

## CBCL Profiles of Children and Adolescents with Asperger Syndrome: A Review and Pilot Study

### Abstract

*There is increasing recognition of psychiatric co-morbidities in individuals with Asperger syndrome (AS) that extend beyond the core features of the disorder. Previous research with individuals with AS and autism are summarized. This study aims to examine the behavioural profile of a non-referred AS sample. The Childhood Behaviour Checklist (CBCL) was completed by parents of fifteen children and adolescents with AS (6–18 years). Elevated scores across all CBCL scales were found relative to the normative group. Social, thought and attention problems and anxiety and depressive symptoms were particularly elevated. Research and clinical implications are discussed.*

Asperger syndrome (AS) is a pervasive developmental disorder on the autism spectrum. It is similar to autistic disorder (AD) in that a diagnosis requires two social symptoms and one behavioural symptom. However, according to the Diagnostic and Statistical Manual-IV (DSM-IV), AS differs from AD in that there are no marked cognitive delays, no clinically significant history of delays in language, current communication deficits are not required, and there is no upper limit on age of onset (American Psychiatric Association [APA], 2000). While individuals with AD with average or above average cognitive functioning (referred to as high-functioning autism, HFA) also have no marked cognitive delay and may have intact communication abilities, the distinction between AS and HFA, according to DSM-IV criteria, is based on the history of significant delays in language development for HFA, and the age of onset criterion, although considerable debate exists about the ability to differentiate between the disorders (e.g., Mayes, Calhoun, & Crites, 2001; Sciutto & Cantwell, 2005; Tryon, Mayes, Rhodes, & Waldo, 2006). There is increasing recognition of psychiatric co-morbidities in individuals with autism spectrum disorders (ASDs) beyond the core features of the disorders. Several mental health problems are thought to be more common than in the general population, although rates vary significantly depending on whether the sample is from the community or psychiatric centre, the size of the sample, and the disorders under examination. A review of the literature, displayed in Table 1, suggests high rates of anxiety disorders, depression and attention problems in individuals with an ASD, as well as the potential for symptoms of oppositional defiant disorder and obsessive compulsive disorder.

#### Authors

Jessica Schroeder,  
Jonathan Weiss,  
James Bebko

Department of Psychology,  
York University,  
Toronto, ON

#### Correspondence

jessica4@yorku.ca

#### Keywords

Asperger syndrome,  
CBCL,  
psychopathology,  
mood disorders,  
attention

Table 1: Summary of Research on Psychiatric Symptoms in Individuals with ASD

Author	Sample	N	AS	Comparison group	Measure	Psychiatric symptoms
Brereton et al., 2006	Clinical sample with autism; 4–18 years	381	No	Intellectual disability	DBC-P	Attention-Autism > ID Depression-Autism > ID Anxiety-Autism > ID
Gadow et al., 2005	Clinical sample with PDD; 6–12 years	284	AS = 80 PDD-NOS = 118	Clinic control, community-based TD sample, special education class	CSI-4	Attention – 60% Depressive symptoms – 6% Anxiety – 24% Separation anxiety – 7% Oppositional – 27%; Conduct – 7%
Gillott et al., 2001	Clinical sample with HFA; 8–12 years	15	No	Specific language impairment and TD	SCAS	Anxiety-HFA > SLI Separation anxiety-HFA > SLI Obsessive-Compulsive-HFA > SLI
Hartley et al., 2008	Clinical sample with autism; 1.5–5.8 years	169	No	No	CBCL	Attention – 39% Clinical range Anxious/Depressed – 4% Clinical range Withdrawn – 70% Clinical range Aggression – 23% Clinical range
Holtmann et al., 2007	In or out patient with PDD; 3–20 years	182	5	No	CBCL	Attention – mean in Clinical range Anxious/Depressed – mean in Borderline range Social Anxiety – mean in Clinical range Withdrawn – mean in Borderline range Thought – mean in Clinical range
Hurtig et al., 2009	Clinical sample with HFA or AS; 11–17 years	47	AS = 24 HFA = 23	TD sample	CBCL YSR TRF	Withdrawn-AS/HFA > Control Social-AS/HFA > Control Thought-AS/HFA > Control (girls) Attention-AS/HFA > Control (girls)
Kim et al., 2000	Clinical sample with PDD; 9–14 years	59	19	No	OCHS-R	Attention – 17% Depression – 17% Anxiety – 14% Separation anxiety – 9% Oppositional – 7% Conduct – 3%

continued on following page

Table 1: Summary of Research on Psychiatric Symptoms in Individuals with ASD (continued)

Author	Sample	N	AS	Comparison group	Measure	Psychiatric symptoms
Kobayashi & Murata, 2003	Clinical and community sample with autism; young adults	187	No	No	CBCL	Depression – common Obsessions – common
Leyfer et al., 2006	Community sample with autism; 5–17 years	109	No	No	ACI	Attention – 31% Depression – 10% Anxiety – 2% Phobia – 44% Separation anxiety – 12% Social phobia – 8% Oppositional – 7% Obsessive-Conduct – 37%
Ming et al., 2008	Clinical sample with ASD; 2–18 years	160	11	No	MI	Anxiety and depression – 26% Aggression – 32%
Shtayerman, 2007	Community sample with AS; mean age = 20 years	10	10	No	PHQ-A	Depression – 20% Anxiety – 30%
Sukhodolsky et al., 2008	Clinical trial participants with PDD & aggression & SIB or hyper-activity; 5–17 years	171	AS = 6; PDD-NOS = 14	No	CASI	Anxiety – 9% Phobia – 31% Separation anxiety – 11% Social phobia – 20%
Tonge et al., 1999	Clinical sample with HFA & AS; 4–18 years	127	52	No	DBC	Disruptive-AS > HFA Antisocial-AS > HFA Social relating-AS > HFA Anxiety-AS > HFA
Weisbrot et al., 2005	Clinical sample with PDD; 3–12 years	483	AS = 104; PDD-NOS = 209	Clinical control	ECI-4 CSI-4	Anxiety-PDD > Clinical control

ACI = Autism Co-morbidity Index

AS = Asperger syndrome

CASI = Child and Adolescent Symptom Inventory

CSI-4 = Child Symptom Inventory

DBC = Developmental Behaviour Checklist

DBC-P = Developmental Behaviour Checklist-Parent

ECI-4 = Early Childhood Inventory-4

HFA = High functioning autism

ID = Intellectual disability

MI = Medical Interview

OCHS-R = Ontario Child Health Study-Revised

PDD-NOS = Pervasive developmental disorder

– not otherwise specified

PHQ-A = Patient Health Questionnaire-Adolescent

SCAS = Spence Children's Anxiety Scale

SLI = Specific language impairment

TD = Typically developing

TRF = Teacher Report Form

YSR = Youth Self Report

There is a paucity of research examining co-occurring disorders in individuals specifically with AS, independent of people with autism (cf., Tantom, 2000). Most researchers describe their sample as “autism spectrum disorder,” combining AS with autism (e.g., [Holtmann, Bolte, & Poustka, 2007](#); [Ming, Brimacombe, Chaaban, Zimmerman-Bier, & Wagner, 2008](#); [Sukhodolsky et al., 2008](#)), or excluding those with AS altogether. This paper presents data of a profile of mental health problems found in individuals with AS using the Childhood Behaviour Checklist (CBCL; [Achenbach & Rescorla, 2000](#)), a commonly used measure within clinical settings. The pervasiveness of co-occurring mental health issues in the ASD population highlights the potential utility of including a quick and easily administered screener to assessments. This study highlights to clinicians and researchers the importance of understanding the mental health problems that occur more frequently in this population.

Although limited, there is some research to suggest that those with AS experience more psychiatric problems than those with autism. For example, [Tonge, Brereton, Gray and Einfeld \(1999\)](#) report that 85% of their AS sample met criteria for at least one additional disorder, relative to 65% of their autism sample. Parents of children aged 4–18 years with AS reported significantly more disruptive, antisocial, and anxious behaviours than those with autism. These results are consistent with research that demonstrates a negative relationship between autism symptoms and psychiatric problems in school-age children, with AS reporting more anxiety ([Weisbrot, Gadow, DeVincent, & Pomeroy, 2005](#)) and psychiatric problems ([Gadow, DeVincent, Pomeroy, & Azizian, 2005](#)) than those with a diagnosis either of autism, or Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS).

Other researchers have reported similar degrees of depressive and anxious symptoms in children with AS and autism ([Kim, Szatmari, Bryson, Streiner, & Wilson, 2000](#)). [Kim and colleagues \(2000\)](#) used the Ontario Child Health Study ([Boyle et al., 1987](#)), which is based on questions from the CBCL, to assess mental health problems in 59 children (9–14 years) with either HFA or AS and found that, using normative cut-offs, between 14–17% of their sample had clinically

significant levels of anxiety, depression, and attention deficit hyperactivity disorder (ADHD), and somewhat lower levels for separation anxiety (9%), oppositional behaviour (7%), and conduct problems (3%). In addition, they found that internalizing problems were more common than externalizing problems, and noted that these disorders had detrimental effects on the lives of the parents and children. Contrary to their hypotheses, these researchers did not find that verbal or non-verbal intelligence and specific autism symptoms were significant predictors of anxiety or depression within their sample. They did find that discrepancies scores were significant, albeit very limited, predictors of mood problems, such that individuals with substantially higher verbal than non-verbal intelligence reported higher levels of anxiety and depression.

[Hurtig and colleagues \(2009\)](#) reviewed results from the CBCL completed by parents of 47 adolescents with AS or HFA. Similar to [Kim and colleagues \(2000\)](#), no differences were found between the AS and the HFA groups; thus the groups were combined to create one AS/HFA group. They found that 54% of CBCL Total Problems scores were in the Borderline range (82<sup>nd</sup> percentile) relative to less than 4% of the typically developing (TD) comparison sample. Additionally, they found significantly higher scores on all Syndrome scales in the AS/HFA sample relative to the TD comparison adolescents. In this study, withdrawal, social problems, attention and anxiety/depression scores were particularly elevated in the AS/HFA sample relative to the TD comparison group. Gender differences within groups were found and no other sample characteristics were considered.

These variable results highlight the importance of further investigation of psychiatric symptoms in individuals with AS. The CBCL has previously been used to screen for mental health problems in individuals with autism. [Kobayashi and Murata \(2003\)](#) had 187 parents of adults diagnosed with autism complete the CBCL, and found elevated depression and obsession symptoms. Although the CBCL was modified for use with adults by changing the wording of some items, the authors point out that their results may have underestimated the occurrence of psychiatric symptoms given that the CBCL is intended for use with children and

may have overlooked symptoms more likely to affect adults. Holtmann and colleagues (2007) used the CBCL with 182 children and adolescents with ASD and analysed the Syndrome scales. On average, Social, Attention and Thought Problems were in the clinical range, and Social Withdrawal, Anxiety/Depression, and Total Problems were in the borderline range. Hartley and colleagues (2008) used the CBCL with 169 young children (1.5–5.8 years) with autism. One-third of their sample had Total Problems scores in the clinical range, with Withdrawal, Attention, and Aggression the most frequently endorsed Syndrome scales.

The aim of the current study is to determine the frequency and severity of social, emotional, and behavioural problems in a well-defined, community sample of children and adolescents with AS, using the CBCL. The CBCL is a widely administered screener of psychopathology used by many clinicians, and is often a part of a test battery of clinicians who work with children with AS. Screening is an important and easy first step in the detection of mental health problems in AS that may be overlooked due to diagnostic overshadowing by their AS symptoms. At a basic level, the impairments in social interaction that characterize the disorder may well impact the person's social-emotional functioning, or vice versa. There are suggestions in the research literature, as well as in our clinical experience, of a possible profile of psychopathology common to children with AS, with higher rates of internalizing behaviours than externalizing behaviours (e.g., anxiety vs. conduct disorder), as well as co-occurring attention problems, and social and thought problems reflective of AS symptoms. Early detection can inform early intervention to prevent these problems from escalating into psychiatric disorders in adulthood.

Correlation analyses examined the relations among CBCL scores and other individual characteristics of the participants, including intelligence, language ability, and severity of ASD symptoms. The specific hypotheses of this study were:

1) the majority of individuals with AS in this study will report at least one subscale within the borderline or clinical ranges;

- 2) as a group, the AS sample will demonstrate overall higher rates of all symptoms relative to the normative sample;
- 3) Anxious/depressed, Attention, Social, and Thought Problem syndrome scales will be particularly elevated within the AS sample;
- 4) Affective, Anxiety, and Attention Deficit/Hyperactivity DSM scales will be notably high within the AS sample;
- 5) Internalizing aggregate scores will be greater than Externalizing score; and
- 6) correlations between sample characteristics and CBCL scores will be non-significant.

## Methods

### Participants

Fifteen children with AS between the ages of 6–18 years participated in this study. Inclusion criteria included no history of developmental language delay and average or above average cognitive and current language functioning. Children were recruited through the Autism Spectrum Disorders-Canadian American Research Consortium registry and from agencies that serve families of individuals with AS. Participants had a primary diagnosis of AS, which was confirmed through a review of psychological reports using DSM-IV criteria and by scores on the Krug Asperger's Disorder Index (KADI; Krug & Arick, 2003). KADI standard scores ranged from 74–114, comparable to the normative sample of individuals with AS ( $M = 100.27$ ,  $SD = 10.47$ ). ADI-R scores were not used for confirmation of diagnosis because, as noted by Autism Genetic Resource Exchange (AGRE, n.d.), there is no validated algorithm for identifying AS on the ADI-R. Scores for our group varied accordingly: 56% of the AS group scored in the autism range, 11% in the Not Quite Autism range, and 33% in the Broad Spectrum range.

Table 2 displays sample characteristics including age, IQ, language skill, and autism and AS symptom severity.



Table 2: Sample Characteristics

	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Range</i>
Age	15	12.07	2.86	6–16
FSIQ	15	115.40	15.19	89–141
VIQ	15	116.47	16.61	88–150
PIQ	15	111.47	13.99	86–133
VIQ-PIQ	15	5.27	14.66	-18–36
PPVT-III	15	113.73	21.19	80–143
EOWPVT-2000	15	114.13	12.09	95–141
KADI	15	100.67	9.57	74–114
ADI-R Social	10	17.20	6.44	6–24
ADI-R Communication	10	12.70	6.73	5–21
ADI-R Repetitive & Restricted Behaviour	10	6.00	2.63	3–11
ADI-R Developmental History	10	2.50	1.35	0–4

*FSIQ = Full-scale Intelligence Quotient; VIQ = Verbal Intelligence Quotient; PIQ = Performance Intelligence Quotient; VIQ - PIQ = Verbal Intelligence Quotient minus Performance Intelligence Quotient; PPVT-III = Peabody Picture Vocabulary Test-3<sup>rd</sup> Edition; EOWPVT-2000 = Expressive One-Word Picture Vocabulary Test-2000 Edition; KADI = Krug Asperger's Disorder Index; ADI-R = Autism Diagnostic Interview-Revised*

## Measures

The *Childhood Behavior Checklist* (CBCL; Achenbach & Rescorla, 2000) was used to assess behavioural, emotional, and social problems. It is a parent-report measure appropriate for use with children aged 6–18 years with strong empirically supported rating scales for assessing overall psychopathology, and with several syndrome subscales, developed using principal components analysis. It is a 113-item questionnaire that takes 15–20 minutes to complete. Parents are asked to rate their child within the past 6 months using a three-point scale (0 = not true, 1 = somewhat or sometimes true, and 2 = very true or often true). Scores for Internalizing, Externalizing and Total Problems are provided, along with several subscale scores. Internalizing behaviours occur within the self and represent an over-controlled or inhibited pattern of behaviors. The Internalizing score comprises the following syndrome scales:

Anxious/depressed, Withdrawn/depressed, and Somatic Complaints. Externalizing behaviours tend to be directed outward, external to the individual. The Externalizing score comprises the Rule-breaking and Aggressive Behavior Syndrome scales. Additional Syndrome scales are Attention, Social, and Thought Problems. The DSM scales are: Affective, Anxiety, Somatic, Attention Deficit/Hyperactivity, Oppositional Defiant, and Conduct Problems. T-scores are provided, with higher scores reflecting more problematic behaviour. A T-score of 50 represents the mean of the normative group with the standard deviation of 10. On syndrome and DSM scales scores, T-scores of 65–69 represent the borderline range (93<sup>rd</sup> to 97<sup>th</sup> percentile), and T-scores above 70 fall into the clinical range (above the 97<sup>th</sup> percentile). For aggregate and Total Problems scores, the borderline range is defined by T-scores in the 60–63 range (84<sup>th</sup> to 90<sup>th</sup> percentile) and T-scores above 63 are in the clinical range. Extensive reliability and validity

data are reported in the manual (Achenbach, 1991) and reviews indicate strong overall psychometric properties (Flanagan & Watson, 2005).

### *Cognitive and language functioning*

The *Wechsler Abbreviated Scale of Intelligence* (WASI; The Psychological Corporation, 1999) was used as a brief estimate of intellectual skills, and yielded a Verbal IQ, Performance IQ, and Full Scale IQ score. The WASI was selected because the administration time is approximately 30 minutes and it is rated as having very strong psychometric properties overall, its Full Scale IQ score correlating .81 and .87, respectively, with the full scale IQ scores of the two measures from which it was derived, the Wechsler Intelligence Scale for Children-III and the Wechsler Adult Intelligence Scale-III, and with similar correlations for the subscales (e.g., Keith, Lindskog, & Smith, 2001; Sattler, 2001; The Psychological Corporation, 1999).

The *Peabody Picture Vocabulary Test-III* (PPVT-III; Dunn & Dunn, 1997) was used as a screening test of single-word listening comprehension.

The *Expressive One-Word Picture Vocabulary Test-2000 Edition* (EOWPVT-2000; Brownell, 2000) was used as a measure of expressive one-word vocabulary.

### *ASD measures*

*Autism Diagnostic Interview – Revised* (ADI-R; Lord, Rutter, & LeCouteur, 1994) is a standardized, semi-structured clinical review for caregivers of children and adults. It was administered to parents to identify the severity of symptoms reported for participants using the AGRE affective status categories.

The *Krug Asperger's Disorder Index* (KADI; Krug & Arick, 2003) is a parent-report scale that indicates the presence or absence of behaviours that are indicative of AS. It is used to identify those with AS and to discriminate between AS and high functioning autism. It was used to aid in the confirmation of AS diagnosis. In a review of five diagnostic tools for AS (Campbell, 2005), the KADI had the strongest psychometric properties.

## **General Procedure**

This study was reviewed and approved by the Office of Research Ethics at York University. The data reported in the paper were obtained as part of a larger experimental procedure. Participants completed two experimental tasks that involved presentation of auditory and visual stimuli on a large screen, which required 14 minutes to complete, and are not reported here. After a brief break, children were assessed using the WASI, the PPVT-III, and the EOWPVT-2000, lasting approximately 1.0–1.5 hours in total. During the experiment, parents were asked to complete the CBCL, the KADI, and an optional measure of ASD symptoms that was in the process of becoming standardized.

## **Analyses**

A series of one-sample *t*-tests were calculated to compare the AS group's mean CBCL syndrome scores to a T-score of 50, indicative of the mean for the typically developing normative group. Due to the large number of comparisons, alpha was set to .01. Descriptive analyses were also conducted to determine what percentage of participants fell into the borderline and clinical ranges. A paired-sample *t*-test was conducted to determine differences between internalizing and externalizing behaviour within the sample. Post hoc contrasts were used to determine difference among symptom scales. Correlational analyses were conducted to determine the relations among age, language ability (PPVT-III and EOWPVT-2000 scores), intelligence (WASI FSIQ, VIQ, and PIQ scores and VIQ/PIQ split), symptom severity (KADI and ADI-R scores), and CBCL Internalizing, Externalizing, and Total scores.

## **Results**

As shown in Table 3, all symptom scores were significantly greater than the normative sample mean. Overall, the Anxiety/depression, Social Problems, Thought Problems, Attention Problems Syndrome scales, and the Anxiety, DSM-IV scale, were found to have a mean in the borderline range. In addition, the mean Internalizing and Total problems scores were found to be in the clinical range. Significance

levels were such that even conservative corrections for the multiple *t*-tests still indicated significant differences.

All participants had at least one score in the borderline range, and eighty percent of participants had at least one symptom score in the clinical range. Sixty-seven percent of participants showed a Total Problems score in the clinical range. The scales most commonly in the borderline or clinical range in this sample were: Thought Problems (80%), Anxiety Problems (67%), Anxious/Depressed (67%), Attention Problems (63%), and Social Problems (60%; see the first column of Table 3). Figure 1

demonstrates the group's AS symptom profile, through boxplot analyses. The degree of variability and presence of outliers should be considered when interpreting the results.

The paired-sample *t*-test revealed a trend towards a difference between internalizing behaviour and externalizing behaviour scores,  $t(14) = 2.39$ ,  $p = .03$  (significant at the alpha = .05 level, but not at the adjusted alpha of .01), with the AS group showing significantly higher levels of internalizing problems. Post hoc contrasts with Sidak-Bonferroni adjustment confirmed that there were significant differences among the symptom scales, with greater sever-

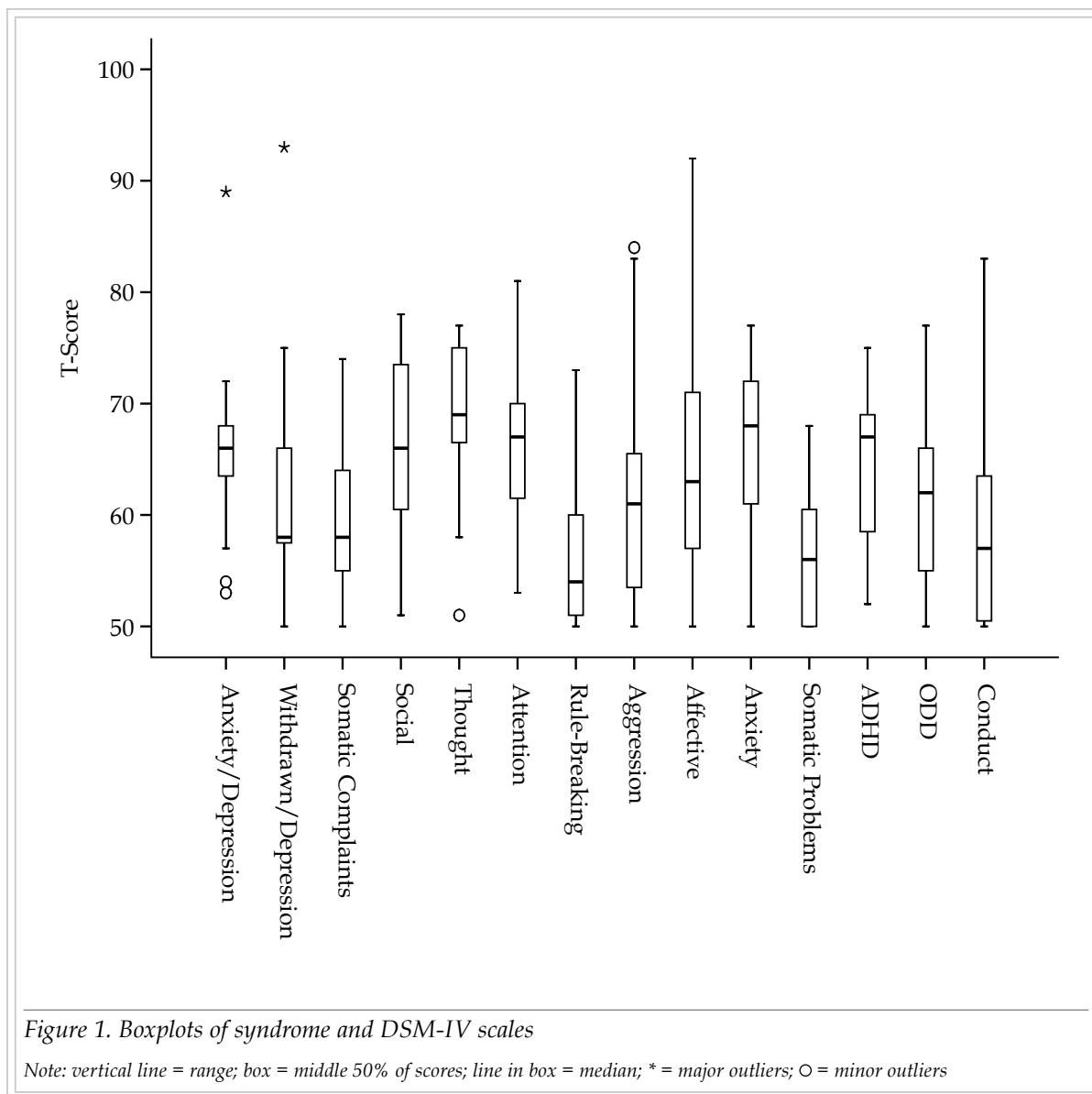
Table 3: Mean T-scores of AS Participants on CBCL Syndrome and DSM-IV Scales

Scale	% Clinical	Mean (SD)	<i>t</i> ( <i>df</i> )	<i>p</i> -value	Cohen's <i>d</i>
<i>Syndrome scales</i>					
Anxious/depressed	20 (47)	66.13 (8.54)	7.31 (14)	< .001	1.73
Withdrawn/depressed	13 (20)	62.40 (10.68)	4.49 (14)	.001	1.19
Somatic complaints	6 (13)	59.60 (6.81)	5.46 (14)	< .001	1.12
Social problems	40 (20)	65.87 (8.35)	7.36 (14)	< .001	1.72
Thought problems	47 (33)	68.87 (7.53)	9.70 (14)	< .001	2.13
Attention problems	30 (33)	66.73 (7.98)	8.12 (14)	< .001	1.85
Rule-breaking behaviour	13 (0)	56.33 (7.29)	3.36 (14)	.005	0.72
Aggressive behaviour	13 (30)	61.93 (10.69)	4.33 (14)	.001	1.15
<i>DSM scales</i>					
Affective problems	13 (33)	64.87 (10.95)	5.26 (14)	< .001	1.42
Anxiety problems	20 (47)	66.33 (7.74)	8.17 (14)	< .001	1.83
Somatic problems	20 (0)	57.13 (6.48)	4.26 (14)	.001	0.85
ADHD problems	40 (20)	64.80 (7.27)	7.88 (14)	< .001	1.69
ODD problems	27 (13)	61.07 (8.15)	5.26 (14)	< .001	1.21
Conduct problems	13 (13)	59.00 (10.17)	3.43 (14)	.004	0.89
<i>Aggregate scores</i>					
Internalizing	53 (13)	65.33 (7.42)	8.00 (14)	< .001	1.74
Externalizing	20 (33)	58.47 (10.11)	3.24 (14)	.006	0.84
Total problems	67 (13)	65.73 (7.24)	8.42 (14)	< .001	1.80

ADHD = attention deficit hyperactivity disorder; ODD = oppositional defiant disorder

Note: scores of 65–69 are in the Borderline range, indicating elevated risk for that variable; scores > 70 are considered as likely in the Clinical range. For the aggregate scores, scores of 60–63 are in the Borderline Range, and scores ≥ 64 are in the Clinical range. A Cohen's *d* of 0.2 is considered a "small" effect size, 0.5 is "medium," and > 0.8 is considered a "large" effect size.





ity of Thought symptoms and Attention symptoms relative to the severity of Rule-breaking symptoms,  $\Delta M = 12.3$ ,  $p = .001$  and  $\Delta M = 10.4$ ,  $p = .003$ , respectively. No other significant differences based on symptom severity on the CBCL emerged.

Correlational analyses indicated no significant correlations among any of the demographic variables (age, language ability, intelligence, age, autism symptom severity) and the CBCL Internalizing, Externalizing or Total Problems scales (all  $p \geq .14$ ).

## Discussion

These results indicate that on average, parents of individuals with AS reported significantly higher symptom severity on every scale of the CBCL relative to the norming population, thus supporting the first and second hypotheses. Sixty-seven percent of participants showed a total problems score in the clinical range, and all participants had at least one scale that fell one and a half standard deviation points above the population average. This is consistent with Tonge and colleagues (1999), who reported that 85% of their AS sample met criteria for at least one disorder. As predicted in

the third and fourth hypotheses, the scales that were most commonly endorsed in the sample were Thought, Anxiety, Social, Affective, and Attention Problems. These results are consistent with the current literature on AS and anxiety, depression, and obsessions ([Gadow et al., 2005](#); [Hartley et al., 2008](#); [Hurtig et al., 2009](#); [Kim et al., 2000](#); [Kobayashi & Murata, 2003](#); [Tonge et al., 1999](#); [Weisbrot et al., 2005](#)). Consistent with our fifth hypothesis, the results indicate that using the CBCL, internalizing behaviour is significantly more problematic than externalizing behaviour. Individuals with AS also appear at significant risk for associated thought problems, anxiety and depression, social problems, and attention problems, and it is important to further investigate these linkages. The sixth hypothesis regarding correlations between sample characteristics and CBCL scores was also supported. Consistent with Kim and colleagues (2000), intelligence, language ability, and autism symptoms were not significantly correlated with CBCL scores. This is not surprising given the homogeneity of these scores within the sample and the small sample size.

Our AS sample's CBCL profile is consistent with the profile found in the Pervasive Developmental Disorder (PDD) group examined by Holtmann and colleagues (2007), with a few notable and predictable exceptions. Across scales, the means for our AS sample were somewhat lower than for the Holtmann et al. PDD group. This may suggest that the AS group showed less psychopathology than the PDD group in their study, although theirs was a mixed sample. It is more likely that the means from our sample underestimate the actual symptom severity of the sample. The frequency of reported symptoms that fell into the borderline and clinical ranges in our sample was quite high, and the group means were reduced by the small number of scores in the non-clinical range.

The symptoms that emerged as being particularly problematic in both the Holtmann and colleagues' (2007) PDD sample, and the Hurtig et al. (2009) AS plus HFA sample included withdrawal, social problems, attention, and anxiety/depression. Hartley and colleagues (2008) also found withdrawal to be particularly problematic in their sample of young children with autism. These differences are quite consistent with our findings, except for withdrawal, which comprises both withdrawal from activi-

ties and from other people. Withdrawal characterizes autism more severely, and each of those studies used mixed diagnostic samples, compared to our sample, which was limited to AS. In AS, unsuccessful attempts at social approach are more common than withdrawal.

Hurtig and colleagues (2009) were unique in not finding thought problems to be as problematic in their sample; however, they removed three items from the thought problems subscale due to overlap with autism symptomatology. The Hartley and colleagues (2008) study was also unique in that aggression was frequently endorsed relative to other scales. This may be related to the age of their sample (1.5–5.8 years); it is possible that aggression is more frequently noted in younger children with autism than older children with autism, or individuals with AS.

Thought problems (including obsessive thoughts and repetitive actions) and social problems as measured by the CBCL may overlap with several of the central diagnostic features of AS, including repetitive and restricted behaviours and social difficulties (Hurtig et al., 2009). Future research is needed to determine if these problems may be indicative of co-occurring OCD or psychotic symptoms, or simply part of the expression of ASD. More distinct from ASD symptoms, however, are attention problems, anxiety, and depression, which are not considered core features of AS, and elevated scores in these domains are likely more indicative of comorbidity. Attention problems frequently occur in individuals with ASD, although these features are not considered core to the disorder. While the DSM-IV prohibits the diagnosis of ADHD in individuals with PDD, due to overlap in diagnostic features, some clinicians will diagnose ADHD in individuals with PDD. A more critical question that could be addressed in future research is at what point should the core characteristics of AS perhaps be expanded to recognize that the majority of individuals with ASD experience these issues. Additional research might also include information from multiple sources, such as teachers, as parents may tend to under-report psychiatric symptoms in their children, and an additional rating source would help provide additional confidence in interpretation of reported symptoms. If it is the case that parents were under-reporting, then the present results may actually be an underestimation of existing problems in the population.

While the small sample size, reliance on parent report only and lack of an autism or typically developing comparison groups may be limiting factors for the present study, this research highlights the importance of considering co-morbidity when assessing the AS population. For that reason, a broad social, behavioural, and emotional problem screen, such as the CBCL, should be included in any assessment battery. This study also underscores the importance of determining the efficacy of current or modified treatments for mental health problems in individuals with AS. Finally, additional research is warranted to determine if there are specific early symptoms of AS that predict later behaviour problems in this population, and that clinicians can use as indicators of risk that may require early intervention.

## Key Messages from This Article

**People with disabilities:** It is important to talk to your health care provider if you are feeling anxious, depressed, or have other mental health concerns. This will help them to make sure that you are provided with the best possible care.

**Professionals:** It is important to screen for additional mental health issues, including anxiety, depression, and attention difficulties, when working with individuals with autism Spectrum Disorders as these are not core features and should be evaluated separately.

**Policy makers:** Policy to promote mental health screening and interventions for individuals with autism spectrum disorders is necessary to ensure that their often complex mental health needs are met.

## References

- AGRE Affected Status Categories. (n.d.). Retrieved February 1, 2009, from <http://www.agre.org/agrecatalog/algorithm.cfm>
- Achenbach, T. M. (1991). *Childhood Behavior Checklist*. Burlington, VT: University of Vermont, Department of Psychology.
- Achenbach, T., & Rescorla, L. (2000). *Child Behavior Checklist*. Burlington, VT: ASEBA.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4<sup>th</sup> ed., text rev.). Washington, DC: Author.
- Boyle, M. H., Offord, D. R., Hofmann, H. G., Catlin, G. P., Byles, J. A., Cadman, D. T., et al. (1987). Ontario Child Health Study: I. Methodology. *Archives of General Psychiatry*, 44, 826-831.
- Brereton, A. V., Tonge, B. J., & Einfeld, S. L. (2006). Psychopathology in children and adolescents with autism compared to young people with intellectual disability. *Journal of Autism and Developmental Disorders*, 36, 849-861.
- Brownell, R. (2000). *Expressive One-word Picture Vocabulary Test*. Novato, CA: Academic Therapy Publications.
- Campbell, J. M. (2005). Diagnostic assessment of Asperger's Disorder: a review of five third-party rating scales. *Journal of Autism and Developmental Disorders*, 35(1), 25-35.
- Dunn, L. M., & Dunn, L. M. (1997). *Peabody Picture Vocabulary Test - III*. Circle Pines, MN: American Guidance Services.
- Flanagan, R., & Watson, T. S. (2005). Review of the test Wechsler Abbreviated Scales of Intelligence. In *Mental Measurements Yearbook*, 16. Retrieved from <http://www.unl.edu/buros/>
- Gadow, K. D., DeVincent, C. J., Pomeroy, J., & Azizian, A. (2005). Comparison of DSM-IV symptoms in elementary school-age children with PDD versus clinic and community samples. *Autism*, 9(4), 392-415.
- Gillott, A., Furniss, F., & Walter, A. (2001). Anxiety in high-functioning children with autism. *Autism*, 5(3), 277-288.
- Hartley, S. L., Sikora, D. M., & McCoy, R. (2008). Prevalence and risk factors of maladaptive behaviour in young children with Autistic Disorder. *Journal of Intellectual Disability Research*, 52(10), 819-829.
- Holtmann, M., Bolte, S., & Poustka, F. (2007). Attention deficit hyperactivity disorder symptoms in pervasive developmental disorders: Association with autistic behavior domains and coexisting psychopathology. *Psychopathology*, 40, 172-177.

- Hurtig, T., Kuusikko, S., Matilla, M., Haapsamo, H., Ebeling, H., Jusilla, K., et al. (2009). Multi-informant reports of psychiatric symptoms among adolescents with Asperger syndrome or autism. *Autism, 13*(6), 583–598.
- Keith, T. Z., Lindskog, C. O., & Smith, J. V. (2001). Review of the test Wechsler Abbreviated Scales of Intelligence. In *Mental Measurements Yearbook, 14*. Retrieved from <http://www.unl.edu/buros/>
- Kim, J. A., Szatmari, P., Bryson, S. E., Streiner, D. L., & Wilson, F. J. (2000). The prevalence of anxiety and mood problems among children with autism and Asperger syndrome. *Autism, 4*(2), 117–132.
- Kobayashi, R., & Murata, T. (2003). Behavioral characteristics of 187 young adults with autism. *Psychiatry and Clinical Neuroscience, 52*(4), 383–390.
- Krug, D. A., & Arick, J. R. (2003). *Krug Asperger's Disorder Index*. Austin, TX: Pro-Ed Inc.
- Leyfer, O. T., Folstein, S. E., Bacalman, S., Davis, N. O., Dinh, E., Morgan, J., et al. (2006). Comorbid psychiatric disorders in children with autism: interview development and rates of disorders. *Journal of Autism and Developmental Disorders, 36*, 849–861.
- Lord, C., Rutter, M., & LeCouteur, A. (1994). Autism Diagnostic Interview-Revised: a revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *Journal of Autism and Developmental Disorders, 24*, 659–685.
- Mayes, S. D., Calhoun, S. L., & Crites, D. L. (2001). Does DSM-IV Asperger's disorder exist? *Journal of Abnormal Child Psychology, 29*(3), 263–271.
- Ming, X., Brimacombe, M., Chaaban, J., Zimmerman-Bier, B., & Wagner, G. C. (2008). Autism spectrum disorders: concurrent clinical disorders. *Journal of Child Neurology, 23*(1), 6–13.
- Sattler, J. M. (2001). *Assessment of children: Cognitive applications* (4<sup>th</sup> ed.) San Diego, CA: Jerome M. Sattler, Publisher, Inc.
- Sciutto, M. J., & Cantwell, C. (2005). Factors influencing the differential diagnosis of Asperger's disorder and high-functioning autism. *Journal of Developmental and Physical Disabilities, 17*(4), 345–359.
- Shtayermman, O. (2007). Peer victimization in adolescents and young adults diagnosed with Asperger's syndrome: A link to depressive symptomatology, anxiety symptomatology and suicidal ideation. *Issues in Comprehensive Pediatric Nursing, 30*(3), 87–107.
- Sukhodolsky, D. G., Scahill, L., Gadow, K. D., Arnold, L. E., Aman, M. G., McDougle, C. J., et al. (2008). Parent-rated anxiety symptoms in children with pervasive developmental disorders: Frequency and association with core autism symptoms and cognitive functioning. *Journal of Abnormal Child Psychology, 36*(1), 117–128.
- Tantum, D. (2000). Psychological disorder in adolescents and adults with Asperger syndrome. *Autism, 4*(1), 47–62.
- The Psychological Corporation. (1999). *Wechsler Abbreviated Scale of Intelligence*. San Antonio: Author.
- Tonge, B. J., Brereton, A. V., Gray, K. M., & Einfeld, S. L. (1999). Behavioural and emotional disturbance in high-functioning autism and Asperger syndrome. *Autism, 3*(2), 117–130.
- Tryon, P. A., Mayes, S. D., Rhodes, R. L., & Waldo, M. (2006). Can Asperger's disorder be differentiated from autism using DSM-IV criteria. *Focus on Autism and Other Developmental Disabilities, 21*(1), 2–5.
- Weisbrot, D. M., Gadow, K. D., DeVincent, C. J., & Pomeroy, J. (2005). The presentation of anxiety in children with pervasive developmental disorders. *The Journal of Child and Adolescent Psychopharmacology, 15*(3), 477–496.