever had thoughts like that?") and suicidal behaviors (eg, "Have you ever tried to kill yourself?"). STB-related reports were followed by targeted questions designed to fully probe the child's experience and ensure to the extent possible that they were reporting on STBs per our operational definitions (ie, that children were indeed endorsing their own desire to die or intent to kill themselves and not, for example, anxiety about harming themselves or pervasive thoughts of death). The determination of the presence of any of the three suicide constructs comprised the rater determined STBs based on child report scores for the present analyses. Interrater reliability for the child interview was substantial ($\kappa = 0.74$) for presence or absence of STBs, determined using the same procedure as the caregiver interviews. In both the child and the caregiver interrater reliability assessments, there was 1 instance where the rater coded for the presence of STBs despite the consensus finding that STBs were not present. This suggests both high reliability and a slightly more conservative approach with group consensus.

Income-to-Needs Ratio. An income-to-needs ratio, calculated by dividing total family income by the Federal Poverty Level for number of individuals living in the household at time of data collection,[27] served as a measure of family socioeconomic status.

Analysis Plan

Any determination of lifetime SI or suicidal behaviors on the K-SADS-EC by the interviewer was considered true-positive rater-determined STBs based on caregiver report for purposes of assessing psychometric properties of the caregiver-STBs screener; similarly, any determination of lifetime suicidal thoughts or behaviors on the K-SADS-PL by the interviewer was considered true-positive rater-determined STBs based on child report. These were analyzed both separately and in combination (either/or) to test how each was associated with the screener. Descriptive statistics (ie, means, SDs, frequencies, and percentages) were calculated to describe the full sample as well as the subgroups of children with positive and negative screens. *F* tests for continuous variables and χ^2 analyses for categorical variables were used to compare those with positive and negative screens (Table 1). Descriptive information regarding number of positive screens by K-SADS rater determinations is presented in Table 2.

Pearson correlations were calculated for key demographic variables (age, gender, race, and income-to-needs ratio) and the caregiver-STBs screener and K-SADS interviews to examine the relations between these variables. All correlations are presented in Table 3.

TABLE 2 Caregiver Endorsements of Suicidal Thoughts and Behaviors (STBs) on Caregiver-STBs Screen and Rater-Determined STBs Based on Caregiver or Child Report by Age Group and Measure

	4 Years		5 Years		6 Years		7 Years	
	n = 20		n = 18		n = 23		n = 18	
	n	(%)	n	(%)	n	(%)	n	(%)
Caregiver-STBs screen	1	(5)	4	(22.2)	4	(17.4)	9	(50.0)
K-SADS-EC, caregiver	1	(5)	3	(16.7)	6	(26.1)	10	(55.6)
	n = 16		n = 18		n = 23		n = 17	
K-SADS-PL, child	0	(0)	1	(5.6)	5	(21.7)	4	(23.5)

Note: K-SADS-EC = Schedule for Affective Disorders and Schizophrenia for School-Age Children–Early Childhood; K-SADS-PL = K-SADS–Present and Lifetime.

TABLE 3 Correlations Between Key Demographic Variables and Suicidal Thoughts and Behaviors (STBs) Measures

	n	1	2	3	4	5	6	7
1. Child's age	80	—	—	—	—	—	—	—
2. Gender[a]	79	0.123	—	—	—	—	—	—
3. Race[b]	71	−0.005	−0.158	—	—	—	—	—
4. Income-to-needs ratio	78	0.117	−0.110	0.297*	—	—	—	—
5. K-SADS-EC, caregiver	80	0.347**	−0.007	−0.172	−0.079	—	—	—
6. K-SADS-PL, child	75	0.268*	0.238*	−0.110	0.118	0.222	—	—
7. K-SADS combined, caregiver −child	80	0.382**	0.059	−0.176	−0.008	0.856**	0.527**	—
8. Caregiver-STBs screen	80	0.278*	0.048	−0.101	−0.071	0.864**	0.239*	0.735**

Note: *K-SADS = Schedule for Affective Disorders and Schizophrenia for School-Age Children; K-SADS-EC = K-SADS–Early Childhood; K-SADS-PL = K-SADS–Present and Lifetime.*
[a]*Gender is coded as male = 0, female = 1.*
[b]*Race is coded as White = 0, Black = 1.*
*p < .0, **p < .01.

The receiver operating characteristic curve functions of IBM SPSS Statistics for Windows Version 27 (IBM Corp, Armonk, NY) were used to calculate specificity and sensitivity. Analyses of sensitivity examined the rate of true positives (measured via the K-SADS) compared to caregiver endorsements of STBs on the screener. Analyses of specificity examined the rate of true negatives compared to caregiver screen endorsements. For both sensitivity and specificity, we conducted 3 sets of analyses with the following K-SADS STBs data: rater-determined STBs based on caregiver report, rater-determined STBs based on child report, and rater-determined STBs based on combined caregiver and child report using the either/or rule. Finally, we conducted a detailed exploration of the false-negative and false-positive responses with the goal of providing context for these classification errors and possibly elucidating directions for future screen modifications toward greater precision.

RESULTS

Of the 80 suicide-risk screeners administered, 18 were positive (22.5%; ie, a caregiver endorsed at least 1 screening item). Across the screen items, 13 caregivers endorsed that their child had experienced passive SI, 4 endorsed experienced active SI, 4 endorsed threatened suicide, and 1 endorsed a suicide attempt.

Rater-determined STBs based on caregiver report from the K-SADS-EC interviews were present in 20 of 80 children (25%), with 15 caregivers reporting passive SI, 11 reporting active SI, and 1 reporting a suicide attempt. In contrast, rater-determined STBs based on child report from the K-SADS-PL interviews were present in 10 of 75 children (13.3%), with 8 children reporting passive SI, 6 reporting active SI, and 2 reporting a suicide attempt. Five children did not complete the K-SADS-PL due to the caregiver requesting STBs items not be administered (2 children) or child irritability/refusal (3 children). Most of these children were 4 years of age and the irritability/refusal behavior was not limited to the suicide portion of the assessment. Rater-determined STBs by age group and measure are presented in Table 2.

Correlations Across Demographics and STBs Measures

Child age was positively correlated with STBs endorsements on the caregiver-STBs screener ($r = 0.28$, $p = .012$), K-SADS-EC ($r = 0.35$, $p = .002$), K-SADS-PL ($r = 0.27$, $p = .020$), and the combined caregiver-/child-report K-SADS ($r = 0.38$, $p < .001$), with increased STBs with increased child age across these measures. Girls had more rater-determined STBs than boys based on the child-report K-SADS-PL ($r = 0.24$, $p = .041$); however, no associations were detected between rater-determined STBs and gender on the caregiver-report K-SADS-EC or the caregiver-STBs screener. There were no significant associations between either race or income-to-needs ratio and any STBs measure.

As predicted, the caregiver-STBs screener was positively correlated with both rater-determined STBs based on caregiver report from the K-SADS-EC interviews ($r = 0.86$, $p < .001$) and rater-determined STBs based on child report from the K-SADS-PL interviews ($r = 0.24$, $p = .039$) as well as the combined caregiver-/child-report K-SADS ($r = 0.74$, $p < .001$). In addition, a trend-level association was observed between rater-determined STBs based on caregiver report from the K-SADS-EC interviews and rater-

TABLE 4 Raw Values and Measures of Diagnostic Performance of Caregiver-Report Suicidal Thoughts and Behaviors (STBs) Screen Relative to Rater-Determined STBs Based on Caregiver or Child Report

	Caregiver-report K-SADS-EC (N = 80)		Child-report K-SADS-PL (n = 75)		Combined caregiver-/child-report K-SADS (N = 80)	
True positive	17		5		17	
False positive	1		13		1	
False negative	3		5		8	
True negative	59		52		54	
	Est. value	**95% CI**	**Est. value**	**95% CI**	**Est. value**	**95% CI**
Sensitivity (%)	85.0	62.1-96.8	50.0	18.7-81.3	68.0	46.5-85.1
Specificity (%)	98.3	91.1-100.0	80.0	68.2-88.9	98.2	90.3-100.0
Positive predictive value (%)	94.4	70.7-99.2	27.8	14.9-45.8	94.4	70.5-99.2
Negative predictive value (%)	95.2	87.4-98.2	91.2	84.7-95.1	87.1	79.2-92.3
Area under the curve	0.9	0.8-1.0	0.7	0.5-0.8	0.8	0.7-0.9

Note: Est. = estimated; K-SADS = Schedule for Affective Disorders and Schizophrenia for School-Age Children; K-SADS-EC = K-SADS–Early Childhood; K-SADS-PL = K-SADS–Present and Lifetime.

determined STBs based on child report from the K-SADS-PL interviews ($r = 0.22$, $p = .055$) (Table 3).

Caregiver-STBs Screener Sensitivity and Specificity

Relative to rater-determined STBs based on caregiver report from the K-SADS-EC interviews, the caregiver-STBs screener had 85% sensitivity and 98.3% specificity for detecting history and/or risk of STBs. Relative to the rater-determined STBs based on child report from the K-SADS-PL interviews, the caregiver-STBs screener had 50% sensitivity and 80% specificity. Relative to the combined caregiver-/child-report K-SADS, the caregiver-STBs screener had 68% sensitivity and 98.2% specificity (Table 4).

Examination of Data for Screen Development

A more detailed examination of the false-negative responses—3 cases in which the caregiver-STBs screener failed to detect rater-determined STBs based on caregiver report present on the K-SADS-EC—revealed 2 potentially important findings. First, one of those cases concerned new-onset STBs that occurred after the screen and before the clinical interview and thus would not have been expected to be detected by the screener. Second, the other 2 cases both concerned instances of infrequent past passive SI, indicating that the screener was 100% sensitive to detecting caregiver-reported active SI and suicidal behaviors in this sample, but less sensitive for detecting passive SI. In the one case in which the caregiver-STBs screener yielded a false-positive response, the caregiver mistakenly endorsed for experiences of homicidal ideation instead of SI.

An initial examination of the discrepancies between caregiver endorsements on the screener and rater-determined STBs based on child report from the K-SADS-PL interviews was somewhat less informative. No discernible patterns were observed concerning age, gender, race, or type of STBs present. However, it is notable that in 3 of 5 cases (60%) where STBs were detected in the child interview, but not in the caregiver interview, the caregiver did acknowledge NSSI during the clinical interview.

DISCUSSION

This study begins to address a critical gap in suicide risk assessment by developing and evaluating a brief caregiver-report screener for STBs in young children. When compared with a reference standard rater-scored clinical diagnostic interview based on caregiver report to assess STBs in children, the caregiver-STBs screener shows favorable psychometric properties in children ages 4 to 7 years. Specifically, the acceptable sensitivity (85%) and high specificity (98.3%) demonstrated by the caregiver-STBs screener is on par with many self-reported suicide risk screeners currently used with older youth.[14] This suggests that this brief caregiver report screener effectively detects STBs risk. Moreover, no appreciable differences were observed in the screener's ability to detect STBs risk based on age, gender, or race within this diverse sample of children, suggesting the screener could have broad applicability in pediatric settings. Importantly, no specialized training is needed to administer this screener, making it accessible for use in various clinical and nonclinical settings. A critical next step would be to determine if the screener could be administered as a survey self-report, which would make it even more cost-effective. Thus, if further validated, the caregiver-STBs screener

holds promise as a brief and reliable tool for rapidly identifying children at elevated risk for suicide and related mental health concerns who are in need of further assessment.

Developing an initial suicide risk screener for young children that prioritizes specificity, as the caregiver-STBs screener does, offers several benefits. Minimizing false positives can reduce caregiver and child distress, alleviate undue worry and unnecessary actions on the part of school officials and other caregivers, and mitigate potential stigma resulting from a false-positive screen. Minimizing false positives also allows providers to emphasize the credibility of the screener and the importance of taking positive screens seriously, while more appropriately allocating limited medical resources. This may lead the provider to spend more time opening up conversations that ensure family engagement in follow-ups and referrals, as difficulty engaging with referrals, whether due to differing views or inability to access resources, is a significant barrier in mental health care.[28] Finally, although it is generally desirable to minimize false positives, it is plausible that the false positives that are captured when assessing suicide risk could uncover related clinically significant concerns such as homicidal ideation or NSSI, which could then be addressed.

The AAP has declared youth suicide a national public health threat and released a Blueprint for Youth Suicide Prevention as a call to action to "create or enhance the safety net for at-risk youth."[7] The blueprint proposes tailored suicide risk screening recommendations for different age groups, including universal screening for youth ages $\geq$12 during preventive care visits and targeted screening for children ages 8 to 11 with specific risk factors such as behavioral complaints or a history of STBs. Screening is not recommended for children younger than age 8 due to the lack of validated tools and uncertainty about whether children at this age can comprehend the screening questions on existing tools. Instead, the AAP states that a risk assessment could be conducted if suicide warning signs are present (eg, depressed mood, severe irritability, history of STBs). However, without clear guidelines for identifying these warning signs, and likely differences in caregivers' willingness to provide unprompted information about suicide risk factors, or even recognition of STBs by caregivers or clinicians as a possibility in young children, relying on caregivers to spontaneously disclose their children's STBs could perpetuate missed cases. Administering a 4-item caregiver-report STBs screener in a targeted and systematic manner, such as to all caregivers who indicate emotional or behavioral struggles on existing screeners or when children exhibit depressed mood or severe irritability, is one potential approach to advancing equity in mental health care. For clinical settings that already employ tools such as the C-SSRS or ASQ for suicide risk screening in children, incorporating a modified caregiver-report version of those familiar tools could provide a valuable complementary measure for identifying at-risk children.

To address further gaps in the AAP recommendations, Hennefield and Denton *et al.*[29] developed a preteen suicide risk screening pathway for pediatric outpatient settings that advocates for involving both caregivers and preteens (ages 8-11) in the screening process. In the absence of a validated caregiver-report suicide risk screener, they suggest modifying an existing youth self-report screener for use with caregivers. Their proposed modifications incorporate many of the same evidence-based recommendations that underpin the current caregiver-STBs screener, such as using a multi-item screen that addresses both SI and suicidal behaviors in clear and direct language. Their work provides precedence for considering a caregiver-report suicide risk screener. Furthermore, when combined with the present findings, it raises the possibility of using the caregiver-STBs screener in conjunction with child self-report screeners for preteens as well as using the caregiver-STBs screener as an initial caregiver-only screening tool in children younger than age 8. The finding that age emerged as a significant correlate across all STBs measures in the present study, with older children more likely to have experienced STBs relative to younger children, also supports this approach. As prevalence of STBs increases with age, more comprehensive screening would be indicated for older children.

Finally, although evidence shows that caregivers are generally willing to permit their children to participate in suicide risk screening[30] and that suicide risk screening in youth is safe[31–33] and effective,[34–36] there are still instances in which a caregiver will not consent to their child being screened. As observed in our study, a caregiver suicide risk screener provides an alternative to asking directly that can alleviate some of the parental concerns about asking children directly. Additionally, caregiver report provides an alternative to asking children directly when children cannot respond in the moment (eg, if they are in extreme distress, refusing to engage with the clinician).

Although not as robust, the caregiver-STBs screener demonstrated acceptable psychometric properties for detecting STB risk relative to combined caregiver- and child-based interviews. However, its sensitivity was lower at 50% when compared solely with rater-determined STBs based on child report, indicating that it captured some, but not all, of the STBs reported by children. This indicates that the screener could serve in a limited capacity as a proxy for obtaining a direct child report, perhaps in circumstances where a caregiver is unsure about their perceptions or is not

a close observer of the child's behavior. However, given that the caregiver-based interview captured twice as many rater-determined STBs as the child-based interview, it may be more appropriate to consider the child-report findings in this age group as supplementary evidence supporting the use of a caregiver-report screener. This approach fits with that of well-established surveys that assess behavioral and emotional problems (eg, PSC, CBCL), which rely on caregiver report in younger children and self-report in older children.[10,13] Critically, discrepancies between caregiver- and self-reported STBs are well documented in the literature in children as young as 8 to 10 years of age,[3,4] with endorsements from either informant associated with concurrent and future risk factors related to STBs. Furthermore, in the present study, children were administered a brief interview consisting solely of topics related to STBs, whereas caregivers completed a full diagnostic interview, which may have amplified discrepancies in STBs endorsements. An important direction for future research will be to determine whether who provides the STBs endorsement or concordance/discordance among informants adds additional information about future risk for suicide or related mental health issues (see Spears *et al.*[37] for additional considerations regarding reporting discrepancies). Furthermore, the finding that caregivers reported NSSI for 60% of children who had rater-determined STBs compared with the overall caregiver-reported NSSI rate of 33.7% suggests that incorporating an NSSI item into future iterations of the screener could be valuable.

The present findings could additionally be taken as limited support of the utility of also directly asking young children about their own experiences with STBs via a semistructured interview. They contribute to the mounting evidence that children can—at least in certain contexts—reliably report on their own STBs, emphasizing the need to take child self-reports seriously as an indicator of risk. For example, Sheftall *et al.*[22] have used the C-SSRS to interview children as young as 6, with self-reported STBs at this age linked to many of the same risk factors identified in older children (eg, parent history of suicide attempt, anxiety). The current study extends these findings to suggest that the STBs portion of the K-SADS-PL, when administered by a trained interviewer, offers a feasible method of assessing STBs in children as young as age 4. Specifically, rater determinations of STBs from the child interview were significantly associated with STBs endorsements on the caregiver-STBs screener, indicating some overlap in the information captured by these measures. Of note, similar to reports by Sheftall *et al.*,[22] most children in our study had no problems answering questions about STBs and seemed to understand the questions being asked. In instances where a child seemed to struggle to understand a question (eg, several of the youngest 4-year-olds), the interviewer simply moved forward with the session. However, this observation needs to be further tested in a larger sample using more systematic methods. The substantial interrater reliability between the case-consensus decisions regarding STBs assessed via child interview and an independent coder reinforces the idea that young children can reliably and effectively describe their own experiences of STBs. However, it will be important for future studies to examine STBs reporting in different contexts, such as comparing the use of targeted STBs items with a full diagnostic interview, and to consider how factors such as children's concerns about caregiver's reactions to their disclosures of STBs might influence reporting. Another important future direction is to develop evidence-based guidelines to inform the contexts in which caregiver screeners are best used alone or in conjunction with child assessments to identify early suicide risk.

This study has several limitations. First, the small sample size precludes the ability to adequately validate the measure for widespread use. Although these initial psychometric properties are promising, replication with a larger sample is still needed. Along with this, although the sample was diverse regarding sociodemographic factors, it was not powered to assess differences (or lack thereof) in psychometric properties by race or ethnicity. A second limitation concerns the potential for confirmation bias due to the repeated querying of STBs during both the initial caregiver screening and the subsequent diagnostic interview. However, the comprehensive nature of the interviewer-administered K-SADS-EC helps mitigate this risk and is considered a gold standard reference standard for assessing psychometric properties of suicide risk screeners.[14] The fact that the screener was administered several weeks before the interview (rather than immediately following it) further helps mitigate this concern. However, future studies should consider incorporating other measures, such as behavioral outcomes, into their approach. Third, in the present study, the caregiver-STBs screener and K-SADS-EC were administered by the same researcher due to staffing limitations. Although not ideal from a research design perspective, it seems unlikely that having the same person administer both screener and interview would drive the present findings. Indeed, although caregiver-reported information was largely consistent across measures, the interview detected several more reports of STBs than the screener, which is to be expected, as the interview is a more in-depth measure. Fourth, 1 item on the screener was modified after the start of the study, and the small sample size limits item-specific analyses. Fifth, children with chronic medical illnesses

and developmental diagnoses such as autism spectrum disorders[38] were excluded from the present study. However, given the increased prevalence of STBs and NSSI among these populations, it will be important for future studies to include children from these groups. Sixth, as only 1 suicide attempt was reported on the screener, the utility of the screen to specifically detect risk for future suicide attempts based on past attempts remains an open question. Finally, caregivers self-selected to participate in a study on early childhood STBs, which may reflect a degree of comfort or willingness to talk about suicide that is not universal. This could stem from a general openness to discuss mental health or experiences with STBs within or outside the family. Similarly, their children may be more informed about STBs which could increase their likelihood of disclosure. These questions will need to be addressed in future work.

The caregiver-STBs screener represents a valuable contribution to suicide risk screening for young children, demonstrating promising psychometric properties and potential for broad applicability in pediatric settings. In particular, the high specificity of the measure (ie, very few false positives) indicate that positive screens should be taken seriously as indicators of STBs risk, with appropriate follow-up care provided. With further validation and refinement, it has the potential to serve as a reliable tool for detecting risk of STBs risk in this vulnerable population, ultimately facilitating early intervention and prevention efforts to reduce the incidence of suicide and related mental health problems in young children.

CRediT authorship contribution statement

Laura Hennefield: Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Christina Chen:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Data curation. **Uchechukwu Agali:** Writing – review & editing, Writing – original draft, Data curation. **Joan L. Luby:** Writing – review & editing, Writing – original draft, Supervision, Resources, Methodology.

This article is part of a special series devoted to the subject of suicide in children and adolescents, with a focus on the need for improvement to current approaches to prediction, prevention, and treatment. This special series is edited by Guest Editor Lynsay Ayer, PhD, Deputy Editor Daniel P. Dickstein, MD, and Editor Manpreet K. Singh, MD, MS.

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This work has been previously posted on a preprint server: https://osf.io/preprints/psyarxiv/mbu5p_v1

Data Sharing: Deidentified participant data will be available with publication upon request from the corresponding author.

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