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Short report

Psychometric properties of the revised children's anxiety and depression scale (RCADS) for autistic youth without co-occurring intellectual disability

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ABSTRACT

Autistic youth often present with comorbid anxiety and depression yet there is a dearth of validated assessment tools. The Revised Children's Anxiety and Depression Scale (RCADS) assesses internalizing symptoms but there is little psychometric data in autistic youth. Treatment-seeking autistic youth with anxiety or obsessive-compulsive symptoms ($N = 74$; age 6–14 years), and caregivers, were administered the RCADS-Parent, RCADS-Child, and assessments of internalizing, externalizing symptoms and social impairment indicative of autism. RCADS-Parent and RCADS-Child total anxiety scores demonstrated excellent internal consistency, and the six subscales demonstrated acceptable-to-good internal consistency. The RCADS-Child and Parent total anxiety scores were weakly correlated, and neither child age nor gender altered the strength of this association. Convergent validity was supported by moderate-to-strong correlations with clinician and parent-reported anxiety symptoms. Support for divergent validity was mixed. Results provide support for the RCADS-Parent and RCADS-Child as reliable, valid measures of internalizing symptoms in autistic youth.

Up to 74% of autistic children and adolescents (i.e., ages 6–18; hereafter youth) have a comorbid psychiatric disorder—most commonly, depression and anxiety [1,2]. Co-occurring anxiety and depressive symptoms are associated with greater functional impairment, social concerns, and risk of suicide [3]. Symptoms are heterogeneous with both typical and atypical presentations of anxiety in autistic youth [4]. There is a critical need to assess for and treat these conditions in autistic youth.

Child- and parent-rated anxiety assessment tools such as the Pediatric Anxiety Rating Scale (PARS) [5], Multidimensional Anxiety Scale for Children-Parent (MASC-P) [6], Screen for Child Anxiety Related Disorders (SCARED) [7], Spence Children's Anxiety Scale (SCAS) [8] and Revised Children's Manifest Anxiety Scale (RCMAS) [9] have demonstrated promising psychometric properties in autistic youth. The Parent-Rated Anxiety Scale for ASD (PRAS-ASD) was specifically developed for this population and has demonstrated high test-retest reliability, divergent and convergent validity [10]. While the assessment of depressive symptoms in autistic youth has received less attention, the Patient Health Questionnaire 9-item (PHQ-9) [11] has low sensitivity and lower parent-reported (vs. youth-reported) symptoms [12]. The Revised Children's Anxiety and Depression Scale (RCADS) [13] is a 47-item questionnaire for children ages 6–18 years old, and their parents, that assesses anxiety, obsessive-compulsive, and depressive symptoms that correspond to DSM-5 diagnoses [13]. The RCADS yields six subscale scores (social phobia, panic, major depression, separation anxiety, generalized anxiety, and obsessive-compulsive symptoms), an Anxiety Total Score, and a Total Score. The RCADS includes both child- and parent-report forms (hereafter "RCADS-C" and "RCADS-P").

Psychometric studies of the RCADS in neurotypical youth have established its internal consistency [14–18], test-retest reliability [15,16], and convergent, divergent, and construct validity [14–16,19–21].

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The psychometric properties of the RCADS in autistic youth have been reported in two studies [22,23]. Sterling et al. [23] found that the RCADS-C demonstrated acceptable internal consistency for high-functioning autistic youth (α = 0.72–0.93). They [23] found modest convergent validity between the RCADS-C and measures of anxiety and depression, including the Anxiety Disorders Interview Schedule–Child Version (ADIS-Child) [24], MASC-Parent [25], PARS, and Child Behavior Checklist (CBCL) Anxious/Depressed subscale [26]. Divergent validity was fair, as demonstrated by non-significant correlations between the RCADS total score and most CBCL scales and autism symptom severity. Kaat and Lecavalier [22] found acceptable internal consistency and test-retest reliability; good convergent validity with the parent-reported Child Symptom Inventory-4 (CSI-4) anxiety subscales; and good divergent validity between the externalizing and CSI-4 autism severity subscales. Poor inter-respondent reliability between the RCADS-C/P was noted. Altogether, these studies suggest that the RCADS may have utility in autistic youth, yet more evidence is needed [22,23]. An additional psychometric evaluation—with a larger sample, focus on youth with clinically significant internalizing symptoms, and a combination of child, parent, and clinician-reported measures—may further support the RCADS as an evidence-based assessment for autistic youth.

The current study examined the reliability and validity of the RCADS among autistic youth with comorbid anxiety or OCD. We had three aims. First, we examined the internal consistency of the RCADS-C/P. Given previous studies [18,22,23], we hypothesized that the RCADS-C/P would show strong internal consistency. Second, we examined parent-child agreement in RCADS-C/P scores. Based on prior studies [22,27], we hypothesized that parent-child agreement would be poor but may be stronger among older vs. younger youth. Third, we examined convergent and divergent validity between the RCADS-C/P and the clinician-rated PARS [10], the CBCL (i.e., internalizing, anxious/depressed, depressed, externalizing, and somatic complaints subscales), and the Social Responsiveness Scale, 2nd Edition (SRS-2) [28]. We hypothesized, based on studies with similar samples [22,23] that RCADS-C/P would have moderate-to-good convergent and divergent validity.

Methods

Participants

Baseline data from a psychotherapy trial for autistic youth were analyzed [29]. Participants were enrolled between February 2019 and December 2020 and included 74 autistic youth ages 6–14 years (85.1% male; Age *M*=9.5 years, SD=2.3 years) with comorbid anxiety or OCD, and their parents. 78.4% of the sample identified as White, 6.8% as Asian, 5.4% as Black, and 9.5% as mixed race or another race. 32.4% identified as Hispanic and/or Latino. Sixty-seven percent of families reported an annual household income ≥ $70,000. Most common primary anxiety diagnoses were specific phobia (21.6%), generalized anxiety disorder (21.6%), and separation anxiety disorder (20.3%).

Participants met the following inclusion criteria: (a) between 4 and 14 years old; (b) have an established autism diagnosis from a credentialed provider using an accepted assessment battery together with a baseline SRS-2 t-score of ≥ 65; (c) have clinically significant symptoms of anxiety or OCD on the ADIS-IV-Child/Parent [30] and a PARS score > 12; (d) have anxiety and/or OCD as a primary, non-ASD presenting problem; (e) demonstrate both full-scale and verbal comprehension IQ≥ 70 on a standardized cognitive assessment; (f) able to read/write in English. Only children ≥ 6 years were included in analyses. Youth who did not meet SRS-2 cut-off criteria ($n = 7$) and did not have OCD or an anxiety disorder ($n = 3$) were excluded.

Procedure

This study was approved by the Institutional Review Board. Assessments were conducted initially in-person and later via telehealth due to the COVID-19 pandemic. Guardians provided written consent for themselves and their child. Child assent was obtained when possible. Participants who met basic requirements during a phone screen completed a baseline evaluation, in which eligibility was confirmed by independent evaluators who were trained master's or doctoral level assessors supervised by licensed psychologists. Participants were compensated $40 for assessment completion. Assessments were audio-recorded for quality assurance.

Measures

PARS

The PARS [5] includes a 7-item severity scale that was clinician-administered to children and parents; both reporters' responses are integrated with clinical judgement to arrive at final ratings. The PARS has been validated in autistic youth [31]. A cutoff score of 17.5 discriminates between youth with and without anxiety disorders [32].

CBCL

The CBCL is a 118-item parent-rated assessment of past-6-month child behaviors [26]. The CBCL includes an internalizing scale, externalizing scale and narrowband scales. Raw scores on the broadband and narrowband scales were used in this study.

SRS-2

The SRS-2 is a 65-item, parent-rated measure of social impairment and responsiveness. T-scores ≥ 65 correspond with moderate autism symptoms [28]. In the present sample, the mean raw total score of the SRS-2 was *M*= 103.8 (SD=21.0).

RCADS

The RCADS was described previously. Raw scores were converted to t-scores and were indicative of the following ranges: < 65 normal; 65–69 borderline; > 70 clinically significant.

Data analysis

Descriptive statistics on demographic and clinical characteristics of participants were calculated. Cronbach's alpha was reported as the measure of internal consistency for the RCADS-C/P. Cut-offs were: acceptable = 0.70–0.79; good = 0.80–0.89; excellent ≥ 0.90. We examined the correlation coefficient between parent- and youth-reported total anxiety scores. Using partial correlation, we examined if child age or gender would impact the level of informant agreement. This was based on the hypotheses that parent-child agreement may be higher for older vs. younger children and that autistic females report greater anxiety than males [33]. Bivariate correlations were calculated to examine the convergent and discriminant validity of the RCADS-C/P. Analyses were conducted using SPSS 28.0. Alpha was set at 0.05.

Results

Internal consistency was excellent for the total anxiety scale on the RCADS-P (α = .91) and RCADS-C (α = 0.94), and acceptable-to-good for all subscales [social phobia: α_{child}= 0.87, α_{parent}= 0.87; panic disorder: α_{child}= 0.83, α_{parent}= 0.71; major depression: α_{child}= 0.82, α_{parent}= 0.67; separation anxiety: α_{child}= 0.70, α_{parent}= 0.79; generalized anxiety: α_{child}= 0.86, α_{parent}= 0.84; obsessive-compulsive: α_{child}= 0.74, α_{parent}= 0.74] with the exception of depression on the RCADS-P.

Total anxiety on the RCADS-C/P was weakly correlated ($r = 0.31$, $p < .05$). Neither age nor gender altered the strength of this association. All within-informant subscale correlations were statistically significant with coefficients predominately falling in the medium to very strong range[1]. Total Anxiety on the RCADS-C/P correlated moderately with the

PARS (Table 1). RCADS-P evidenced medium-to-strong correlations with CBCL internalizing, anxiety/depressed, depression/withdrawal and somatic complaints. There were no statistically significant correlations of the CBCL or SRS-2 subscales with the RCADS-C total anxiety. The SRS-2 Social Cognition and Communications subscales and the CBCL Attention and Social Problems subscales were modestly correlated with RCADS-P total anxiety.

Discussion

Our findings support the RCADS as a reliable assessment of anxiety symptoms in autistic youth without co-occurring intellectual disability, with particularly strong support of validity for the RCADS-P. Consistent with others [14–16], internal consistency of the total anxiety scale in the RCADS-C/P was excellent. Internal consistency for the six RCADS-C/P subscales was acceptable-to-good, which is comparable to others [22]. Internal consistency of the depression subscale was good in the RCADS-C and questionable in the RCADS-P. Given the lack of validated measures of depressive symptoms for autistic youth, this result is promising. Separation anxiety (RCADS-C) and panic disorder (RCADS-P) had acceptable internal consistency. The obsessive-compulsive subscale had acceptable internal consistency in both the RCADS-C/P. These findings suggest that the RCADS is a reliable assessment of anxiety symptoms in autistic youth overall, although it may be less reliable—albeit still adequate—in assessing specific subtypes of anxiety symptoms. The high reliability of the broader construct reflects a higher order anxiety/internalizing dimension to characterize distress in autistic youth.

Our hypothesis that parent-child agreement would be generally poor was supported. RCADS-C/P total anxiety scores were mildly correlated, consistent with previous studies [22,27]. However, our hypothesis that parent-child agreement would be stronger among older vs. younger youth was not supported. One reason may be that the reliability of self-report measures of anxiety relies more heavily on a child's communication skills that may not align with their chronological age. Blakeley-Smith et al. [34] found that autistic youths' verbal ability and metacognitive skills were associated with stronger parent-child agreement. There is also evidence that autistic youth tend to underreport anxiety [35], which may explain the low parent-child agreement in our data.

Table 1
Correlations of the RCADS-C and P total anxiety score with parent and clinician measures.

	RCADS-Child Total Anxiety Symptoms	RCADS- Parent Total Anxiety Symptoms
Convergent validity		
PARS-Total Score	0.33 *	0.41 * *
CBCL-Internalizing	0.17	0.69 * *
CBCL-Anxious/Depressed	0.22	0.73 * *
CBCL-Depressed/ Withdrawn	0.03	0.41 * *
CBCL-Somatic Complaints	0.12	0.50 * *
Divergent validity		
SRS-2- Total Score	0.04	0.27 *
SRS-2- Social Awareness	0.05	-0.04
SRS-2- Social Cognition	-0.09	0.30 *
SRS-2- Social Communication	0.07	0.25 *
SRS-2- Social Motivation	-0.14	0.22
SRS-2- Restricted/ Repetitive Behaviors	0.09	0.22
CBCL-Externalizing	-0.06	0.17
CBCL-Aggressive Behaviors	-0.09	0.18
CBCL-Attention Problems	0.05	0.39 * *
CBCL-Delinquent Behavior	0.09	0.05
CBCL-Social Problems	0.00	0.39 * *
CBCL-Thought Problems	0.05	0.20

* *$p < .001$
*$p < .01$

Convergent validity was strong for the RCADS-P and mixed for the RCADS-C. We found moderate-to-strong correlations between the RCADS-P total anxiety score and the CBCL internalizing scale and related subscales, respectively. The RCADS-C was not associated with the CBCL subscales, which may reflect an informant effect, as demonstrated by low parent-child agreement reported on the RCADS. Convergent validity was also demonstrated by moderate correlations between the PARS total score and the RCADS-C/P total anxiety symptom scores. These findings underscore the utility of accounting for both parent and child report when screening for internalizing symptoms in this population.

Evidence of divergent validity of the RCADS was mixed. Higher RCADS-P total anxiety scale scores were associated with higher scores on the social cognition and communication subscales, reflecting some association between autism severity and psychopathology. The strength of these correlations was smaller than those found in the convergent validity analyses, suggesting weaker associations between anxiety symptoms and autism severity. Additionally, the RCADS-C total anxiety scale scores were not associated with any SRS-2 or CBCL domain. One possible explanation for the statistically significant correlations between RCADS-P anxiety and specific SRS-2 domains is that children's interpersonal difficulties may contribute to anxiety problems. Shared method variance (i.e., both parent-report) may also explain these findings. Likewise, children with autism often present with symptoms of atypical anxiety [4] which may contribute to the mixed results by not mapping onto scales that assess more typical anxiety presentations.

Regarding clinical implications of our findings, clinicians who work with autistic youth are advised to assess for comorbid internalizing symptoms to inform treatment planning. Our findings, along with others [22,23], suggest that the RCADS-P may be useful for screening symptoms and assessing treatment outcomes. Given the psychometric strengths of the RCADS-P, it may be well-suited for Measurement Based Care models [36].

There are several study limitations. First, the sample was overwhelmingly male [37]. Second, the sample was verbal, met criteria for a certain IQ threshold, and modest in size. Third, the present study examined the 47-item RCADS and did not validate its briefer 25-item version. While measures developed for neurotypical children may aid in assessing typical symptoms of anxiety in autistic children, this population may also present with atypical anxiety. Given the development of measures specifically designed to assess atypical anxiety symptoms in autistic youth [38], the convergent validity of the RCADS should also be tested with such measures. Finally, an important next step for the field is to develop measurement tools for comorbid depression that are autism-centric.

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