Research in Autism Spectrum Disorders 18 (2015) 97–109

Contents lists available at ScienceDirect

Research in Autism Spectrum Disorders

journal homepage: http://ees.elsevier.com/RASD/default.asp

Anxiety and aggression in adolescents with autism spectrum disorders attending mainstream schools

Pamela Gaye Ambler[a], Ami Eidels[a,*], Christopher Gregory[b]

[a] The University of Newcastle, Australia
[b] NSW Department of Family and Community Service, Australia

ARTICLE INFO

Article history:
Received 19 December 2013
Received in revised form 28 July 2015
Accepted 30 July 2015

Keywords:
Autism
Anxiety
Anger
Aggression
Adolescents

ABSTRACT

This study investigated the link between anxiety and aggression in adolescents with autism spectrum disorders (ASDs) using self-report measures of anxiety and anger and teacher ratings of behaviour. Participants were 104 high school students aged 12–18: 52 students with ASDs, without intellectual disability, and their typically developing peers matched for age and gender. Students with ASDs who attend mainstream high schools reported higher levels of anxiety and reactive anger than their peers, were reported by their teachers to engage in more aggressive behaviours, and were at higher risk of being suspended from school. The results further suggested that social anxiety is a significant moderator of the relationship between autism and physical aggression. For ASD students, but not for the control students, there was a strong, positive relationship: higher levels of anxiety were associated with higher levels of physical aggression. However, ASD students with high anger control did not display physical aggression. Our results have implications for screening students for anxiety, the provision of interventions for managing anxiety and the development of anger management skills, and for the appropriateness of suspension as a mandatory response to incidents of physical aggression in schools.

1. Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterised by persistent deficits in social communication and social interaction accompanied by restricted, repetitive patterns of behaviour, interests or activities (APA, 2013). Although only recently given official status in the DSM-5: Diagnostic and Statistical Manual of Mental Disorders (APA, 2013), the term has long been used as an umbrella term encompassing the DSM-IV (APA, 2000) diagnostic categories of autistic disorder, Asperger's disorder (also known as Asperger syndrome) and pervasive developmental disorder not otherwise specified (PDD-NOS). The most official prevalence rate of autism for Australian children aged from 6 to 12 years is 62.5 per 10,000 (MacDermott, Williams, Ridley, Glasson, & Wray, 2007). Most children with autism are educated in mainstream schools, often in regular classes. However, due to the emotional and behavioural problems associated with the disorder, children with autism experience many difficulties at school unrelated to academic ability (Australian Bureau of Statistics, 2011; Roth, 2013) and frequently experience suspension, exclusion or partial enrolment (New South Wales Parliament, 2012). In this study we investigated the relationships between autism, anxiety, anger and aggression and their potential effect on student suspension.

* Corresponding author at: School of Psychology, University of Newcastle Callaghan, NSW 2308, Australia.
E-mail address: Ami.eidels@newcastle.edu.au (A. Eidels).

http://dx.doi.org/10.1016/j.rasd.2015.07.005
1750-9467/

1.1. Anxiety and ASD

Studies consistently show that anxiety is one of the most common problems experienced by school age children and adolescents with ASD (Ghaziuddin, 2002). A meta-analysis of studies showed that anxiety disorders occur in around 40% of children with ASDs (van Steensel, Bogels, & Perrin, 2011). For the former categories of autism disorders that exclude intellectual disability, such as high-functioning autism or Asperger syndrome, estimates have been as high as 84% (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000; Muris, Steerneman, Merckelbach, Holdrinet, & Meesters, 1998). Severity ratings have also been noted to increase with age, with adolescents exhibiting more severe anxiety than children (Kuusikko et al., 2008; Lecavalier, 2006). Kerns and Kendall (2012) conducted a comprehensive review of the literature to ascertain whether anxiety is a separate disorder frequently comorbid with ASD or an atypical variant of anxiety unique to ASD. Their conclusions were not definitive, but point toward comorbidity of anxiety and ASD in higher functioning adolescents.

Despite the high prevalence of anxiety symptomatology in children and adolescents with ASD, anxiety disorders are commonly unrecognised or misdiagnosed (MacNeil, Lopes, & Minnes, 2009; White, Oswald, Ollendick, & Scahill, 2009) due to diagnostic overshadowing. Diagnostic overshadowing is the tendency to either attribute comorbid mental health problems to a disability (Levitan & Reiss, 1983) or to ignore such problems because they are considered to be less significant than the effects of the disability (Mason & Scior, 2004). Sometimes the behaviours resulting from anxiety, such as aggression, may be perceived as behaviours associated with the ASD (Tsai, 2006; White et al., 2009) and differentiating between the two can be difficult, particularly if the symptoms of anxiety are longstanding and have become part of the child's typical behaviour. Farrugia and Hudson (2006) found in their study that few adolescents with ASDs who scored highly on measures of anxiety had received any psychological treatment at all for their symptoms.

Cognitive and environmental explanations have been proposed to account for the difference in levels of anxiety experienced by higher functioning children with autism compared to those with autism and comorbid intellectual disability. Cognitive impairments may preclude those types of anxiety disorders with substantial cognitive components, such as social phobia (Muris et al., 1998). Alternatively, the apparent association between IQ and anxiety may be mediated by higher social understanding (Niditch, Varela, Kamps, & Hill, 2012). Higher functioning children attend mainstream schools, and are therefore more exposed to daily stressors. Ashburner, Ziviani, and Rodger (2010) suggested a number of school-related stressors which could contribute to the development and maintenance of anxiety in children with autism: lack of order and predictability in the school environment; frequent changes and/or interruptions to their narrow interests or obsessions; complexity of timetabling and curriculum; the pressures of adolescence and demand for a level of flexibility that students with ASD do not possess; and vulnerability to bullying and social exclusion.

The prevalence of anxiety disorders in children and adolescents with autism has also been attributed to their neurobiological predisposition to anxiety, and possibly also to aggression. The prefrontal cortex, the limbic system (and the amygdala, in particular) and serotonin have all been implicated in the fear response (Amaral, Bauman, & Schumann, 2003), anxiety (Kim & Gorman, 2005), aggression (Birger et al., 2003; Blair, 2010) and violence (Reif et al., 2007; Siever, 2008) and in the aetiology of autism spectrum disorders (Eigsti & Shapiro, 2003). Neurobiological predisposition combined with environmental stressors make the high functioning autistic child particularly vulnerable to aggressive outbursts, acts of violence and 'meltdowns', which are intense emotional and physical responses to stress (Mazefsky et al., 2013). On the other hand, some research suggests that, rather than anxiety causing aggression, aggression can lead to anxiety through peer rejection (Niditch et al., 2012).

1.2. Anger, aggression and ASD

Aggression may result from a predisposition to behave aggressively or to a deficit in the ability to inhibit such behaviour (Jahoda, Willner, Pert, & MacMahon, 2013). While children with autism and comorbid intellectual disability exhibit less anxiety than their higher functioning peers (Davis et al., 2011), they engage in more frequent and more severe challenging behaviours, including physical aggression (Kanne & Mazurek, 2011; Matson, 2009). In people with an intellectual disability and impairments in communication, challenging behaviours can be functional, serving to communicate needs in the absence of language, whereas for those without an intellectual disability aggression at school is a maladaptive behaviour, leading to social exclusion and disciplinary action such as suspension.

Anger is a primary emotion that may at times be expressed behaviourally as aggression or violence (Gardner & Moore, 2008). McKinnie Burney and Kromrey (2001) proposed two classes of anger: *instrumental anger* is defined as a "negative emotion that occurs to achieve some desired and planned goal" whereas *reactive anger* is "an immediate response to some anger-provoking event that is perceived as negative, threatening, or fear provoking". Both may lead to aggression in the absence of anger control, which is a set of proactive behaviours used when responding to provocation.

Anxiety in children with ASD is more likely to be expressed as externalising, acting out behaviours than in typically developing children (White et al., 2009). Social anxiety has been shown to exacerbate hostility and aggression in adults with ASD (White, Kreiser, Pugliese, & Scarpa, 2012). However, other studies have shown that, when autism is not a factor, social anxiety is associated with low levels of violence and aggression (DeWall, Buckner, Lambert, Cohen, & Fincham, 2010).

1.3. Autism and schools

There is an increasing awareness of the special needs of children with autism, and their heightened risk of suspension, expulsion or early exit from school (New South Wales Government, 2010). Ashburner et al. (2010) observed that, because their intellectual capabilities are average, the behaviours of children with Asperger syndrome or high functioning autism are often misunderstood. They are frequently excluded from school because of disruptive or aggressive behaviour (Barnard, Prior & Potter, 2000) and parents claim that schools tend to blame the child and use management strategies based on punishment (Whitaker, 2007). Students with ASD are subject to the same discipline and welfare policies as typically developing peers. While taking into account factors such as the student's age, individual needs, any disability and developmental level, principals are required to suspend immediately any student who is physically violent (New South Wales Department of School Education Student Welfare Directorate, 1996). Similar provisions exist in the United States and Canada (Ontario Human Rights Commission, 2003; U.S. Department of Education, 2014). There has been increasing criticism of mandatory suspension and zero tolerance policies, which have resulted in the suspension or expulsion of students with disabilities, and particularly those with emotional or behavioural disorders, at a disproportionate rate (American Psychological Association, 2008). Given that the violence may be the result of a phenotypic predisposition to high levels of anxiety and to aggressive behaviour, the otherwise equitable application of the suspension policy may be considered to be at odds with the principle and policy of inclusiveness. To date, there has been limited consideration given to aggression by students with autism being a mental health issue rather than a behavioural issue (Bjorkly, 2009; Newman & Ghaziuddin, 2008).

1.4. Choosing appropriate instruments: ASD and self-report measures

There may be some questions as to the suitability of standardised written questionnaires for children with autism. Mazefsky, Kao, and Oswald (2011) warned that, although an anxiety questionnaire may be a useful diagnostic tool for adolescents with high-functioning autism spectrum disorders, it is difficult to control for the effects of medication. Many children with autism are prescribed anti-depressants or ADHD medications. Information about medications was requested in the current study, but participants were not excluded if they were taking such medications.

Theory of Mind is the ability to recognise and understand the thoughts and beliefs of oneself and of others (Baron-Cohen, 1995). Because of the Theory of Mind impairments associated with autism, another question with respect to the suitability of self-report measures for this population concerns the ability of participants to identify and reflect on their thoughts. Chalfant, Rapee, and Carroll (2007) concluded from their study that children with high functioning autism disorders do have sufficient Theory of Mind abilities to reliably complete these self-report measures.

1.5. The current study

The purpose of the current study is to explore the links between anxiety and aggression in high-functioning adolescents with autism in mainstream high schools. In particular, we tested whether physical aggression by high school students with ASDs could be attributed to anxiety and therefore should be considered a mental health issue rather than a behavioural issue. Our first hypothesis was that, in keeping with the results of prior research, the average level of anxiety in participants with autism would be higher than in their typically developing peers. Second, we hypothesised that levels of anxiety and aggressive behaviours would be positively related, and that this relationship would be stronger in adolescents with ASDs than in typically developing adolescents. This was tested by comparing self-reported anxiety scores with teacher ratings of student behaviour.

Third, we tested whether aggression in adolescents with ASDs is characterised by high scores on measures of reactive anger but not instrumental anger (McKinnie Burney & Kromrey, 2001). That is, we predicted that incidents of aggression are more likely to be immediate responses to feelings of fear, frustration or being threatened rather than delayed and goal-directed, indicated by correlations between behavioural measures of aggression and reactive anger but not instrumental anger.

Our fourth and key hypothesis was that aggression in adolescents with autism may be explained by comorbid anxiety. We proposed that the apparent relationship between autism and physical aggression in schools is not directly related to autism, but could be the result of high levels of anxiety commonly experienced by high-functioning adolescents with autism spectrum disorders. That is, anxiety mediates the relationship between autism and aggression, and may be tested by mediation analysis using multiple regression (Hayes, 2013).

2. Method

2.1. Overview

This research is a correlational study comparing levels of anger, anxiety and aggression in adolescents with autism and in a control group of their typically developing peers matched for age and gender. Information was collected using self-report measures of anxiety and anger completed by the students, and teacher-reported measures of behaviour.

2.2. Participants

This research was conducted in the Hunter and Central Coast region of New South Wales (NSW), Australia. Of the ten government school regions in NSW, it is the most demographically diverse and the second largest in population, comprising 15% of enrolments in the state. It includes metropolitan and rural schools in communities ranging from high to very low socio-economic status.

Following approval from the NSW Department of Education and Communities and the Catholic Schools Office, Maitland-Newcastle Diocese, principals of the 52 government high schools and 12Catholic high schools in the region were invited to take part in the research. Principals of 10 public highs schools and two Catholic high schools agreed to participate and students from those schools were then invited to take part. One staff member at each school was appointed by the principal to help facilitate the conduct of the research and encourage participation by eligible students.

Participants included students with a diagnosis of an autism spectrum disorder attending mainstream high schools (ASD group) and a control group of typically developing children matched for gender and age (control group). Eligible diagnoses included high functioning autism, Asperger's disorder or Asperger syndrome, or autistic disorder without intellectual disability. To satisfy the NSW Department of Education's disability criteria, which are also used by NSW Catholic Schools for funding students with special needs (NSW Parliament, 2010), students with autism must have a current report confirming their diagnosis from a specialist medical practitioner or registered psychologist with appropriate clinical experience (NSW Department of Education and Training, 2003). The accuracy of participants' diagnoses was not questioned for this research. Where possible, students were matched with other students from the same grade at the same school but, due to some difficulty in recruiting enough control group participants, some participants were matched with students from a different school or grade. All were matched with a student of the same gender and less than 12 months difference in age.

Thus, a total of 104 students provided data for the study, 52 with autism spectrum disorders, matched for age and gender with a control group of 52 typically developing students, along with 62 of their teachers. Some teachers completed surveys for both the student with autism and his or her matched peer, while others were only able to report on one student. There were 84 male student participants (42 in each of the ASD and control groups) and 20 female (10 in each group). This ratio followed naturally from the recruitment process and approximates the reported gender ratio of 4:1 (Blumberg et al., 2013). Students were between 12 and 18 years old, with a mean age of 14.50 (SD = 1.77) for the ASD group and 14.35 (SD = 1.68) for the control group. All grades, from year 7 to year 12, were represented. Students from year 8 had the highest participation rate ($N = 33$) while those from year 10 had the lowest ($N = 3$). The highest number of participants contributed by any one school was 27, and the least was 1.

2.3. Materials

Student participants were asked to complete two psychometric assessments to gauge their levels of anxiety and anger, and a brief additional survey. Their teachers were asked to complete a questionnaire assessing emotional and behavioural problems.

2.3.1. Revised children's manifest anxiety scale: second edition (RCMAS-2)

The RCMAS-2 (Reynolds & Richmond, 2008) is a paper-and-pencil, 49-item self-report scale that takes respondents 10–15 min to complete. It was designed to assess the level and nature of anxiety in children and adolescents, and is suitable for children aged from 6 to 19. The scale provides a total anxiety score, as well as physiological anxiety, worry, social anxiety and defensiveness (lie) subscales and an inconsistent responding index.

Reliability coefficients (Cronbach's alpha) for internal consistency for the RCMAS-2 range from 0.92 for total anxiety down to 0.75 for physiological anxiety for the full reference sample, with similar reliabilities for gender and age and for clinical samples that included autism spectrum disorders. Test–retest reliability estimates ranged from a high of 0.76 for total anxiety down to 0.64 for social anxiety.

2.3.2. Adolescent anger rating scale (AARS)

The AARS (Burney, 2001) is a 41-item self-report measure intended to assess anger and control of anger response in adolescents, aged 11–19 years. Twenty items measure instrumental anger, a delayed, goal-related response that may include threatening and bullying, and include "When I am angry I enjoy hitting and kicking people" and "When I am angry I will find a weapon to deliberately hurt someone". Eight items measure reactive anger, an immediate response to events perceived as negative, threatening, or fear provoking: "When I am angry I act without thinking". Thirteen items measure Anger Control, and represent positive cognitive and behavioural responses to provocation, such as "When I am angry I walk away to avoid fighting". Total anger, a general index of anger expression, is calculated from the three scale scores.

Reliability coefficients for internal consistency ranged from 0.81 to 0.92 for the reference sample. Test–retest reliability coefficients ranged from 0.71 to 0.79 over a two-week interval. A panel of school psychologists, school personnel and clinicians assessed content validity of the AARS. Overall, the scale was found to be a valid and reliable instrument to identify behavioural components of anger, aggression and violence in the schools (McKinnie Burney & Kromrey, 2001).

2.3.3. Brief additional survey for students

Students were also asked to complete a brief survey to provide information not obtained in the two surveys described above. This section contained the written instructions for completing the surveys and requested information about how often they had been involved in incidents that did not result in suspensions (parallel to that requested in the AARS about suspensions) and whether they were prescribed medication for anxiety. They were also provided the opportunity to write about significant relevant experiences or incidents if they so wished. This last section was optional and was not included in the data analysis. It was provided primarily as a courtesy to students in case they were frustrated by the limited responses available to them on the questionnaires and wished to share their experiences in more detail.

2.3.4. Student behavior survey (SBS)

The SBS (Lachar, Wingenfeld, Kline, & Gruber, 2000) is a brief assessment for rating student school behaviours by teachers and consists of 102 items in a Likert scale response format. It identifies emotional and behavioural maladjustment in children aged 5–18 years. It produces scores for 11 scales: academic performance, academic habits, social skills, parent participation, health concerns, emotional distress, unusual behaviour, social problems, verbal aggression, physical aggression and behaviour problems. These last six scales are grouped together in a section labelled adjustment problems, and are the scales of interest in this study.

Reliability estimates for internal consistency of the SBS lie between 0.80 and 0.90 for a standardisation sample of regular students and for a sample of students referred for behavioural and academic concerns. Test–retest reliability ranged from 0.86 for intervals of around two weeks to 0.71 at 6 months. Inter-rater reliability was reported to lie between 0.70 and 0.80.

2.4. Procedure

Informed consent was obtained from the students and their parents or caregivers, and from the teachers who were asked to complete a survey about the students. The researchers visited the schools to administer the surveys to student participants. Some were administered individually and some in groups to suit the timetable and personal preferences of the students and staff. Students were advised to contact their school counsellor or other appropriate person or service, as described in the information statements, should they wish to discuss the issues raised in the surveys. When students were absent on the day of the visit, the surveys were completed after their return under the supervision of an appropriate and informed member of staff. Teachers were provided with the SBS to complete at a time of their choosing.

3. Results

3.1. Anxiety

There was no difference between the two groups on the inconsistency index or the defensiveness scale of the RCMAS-2. The overall defensiveness *T* scores for the whole group ($M = 51.63$, SD = 10.96) did not differ significantly from the standard *T* score mean ($M = 50$, SD = 10.00), $t(103) = 1.52$, $p = 0.13$, $d = 0.16$. Thus, the sample as a whole was not trying to give an overly positive impression.

One-tailed paired-samples *t*-tests were conducted to compare the ASD and control groups on the total anxiety and worry scales, as previous research has identified that children with ASD were higher on these two scales than children in a standardisation sample (Richmond & Reynolds, 2008). All remaining *t*-tests were two-tailed. Highly significant differences were found between the ASD group and the control group on physiological anxiety, worry and social anxiety and on total anxiety, which is calculated from the scores on the three subscales (Table 1).

3.2. Anger

As we had not predicted the direction of the difference between the two groups on measures of anger, 2-tailed paired-sample *t*-tests were conducted (Table 2). Mean scores for the ASD group were significantly higher than for the control group

Table 1
Descriptive statistics and *t*-test results for anxiety.

	ASD		Control		95% CI for mean difference	*t*	*d*
Scale	M	SD	M	SD			
Total anxiety	52.75	10.96	45.87	10.13	3.17–10.60	3.72[b]	0.65
Physiological anxiety	50.19	8.87	43.85	11.37	2.36–10.33	3.20[*]	0.62
Worry	52.37	11.56	47.44	10.23	1.28–8.57	2.71[b]	0.45
Social anxiety	53.83	10.78	47.19	9.71	2.96–10.31	3.62[**]	0.65

$N = 104$; df = 51; *d* = Cohen's *d* (effect size). [*] $p < 0.05$, two-tailed. [**] $p < 0.01$, two-tailed. [a] $p < 0.05$, one-tailed. [b] $p < 0.01$, one-tailed.

on all three anger scales: instrumental anger, reactive anger and total anger. Anger control measures the proactive behaviours that mitigate feelings of anger. The score for anger control is subtracted from the sum of the instrumental anger and reactive anger scales to produce the total anger scale, and is therefore negatively correlated with that scale. There was no significant difference between the two groups on the anger control scale.

Standardised *T*-scores for reactive and instrumental anger within the ASD group were also compared and found to be significantly different. The mean score for reactive anger, as hypothesised, was significantly higher than for instrumental anger, $t(51) = 3.98$, $p < 0.001$, $d = 0.49$.

3.3. Behaviour

All the scores in the adjustment problems section of the student behavior survey were significantly different between the two groups, with the ASD group obtaining higher mean scores on all scales. Four scales were of particular interest in this study: emotional distress, social problems, verbal aggression and physical aggression (Table 3). Teachers perceived more symptoms of emotional distress in the ASD group than in the control group. Social problems, a key feature of autism spectrum disorders, were also rated much higher in the ASD group than in the control group. Both verbal and physical aggression were reported more for the ASD group. However, the analyses and discussions in this paper have been based on physical rather than verbal aggression as the key measure of aggression, as it is physical aggression that is more likely to result in serious disciplinary action such as suspension.

3.4. Relationships between anxiety, anger and behaviour

Pearson product-moment correlation coefficients were calculated between subscales of the anxiety, anger and behaviour measures. Total anger and total anxiety were excluded as their scores are calculated using the subscale scores and do not provide any additional information. We found highly significant relationships between the three anxiety subscale scores and the reactive anger score for both groups (Table 4), as well as between reactive anger and the teacher-report scales for the ASD group. Instrumental anger correlated highly with worry and physiological anxiety for the control group but not for the ASD group, and correlated with social anxiety for the ASD group but not the control group. There were no significant correlations between the teacher-report measures or the self-report measures for the control group. For the ASD group alone, both verbal aggression and physical aggression correlated with the anger scales, including anger control, which showed a negative relationship. Physical aggression, but not verbal aggression, correlated highly with social anxiety for the ASD group.

For the ASD group, worry and reactive anger (but not instrumental anger), as reported by the students themselves, correlated highly with emotional distress as reported by teachers. These children were not only feeling anxious but also seen to be anxious by their teachers. Those who reported higher levels of anger, both instrumental and reactive, were reported by teachers as displaying more challenging behaviours on the verbal aggression and physical aggression scales, demonstrating convergent validity between the measures.

Anger control showed highly significant negative correlations with instrumental anger and reactive anger for the ASD group. Reactive anger correlated strongly with physiological anxiety, with worry, and social anxiety, but only social anxiety showed a significant relationship with instrumental anger.

3.5. Predicting aggression

We conducted a standard multiple regression analysis to identify any significant predictors of physical aggression for the whole sample (Table 5). Each of the three anxiety subscales and three anger subscales were entered, along with ASD (yes/no). A significant model emerged with social anxiety as a significant predictor: $F(7,96) = 3.78$, $p = 0.001$, explaining 15.9% of the variance (adjusted $R^2 = 0.159$). We then removed two "outliers" from the control group (see Section 3.6) and ran the analysis again. Anger control joined social anxiety as a significant predictor: $F(7,94) = 4.96$, $p < 0.001$ (adjusted $R^2 = 0.22$).

Table 2
Descriptive statistics and *t*-test results for anger.

	ASD		Control		95% CI for mean difference	*t*	*d*
Scale	M	SD	M	SD			
Total anger	47.27	9.37	42.60	6.81	1.29–8.05	2.77**	0.50
Instrumental anger	48.06	8.09	44.52	4.74	0.81–6.26	2.61*	0.53
Reactive anger	52.88	10.36	46.65	8.74	2.49–9.98	3.34**	0.60
Anger control	53.60	9.35	56.25	9.97	−6.13 to 0.82	−1.53	0.28

$N = 104$; df = 51; d = Cohen's d (effect size). $^{*}p < 0.05$. $^{**}p < 0.01$.

Table 3
Descriptive statistics and *t*-test results for teacher-reported behaviour.

	ASD		Control		95% CI for mean difference	*t*	*d*
Scale	M	SD	M	SD			
Emotional distress	62.31	13.56	45.02	7.52	12.65–21.92	7.49**	1.58
Social problems	61.04	10.01	43.79	7.38	13.83–20.66	10.15**	1.96
Verbal aggression	52.13	10.83	45.29	7.02	3.39–10.31	3.97**	0.75
Physical aggression	50.29	10.54	46.06	3.45	1.17–7.29	2.77*	0.54

$N = 104$; df = 51; d = Cohen's d (effect size). $^{*}p < 0.05$. $^{**}p < 0.01$.

Table 4
Pearson correlations between anxiety, anger and behaviour subscales.

			AARS			SBS			
			IA	RA	AC	Emotional distress	Social problems	Verbal aggression	Physical aggression
RCMAS	PHY	Control	0.47**	0.62**	−0.20	0.02	.03	−.00	.13
		ASD	0.19	0.43**	−0.05	0.25	.19	.18	.21
	WOR	Control	0.36**	0.49**	−0.00	−0.02	.08	.02	−.03
		ASD	0.08	0.36**	0.06	0.40**	.18	.08	.14
	SOC	Control	0.25	0.42**	−0.11	0.13	.17	.07	.00
		ASD	0.32*	0.42**	−0.07	0.28*	.29*	.24	.36**
AARS	IA	Control		0.56**	−0.26	0.09	.00	.04	.19
		ASD		0.58**	−0.37**	0.03	.20	.31*	.32*
	RA	Control			−0.12	0.04	−.12	.01	−.08
		ASD			−0.39**	0.40**	.29*	.44**	.40**
	AC	Control				0.03	.01	−.04	.15
		ASD				−0.07	−.21	−.44**	−.37**

PHY = physiological anxiety; WOR = worry; SOC = social anxiety; IA = instrumental anger; RA = reactive anger; AC = anger control. $^{*}p < 0.05$. $^{**}p < 0.01$.

Table 5
Variables predicting physical aggression.

Group	Variable	*B*	SE B	β
Whole group[a]	Social anxiety	0.24	0.11	0.31*
Excluding outliers[b]	Social anxiety	0.24	0.10	0.33*
	Anger control	−0.16	0.08	−0.19

[a] $N = 104$. [b] $N = 102$. $^{*}p = 0.05$. $^{**}p < 0.01$.

3.6. Scatterplots

3.6.1. Social anxiety and physical aggression

We examined the relationship between social anxiety, physical aggression and autism. The scatterplot revealed strikingly different patterns of relationship between anxiety and aggression for the two groups, with little apparent effect of anxiety on aggression for the control group, but the suggestion of a significant effect for the ASD group (Fig. 1).

The apparent interaction in Fig. 1 implies that, rather than being mediated by social anxiety as we had hypothesised, ASD was moderating the relationship between anxiety and aggression. To test this post-hoc hypothesis, we conducted a univariate analysis of variance, bootstrapped (IBM Corporation, 1989; IBM Corporation, 1989) with 1000 resamples and centred means. Firstly, we examined the main effects of ASD and social anxiety then added the interaction term to the model. There were statistically significant effects for social anxiety ($F(1100) = 5.94$, $p = 0.02$, partial $\eta^2 = 0.06$) and – most interestingly – for the interaction ($F(1100) = 5.85$, $p = 0.02$, partial $\eta^2 = 0.06$). These results suggest that social anxiety moderates the relationship between ASD and physical aggression. There appears to be a fundamental difference between the two groups. While social anxiety predicts an increase in physical aggression for the ASD group, it has no apparent effect on the observed values of the control group, who engage in very low levels of physical aggression even at high levels of anxiety.

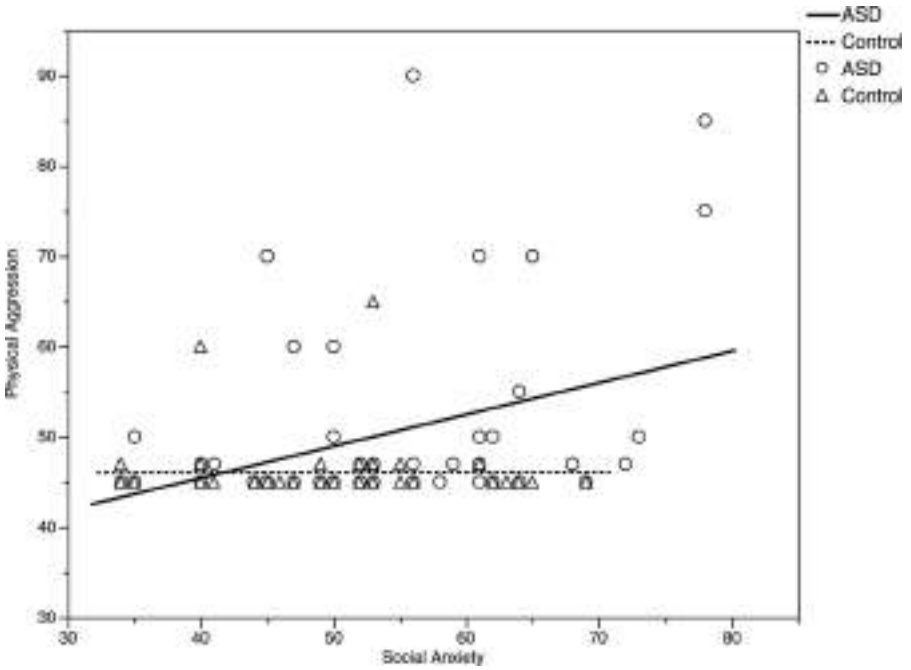

Fig. 1. Physical aggression *T* scores as a function of social anxiety *T* scores for the ASD and control groups showing lines of best fit and individual cases (represented by circles and triangles).

Further support for the differential relationship between social anxiety and physical aggression for ASD and controls comes from calculating Pearson's product-moment correlation between the former two, separately for each group. Linear correlation was significant for ASD ($r = 0.36$, $p < 0.01$) but *not* for controls (negligible $r = -0.02$, $p = 0.85$). Similar results were obtained with Spearman's rank order correlation. We compared the regression coefficients of social anxiety predicting

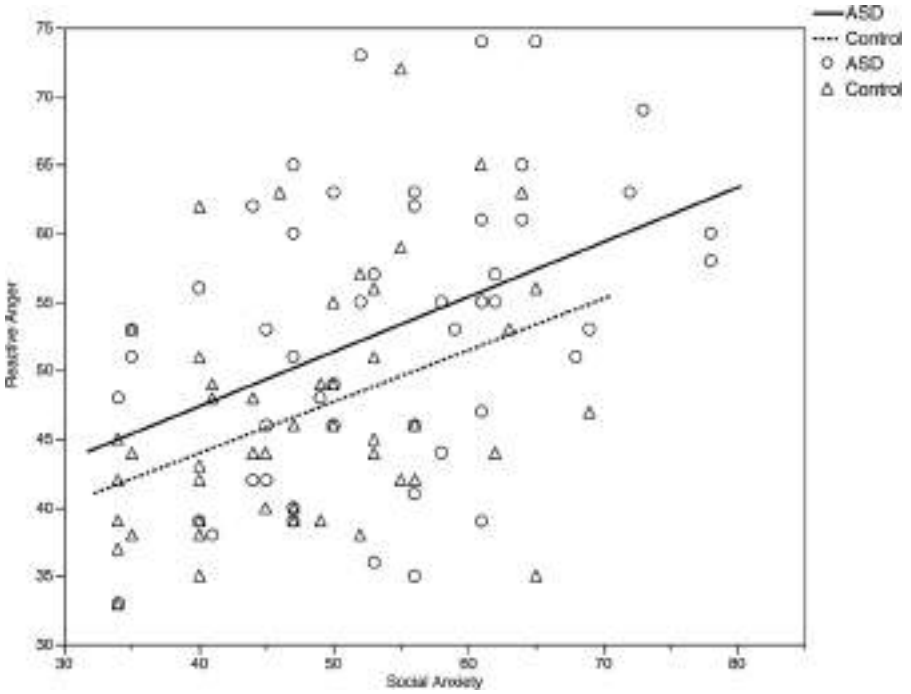

Fig. 2. Reactive anger *T* scores as a function of social anxiety *T* scores for the ASD and control groups showing lines of best fit and individual cases (represented by circles and triangles).

physical aggression for the two groups and found that social anxiety is a significantly stronger predictor of physical aggression for the ASD group than for the control group. $t(51) = 2.72$, $p = 0.01$, $d = 0.78$.

All but two of the control group members fitted the regression line well. When we examined the raw data, we found that the two outliers were 13-year-old boys from different schools whose scores were relatively high on physical aggression, relatively low on both social anxiety and reactive anger, and high on anger control. The scores of these individuals were also low on instrumental anger. These two cases were qualitatively and well as quantitatively different from the rest of their cohort; yet, discarding them and repeating the same analyses had not altered the overall results.

3.6.2. Social anxiety and reactive anger

The ASD group and control group clearly differed on the scatterplot of anxiety and aggression. The relationships between reactive anger and social anxiety for the two groups, however, were very similar and highly significant, suggesting that social anxiety was mediating the relationship between ASD and reactive anger (Fig. 2). These were within-subjects measures and therefore may violate assumptions of independence in regression, so further analysis was not pursued. Nevertheless, the data provide evidence of the positive relationship between social anxiety and reactive anger for all participants, and the differences between students with and without ASDs.

When physical aggression was plotted against reactive anger rather than anxiety, the moderating effect of autism again became apparent. This plot is not shown but closely resembles Fig. 1. Particularly notable was the spread of high scores on physical aggression at high levels of anger for the ASD group.

3.6.3. Anger control and physical aggression

Lastly, we examined the patterns when anger control was included, plotted against physical aggression. Interaction with ASD was apparent, with little difference between the ASD group and the control group at high levels of anger control (resulting in low levels of aggression and anger), but a large difference at lower levels of anger control (Fig. 3). Again, the two control group outliers stood out from the rest.

The analysis conducted in Section 3.5 showed that anger control was a significant predictor when the data from two control participants were excluded. By again removing these data, a significant moderation model was obtained. In the first step of the hierarchical multiple regression analysis, two variables were included: anger control and ASD. These variables accounted for a significant amount of variance in physical aggression, $R^2 = 0.13$, $F(2,99) = 9.12$, $p < 0.001$. The interaction term between anger control and ASD was then added to the regression model, and accounted for significantly more of the variance in physical aggression, $\Delta R^2 = 0.07$, $\Delta F(1,98) = 59.25$, $p = 0.005$, $b = 0.42$, $t(98) = 2.13$, $p = 0.04$, $d = 0.43$. As anger control increased in the ASD group, physical aggression decreased. ASD students with low or average levels of anger control were more aggressive than the control group students but, with high anger control, physical aggression was low for both groups.

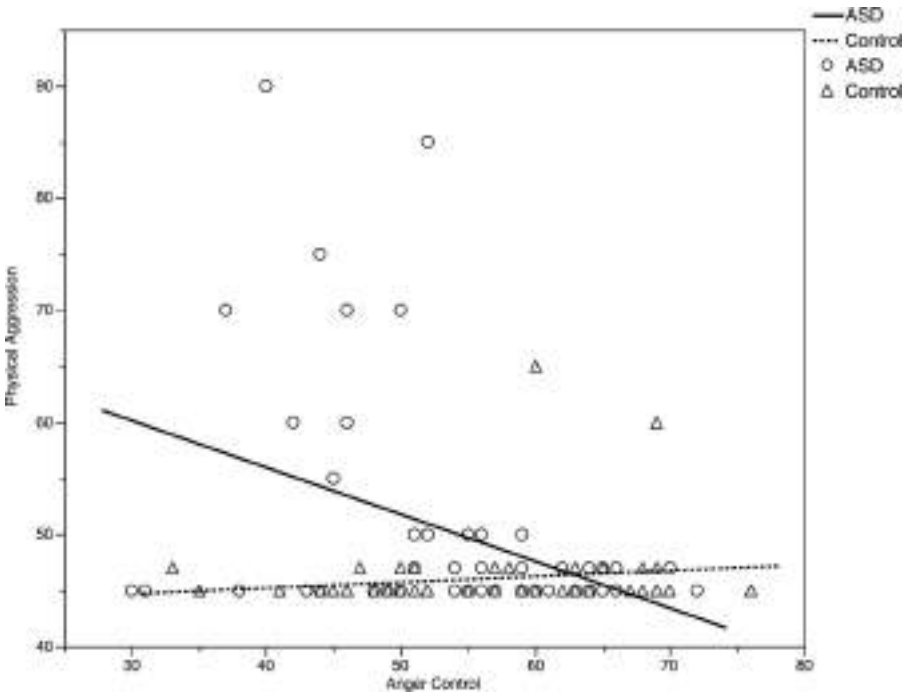

Fig. 3. Physical aggression *T* scores as a function of anger control *T* scores for the ASD and control groups showing lines of best fit and individual cases (represented by circles and triangles).

3.7. Suspension

Frequency data from both students and teachers relating to suspension and to other incidents that did not result in suspension were converted to yes/no scores. A Pearson's chi-square test of independence was performed to examine the relationship between autism and suspension and the odds ratio calculated. The relationship between the presence of an autism spectrum disorder and being suspended was significant, X^2 (1, N = 89) = 5.62, p = 0.02, ϕ = 0.25. Based on the student self-reports, students with autism were 3.67 times more likely to be suspended than their typically developing peers. Although teachers reported fewer overall suspensions than students, they still identified a higher rate of suspensions for students with autism than for their peers (2.54 times more likely), but the effect was not significant, X^2 (1, N = 104) = 1.77, p = 0.18, ϕ = 0.13.

3.8. Medication

Of the 52 control group participants, 51 were not prescribed any medication for anxiety and one was not sure. Seven of the ASD group were not sure: three of those reported that they were prescribed methylphenidate (usually prescribed for attention deficit/hyperactivity disorder) and the remaining four did not provide any additional information. Of the 19 who answered yes to anxiety medication, three were prescribed methylphenidate only, and sixteen were prescribed one or more of the following classes of medication: antidepressants (SSRIs and SNRIs), atypical antipsychotics, clonidine, or methylphenidate. As all these medications can help with anxiety, we scored all those who reported being prescribed any one or more of them, including methylphenidate, as "yes" responses. As no control group participants were prescribed medications (apart from the one who was not sure), we compared the mean social anxiety scores for the ASD group. There was a significant difference in the mean anxiety scores between those that answered "yes" (M = 52.53, SD = 9.72), "no" (M = 52.39, SD = 10.06) and "not sure" (M = 62.71, SD = 13.29). Those who were not sure had by far the highest scores, $F(2,49)$ = 2.96, p = 0.03, partial η^2 = 0.11. There was no significant difference between those that answered yes or no $t(43)$ = 0.05, p = 0.48, d = 0.02.

4. Discussion

4.1. Hypotheses

In accordance with our first hypothesis, students with autism spectrum disorders reported significantly more symptoms of anxiety and feelings of anger than their typically developing peers and their teachers reported more behavioural issues and symptoms of distress in the students.

Our second hypothesis, that anxiety and aggressive behaviours would be positively related, was partially supported by the data. For the ASD group, only social anxiety showed a strong relationship with physical aggression. This result is consistent with the findings of Pugliese, White, White, and Ollendick (2013) and White et al. (2012). None of the anxiety measures was significantly related to verbal aggression. For the control group, no anxiety measures were associated with verbal or physical aggression.

For our third hypothesis, we predicted that there would be a relationship between reactive anger and physical aggression for the ASD students, but not between instrumental anger and physical aggression. The results indicate that this relationship exists for both types of anger, but the relationship is significantly stronger for reactive anger. This suggests that, when children with autism spectrum disorders engage in acts of verbal or physical aggression, we should first suspect reactive anger rather than instrumental anger as the precursive emotion. Stressors can be cumulative and the actual trigger for the incident may be seen as trivial or even non-existent. This can lead to the assumption that there is no reasonable explanation for the behaviour and disciplinary action is taken, when in fact the precipitant may have been some trivial remark or interruption to routine that was just enough to tip the student's anxiety to an intolerable level, resulting in the outburst of rage (Attwood, 2007).

Anger control was negatively correlated with verbal aggression and physical aggression for the ASD group. This suggests a causal relationship, with those students who are able to exercise anger control skills being less likely to engage in aggressive behaviours. This may be because they are able to use strategies to control their anger, but the data also suggest the possibility that students who have higher anger control experience lower levels of anger. Insufficient skills may lead to more frustration, thus fostering feelings of anger. Although this post-hoc hypothesis was supported by subsequent analysis, it does not explain the mechanism by which this occurs. It may be that the similarities in the neurobiology of autism, anxiety and aggressive behaviour result in the increased predisposition to aggression for students with autism disorders (Kim & Gorman, 2005; Siever, 2008). Alternatively, there may be an environmental or social explanation, whereby those with autism disorders have not had the same opportunities to develop pro-social anger control skills and thus, when high levels of social anxiety lead to high levels of reactive anger, low levels of anger control result in increased physical aggression. We cannot discount the possibility that the nature or relentlessness of the incidents leading up to the expression of anger as aggression are more severe for the ASD group and that the response is less disproportionate that it may seem at face value.

Our final and key hypothesis, that aggression in adolescents with autism can be explained by social anxiety, was partially supported by the data. We performed mediation and moderation analyses (Hayes, 2013), using multiple regression

techniques to explore the relationships between our main dependent variable, physical aggression, and the significant predictor variables. Anxiety did not explain physical aggression for the group of students as a whole, as we expected, as the control students without autism in our study generally did not engage in physical aggression even at higher levels of anxiety. For the ASD students, however, there was a clear and positive relationship: higher levels of anxiety were associated with higher levels of physical aggression. With respect to the incidence of physical aggression, and thereby suspension, anxiety has a far greater impact on students with ASD than for their peers. The association between instrumental anger and aggression is suggestive of a more complicated relationship, as is the finding that control group students high on social anxiety or reactive anger engage in fewer incidents of physical aggression. There seems to be something associated with autism that increases the likelihood of anger being expressed as aggressive behaviour that cannot be explained by anxiety alone. Whatever the reason, be it biological, cognitive or environmental, the results of this study may help in devising programs that better fit the needs of this group of children. Effective interventions should minimise difference in aggression or suspension statistics for students with autism compared to their peers. The results of this study suggest that intervention should occur at two early stages, one to identify and manage anxiety and another to develop proactive anger management skills. Intervention at the endpoint, by punishing aggression with suspension, may not address the special needs of students with ASD.

4.2. Further research

Prospective participants were given information statements and invited to volunteer for the study. We had a pleasingly high volunteer rate by students with ASDs, possibly due to its personal relevance. Recruitment of the control group was very difficult, and those who were motivated to participate in the research may not have been particularly representative of the population. The mean scores for the control group on anxiety, anger and adjustment problems were all somewhat below the standardised means and test norms. True random sampling in a natural setting is difficult to obtain with vulnerable groups such as children.

This study collected data from the students and their teachers only, and did not include parents or caregivers. This was intentional when the study was designed, as the focus was on the feelings and experiences of these children at school, not at home, but future research can complement the picture by including all three perspectives. Including the parents would have also given the opportunity to obtain better quality information about prescription medication. The design initially allowed two teachers to provide information for each child, but this pre-requisite was soon reduced to one when it became apparent that recruitment of teachers was more problematic than recruiting the students.

The results of the current study suggest that higher levels of aggression as reported by teachers are related to higher levels of suspensions reported by the students. However, information was not collected on the grounds for suspension so, although the data indicate that students with autism are more likely to be suspended than their typically developing peers, we do not know the underlying reasons. We cannot conclude from the data that suspension was due to aggression or to other factors, nor do we know whether there was a difference between the two groups in the nature or severity of the behaviours that led to suspension. Further research is required to explore these issues in more detail.

Lastly, no information was collected from students or school staff about the programs and resources they have provided for students with autism or their effectiveness. Level of support varies and seems to be highly dependent on a key member of staff having a special interest in the needs of this group of students.

5. Conclusion

Students with autism attending mainstream schools experience higher levels of anxiety, anger and aggression than their typically developing peers, and they are more likely to be suspended from school. The current study suggests that aggression in students with autism can be partially explained by social anxiety but, at similar levels of anxiety or anger, students with autism engage in more frequent teacher-reported aggression than their peers. The explanation for this anomaly may lie in the students' ability to manage the feelings of anger that arise from their anxiety. While there was no significant difference overall between students with autism and their typically developing peers on self-reported measures of anger control, low and average anger control in the ASD group were associated with higher levels of aggression while both ASD and typically developing students with high anger control displayed little physical aggression. Based on these findings, we suggest a two-part approach to managing aggression in students with autism. Firstly, we recommend that students with ASDs be screened for anxiety, even when anxiety has not been previously suspected. Those who exhibit symptoms of anxiety should be provided with appropriate treatment and environmental support. Secondly, students with ASDs should be provided the opportunity to learn and to practise anger control skills, giving them greater ability to regulate their emotions and behaviour, and improving their experiences and outcomes in mainstream schools.

References

Amaral, D., Bauman, M., & Schumann, C. (2003). The amygdala and autism: implications from non-human primate studies. *Genes, Brain & Behavior 2*(5), 295–302. http://dx.doi.org/10.1034/j.1601-183X.2003.00043.x.

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders*, 4th ed. Washington, D.C: American Psychiatric Association (text revision (DSM-IV-TR)) Author.
American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders*, 5th ed. Washington, D.C: American Psychiatric Association Author.
American Psychological Association (2008). Are zero tolerance policies effective in the schools? An evidentiary review and recommendations. *American Psychologist*, *63*, 852–862. http://dx.doi.org/10.1037/0003-066X.63.9.852.
Ashburner, J., Ziviani, J., & Rodger, S. (2010). Surviving in the mainstream: capacity of children with autism spectrum disorders to perform academically and regulate their emotions and behavior at school. *Research in Autism Spectrum Disorders 4*(1), 18–27. http://dx.doi.org/10.1016/j.rasd.2009.07.002.
Attwood, T. (2007). *The complete guide to Asperger's syndrome*. London: Jessica Kingsley.
Australian Bureau of Statistics. (2011). Autism in Australia, 2009 (No. 4428.0). http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4428.0main+features62009.
Barnard, J., Prior, A., & Potter, D. (2000). *Inclusion and autism: is it working?* London: The National Autistic Society.
Baron-Cohen, S. (1995). *Mindblindness: an essay on autism and theory of mind*. Cambridge, MA, US: The MIT Press.
Birger, M., Swartz, M., Cohen, D., Alesh, Y., Grishpan, C., & Kotelr, M. (2003). Aggression: the testosterone-serotonin link. *Israel Medical Association Journal*, *5*(9), 653–658.
Bjorkly, S. (2009). Risk and dynamics of violence in Asperger's syndrome: a systematic review of the literature. *Aggression and Violent Behavior 14*(5), 306–312. http://dx.doi.org/10.1016/j.avb.2009.04.003.
Blair, R. J. R. (2010). Psychopathy, frustration, and reactive aggression: the role of ventromedial prefrontal cortex. *British Journal of Psychology*, *101*(3), 383–399. http://dx.doi.org/10.1348/000712609X418480.
Blumberg, S.J., Bramlett, M.D., Kogan, M.D., Schieve, L.A., Jones, J.R., & Lu, M.C. (2013). Changes in prevalence of parent-reported autism spectrum disorder in school-aged U.S. children: 2007 to 2011–2012. National Health Statistics Reports, No 65.
Burney, D. M. (2001). *Adolescent anger rating scale (AARS): professional manual*. Odessa, FL: Psychological Assessment Resources.
Chalfant, A. M., Rapee, R., & Carroll, L. (2007). Treating anxiety disorders in children with high functioning autism spectrum disorders: a controlled trial. *Journal of Autism and Developmental Disorders*, *37*(10), 1842–1857.
Davis, T. E. III, Moree, B. N., Dempsey, T., Reuther, E. T., Fodstad, J. C., & Hess, J. A., et al., (2011). The relationship between autism spectrum disorders and anxiety: the moderating effect of communication. *Research in Autism Spectrum Disorders 5*(1), 324–329. http://dx.doi.org/10.1016/j.rasd.2010.04.015.
DeWall, C. N., Buckner, J. D., Lambert, N. M., Cohen, A. S., & Fincham, F. D. (2010). Bracing for the worst, but behaving the best: social anxiety, hostility, and behavioral aggression. *Journal of Anxiety Disorders*, *24*(2), 260–268. http://dx.doi.org/10.1016/j.janxdis.2009.12.002.
Eigsti, I.-M., & Shapiro, T. (2003). A systems neuroscience approach to autism: biological, cognitive, and clinical perspectives. *Mental Retardation and Developmental Disabilities Research Reviews 9*(3), 205–215. http://dx.doi.org/10.1002/mrdd.10081.
Farrugia, S., & Hudson, J. (2006). Anxiety in adolescents with asperger syndrome: negative thoughts, behavioral problems, and life interference. *Focus on Autism and Other Developmental Disabilities*, *21*(1), 25–35. http://dx.doi.org/10.1177/10883576060210010401.
Gardner, F. L., & Moore, Z. E. (2008). Understanding clinical anger and violence the anger avoidance model. *Behaviour Modification*, *32*(6), 897–912. http://dx.doi.org/10.1177/0145445508319282.
Ghaziuddin, M. (2002). Asperger syndrome: associated psychiatric and medical conditions. *Focus on Autism and Other Developmental Disabilities 17*(3), 138–144. http://dx.doi.org/10.1177/10883576020170030301.
Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: a regression-based approach*. New York: Guilford Press.
IBM Corporation. (1989, 2011). IBM SPSS Bootstrapping 20: Author.
Jahoda, A., Willner, P., Pert, C., & MacMahon, K.M.A. (2013). From causes of aggression to interventions: the importance of context. 44, 69–104 pp.
Kanne, S. M., & Mazurek, M. O. (2011). Aggression in children and adolescents with ASD: prevalence and risk factors. *Journal of Autism and Developmental Disorders 41*(7), 926–937. http://dx.doi.org/10.1007/s10803-010-1118-4.
Kerns, C. M., & Kendall, P. C. (2012). The presentation and classification of anxiety in autism spectrum disorder. *Clinical Psychology: Science and Practice*, *19*(4), 323–347. http://dx.doi.org/10.1111/cpsp.12009.
Kim, J., & Gorman, J. (2005). The psychobiology of anxiety. *Clinical Neuroscience Research 4*(5–6), 335–347. http://dx.doi.org/10.1016/j.cnr.2005.03.008.
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. http://dx.doi.org/10.1177/1362361300004002002.
Kuusikko, S., Pollock-Wurman, R., Jussila, K., Carter, A., Mattila, M.-L., & Ebeling, et al., (2008). Social anxiety in high-functioning children and adolescents with autism and Asperger syndrome. *Journal of Autism and Developmental Disorders*, *38*(9), 1697–1709. http://dx.doi.org/10.1007/s10803-008-0555-9.
Lachar, D., Wingenfeld, S. A., Kline, R. B., & Gruber, C. P. (2000). *Student behavior survey (SBS)*. Los Angeles: Western Psychological Services.
Lecavalier, L. (2006). Behavioral and emotional problems in young people with pervasive developmental disorders: relative prevalence, effects of subject characteristics, and empirical classification. *Journal of Autism and Developmental Disorders 36*(8), 1101–1114. http://dx.doi.org/10.1007/s10803-006-0147-5.
Levitan, G. W., & Reiss, S. (1983). Generality of diagnostic overshadowing across disciplines. *Applied Research in Mental Retardation 4*(1), 59–64. http://dx.doi.org/10.1016/S0270-3092%2883%2980018-6.
MacDermott, S., Williams, K., Ridley, G., Glasson, E., & Wray, J. (2007). The prevalence of sutism in Australia: can it be established from existing data? Australian Advisory Board on Autism Spectrum Disorders.
MacNeil, B. M., Lopes, V. A., & Minnes, P. M. (2009). Anxiety in children and adolescents with autism spectrum disorders. *Research in Autism Spectrum Disorders 3*(1), 1–21. http://dx.doi.org/10.1016/j.rasd.2008.06.001.
Mason, J., & Scior, K. (2004). 'Diagnostic overshadowing' amongst clinicians working with people with intellectual disabilities in the UK. *Journal of Applied Research in Intellectual Disabilities 17*(2), 85–90. http://dx.doi.org/10.1111/j.1360-2322.2004.00184.x.
Matson, J. (2009). Aggression and tantrums in children with autism: a review of behavioral treatments and maintaining variables. *Journal of Mental Health Research in Intellectual Disabilities 2*(3), 169–187. http://dx.doi.org/10.1080/19315860902725875.
Mazefsky, C. A., Herrington, J., Siegel, M., Scarpa, A., Maddox, B. B., Scahill, L., & White, S. W. (2013). The role of emotion regulation in autism spectrum disorder. *Journal of the American Academy of Child & Adolescent Psychiatry 52*(7), 679–688. http://dx.doi.org/10.1016/j.jaac.2013.05.006.
Mazefsky, C. A., Kao, J., & Oswald, D. P. (2011). Preliminary evidence suggesting caution in the use of psychiatric self-report measures with adolescents with high-functioning autism spectrum disorders. *Research in Autism Spectrum Disorders*, *5*(1), 164–174.
McKinnie Burney, D., & Kromrey, J. (2001). Initial development and score validation of the adolescent anger rating scale. *Educational and Psychological Measurement 61*(3), 446–460. http://dx.doi.org/10.1177/00131640121971310.
Muris, P., Steerneman, P., Merckelbach, H., Holdrinet, I., & Meesters, C. (1998). Comorbid anxiety symptoms in children with pervasive developmental disorders. *Journal of Anxiety Disorders 12*(4), 387–393. http://dx.doi.org/10.1016/S0887-6185%2898%2900022-X.
New South Wales Department of Education and Training. (2003). Disability criteria (school sector). Retrieved from http://www.schools.nsw.edu.au/media/downloads/schoolsweb/studentsupport/programs/disabilitypgrms/disabcriteria.doc.
New South Wales Department of School Education Student Welfare Directorate. (1996). Student welfare, good discipline and effective learning: Student Welfare Policy. Retrieved from https://http://www.det.nsw.edu.au/policies/student_serv/student_welfare/stude_welf/pd02_52_student_welfare.pdf.
New South Wales Parliament, Legislative Council, General purpose standing committee no. 2. (2010). The provision of education to students with a disability or special needs. (Report no. 34). Retrieved from http://www.parliament.nsw.gov.au/prod/parlment/committee.nsf.
New South Wales Government. (2010). Inquiry into the provision of education for students with a disability or special needs. Submission No. 715. March 2010.

New South Wales Parliament, Legislative Council, Standing Committee on Social Issues. (2012). Transition support for students with additional or complex needs and their families. (Report No. 45). Sydney, NSW: Retrieved from http://www.parliament.nsw.gov.au/Prod/parlment/committee.nsf/0/84e7c8334c95d7a5ca2579b90015e32d/$FILE/120306.Finalreport.pdf.

Newman, S. S., & Ghaziuddin, M. (2008). Violent crime in Asperger syndrome: the role of psychiatric comorbidity. *Journal of Autism Developmental Disorders 38*(10), 1848–1852. http://dx.doi.org/10.1007/s10803-008-0580-8.

Niditch, L. A., Varela, R., Kamps, J. L., & Hill, T. (2012). Exploring the association between cognitive functioning and anxiety in children with autism spectrum disorders: The role of social understanding and aggression. *Journal of Clinical Child and Adolescent Psychology 41*(2), 127–137. http://dx.doi.org/10.1080/15374416.2012.651994.

Ontario Human Rights Commission. (2003). The Ontario Safe Schools Act: School discipline and discrimination. Report. July 2003. Downloaded from http://www.ohrc.on.ca/en/ontario-safe-schools-act-school-discipline-and-discrimination.

Pugliese, C. E., White, B. A., White, S. W., & Ollendick, T. H. (2013). Social anxiety predicts aggression in children with ASD: clinical comparisons with socially anxious and oppositional youth. *Journal of Autism and Developmental Disorders 43*(5), 1205–1213. http://dx.doi.org/10.1007/s10803-012-1666-x.

Reif, A., Rösler, M., Freitag, C. M., Schneider, M., Eujen, A., Kissling, C., & Retz, W. (2007). Nature and nurture predispose to violent behavior: serotonergic genes and adverse childhood environment. *Neuropsychopharmacology*, *32*(11), 2375–2383. http://dx.doi.org/10.1038/sj.npp.1301359.

Reynolds, C. R., & Richmond, B. O. (2008). *Revised children's manifest anxiety scale: 2nd ed. (RCMAS-2): manual*. Los Angeles: Western Psychological Services.

Roth, L. (2013). Autism spectrum disorder: briefing paper. (5/2013). NSW Parliamentary Research Service Retrieved from http://www.autismadvisoryboard.org.au/uploads/pdfs/PrevalenceReport.pdf.

Siever, L. J. (2008). Neurobiology of aggression and violence. *The American Journal of Psychiatry 165*(4), 429–442. http://dx.doi.org/10.1176/appi.ajp.2008.07111774.

Tsai, L. Y. (2006). Diagnosis and treatment of anxiety disorders in individuals with autism spectrum disorder. In J. G. M. G. Baron, G. Groden, & L. P. Lipsitt (Eds.), *Stress and coping in autism* (pp. 388–440). New York: Oxford University Press.

U.S. Department of Education. (2014). Guiding principles: a resource guide for improving school climate and discipline. Washington, D.C., Downloaded from http://www2 ed.gov/policy/gen/guid/school-discipline/guiding-principles.pdf.

van Steensel, F. J., Bogels, S. M., & Perrin, S. (2011). Anxiety disorders in children and adolescents with Autistic spectrum disorders: a meta-analysis. *Clinical Child and Family Psychology Review 14*(3), 302–317. http://dx.doi.org/10.1007/s10567-011-0097-0.

Whitaker, P. (2007). Provision for youngsters with autistic spectrum disorders in mainstream schools: what parents say—and what parents want. *British Journal of Special Education*, *34*(3), 170–178. http://dx.doi.org/10.1111/j. 1467-8578.2007.00473.x.

White, S. W., Kreiser, N. L., Pugliese, C., & Scarpa, A. (2012). Social anxiety mediates the effect of autism spectrum disorder characteristics on hostility in young adults. *Autism 16*(5), 453–464. http://dx.doi.org/10.1177/1362361311431951.

White, S. W., Oswald, D., Ollendick, T., & Scahill, L. (2009). Anxiety in children and adolescents with autism spectrum disorders. *Clinical Psychology Review 29*(3), 216–229. http://dx.doi.org/10.1016/j.cpr.2009.01.003.