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Sex Differences in Internalizing and Externalizing Behaviors in Children with Autism Spectrum Disorder

Caroline C. Cherry

University of New Hampshire, Durham, ccc2001@wildcats.unh.edu

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Abstract

This study used a retrospective practice-based research method to compare levels of internalizing and externalizing behaviors of a clinically-ascertained sample of young children with autism spectrum disorder (ASD; $n=90$). As measured by the *Child Behavior Checklist (CBCL)*, internalizing and externalizing behaviors were compared to normative behavior, and between boys and girls with ASD. Findings suggest that in a clinical sample, children with ASD are more likely than typically developing children to have internalizing and/or externalizing problems. No significant sex differences were found for Internalizing Problems, Externalizing Problems, or Total Problems scores on either the parent or teacher versions of the *CBCL*. These findings may help clinicians better understand how children with ASD are affected by co-morbid psychiatric disorders, and could help to inform diagnosis and intervention.

Keywords

autism, gender, psychiatric disorders

Subject Categories

Speech Pathology and Audiology

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Caroline Cherry

University of New Hampshire

Abstract

This study used a retrospective practice-based research method to compare levels of internalizing and externalizing behaviors of a clinically-ascertained sample of young children with autism spectrum disorder (ASD; $n=90$). As measured by the *Child Behavior Checklist (CBCL)*, internalizing and externalizing behaviors were compared to normative behavior, and between boys and girls with ASD. Findings suggest that in a clinical sample, children with ASD are more likely than typically developing children to have internalizing and/or externalizing problems. No significant sex differences were found for Internalizing Problems, Externalizing Problems, or Total Problems scores on either the parent or teacher versions of the *CBCL*. These findings may help clinicians better understand how children with ASD are affected by co-morbid psychiatric disorders, and could help to inform diagnosis and intervention.

Autism spectrum disorder (ASD) is characterized by deficits in social communication and interaction, as well as repetitive behaviors and restricted interests. Many children with ASD present with co-morbid psychiatric disorders as well. For example, internalizing behaviors, such as depression and anxiety, and externalizing behaviors, such as attention and behavioral problems, present more frequently in children with ASD than in typically developing children (Hull, Mandy, & Petrides, 2016). Previous research has found evidence that girls with ASD experience more internalizing problems than boys, while externalizing problems occur with similar frequency across the sexes (Vaillancourt et al., 2017). Further, studies have reported a relationship between higher levels of emotional and behavioral problems and an increased probability of an ASD diagnosis in girls, but not boys (Duvekot et al., 2017), as well as earlier and more frequent diagnoses for males (1 in 42) than females (1 in 189) in the United States (Reinhardt, Wetherby, Schatschneider, & Lord, 2015). Thus, research has begun to ask whether males and females with ASD present with different co-morbid symptoms, such as internalizing and externalizing behaviors, which importantly might affect age and frequency of diagnosis, among other factors. Understanding sex differences in the internalizing and externalizing behaviors of children with ASD may also permit refinement of diagnostic criteria to reflect how such differences influence the manifestation of ASD symptoms. The aim of this study is to examine rates of these behaviors relative to normative expectations as well as sex differences in these behaviors, using a retrospective, practice-based research method.

Internalizing and Externalizing Behaviors in ASD

According to Leyfer et al. (2006 as cited by Vaillancourt et al., 2017), about 72% of children with ASD have at least one other psychiatric disorder, frequently internalizing behaviors, such as depression and anxiety, and externalizing behaviors, such as hyperactivity and

behavioral deficits (Hull et al., 2016). Prior longitudinal studies indicate that internalizing and externalizing problems occur in children with ASD starting at a young age, often last throughout life, and regularly co-occur with each other (Eisenberg et al., 2009 as cited by Vaillancourt et al., 2017). Vaillancourt et al. (2017) investigated the trajectory of internalizing and externalizing problems in preschool children with ASD, over four assessments that spanned about 3 years. Results indicated that 76.8% of the sample showed a low/declining trajectory for internalizing problems, and 23.2% had a high/stable trajectory. Thus, about 1 in 5 children in the sample had clinically significant internalizing problems over the 3-year study. The results further showed that 46.4% of the sample had a moderate/declining trajectory for externalizing problems; 40.1% showed a low/declining trajectory; 13.5% showed a high/stable trajectory (Vaillancourt et al., 2017). Vaillancourt et al. (2017) concluded that children who followed a high-risk trajectory for externalizing problems also were more likely to follow a high-risk trajectory for internalizing problems, with only a small minority group of boys (1% of the sample) showing declining internalizing behaviors and high/stable externalizing problems.

However, there have been some differing results regarding internalizing and externalizing behaviors of children with ASD. Turygin et al. (2013) found that children with ASD were not more likely to have internalizing behaviors than children without ASD, while Hull et al. (2016) reported higher levels of internalizing and externalizing in children with ASD than those with typical development. These varied research findings clearly show the need for more research regarding internalizing and externalizing behaviors, which have significant implications for diagnosis and treatment. Specifically, if children exhibit internalizing or externalizing behaviors, the manifestation of ASD symptoms may be affected. Symptoms may be more or less detectable to parents or clinicians, requiring more careful, in-depth behavioral assessment (Hiller et al.,

2014 as cited in Duvekot et al., 2017; Mandy et al. 2012 as cited in Duvekot et al., 2017).

Because externalizing behaviors tend to be more noticeable, it also follows that girls who exhibit more internalizing behaviors and fewer of the more obvious externalizing behaviors may go unnoticed and be less likely to receive a referral.

Internalizing and Externalizing Sex Differences in ASD

Many studies have found higher rates of internalizing behaviors in girls with ASD than boys with ASD, but fairly even rates between the sexes for externalizing behaviors. Despite the fact that Hull et al. (2016) reported no overall significant sex differences in internalizing and externalizing in children with ASD, results indicated that sex differences in internalizing behaviors might exist at younger ages. Specifically, females with ASD had higher rates of depressive symptoms than males with ASD until adolescence. Further, Vaillancourt et al. (2017) found that girls demonstrated more internalizing problems than boys, and more externalizing problems than typically developing girls, though they found no differences in externalizing trajectories between the sexes (Vaillancourt et al., 2017). Interestingly, Duvekot et al. (2017) found that girls had more internalizing problems across TD and ASD samples, yet there were no significant differences based on diagnosis, meaning sex differences in internalizing behaviors in ASD mirrored those observed in typically developing children. This was consistent with previous reports of sex differences in internalizing behaviors in the general population (Compas et al., 1997 as cited by Duvekot, et al., 2017).

Understanding internalizing and externalizing sex differences in ASD could have profound consequences for diagnosis and treatment. Specifically, internalizing and externalizing behaviors might affect how ASD symptoms manifest, and therefore how early ASD is recognized. If sex differences exist in internalizing and externalizing behaviors in ASD, this may

be one variable contributing to the later referral and diagnosis of girls with ASD in comparison to boys. For example, Duvekot et al. (2017) found that higher levels of emotional and behavioral problems were related to increased probability that girls would receive an ASD diagnosis, but did not affect diagnosis for boys. This suggests that if girls do not demonstrate such externalizing behaviors (e.g., based on copying of others' social cues, or social "camouflage"), they may be less likely to receive a diagnosis because their symptoms may be less obvious during an evaluation. Supporting this idea, teachers have reported girls who received a diagnosis as having fewer externalizing problems than boys who also received a diagnosis (Hiller et al., 2014 as cited in Duvekot et al., 2017; Mandy et al. 2012 as cited in Duvekot et al., 2017). In such situations, parents may need to report behaviors they have observed at home, where girls may be tired and irritable after expending a great deal of energy masking their symptoms at school (Duvekot et al., 2017). Furthermore, the fact that girls typically receive an ASD diagnosis later in life may exacerbate or lead to the development of internalizing problems, because they may spend much of their lives without necessary intervention or services, and may feel misunderstood or different from their peers (Bargiela et al., 2016 as cited by Duvekot et al., 2017). Finally, recognizing sex differences in internalizing and externalizing behaviors may help clinicians identify co-morbid conditions that otherwise might go unnoticed.

To improve recognition of differences between internalizing and externalizing behavior in children with ASD versus typically developing children, and in boys and girls with ASD, researchers must address the following limitations: 1) a paucity of research currently addresses these topics, and 2) prior studies with strong internal validity controls have prevented bias, but also may have limited generalizability to clinical samples seen in the community.

Practice-Based Research

The present study uses practice-based research methods to address the clinically important question of sex differences in internalizing and externalizing behaviors in ASD and increase generalizability of findings. Epstein (2001) defines practice-based research as “the use of research-inspired principles, designs and information gathering techniques within existing forms of practice to answer questions that emerge from practice in ways that inform practice” (p. 17). The purpose of this research is to generalize findings specific to certain clients to a larger clinical population, thus increasing understanding of the subject throughout the entire field (Crooke & Olswang, 2015). Practice-based research is collaborative in nature, as clinicians and researchers often work together to “mine” clinical data retrospectively to gain knowledge about a cohort, which may improve future clinical decision-making and further programmatic research (Crooke & Olswang, 2015). In the current study, clinical data provides an opportunity to examine internalizing and externalizing differences in children with ASD versus typically developing children, as well as sex differences in children with ASD, providing a different perspective and supplementing the findings of controlled studies. The trends in this sample may be generalizable to other clinically-derived samples of children with ASD and may help to bridge the gap between research and practice.

Research Questions

This study addressed the following research questions: 1) What proportion of a clinically-ascertained sample of young children with ASD demonstrated elevated rates of internalizing and externalizing behaviors, as measured by the *Child Behavior Checklist*, compared to normative expectations? 2) Are there significant sex differences in the internalizing and externalizing behaviors in this sample? Based on Hull and colleagues (2016), it was hypothesized that a

majority of the ASD group would demonstrate elevated Internalizing Problems, Externalizing Problems, and Total Problems composite scores, compared to normative expectations. In addition, it was hypothesized that females in the sample would display more internalizing behaviors, while males would display more externalizing behaviors.

Methods

Participants

The current study used existing clinical data from developmental assessments at the Seacoast Child Development Clinic (SCDC), from 2011-2017. Data includes scores from developmental assessments administered with 90 children ages 6 years and younger, whose parents were concerned with their development, and whose assessment led to a diagnosis of ASD. ASD diagnosis was confirmed based on a combination of clinical judgment and administration of the *ADOS* by clinically trained professionals. The SCDC, which recently closed, was affiliated with the University of New Hampshire (UNH). All clients signed a notice of privacy practice that permitted the use of collected data for research purposes. The UNH Institutional Review Board approved the use of existing, de-identified clinic data for this study.

Of the 90 children, there were 18 girls and 72 boys. Eighty percent were Caucasian; 9% indicated non-Caucasian races; 11% did not report their race. Ethnicity was only reported for 86.6% of the sample; 3.3% were Hispanic. The mean chronological age of the sample was 41.31 months. Participant demographics are summarized in Table 1.

Table 1

Demographic Information and CBCL Results for Males and Females

	Males		Females		Fisher's exact test, <i>p</i>	
Race, Caucasian:Other:NR	57:8:7		15:0:3		0.341	
Ethnicity, Hispanic:nonHispanic:NR	1:62:9		2:13:3		0.093	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>t</i>	<i>p</i>
Chronological age (months)	41.34	(13.170)	41.17	(12.557)		
<i>CBCL-P</i>	<i>n</i> =70		<i>n</i> =18			
Internalizing Problems	60.700	(9.708)	61.278	(10.425)	.222	.825
Externalizing Problems	59.643	(12.496)	60.667	(10.825)	.318	.751
Total Problems	62.171	(11.194)	62.389	(10.678)	.074	.941
<i>CBCL-T</i>	<i>n</i> =56		<i>n</i> =15			
Internalizing Problems	62.643	(7.052)	66.467	(11.243)	1.628	.108
Externalizing Problems	61.482	(8.253)	65.200	(6.178)	1.624	.109
Total Problems	63.839	(7.774)	66.467	(6.610)	1.197	.236

Note: NR=not reported, *CBCL-P* = *Child Behavior Checklist-Parent*; *CBCL-T* = *Child Behavior Checklist-Teacher*.

Procedure

Existing SCDC health records were de-identified and recorded in a protected database, using the following process to maintain clients' privacy and the confidentiality of all HIPAA-protected health information or identifiers. A former clinician directly involved in operations at the SCDC (RS) and one HIPAA-trained graduate research assistant, trained in appropriate data access, managed the data de-identification process. After conducting an initial review of all health records, one of these two individuals assigned an identification number to each child who

received an ASD diagnosis. The connection between each identification number and personally identifiable information was kept in a separate file, only accessible by former SCDC researchers/clinicians and the approved graduate research assistant. Following assignment of an identification number, demographic information and assessment scores (see below for specific measures) were read to trained student research assistants, who recorded this data in a protected database.

Measures

The *Autism Diagnostic Observation Schedule (ADOS-G: Lord et al., 1999; ADOS-2: Lord et al., 2012)* is a partially structured observation of children designed to evaluate their social communication and restricted/repetitive behaviors and interests (ASD symptomology). It is the gold-standard assessment for diagnosing ASD. Depending on the child's age and expressive language ability, one of five modules is chosen. The *ADOS-G* generates algorithm scores for communication, reciprocal social interaction, and stereotyped behaviors and restricted interests; the *ADOS-2* consolidates communication and social behaviors in a social affect algorithm score. In conjunction with clinical judgment, cut-offs for these algorithm scores confirm or rule out ASD. The *ADOS* has strong inter-rater reliability, validity, and diagnostic accuracy for identifying ASD (Lord et al. 2000). *ADOS* algorithm scores combined with clinical judgment served to confirm ASD diagnoses for participants in this study.

The *Child Behavior Checklist (Achenbach & Rescorla, 2001)* is a checklist that evaluates internalizing and externalizing symptoms as reported by a parent/caregiver (*CBCL-P*) or teacher (*CBCL-T*). Caregivers and teachers rate statements about various emotional or behavioral problems from 0 ("not true") to 3 ("very true"). The *CBCL* has excellent test-retest reliability (mean $r = .85$), and acceptable interparent agreement (mean $r = .61$; Achenbach & Rescorla,

2001). The following norm-referenced composite scores served as dependent variables for this study: Internalizing Problems, Externalizing Problems, and Total Problems.

Data analysis

To compare the ASD sample's internalizing and externalizing behaviors to normative behaviors, we determined the proportions of the sample that had borderline and/or clinically significant scores for the three composite scores on the *CBCL-P* and *CBCL-T*.

To examine sex differences, multiple t-tests were conducted using sex as the independent variable, and Internalizing Problems, Externalizing Problems, and Total Problems for both the *CBCL-P* and *CBCL-T* as the dependent variables. Eighty-eight children in the sample had a *CBCL-P* that was used in the analysis, while 71 of the children had a *CBCL-T* available for use.

Results

ASD sample compared to norms

Twenty of 88 (22.727%) children with ASD had a *CBCL-P* Internalizing Problems score in the borderline significant range; 36 of 88 (40.909%) were in the clinically significant range on this score. Thus, 63% of the sample demonstrated elevated rates of internalizing problems, in comparison to same-aged peers in the normative sample. Twelve of 88 (13.636%) children with ASD had a *CBCL-P* Externalizing Problems score in the borderline significant range; 33 of 88 (37.500%) scored in the clinically significant range. This means that 51% of the sample showed elevated rates of externalizing problems as compared with peers in the normative sample. For the Total Problems score on the *CBCL-P*, 10 of 88 (11.364%) children scored in the borderline significant range, while 41 of 88 (46.591%) children scored in the clinically significant range. Overall, 58% of the sample had an elevated Total Problems score on the *CBCL-P*.

On the *CBCL-T*, 8 of 71 (11.268%) children with ASD scored in the borderline significant range for Internalizing Problems; 40 of 71 (56.338%) scored in the clinically significant range. Thus, 68% of the sample demonstrated elevated levels of internalizing problems, compared with same-aged peers in the normative sample. For the Externalizing Problems score, 14 of 71 (19.718%) children scored in the borderline significant range; 31 of 71 (43.662%) children scored in the clinically significant range. This means that overall, 63% of the sample showed elevated rates of externalizing problems according to the *CBCL-T*. For the Total Problems score, 17 of 71 (23.944%) children with ASD scored in the borderline significant range; 38 of 71 (53.521%) children scored in the clinically significant range. Thus, 77% of the sample had an elevated Total Problems score as reported on the *CBCL-T*. This information is displayed in Figure 1.

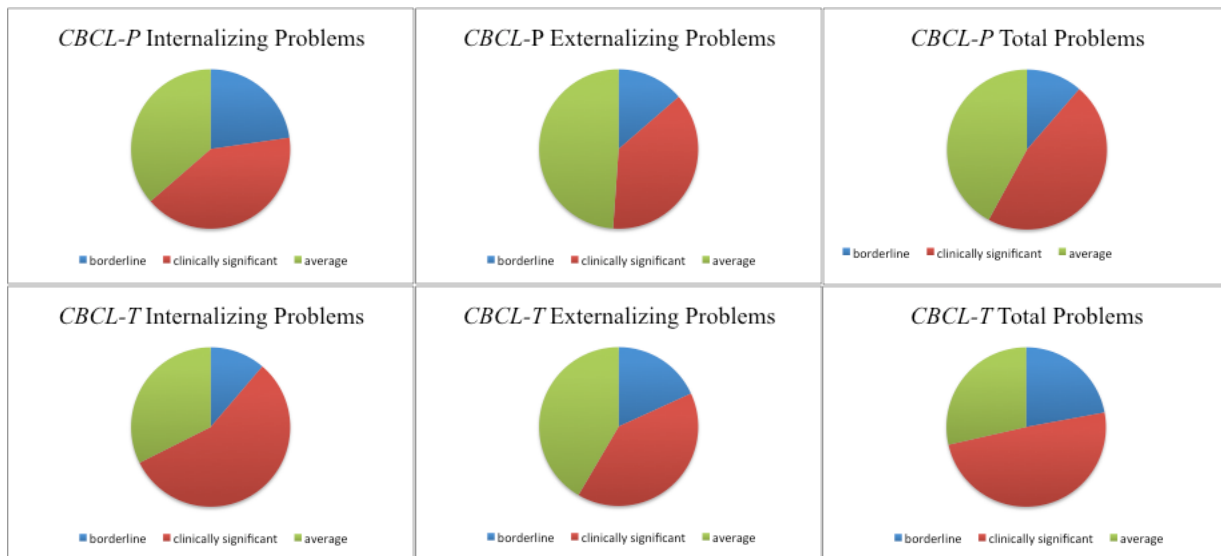


Figure 1. Paneled pie charts depicting the proportion of the sample with average, borderline, and clinically significant scores on the (left to right) Internalizing, Externalizing, and Total Problems scores, as reported by parents (top) and teachers (bottom) on the *Child Behavior Checklist (CBCL)*.

Sex differences in the ASD sample

As summarized in Table 1, independent-samples t-tests were conducted to determine if there were differences in Internalizing Problems, Externalizing Problems, or Total Problems scores between boys and girls with ASD based on parent report on the *CBCL-P*. No significant differences were found for Internalizing Problems, $t = .222, p = .825$, Externalizing Problems, $t = .318, p = .751$, or Total Problems, $t = .074, p = .941$.

Additional independent-samples t-tests were conducted to determine if there were differences in Internalizing Problems, Externalizing Problems, or Total Problems scores between these same boys and girls based on teacher report on the *CBCL-T*. Again, no significant differences were found for Internalizing Problems, $t = 1.628, p = .108$, for Externalizing Problems, $t = 1.624, p = .109$, or for Total Problems, $t = 1.197, p = .236$.

Discussion

This study compared the internalizing and externalizing behaviors of a clinically ascertained sample of children with ASD to normative behavior based on the *CBCL-P* and *CBCL-T*, and investigated differences in these behaviors between boys and girls with ASD. According to parent report, 63% of children with ASD had elevated scores related to Internalizing Problems; 51% had elevated externalizing scores; and 58% had elevated Total Problems scores. Thus, parents reported a majority of the sample had elevated rates of internalizing and/or externalizing behaviors in comparison with typical rates of these behaviors, based on the normative sample. These findings suggest that in clinical samples, children with ASD are more likely than typically developing children to have either internalizing or externalizing problems, or that they may be affected to a greater extent. There were no significant differences found between boys and girls for Internalizing Problems, Externalizing

Problems, or Total Problems based on the scores from the *CBCL-P* or *CBCL-T*. This lack of significance suggests that boys and girls in this sample did not differ in the extent to which they demonstrated internalizing and externalizing problems.

Similar to our findings, prior research by Hull et al. (2016) found that children with ASD had higher levels of internalizing and externalizing problems than typically developing children. This contradicts the findings of Turygin et al. (2013) who found that children with ASD were not more likely to exhibit internalizing behaviors than typically developing children. This discrepancy in research findings indicates a need for continued study in this area. Specifically, studies should be conducted with both an ASD group and a typically developing group to more directly compare internalizing problems and externalizing problems scores, using either the scores from the *CBCL*, or data gathered from other measures that address these behaviors.

No significant sex differences were found in internalizing or externalizing in the present sample. This finding was consistent with Hull et al. (2016), but inconsistent with findings from many other studies. For example, Vaillancourt et al. (2017) found that girls with ASD exhibited higher levels of internalizing behaviors than boys with ASD, while Duvekot et al. (2017) found that girls in general (both with ASD and typically developing) had higher levels of internalizing problems than boys with or without an ASD diagnosis. One potential explanation for this discrepancy could be publication bias. Studies that found differences are more likely to be published than studies that found no significant differences, meaning that the literature is likely to contain more studies that find differences simply due to the nature of publication. Another possible explanation for our lack of significant differences between boys and girls might be our methodology. Specifically, the current sample was comprised of clinical data from children who had been referred for developmental evaluation due to parent concerns, and had a confirmed

ASD diagnosis. Thus, it is possible that our sample was composed of children with more noticeable manifestations of ASD symptoms than an average child with ASD. It is also possible that if girls are engaging in social camouflage early, they might not be referred, and therefore would not be represented in clinical samples, like the one used for this study. Those who were referred might be more likely to show traditional manifestation of ASD and co-morbid symptoms, which would likely have a large impact on our results when examining sex differences.

Limitations

Certain limitations existed in this study that may have impacted the results. Most notably, our sample size was quite small, especially with respect to the number of girls, which may have limited our power to detect differences between the sexes. Additionally, while our study's clinically ascertained sample made it more likely to generalize to clinical samples in the community, it lacked the strong internal validity controls seen in traditional studies, which prevent bias. In the present research, the strength of generalizability was felt to outweigh the limitations related to internal validity controls; however, it should be noted that both approaches have their merits and flaws.

Conclusion

This study showed evidence supporting the hypothesis that children with ASD are likely to have higher rates of internalizing and externalizing problems than same-aged typically developing peers. This is important to know because it could make clinicians more sensitive to the possibility of children with ASD having these co-morbid psychiatric disorders, and it also might help inform how clinicians approach intervention. In addition, no significant differences in the internalizing and externalizing behaviors were found between boys and girls with ASD,

suggesting that boys and girls with ASD have similar levels of internalizing and externalizing problems within a clinical sample. Overall, this study allowed us to compare internalizing and externalizing problems in a clinically ascertained sample of children with ASD versus a same-aged normative sample, and to compare boys versus girls with ASD, contributing to the growing body of research in a way that is generalizable to the clinical community. These findings may help clinicians better understand how children with ASD are affected by co-morbid psychiatric disorders and could help to inform diagnosis and intervention.

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