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Introduction

Until recently, a paucity of research addressed the co-occurrence of autism spectrum conditions (ASC) with anxiety and depression (see Matson & Nebel-Schwalm, 2005). More recently, however, there has been increasing speculation that individuals with ASC diagnoses could be at elevated risk for anxiety and depression. The hypothesis of elevated risk for anxiety and depression has received some empirical support, but most supporting studies used small samples, lacked controls, or sampled non-systematically. The current study investigated whether anxiety and depression are characteristic of children and adolescents on the autism spectrum.

We assessed the prevalence of depressive and anxious symptoms in ASC children and their cotwins without an ASC diagnosis using child self reports, parent reports, and post observational ratings. We analyzed a subset of the sample, which included only twin pairs discordant on ASC diagnosis, using cotwins (siblings) as controls for many demographic and familial factors. An additional analysis included the entire sample, which was compared with a group of non-ASC children from another twin sample. This other group was matched to the ASC twins on the Peabody Picture Vocabulary Test-III (PPVT-III) age equivalent scores, chronological age, gender, and parental income and education.

Specific Aims

- Determine if ASC children provide reliable self reports of depressive and anxious symptoms.
- Determine if ASC children are more anxious or depressed than (a) their cotwins (for discordant pairs only) and (b) a matched comparison group of non-ASC twins.

Measures

Berkeley Puppet Interview (BPI). An age appropriate puppet interview administered to children in which two puppets make divergent but statements such as, "I'm a happy kid," (Puppet A) and "I'm not a happy kid," (Puppet B). "What about you?" (both puppets).

Health and Behavior Questionnaire (HBO). Developed in tandem with the Berkeley Puppet Interview to measure DSM symptoms of child psychopathology and administered to the primary caregiver.

Post Observation Anxiety Scale. Ratings on general anxiety made by research staff who are naïve with regard to the child's diagnosis.

Social Communication Questionnaire (SCQ). An autism screening questionnaire completed by the primary caregiver. Twin pairs in which at least one twin received above validated cut scores for detecting ASC were administered the Autism Diagnostic Observation Schedule (ADOS).

Autism Diagnostic Observation Schedule (ADOS). A play-based observation assessment, considered the "gold standard" for assessing and diagnosing ASC, administered to each twin.

Participants

- Full sample: 114 twin children (57 pairs, in which one or both children received an ASC diagnosis on the SCQ or ADOS).
ASC diagnosis: N = 86, Age range 4,2 – 17,9 (M=8,7 years), 71 Males, 15 Females
Cotwin without ASC: N = 28, Age range 4,3 – 17,9 (M=8,7 years), 14 Males, 14 Females
- Subset of 25 twin pairs: discordant on ASC diagnosis (Age range 4,3 – 17,9 M=8,4)
ASC diagnosis: N = 25, 24 Males, 1 Female
Cotwin without ASC: N = 25, 13 Males, 12 Females

- Additional comparison group of children from the Wisconsin Twin Project, matched on gender, Peabody Picture Vocabulary Test-III (PPVT-III) age equivalent scores, chronological age, and SES

Table 1. Cronbach's alpha for child self reports (Berkeley Puppet Interview) for each subscale.

	N items	ASC Twin*	Cotwin	ASC twin^	WTP match
Depression	8	0.70	0.79	0.71	0.67
Overanxious	9	0.72	0.69	0.74	0.71
Sep Anxiety	7	0.81	0.87	0.86	0.78

* Discordant twin pairs only
^ All ASC participants

Conclusion: Internal consistency reliability appears not to differ between ASC and non-ASC children.

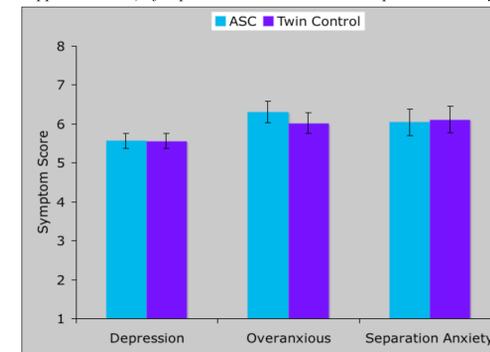
Data Analysis

A series of one-way ANOVAs compared the children from DISCORDANT pairs on child self reports on the Berkeley Puppet Interview and parent reports on the Health and Behavior Questionnaire for anxious and depressive symptoms. We then conducted the comparisons, statistically controlling for cognitive ability, measured by the PPVT-III standardized scores. The full sample of ASC twins and non-ASC cotwins were also compared to the group of matched controls. Age of participant did not account for a significant amount of the variance and was therefore not used as a covariate.

Results

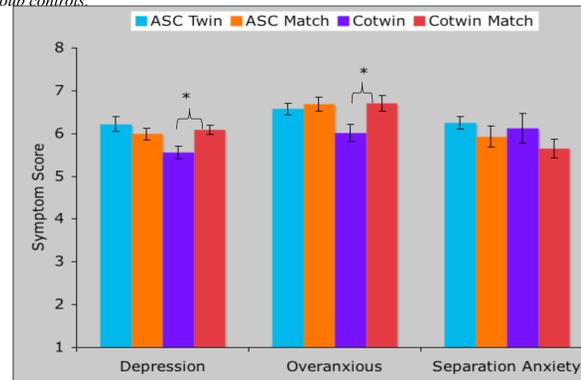
Child Self Reports of Anxiety and Depression (BPI)

Figure 1. Comparison of mean scores for ASC twins versus their non-ASC cotwins on self-report (Berkeley Puppet Interview) of depression, overanxious, and separation anxiety symptoms.



The means on the BPI subscales were not significantly different between children with an ASC diagnosis and their non-ASC cotwins (discordant pairs only included in this analysis).

Figure 2. Comparison of child self reports (Berkeley Puppet Interview) of all participants with an ASC diagnosis (from both discordant and concordant pairs) to match group controls, and cotwins without an ASC diagnosis to match group controls.



- The previous analysis (Figure 1) only included pairs discordant on ASC diagnosis; including the pairs concordant for ASC (Figure 2) leads to differences between ASC twins (blue) and the cotwins of the subset who were discordant (purple) for Depression and Overanxious.

- ASC children (blue) were not significantly different from the matched twin controls (orange) on any of the Berkeley Puppet Interview subscales.

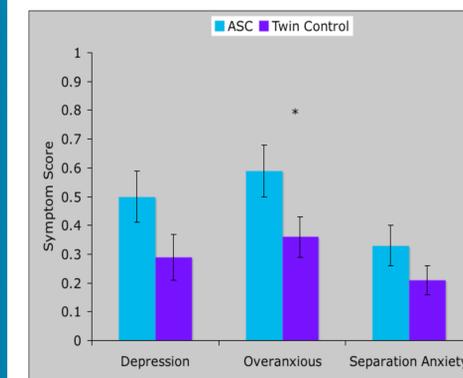
- Twins without ASC who had a cotwin with ASC were significantly less symptomatic than their matched comparison group on the Depression subscale ($d=.43, p < .01$) and the Overanxious subscale ($d=.58, p < .01$). This finding suggests the possibility of potentially over-enhanced self-perceptions of children who have siblings with ASC.

Conclusions

- ASC children can provide reliable information on their anxious and depressive symptoms.
- ASC children did not report significantly more depressive or anxious symptoms than their cotwins or their matched comparison group. Raters blind to the children's diagnosis did not rate ASC twins as more anxious than their non-ASC cotwins. Parents did report significantly more overanxious symptoms (but not other symptoms) for the ASC twins than their cotwins; however, these differences were not statistically significant after controlling for Peabody Picture Vocabulary Test-III scores. The ASC twins were also rated by their parents as being more overanxious when compared to the WTP match group. **On balance, across the three methods, the results did NOT generally support the notion that ASC children are more anxious and depressed than relevant comparison groups.**
- Twins without ASC themselves (but with an ASC cotwin) reported fewer depressive and overanxious symptoms than their matched comparison group. Moreover, according to parent reports, the cotwins without ASC were significantly lower on the overanxious subscale than their matched comparison group. These findings suggest that parents with ASC children may perceive their non-ASC children as less symptomatic than expected, and that these non-ASC children's self-views are consistent with their parents' (perhaps biased) reports.

Parent Reports of Anxiety and Depression (HBQ)

Figure 3. Comparison of mean scores for ASC twins versus their non-ASC cotwins on parental reports (HBQ) of depression, overanxious, and separation anxiety symptoms

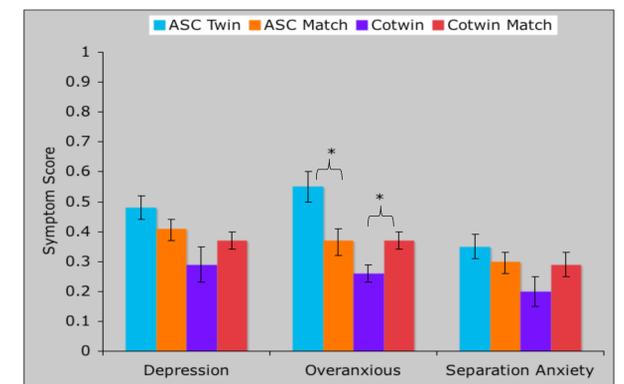


- For discordant pairs only, parent reports of Depression and Separation Anxiety were not significantly different between children with ASC and their non-ASC cotwins.

- Consistent with nonsignificant trends for the other two scales, Overanxious symptom means were significantly greater for the ASC children than their cotwins ($d=.59, p < .05$).

o However, this effect was not statistically significant when cognitive ability, measured by PPVT-III standardized scores, was statistically controlled.

Figure 4. Comparison of means for parent reports (HBQ) of all participants with an ASC diagnosis to the match group controls, and of cotwins without an ASC diagnosis to match group controls.



- ASC twins did not differ significantly from the match group on the Depression or Separation Anxiety scales. On the Overanxious scale, ASC children were rated as significantly higher than the match group ($d=.42, p < .01$)

- Non-ASC twins were rated as significantly less Overanxious than their match group ($d=.39, p < .01$) and trended toward lower symptoms for the other two scales, suggesting that parents might exaggerate the "normality" of the non-ASC member of a discordant pair.

Post Observation Anxiety Scale

The means were not significantly different for the discordant pairs between children with an ASC diagnosis and their cotwins on the post observer ratings of anxiety.

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