

Assessing suicidal thoughts and behaviors and nonsuicidal self-injury in autistic and non-autistic early adolescents using the Columbia Suicide Severity Rating Scale

Autism

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Abstract

Suicidal thoughts and behaviors and nonsuicidal self-injury are more common in autistic adolescents than non-autistic adolescents, per parent- and self-report. Clinician-rated measures of suicide risk (e.g. Columbia Suicide Severity Rating Scale) have not been investigated with autistic youth despite high parent–child rating discrepancies. In the present study, the Columbia Suicide Severity Rating Scale was employed to assess suicidal thoughts and behaviors and nonsuicidal self-injury in 239 early adolescents (10:0–13:9 years old) without intellectual disability, of whom 138 youth were autistic. Analyses tested diagnostic- and sex-based differences in suicidal thoughts and behaviors and nonsuicidal self-injury, and youth consistency in reporting across self- and clinician-rated measures. A greater proportion of autistic youth reported lifetime suicidal ideation (33 of 138, 23.9%) and nonsuicidal self-injury (12 of 138, 8.7%) than non-autistic youth (7 of 101, 6.9% suicidal ideation; 2 of 101, 2.0% nonsuicidal self-injury); however, there were no sex-based differences. Non-autistic youth were consistent in reporting suicidal thoughts across measures, but nearly one in five autistic youth disclosed suicidal thoughts on a self-report measure, but not on the clinician-rated Columbia Suicide Severity Rating Scale. Findings suggest that autism diagnostic status, but not sex, confers significant risk for suicidal thoughts and behaviors and nonsuicidal self-injury in early adolescents and that the Columbia Suicide Severity Rating Scale may be a useful measure of suicide risk for some autistic youth, but it may not detect all autistic youth experiencing suicidal thoughts.

Lay abstract

Autistic adolescents are more likely to experience suicidal thoughts and behaviors and nonsuicidal self-injury than non-autistic adolescents, per caregiver- and self-report on single-item questionnaires. Comprehensive, clinician-rated measures of suicide risk have not been used to measure suicidal thoughts and behaviors and nonsuicidal self-injury in autistic youth despite greater parent–child rating discrepancies among autistic youth than their non-autistic peers. The Columbia Suicide Severity Rating Scale is a widely used, clinician-rated measure of suicide risk that has not been tested with autistic youth. In this study, the Columbia Suicide Severity Rating Scale was employed to assess suicidal thoughts and behaviors and nonsuicidal self-injury in a community sample of 239 early adolescents (10:0–13:9 years old), of whom 138 youth were autistic and 101 were not autistic. Multiple analyses examined diagnostic (autistic vs non-autistic) and sex-based (male vs female) differences in suicidal thoughts and behaviors and nonsuicidal self-injury, as well as youth consistency in reporting across self- and clinician-rated measures. Findings show that a greater proportion of autistic youth reported lifetime suicidal thoughts and nonsuicidal self-injury than non-autistic youth; however, there were no sex-based differences. The majority of non-autistic youth were consistent in reporting suicidal thoughts on self- and clinician-rated measures; however, nearly one in five autistic youth disclosed suicidal thoughts on a self-report measure but not to a psychiatrist on the Columbia Suicide Severity Rating Scale. Findings suggest that autism diagnostic status,

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but not sex, confers significant risk for suicidal thoughts and behaviors and nonsuicidal self-injury in early adolescents and that the Columbia Suicide Severity Rating Scale may be a useful measure of suicide risk for some autistic youth, but it may not detect all autistic youth experiencing suicidal thoughts.

Keywords

autism, early adolescent, nonsuicidal self-injury, sex, suicide

Suicide is a significant public health problem as it is the second leading cause of death among youth in the United States (Hawton et al., 2013). Autistic¹ youth are more likely to experience depression than non-autistic youth (Pezzimenti et al., 2019), and autistic people are more likely to die prematurely by suicide than the general population (Kirby et al., 2019). Risk factors for suicidal thoughts and behaviors (STBs) in autism are not well understood, and even less research is available on interventions (DeFilippis, 2018; Menezes et al., 2020; Pezzimenti et al., 2019). Current knowledge of STBs in autistic youth is based on caregiver- and self-reports on single items of questionnaires (e.g. Item 8 on the Children's Depression Inventory; Kovacs, 2015); however, caregiver-youth rating discrepancies are common in autism (Kalvin et al., 2020; White et al., 2012) and self-reports alone are not always reliable (Mazefsky et al., 2011). Importantly, clinician-rated measures of suicide risk have not been studied in autism. Rater biases of STBs in youth may be more salient in autism as greater parent-child rating discrepancies occurred in autistic early adolescents than non-autistic early adolescents (Schwartzman & Corbett, 2020), underscoring the need for multimethod, multi-informant measures (i.e. clinician-rated measures). The Columbia Suicide Severity Rating Scale (C-SSRS; Posner et al., 2011) is a brief, clinician-administered measure of suicide risk that is frequently used in research, clinical, and healthcare settings with non-autistic youth and adults. However, the C-SSRS has not been evaluated as an assessment of STBs in autistic youth without intellectual disability despite increased risk for STBs and caregiver-youth rating discrepancies in autism.

Suicidality in autistic youth: Current knowledge and gaps

Persistent STBs result in emergency room visits (Ting et al., 2012), inpatient hospitalizations (Plemmons et al., 2018), and pervasive psychiatric challenges that contribute to diminished quality of life and financial costs at individual, family, and societal levels (Bodden et al., 2018). In the United States, prevalence rates of premature death by suicide among youth 10–24 years old have increased substantially in the past several decades (Ivey-Stephenson et al., 2020). Autistic youth are a significant, at-risk group as they are more likely to experience STBs and to attempt suicide than their non-autistic peers (Hedley & Uljarević, 2018). In community samples, significantly greater

proportions of autistic youth (13%–18%) experienced STBs per caregiver-report than non-autistic youth (0.5%; Mayes et al., 2013, 2015). Per caregiver-report, autistic youth under 12 years old were more likely to experience suicidal thoughts (13.4%) and to attempt suicide (6.5%) than their non-autistic peers (0.5% thoughts, 0% attempts, respectively; Mayes et al., 2015). At the systems level, healthcare clinics serving autistic youth had higher rates of positive suicide risk screenings compared to all other healthcare clinics (Rybczynski et al., 2022). Per caregiver-report, prevalence rates of STBs were higher in autistic youth receiving treatment in a psychiatric inpatient setting than rates of STBs in outpatient settings and community samples (Horowitz et al., 2018).

Research into risk factors to STBs in autism is ongoing, with some work suggesting that older age (Mayes et al., 2013), female sex (Schwartzman et al., 2022), higher autistic traits (Cassidy et al., 2022), and loneliness (Hedley et al., 2018) confer additional risk. Alarming, autistic female adults are over 4× more likely to attempt suicide than autistic males (Kölves et al., 2021), and over 5× more likely to die prematurely by suicide than non-autistic female adults (Kirby et al., 2019). Sex-based differences in STBs among autistic people have been investigated primarily in adult samples, with limited insights in youth. As such, it is critical to investigate sex-based differences in suicide risk among autistic youth as youth assigned female sex at birth may be particularly vulnerable and earlier screening and intervention could be lifesaving (Horowitz et al., 2020).

Suicide screening in autism: Measurement challenges

The majority of studies investigating co-occurring psychiatric disorders in autistic youth fail to assess for suicidality (Howe et al., 2020), with information limited to single items on a caregiver- or self-report measure (e.g. a single caregiver-reported item on the Child and Adolescent Symptom Inventory-5; Horowitz et al., 2018). To date, a prospective study of suicide risk in autistic youth without intellectual disability using a more comprehensive clinician-rated measure has not been conducted. Single items (e.g. Item 9 of the PHQ-9) may reliably screen for some suicide risk, yet they afford a limited understanding of risk and are less comprehensive than assessments that include multiple items (e.g. Suicidal Ideation Questionnaire; Ammerman et al., 2021; Reynolds, 1988).

Complicating matters, caregiver-youth disagreement over youth symptoms is common in autism (Kalvin et al., 2020; White et al., 2012) and occur more frequently in autistic youth than non-autistic youth (Schwartzman & Corbett, 2020). Rater disagreement impedes access to care (C. D. Williams et al., 2011), contributes to diagnostic uncertainty (Grills & Ollendick, 2002), and interferes with suicide prevention (Brahmbhatt & Grupp-Phelan, 2019). As social communication differences in autism may complicate youth's efforts to identify and communicate their internal experiences to caregivers and providers (Kinnaird et al., 2019), and caregiver-youth rater disagreement is common in autism, alternative assessment methods (e.g. clinician-rated measures, interviews) may be critical to understand suicide risk in autism. Clinician-rated measures of STBs (e.g. C-SSRS) may be superior to self- or parent-report measures alone as they leverage clinical judgment to assess and interpret the risk of STBs, enable clinicians to clarify youth responses and collect additional information (e.g. follow-up questions, informant report if needed), and afford opportunities to resolve parent-child rater discrepancies to obtain a more valid risk assessment (Posner et al., 2011). For autistic youth, clinician-rated measures of STBs may be particularly important for obtaining valid risk assessments as alexithymia, social communication differences, and parent-child rating discrepancies are more prevalent in autistic youth than their non-autistic peers (Kinnaird et al., 2019).

Suicide screening tools in autism

Screening tools for psychiatric disorders have been successfully validated in autistic adults without intellectual disability (e.g. validity of the Beck Depression Inventory for depression in autistic adults; Z. J. Williams et al., 2021) and youth (e.g. validity of the Revised Children's Anxiety and Depression Scale in autistic youth; Sterling et al., 2015). Importantly, suicide screening tools developed for and with autistic adults without intellectual disability have been released (e.g. Suicidal Behaviours Questionnaire-Autism Spectrum Conditions; Cassidy et al., 2021) and demonstrate promise in detecting suicide risk. However, an autism-adapted screening tool for youth without intellectual disability has not been developed. An extension of this exceptional work to autistic youth is needed as suicide is a leading cause of death for youth (Hawton et al., 2013), STBs occur more frequently in autistic youth than non-autistic youth (Pezzimenti et al., 2019), and earlier intervention for STBs is critical. Without these tools, autistic youth will likely pass through healthcare systems with undetected STBs, placing them at higher risk for suicide attempts.

An important review of suicide risk assessment tools for youth concluded that only one measure, the Columbia

Suicide Severity Rating Scale (C-SSRS; Posner et al., 2011), had moderate evidence in predicting future suicide attempts in non-autistic youth. However, the authors concluded that *no clinician-rated tools* have been developed and used to accurately assess STBs in autistic youth nor predict future risk of STBs and attempts in this vulnerable population (Howe et al., 2020). There is an urgent need for research on the use of the C-SSRS and other clinician-rated measures of suicidality in autistic youth, particularly in light of caregiver-youth rating discrepancies and high prevalence rates of STBs.

Columbia Suicide Severity Rating Scale

The C-SSRS (Posner et al., 2011) is a brief, semistructured interview designed to screen for the presence and intensity of STBs. In research and clinical settings, the C-SSRS is used to determine the level of suicide risk and to inform safety planning. The C-SSRS has been found to be reliable in predicting suicide risk in non-autistic youth and adults (Posner et al., 2011), and can be administered by multidisciplinary professionals (e.g. psychologists, physicians, research staff). Many healthcare settings in the United States have implemented the C-SSRS and other measures to screen for suicide risk in all people treated for behavioral health conditions to increase safety and quality of care ("National Patient Safety Goal for Suicide Prevention," n.d.). Despite its growing use, the C-SSRS has not been investigated in autistic youth without intellectual disability to assess the prevalence and intensity of STBs and NSSI.

Present study

In the present study, we aimed to understand diagnostic (autistic vs non-autistic) and sex-based (female vs male) differences in the presence and intensity of recent and lifetime suicidal thoughts and behaviors (STBs) and nonsuicidal self-injury (NSSI) in a large sample of early adolescents without intellectual disability using a clinician-administered measure, the C-SSRS (Posner et al., 2011). We hypothesized that the presence and intensity of recent and lifetime STBs and NSSI would be: (1) higher among autistic youth than non-autistic youth and (2) higher in youth assigned female sex at birth compared to males. An exploratory aim of the present study was to examine potential predictors (i.e. age, diagnostic status, severity of depressive symptoms) of STBs and NSSI in this sample. With limited evidence on the use of the C-SSRS in autism, we also explored consistencies and/or inconsistencies in youth reports of suicidal ideation on self-report (i.e. Item 8 on the Children's Depression Inventory, Second Edition; CDI-2; Kovacs, 2015) and clinician-rated measures (i.e. C-SSRS).

Table 1. Demographic statistics.

	N	Non-autistic (N=101)		Autistic (N=138)		Test Statistic	p-value
		M	SD	M	SD		
Age	239	11.7	1.21	11.4	1.03	t=1.91	0.06
Full-scale IQ	239	116.9	13.89	101.0	20.65	t=7.16	<0.001
ADOS total	138	–	–	12.6	4.57	–	–
SCQ	239	2.7	2.49	17.5	8.35	t=-19.86	<0.001
CDI total T	239	51.1	8.63	58.7	12.45	t=-5.58	<0.001
	N	Proportion		Proportion		Test statistic	
Sex: female	239	0.455 (46/101)		0.261 (36/138)		$\chi^2=9.17$	0.002
Race	239					$\chi^2=12.06$	0.007
White		0.853 (86/101)		0.813 (112/138)			
Black		0.019 (2/101)		0.123 (17/138)			
Asian/Pacific Islander		0.000 (0/101)		0.007 (1/138)			
Multiracial		0.128 (13/101)		0.057 (8/138)			

ADOS: Autism Diagnostic Observation Schedule; CDI: Children's Depression Inventory; IQ: intelligence quotient; M: mean; N: number of nonmissing values; SD: standard deviation; SCQ: Social Communication Questionnaire.

Methods

Participants

The total sample included 239 early adolescents (157 males, 82 females, 10:0–13:9 years), of whom 138 youth were autistic (102 males, 36 females, mean age = 11.2 years) and 101 were not autistic (55 males, 46 females, mean age = 11.7 years; see Table 1). Due to a higher prevalence of autism in males (Baio, 2012; Loomes et al., 2017), biological sex distributions differed between the groups, with more males in the autistic group (102 of 138 autistic youth, 73.9% vs 58 of 101 non-autistic youth, 57.4%). Although the study team aimed to recruit an equivalent number of males and females into each diagnostic cohort, a greater proportion of autistic males than autistic females were enrolled and included in the final sample. In terms of ethnic identity, 16 of 239 participants (6.7%) in the sample identified as Hispanic/Latino, and the following racial identities were endorsed: 198 White (82.8%), 19 Black (7.9%), 1 Asian (0.4%), and 21 Multiracial (8.9%). Although the sample was not racially diverse, it reflected the demographics of the general region from which the sample was recruited. In the present sample, 66 of 138 autistic youth (47.8%) and 11 of 101 non-autistic youth (10.9%) were reported to take psychotropic medications, with the most common medication classes in both groups being stimulants (49 of 138 autistic youth (35.7%) and 9 of 101 non-autistic youth (8.9%)) and selective serotonin reuptake inhibitors or atypical antidepressants (35 of 138 autistic youth (25.4%) and 3 of 101 non-autistic youth (2.9%)). Elevated prevalence rates of psychiatric comorbidities and medication use have been documented in autistic people compared to the general population (Joshi et al., 2010).

Participants were part of a longitudinal study of pubertal development in autistic youth (R01 MH111599; PI: Corbett) and recruited from a broad catchment area within a 200-mile radius of Vanderbilt University Medical Center in Nashville, TN. Participants were recruited through research registries, medical-health-related networks, well-check and diagnostic clinics, regional autism/disability organizations, and social media platforms. Participants and their caregivers received financial compensation for their participation in the study. Inclusion criteria included participants: (a) 10:0–13:9 years old, (b) full-scale IQ (FSIQ) of 70 or above on the four-subtest Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II; Wechsler, 2011) to complete study measures, and (c) able to attend a study visit of approximately 3 h. For autistic youth, diagnostic status was later confirmed by the research team (see Procedures section below) and when applicable, first-time autism diagnoses were provided by a licensed clinical psychologist with expertise in autism. Exclusion criteria for the present study aligned with exclusion criteria of the longitudinal study including: (a) severe aggression (i.e. exhibiting harmful behaviors to self or others) per caregiver-report or clinical observation, (b) a neurological or medical condition known to influence pubertal development (e.g. genetic disorder), and (c) use of medications (e.g. corticosteroids) that are known to alter functions of the hypothalamic-pituitary-adrenal (HPA) axis. Additional exclusion criteria for non-autistic youth included an autistic sibling or parent, or a score ≥ 10 on the Social Communication Questionnaire (SCQ; Rutter et al., 2003). Informed consent and assent were collected in writing from caregivers and participants, respectively, prior to inclusion in the study. All study procedures were approved

by the Vanderbilt Institutional Review Board in accordance with the 1964 Helsinki declaration and its later amendments.

Procedures

Autistic and non-autistic youth attended an initial study visit (2 h) at the university-based clinic to establish eligibility for study participation. In this first visit, youth completed the WASI-II (Wechsler, 2011) and caregivers completed the SCQ (Rutter et al., 2003). For autistic youth, diagnosis was confirmed by a review of *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5) criteria (American Psychiatric Association [APA], 2013) and research-reliable administration of the Autism Diagnostic Observation Schedule–2, Module 3 (ADOS-2; Lord et al., 2012). Eligible participants attended a second study visit (3 h) to complete study measures, which included self-report measures (e.g. Children's Depression Inventory, Second Edition; CDI-2; Kovacs, 2015) and the C-SSRS (Posner et al., 2011). The C-SSRS was administered to all participants individually without a parent present by a child and adolescent psychiatrist with expertise in administration of the C-SSRS and treating autistic and non-autistic youth.

Although the C-SSRS has not been carefully validated for use in autism, it is a widely used and reliable screening tool for suicide (Interian et al., 2018) that has been frequently used with autistic people (Howe et al., 2020). Data collected by study psychiatrists from the C-SSRS were analyzed in the present study. For youth who endorsed active suicidal ideation, intent, plan, or attempt, safety interventions were immediately implemented by study psychiatrists. Referrals for psychotherapy and/or psychiatry services were provided to families. Community members were not involved in the present study.

Dependent measure: C-SSRS lifetime and recent

The C-SSRS, Lifetime and Recent (Posner et al., 2011) is a clinician-rated interview that assesses recent and lifetime suicidal ideation (i.e. thoughts or wishes of death/suicide) and behaviors (i.e. suicide attempts, NSSI). The *Suicidal Ideation* section of the C-SSRS comprised two domains assessing the type and intensity of suicidal thoughts. Five questions are administered to assess the types of recent and/or lifetime suicidal thoughts (e.g. wish to be dead, nonspecific active suicidal thoughts) and items are rated on a dichotomous scale (yes/no). For youth who endorse recent (past month) or lifetime suicidal ideation (i.e. respond "yes" to any of the first five questions), follow-up questions are administered to assess the intensity of ideation (i.e. frequency, duration, controllability, deterrents,

reasons for ideation) on an ordinal scale (1=less severe to 5=more severe).

The *Suicidal Behaviors* section of the C-SSRS assesses the presence/absence of recent (past 3 months) and lifetime suicide attempts (i.e. actual attempt, interrupted attempt, aborted attempt, preparatory acts/behavior) using dichotomous items (yes/no). If a youth endorsed a recent or lifetime attempt, the number of attempts were recorded (continuous variable). The presence/absence of recent and lifetime NSSI (e.g. cutting, burning) was also measured on a singular dichotomous item (yes/no). Self-injurious behavior (SIB), which is any type of action directed toward the self that results in physical injury (Fee & Matson, 1992) is common in some autistic people and SIBs are often rhythmic and repetitive.

Given this, SIBs may be a form of restricted, repetitive behavior (RRB) in autism (South et al., 2005); however, SIBs are distinct from NSSI (Maddox et al., 2017). The function of SIBs (e.g. communication) and NSSI (e.g. coping, intent to self-harm) may be different in autism (Lecavalier, 2006; Maddox et al., 2017; McClintock et al., 2003), and require continued investigation in larger samples to tease apart shared and distinct mechanisms of SIBs and NSSI in this population. Given this distinction in the literature, study psychiatrists asked if youth engaged in any current and/or lifetime self-injury and if so, if self-injury occurred in moments of distress. For youth who reported a history of current or lifetime self-injury, the psychiatrists queried further to determine if the self-injury occurred in moments of distress or not. If youth engaged in self-injury amid distress, then psychiatrists marked the answer as "yes" in the NSSI current and lifetime sections of the C-SSRS. If youth engaged in self-injury outside of distress (e.g. in response to feeling really excited about something), then psychiatrists marked the answer as "no" in this section. Additionally, for youth without a history of current or lifetime self-injury, the psychiatrists marked the answer as "no" in the NSSI current and lifetime sections of the C-SSRS. As the focus of the larger study was not on NSSI function and causes in autistic youth, the study team did not further inquire about the cause or triggers (e.g. overwhelming stimuli, too many demands) of the distress. Despite this, there is a clear need for further research into conceptualizing SIBs and NSSI and their functions in autistic youth to inform risk stratification and intervention efforts. Additionally, in the *Suicidal Behaviors* section of the C-SSRS, the potential/actual lethality of recent and/or lifetime suicidal behaviors (if endorsed) was scored by the clinician, with higher scores indicating higher severity.

The C-SSRS can be utilized in research and clinical settings to screen for suicide risk in youth and adults. In research settings, the C-SSRS can be administered by research staff who have completed training in the administration of the C-SSRS. For additional information on the

administration, scoring, and materials of the C-SSRS, please refer to the resources made publicly available by the generous investigators of The Columbia Lighthouse Project (Posner et al., 2011). If a youth participant endorsed current STBs, then a licensed mental health provider (e.g. psychiatrist, psychologist, social worker) was contacted to conduct a thorough risk assessment and to develop a safety plan with the participant and their parent. Clinical judgment was used to support a more comprehensive and nuanced assessment for youth who endorsed STBs on the C-SSRS by asking follow-up questions to determine the nature and severity of STBs. Follow-up questions typically include questions about a youth's intention to act on suicidal thoughts (i.e. "Do you have any intention to act on your thoughts?," or, "On a scale from 1–10, how likely are you to act on your thoughts?"), plans for suicide (i.e. "Have you thought about how you would kill yourself?"), and/or access to means (i.e. "Do you have access to firearms in your house?").

In the present study, two child and adolescent psychiatrists with experience treating autistic and non-autistic youth in various settings (e.g. inpatient, partial hospitalization program, outpatient, research) administered the C-SSRS. The psychiatrists previously completed the C-SSRS training modules as part of psychiatry residency and fellowship training. At the start of the study, all staff psychiatrists administered several C-SSRS interviews together to study participants to ensure that all psychiatrists were consistent in their administration. There was no formal testing of inter-rater reliability.

Clinical characterization measures

Wechsler Abbreviated Scale of Intelligence, Second Edition. All participants completed the Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II; Wechsler, 2011) in Visit 1 and eligible participants had an FSIQ \geq 70 to complete study questionnaires and protocols.

Autism Diagnostic Observation Schedule, Second Edition. The Autism Diagnostic Observation Schedule, Second Edition (ADOS-2; Lord et al., 2012) is a semistructured interview-based instrument used to facilitate diagnostic decisions regarding autism spectrum disorder (ASD). Research-reliable clinicians administered Module 3 of the ADOS-2 to autistic youth in the study to confirm diagnostic status (i.e. total score greater than 7). Autistic youth had a diagnosis of ASD based on the DSM-5 (APA, 2013) and confirmed by current clinical judgment and ADOS-2 scores.

Social Communication Questionnaire, Lifetime. The Social Communication Questionnaire, Lifetime (SCQ-L; Rutter et al., 2003) is a brief caregiver-report questionnaire that assesses for lifetime behaviors indicative of autism. In this study, the SCQ was utilized as a screening tool to corroborate autism diagnoses, in conjunction with ADOS-2 scores

and clinical judgment, and to rule out autism in non-autistic youth (i.e. scores $<$ 10).

Children's Depression Inventory, Second Edition. The Children's Depression Inventory, Second Edition (CDI-2; Kovacs, 2015) is a self-report questionnaire that assesses the severity of cognitive, affective, and behavioral depressive symptoms in youth 7–17 years old. Raw scores are converted to T-scores with a mean of 50 and standard deviation of 10. The total CDI T-score was used in the present analyses. Youth who endorsed, "I think about killing myself but would not do it," or, "I want to kill myself," on Item 8 of the CDI-2 met with study personnel for further risk assessment.

Statistical analyses

Independent samples *t*-tests were employed to examine differences in demographic (i.e. age, FSIQ score) and clinical (i.e. CDI Total T-score) factors between autistic and non-autistic youth. To test the first hypothesis (i.e. diagnostic-based differences in STBs and NSSI), chi-square analyses were used with C-SSRS responses given the dichotomous variables (yes/no). As mentioned, the five items measuring intensity of suicidal ideation are ordinal and thus, Kruskal–Wallis H tests were used to test diagnostic-based differences on these items.

To test the second hypothesis (i.e. sex-based differences in STBs and NSSI), the same analytic plan described above was employed with biological sex as the independent variable. A binary hierarchical logistic regression model with diagnosis, age, sex, race, and CDI total score explored the extent to which diagnostic and demographic factors were associated with likelihood of lifetime suicidal ideation. To investigate consistency in reporting across self- (CDI-2) and clinician-rated (C-SSRS) measures of suicidal ideation, proportions of youth who endorsed recent (i.e. past month) suicidal thoughts on the C-SSRS and CDI-2 were compared. Given a community sample, the prevalence of STBs and NSSI were not as high as observed in clinical samples (Posner et al., 2011) and thus, reliability and validity analyses were not conducted.

Results

Demographic characterization of the sample is presented in Table 1. While the groups differed in average IQ, the autistic group fell well within the average range of functioning, with group differences largely driven by the above-average IQ in the non-autistic group. Although recruitment procedures were universal for autistic and non-autistic participants, many children of academic professionals at Vanderbilt University enrolled in the study as non-autistic participants and may account for differences in IQ scores. As expected, the autistic group had higher scores on the SCQ and CDI-2 compared to the non-autistic group (see Table 1).

Table 2. Proportion of youth endorsing suicidal ideation and behavior and nonsuicidal self-injury.

	Non-autistic (N=101)	Autistic (N=138)	Test statistic	p-value
Ideation—Lifetime	7/101 (6.9%)	33/138 (23.9%)	$\chi^2=12.07$	<0.001
Ideation—Current ^a	1/101 (1.0%)	8/138 (5.8%)	$\chi^2=3.72$	0.083
Behavior—Lifetime	1/101 (1.0%)	5/138 (3.6%)	$\chi^2=1.65$	0.406
Behavior—Current ^b	1/101 (1.0%)	3/138 (2.2%)	$\chi^2=0.50$	0.640
Nonsuicidal self-injury— Lifetime	2/101 (2.0%)	12/138 (8.7%)	$\chi^2=4.77$	0.029

^aPast 3 months.^bPast 1 month.

Diagnostic-based differences in suicidal ideation, suicidal behaviors, and NSSI

Suicidal ideation. Proportions of autistic and non-autistic youth who reported recent and lifetime suicidal ideation are presented in Table 2. In the total sample, 40 of 239 youth (16.7%) reported lifetime suicidal ideation on the C-SSRS. Autistic youth were more likely to endorse lifetime suicidal ideation than their non-autistic peers [$X(1)=12.069$, $p<0.001$]. The proportion of autistic youth (33 of 138, 23.9%) with lifetime suicidal ideation was nearly four times as large as the proportion of non-autistic youth (7 of 101, 6.9%). A closer examination revealed that autistic youth were more likely to report the following types of ideations than their peers: Wish to be dead, nonspecific active suicidal thoughts, active suicidal ideation with any methods without intent to act, active suicidal ideation with some intent to act without specific plan, and active suicidal ideation with specific plan and intent. Although autistic youth were more likely to report lifetime suicidal ideation than non-autistic peers, a Kruskal–Wallis H test showed that there was a significant difference in the frequency of suicidal thoughts between diagnostic groups [$X^2(1)=3.380$, $p=0.026$] with more frequent thoughts experienced by non-autistic youth. During periods of suicidal thoughts, non-autistic youth reported more frequent thoughts (i.e. 2–5 times per week) than autistic youth (i.e. once a week). There were no significant differences in the duration and controllability of lifetime suicidal thoughts between groups. In the total sample, nine of 239 youth (3.8%) reported recent suicidal ideation on the C-SSRS, and there were no diagnostic-based differences [$X(1)=3.719$, $p=0.083$]. Since only a limited number of youth endorsed recent suicidal ideation, additional analyses on the intensity of suicidal ideation were not conducted.

Suicidal behaviors. Proportions of autistic and non-autistic youth who reported recent and lifetime suicidal behaviors are presented in Table 2. In the total sample, 6 of 239 youth (2.5%) reported a lifetime suicidal behavior (e.g. actual

attempt, interrupted attempt) on the C-SSRS, but diagnostic-based differences were not observed [$X(1)=1.652$, $p=0.406$]. In the total sample, four of 239 youth (1.7%) reported suicidal behavior in the past 3 months on the C-SSRS, but diagnostic-based differences were not observed ($p=0.640$).

Nonsuicidal self-injury. Of all youth, 14 of 239 (5.9%) engaged in lifetime NSSI, with a higher proportion of autistic youth (12 of 138, 8.7%) than non-autistic youth [2 of 101, 2.0%; $X(1)=4.769$, $p=0.029$]. A closer examination of clinician notes showed that head banging was the most common form of NSSI reported by autistic youth.

Sex-based differences in suicidal ideation, suicidal behaviors, and NSSI

Suicidal ideation. There were no sex-based differences in recent [$X(1)=0.00$, $p=0.993$] or lifetime [$X(1)=0.05$, $p=0.823$] suicidal ideation. Because sex-based differences were not observed, additional analyses on the intensity of suicidal ideation between the sexes were not conducted. Though more non-autistic females endorsed lifetime suicidal ideation than non-autistic males, only seven of 101 non-autistic youth in total endorsed lifetime suicidal ideation.

Suicidal behaviors. There were no sex-based differences in recent [$X(1)=0.499$, $p=0.480$] nor lifetime [$X(1)=0.755$, $p=0.385$] suicidal behaviors. Within the autistic cohort, the proportions of males and females with recent and lifetime suicidal behaviors were similar. Similarly, the proportions of non-autistic males and females with recent and lifetime suicidal behaviors were nearly equivalent.

Nonsuicidal self-injury. In terms of lifetime NSSI, sex-based differences were not observed [$X(1)=0.969$, $p=0.325$]. The proportions of autistic males and females with lifetime NSSI were similar, as well as the proportions of non-autistic males and females.

Suicidal thoughts: Reporting styles and potential predictors

Proportions of youth who reported recent suicidal ideation on the CDI-2 (self-report) and C-SSRS (clinician-rated) were examined in the total sample and within diagnostic groups.

Among autistic youth, the majority of youth (105 of 138, 76.1%) were consistent in reporting recent suicidal ideation across measures, while a smaller proportion of autistic youth (33 of 138, 23.9%) was inconsistent in reporting with many (27 of 138, 19.6%) endorsing suicidal ideation on the CDI-2 and not the C-SSRS. A small proportion of autistic youth (6 of 138, 4.3%) endorsed suicidal ideation on the C-SSRS and not the CDI-2. Among non-autistic youth, the majority of youth (93 of 101, 92.0%) were consistent in reporting recent suicidal ideation across measures, while a small proportion of non-autistic youth (8 of 101, 8.0%) endorsed suicidal ideation on the CDI-2 and not the C-SSRS. The proportion of youth with consistent reporting across measures was higher in the non-autistic group (92%) than the autistic group (76.1%).

A binary hierarchical logistic regression was performed to ascertain the effects of diagnosis, age, and CDI-2 total score on a youth's likelihood of reporting any lifetime history of suicidal ideation (SI). The first step of the model examined age, sex, and race, to account for potential covariates. Next, diagnosis was added to determine the effect of diagnosis on the likelihood of SI. Finally, CDI-2 total score was included in the model to ascertain the unique contribution of depressive symptoms after controlling for diagnosis. When only diagnosis and covariates were in the model, the model was statistically significant, $\chi^2(4) = 12.89$, $p = 0.01$ and explained 9.1% (Nagelkerke R^2) of the variance. Diagnosis was a significant, unique contributor in predicting SI likelihood ($\chi^2(1) = 10.24$, $p = 0.001$), while age, sex, and race were not significant ($p > 0.05$). Inclusion of CDI-2 total score significantly improved the model, $\chi^2(1) = 27.04$, $p < 0.001$, and the total model accounted for 26.7% of the variance. While the model correctly classified 85.5% of cases, accuracy was far better when predicting which youth would have no history of SI (97.4% accuracy) compared to predicting those with a history of lifetime SI (23.7%). While an autism diagnosis was associated with a higher odds ratio of reporting SI, the predictor did not reach statistical significance ($p = 0.09$) in the final model. The CDI-2 total score was the only independent predictor associated with increased likelihood of SI (see Table 3 for full regression results).

Discussion

The present study was the first to assess recent and lifetime STBs and NSSI in a large community sample of autistic and non-autistic early adolescents (10:0–13:9 years old)

without intellectual disability using the C-SSRS (Posner et al., 2011). Our first hypothesis was partially supported as a greater proportion of autistic youth-reported lifetime suicidal ideation and NSSI than non-autistic youth. However, differences were not observed on recent suicidal ideation nor recent and lifetime suicidal behaviors between autistic and non-autistic youth. Our second hypothesis was not supported as there were no sex-based differences in recent and lifetime STBs and NSSI in this sample. In the autistic group, the proportions of males and females endorsing recent and lifetime STBs and NSSI were nearly equivalent. Consistencies in youth reports of suicidal ideation were observed on clinician- and self-report measures and provide preliminary support for the use of the C-SSRS in assessing suicide risk in autistic youth. Importantly, nearly one in five autistic youth-reported suicidal thoughts on a self-report measure (CDI-2) but not to a clinician on the C-SSRS. Continued studies are needed on the utility, reliability, and validity of the C-SSRS and other widely used measures of suicide risk with autistic youth to enhance screening and safety planning.

A larger proportion of autistic youth (33 of 138, 23.9%) reported lifetime suicidal thoughts or wishes than non-autistic youth (7 of 101, 6.9%) on the C-SSRS, which highlights the importance of earlier screening in this at-risk population. In our community sample, over one in five autistic early adolescents thought about death or suicide in their lifetime and the proportion of autistic youth endorsing lifetime suicidal ideation was nearly four times as large as the proportion of non-autistic youth. Findings add to a limited evidence base on STBs in early adolescents (Bhatta et al., 2014) and clearly highlight the extent to which suicidal ideation is a growing public health problem and presents even earlier in development, particularly for autistic youth. Depression often emerges during adolescence and has been linked to pubertal timing such that increases in depressive symptoms occur simultaneously with the start of puberty (Angold et al., 1998; Costello et al., 2005; Kaltiala-Heino et al., 2003). Findings from the present study suggest that screening for STBs in early adolescence is an important practice in clinical and/or research settings as many autistic youth are more likely to endorse STBs before and/or during this developmental period than their non-autistic peers. On average, autistic youth were more likely to report lifetime SI than their peers (i.e. a greater number of SI periods); however, during periods of SI, non-autistic youth reported more frequent thoughts (i.e. 2–5 times per week) than autistic youth (i.e. once a week). This finding suggests that non-autistic youth may experience a greater volume of suicidal thoughts during crisis periods than autistic youth, which indicates a heightened risk state for non-autistic youth as frequent SI has been identified as a risk factor for suicide attempts (Plemmons et al., 2018). As healthcare settings shift toward universal suicide risk screening, concentrated efforts to screen and treat autistic

Table 3. Binary logistic regression for predicting the presence of suicidal ideation.

Factor	B (SE)	<i>p</i> ^a	95% CI for odds ratio		
			Lower	Odds ratio	Upper
Model 1					
Constant	-1.56 (1.84)	0.40	–	0.21	–
Age	-0.02 (0.16)	0.92	0.72	0.98	1.35
Sex	-0.10 (0.38)	0.80	0.43	0.91	1.91
Race	0.09 (0.15)	0.54	0.82	1.10	1.47
Model 2					
Constant	-3.64 (2.06)	0.08	–	0.03	–
Age	0.07 (0.17)	0.70	0.77	1.07	1.49
Sex	0.17 (0.40)	0.67	0.54	1.19	2.59
Race	0.13 (0.16)	0.42	0.83	1.14	1.55
Diagnosis	1.47 (0.46)	0.001	1.76	4.33	10.63
Model 3					
Constant	-9.61 (2.66)	<0.001	–	0.00	–
Age	0.20 (0.19)	0.30	0.84	1.22	1.77
Sex	-0.05 (0.44)	0.91	0.40	0.95	2.24
Race	0.11 (0.17)	0.49	0.81	1.12	1.56
Diagnosis	0.85 (0.51)	0.09	0.87	2.35	6.35
CDI Total T score	0.08 (0.02)	<0.001	1.05	1.09	1.13
Model summaries					
	Chi-square	df	<i>p</i>	Nagelkerke <i>R</i> ²	
Model 1	0.43	3	0.93	0.003	
Model 2	12.46	1	<0.001	0.091	
Model 3	27.04	1	<0.001	0.267	

CDI: Children's Depression Inventory; CI: confidence interval; SE: standard error.

^aWald test.

early and late adolescents are essential as they are far more likely to experience STBs than their non-autistic peers and more frequently utilize psychiatric and general healthcare services (Gilmore et al., 2022; Gurney et al., 2006; Narendorf et al., 2011).

The present findings point to the importance of clinician-rated measures in screening for suicide risk in autism as nearly 10% more autistic youth screened positive for suicidal ideation on the C-SSRS than caregiver-report measures alone in other studies. Autistic youth may feel more comfortable disclosing suicidal thoughts to a healthcare provider than their caregivers, and/or interview measures like the C-SSRS provide direct, concrete questions about suicidal ideation that may be easier for autistic youth to answer. Recent implementation efforts to increase provider use of clinician-rated suicide risk measures in pediatric neurodevelopmental disabilities medical clinics have been successful as many youth (38.5%) screened positive for suicide risk and received connections to mental health services (Rybczynski et al., 2022). Continued efforts to expand these types of suicide surveillance programs may be highly beneficial to autistic youth, including early adolescents on the cusp of puberty.

The proportions of autistic and non-autistic youth who reported suicidal ideation in the past month were not

significantly different, and the total number of positive screens was low in this community sample. The C-SSRS was administered once in the present study (i.e. cross-sectional data) and thus, may not be a sufficient number of administrations to capture the often fleeting and changing nature of suicidal thoughts (Kleiman & Nock, 2018). In the general population, repeated administrations of suicide risk assessments (e.g. ecological momentary assessment) have been more successful in measuring suicidal thoughts than single administrations (Kleiman & Nock, 2018). Therefore, for autistic youth, it is likely that repeated administrations of the C-SSRS or related assessments may be more effective at detecting the presence of suicidal thoughts than single administrations. This suggestion is further supported by findings that some autistic children were reported to first experience STBs in the final year of a longitudinal study (Hunsche et al., 2020). The proportions of autistic and non-autistic youth who reported recent and lifetime suicidal behaviors and attempts were not significantly different, and the total number of positive screens in the sample was low. However, the importance of utilizing the C-SSRS and other suicide risk measures is highlighted by the fact that five autistic youth endorsed lifetime suicide attempts, with three reporting an attempt in the previous 3 months. By administering the C-SSRS,

study psychiatrists successfully identified these at-risk youth and completed crisis assessments and safety plans quickly with their families. As suicidal behaviors strongly predict risk for premature death by suicide (Nock et al., 2008), systematic and repeated suicide risk screening is critical for all behavioral and healthcare settings serving autistic youth.

The prevalence of lifetime NSSI reported on the C-SSRS was significantly higher in autistic youth than non-autistic youth, with head banging as the most common form of NSSI reported by autistic youth. Self-injury occurs more often in some autistic people than the general population (Minshawi et al., 2014) and as such, requires nuanced assessment to better understand the function, causes, and other mechanisms of self-injury and NSSI in this population. In autistic adults, NSSI significantly predicts suicidality (Cassidy et al., 2018); our findings suggest that NSSI may be an important risk factor to suicidality in some autistic youth. The C-SSRS utilizes a single item to assess the presence/absence of NSSI, which limits a better understanding of the function of these behaviors in the context of suicidality. Therefore, the use of more comprehensive measures of NSSI (e.g. Non-Suicidal Self-Injury Assessment Tool, NSSI-AT; Whitlock et al., 2014) would afford a more complete conceptualization of NSSI in autistic youth and associations with suicidality (Maddox et al., 2017).

Sex-based differences in recent and lifetime STBs and NSSI were not observed within nor between autistic and non-autistic early adolescents in this sample and add to a limited research base on STBs and NSSI in early adolescents (Bhatta et al., 2014). Our findings indicate that autism diagnostic status, but not biological sex, confers risk for STBs and NSSI in early adolescents. In the general population, the prevalence of STBs is highest among older adolescent females (14–17 years old; Ivey-Stephenson et al., 2020) and may suggest that sex-based differences in STBs become more prevalent as youth progress through development and into social landscapes of increasing complexity (i.e. high school). Alternatively, a lack of sex-based differences in the present sample may be explained by the low number of autistic and non-autistic youth who endorsed STBs and NSSI on the C-SSRS in this community sample. It is also likely that a lack of sex differences in recent and lifetime STBs and NSSI observed in this study may be attributed to the slight sampling bias against autistic females. Additional research on the experiences of autistic female youth is a critical next step in this line of research to increase representation in autism research and best serve this cohort. Furthermore, sampling in clinical populations with a greater number of autistic females may elucidate the role of biological sex in the prevalence of STBs and NSSI in early adolescents, which could guide screening and prevention efforts.

As autistic females are a historically under-represented cohort in autism research (Mandy & Lai, 2017), the present study adds important insights into higher prevalence rates of STBs and NSSI in young autistic females than non-autistic females. Increased efforts to understand experiences of autistic females are critical to advancing screening and intervention efforts, as well as opportunities for community and public change. It would be important to investigate gender diversity and STBs in autistic youth as gender diversity is more common among autistic youth than their non-autistic peers (Corbett et al., 2023) and gender diversity has been linked to higher STBs in the general population (McNeil et al., 2017) as well as elevated depression and anxiety in autistic youth (Corbett et al., 2023).

The proportion of non-autistic youth (93 of 101, 92.0%) with consistent reporting across measures was larger than the proportion of autistic youth (105 of 138, 76.1%) with consistent reporting. The C-SSRS and CDI-2 were administered in the same study visit to all youth, but a portion (27 of 138, 19.6%) of autistic youth reported recent suicidal ideation on the CDI-2 and not the C-SSRS. In essence, nearly one out of every five autistic youth were likely to endorse suicidal thoughts on a self-report measure and not a clinical interview. Our findings suggest that multimethod assessments (i.e. self-report, clinician-rated) are needed to screen for suicide risk in autistic youth as self-report or clinician-rated alone may not accurately detect all youth experiencing suicidal thoughts. Alternatively, since some social interaction is inherent to the C-SSRS, it may be challenging for some autistic youth to identify and communicate their STBs to an interviewer, and may explain why some youth are more likely to self-report ideation on a questionnaire than to an interviewer. It is likely that a suicide risk measure developed for and with autistic youth may enhance screening efforts for this population given the demonstrated success of a measure (i.e. Suicidal Behaviors Questionnaire-Autism Spectrum Conditions; Cassidy et al., 2021) developed for and with autistic adults. As pediatric healthcare settings shift toward universal screening for suicide risk, the development of a novel measure or adaptation of an existing one (e.g. C-SSRS) for autistic youth is a critical gap in autism research and clinical care.

Autistic youth were more likely to endorse a lifetime history of suicidal ideation (SI), which was added in the first step of the hierarchical regression analysis; however, the addition of depressive symptoms on the CDI-2 into the model significantly improved model fit. In the final model, depressive symptoms emerged as the only independent predictor associated with an increased likelihood of SI, which mirrors findings in autistic adults (Hedley et al., 2018). It is apparent from the updated models that depressive symptoms were a strong predictor of lifetime SI and that diagnostic differences in SI were likely largely

explained by elevated scores on the CDI-2 for the autistic group. With a low incidence of SI in our community-based sample, the model was unable to accurately predict youth with a lifetime history of SI and points to the importance of continued investigation in this area. Longitudinal studies of youth as they transition through puberty, a developmental period characterized by spikes in internalizing symptoms and suicidal thoughts (Costello et al., 2005), may afford an enhanced understanding of SI and associated risk factors in autistic and non-autistic youth.

Limitations

The present study was the first to examine STBs and NSSI in a large sample of autistic and non-autistic youth using the C-SSRS, but there are several limitations to this study that warrant a discussion. First, the sample did not include equivalent numbers of males and females in the autistic group, which may limit the generalizability of findings. It will be essential to include a larger number of autistic females in future investigations to understand the emergence and trajectory of STBs and NSSI in this population. Second, data on the presence/absence of recent NSSI were not entered into the study database and limit our ability to examine diagnostic- and sex-based differences. Third, data are cross-sectional and cannot provide information on causal relationships between variables. The current sample is part of a longitudinal study of adolescence; therefore, examining STBs and NSSI over time may provide important insights regarding diagnostic- and sex-based differences and causal relationships over development. Fourth, the sample was not ethnically/racially diverse, which limits the generalizability of findings. A critical future direction is to investigate the role of ethnic/racial minority status in the emergence and maintenance of STBs and NSSI in autistic youth. Fifth, given the structure of the parent longitudinal study, additional information on STBs (e.g. number of past incidents, ages of STBs) and NSSI (e.g. causes of distress, functions) was not collected and constitutes an important area of future investigation. Finally, with a low incidence of STBs and NSSI in this community sample, we were unable to perform reliability and validity analyses between the C-SSRS and CDI-2. Similarly, the low incidence of STBs and NSSI likely contributed to the poor accuracy of the binary logistic model in predicting the presence of lifetime SI, and analyses were likely underpowered to more accurately examine the extent to which diagnostic and demographic features may predict history of SI in a more clinical population.

Conclusion

With suicidal thoughts and behaviors on the rise among youth and increasing efforts to screen for suicide risk in healthcare settings, research on autistic youth and

clinician-rated measures are needed to guide efforts. The extent to which autism diagnostic status and biological sex may be risk factors to STBs and NSSI in early adolescents is unclear and important to understand as youth approach the start of puberty. The current analyses from a large community sample of early adolescents revealed diagnostic-based differences in lifetime suicidal ideation and NSSI on the C-SSRS (Posner et al., 2011), a widely used suicide risk screener, with higher rates among autistic youth than non-autistic youth. Sex-based differences in STBs and NSSI were not observed within and between autistic and non-autistic youth. Though the majority of all youth were consistent in reporting recent suicidal ideation on clinician- (C-SSRS) and self-report (CDI-2) measures, nearly 20% of autistic youth endorsed suicidal thoughts on a self-report questionnaire and not to a study psychiatrist, which underscores the need for multimethod assessments of suicide risk in autism and/or suicide assessments developed for and with autistic youth. Though youth in the present study had clinical diagnoses of autism, undiagnosed autistic youth may also be at risk for STBs and highlight the importance of studying autistic traits in the pathway to STBs in autism. The present findings add to the literature on STBs and NSSI in a younger cohort of autistic and non-autistic adolescents, with implications for screening efforts: In the absence of an autism-specific measure of STBs and NSSI, multimethod measures (i.e. self-report questionnaire, clinician-administered interview) may be critical for accurate screening in autistic youth.

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Note

1. We used identity-first language (i.e. autistic youth and adults) in this article as it is the preference of most autistic people (Kenny et al., 2016) and supported by recent research (Bottema-Beutel et al., 2021).

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