

A REVIEW OF CO-MORBID DISORDERS OF ASPERGER'S DISORDER AND THE TRANSITION TO ADULTHOOD

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This review includes empirical peer-reviewed articles which support the examination of Asperger's Disorder and co-morbid disorders, as well as an analysis of how adolescents with Asperger's Disorder transition to adulthood. Although the focus was on Asperger's Disorder, some studies include Autism Spectrum Disorder samples. It was found that people with Asperger's Disorder generally experience more anxiety than control groups. Rates of non-verbal learning disabilities did not differ significantly from control groups, however it remained unknown if rates of specific learning disabilities differ. The transition to adulthood focused on education, employment, living arrangements, and relationships. The findings revealed that people with Asperger's may have more difficulty in the transition to adulthood, however they were capable of achieving high educational levels, employment, independent living, and successful relationships. It was suggested that anxiety treatments and social skills training be further incorporated into counselling programs, and that future research examine gender differences in the diagnosis, treatment, and prognosis of Asperger's Disorder.

According to the American Psychiatric Association (DSM-IV-TR, 2000), Asperger's Disorder is a Pervasive Developmental Disorder that is characterized by significantly impaired social development, obsessive-compulsive-like behaviours, and typically developing language and self-advocacy skills. It is diagnosed more often in males than females, and is similar to Autistic Disorder; the main difference between the two disorders is that Asperger's Disorder does not feature the early childhood delays that are necessary to diagnose Autistic Disorder, and the prognosis of Asperger's Disorder is generally seen to be more positive (DSM-IV-TR, 2000).

Approximately 10 in 10,000 people meet the criteria for Asperger's Disorder (Fombonne, Zakarian, Bennett, Meng, & McLean-Heywood, 2006). Considering these numbers, approximately 3,300 Canadians are affected by Asperger's Disorder (Fombonne et al., 2006). This disorder has also been seen to have higher than average co-morbidity with several other disorders, including but not limited to a variety of anxiety disorders, ADHD, tic disorders, mood disorders, and learning disabilities (DSM-IV-TR, 2000; Klin, Volkmar, Sparrow, Dichetti, & Rourke, 1995; Mattila et al., 2010). Despite these studies, others debate the findings, and some even show that people with Asperger's Disorder are less likely to develop these disorders than the normative sample (Chen, Planche, & Lemonnier, 2010; Ryburn, Anderson, & Wales, 2009). It is important to investigate these possible links to ensure that if there are in fact higher percentages of co-morbid disorders, they are in fact co-morbid disorders and not an aspect of Asperger's Disorder that has been overlooked previously. In doing this, we can ensure that children and adults with Asperger's Disorder receive the best possible treatments and programs to help their specific needs.

Some researchers have argued that Asperger's Disorder is not a separate disorder from Autistic Disorder, but rather a subtype of the disorder (Firth, 2004). For this, and other reasons, many studies group Asperger's Disorder, Autistic Disorder, and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) into one study. Other studies use High Functioning Autistic (HFA) samples, which will refer to a diagnosis of an Autism Spectrum Disorder along side having average to above average IQ.

Although these studies often relay the percentage of the sample with Asperger's Disorder, they do not always separate the groups for analysis. The focus of this paper will remain on Asperger's Disorder, however some studies used in this paper will involve subjects with Autism Spectrum Disorders or HFA, which both tend to include all three disorders.

The purpose of this paper is to examine issues that affect the Asperger's population. To begin, the prevalence of anxiety disorders will be examined in comparison to those of the normative population across the lifespan. Similarly, the prevalence of a variety of learning disabilities will be explored. Lastly, issues specific to transitioning to adulthood will be investigated, such as level of education, living conditions, work options, and relationships. Throughout the paper there will be an ongoing conversation of current accommodations and community services, as well as current services that have literature support.

Co-morbid Anxiety Disorders and Asperger's Disorder

Several recent studies have assessed anxiety levels of children and adults with Asperger's Disorder (Bellini, 2006; Hess, Matson, & Dixon, 2010; Russell & Sofronoff, 2005; Ruta, Mugno, D'Arrigo, Vitiello, & Mazzone, 2010; White & Roberson-Nay, 2009). If anxiety is a part of Asperger's Disorder, anxiety treatment should be provided alongside general Asperger's treatments; however, if anxiety were only a co-morbid issue for some patients with Asperger's Disorder, it would be economically feasible to offer anxiety treatment specifically for those who require it. It is important to understand whether anxiety of those with Asperger's Disorder would benefit from treatment for anxiety.

There are many specific types of anxiety that could be co-morbid with Asperger's Disorder (DSM-IV-TR, 2000). Many researchers have assessed anxiety levels in children and adults diagnosed with Asperger's Disorder but not formally diagnosed with an anxiety disorder (Hess et al., 2010; Russell & Sofronoff, 2005). For the purposes of this paper, undiagnosed anxiety will be considered non-disordered anxiety; due to this distinction, non-disordered anxiety will be discussed first, followed by sections devoted to three specific anxiety disorders: Generalized Anxiety Disorder, Social Anxiety Disorder, and Obsessive Compulsive Disorder. Lastly, gender and age will be investigated in their relationship to the anxiety levels of people with Asperger's Disorder.

Non-Disordered Anxiety

Children with Asperger's Disorder appear to show higher levels of anxiety than the normative population, even when they are not diagnosed with an anxiety disorder (Hess et al., 2010; Russell & Sofronoff, 2005). Russell and Sofronoff (2005) asked 65 children with Asperger's Disorder (85% male) and their parents to complete questionnaires to evaluate their Asperger's Disorder diagnosis and levels of anxiety. Child responses on the Spence Children's Anxiety Scale (SCAS) were compared to previously collected scores of children without Asperger's Disorder or a diagnosed anxiety disorder, as well as a subgroup of children previously diagnosed with Social Anxiety Disorder. The researchers found that children in the Asperger's group had significantly higher anxiety scores than did the normative sample; however, these scores did not differ significantly from those with Social Anxiety Disorder. It also found that the parent ratings for the Asperger's group were significantly higher than those of the clinically anxious group.

Similarly, Hess et al. (2010) used the Autism Spectrum Disorders – Comorbid for Children (ASD-CC) to assess psychiatric symptoms in children with Autism Spectrum Disorders as well as the normative population. The sample ranged in age from 4 to 16 years, and all children had an IQ over 70. The parent rated questionnaires showed that the Autism Spectrum Disorder sample demonstrated significantly more depressive, anxious, and repetitive behaviour symptoms compared to the normative sample.

White and Roberson-Nay (2009) also looked at children, aged 8 to 14, with Autism Spectrum Disorders, but not diagnosed with an anxiety disorder. A total of 75% of the sample were diagnosed with Asperger's Disorder, and 18 of the 20 subjects were male. Both children and their parents answered self-report measures, including the Multidimensional Anxiety Scale for Children (MASC). The researchers found that 25% of their sample was above the clinical cut off scores for one or more anxiety disorders, even though these youth were not formally diagnosed with an anxiety disorder.

Generalized Anxiety Disorder

Gadow, DeVincent, Pomery, and Azizian (2004) used the Early Childhood Inventory-4 (ECI-4) to compare 172 young children with Autism Spectrum Disorders (79% male) to groups of 135 outpatient

clinical children (73% male), 507 typically developing children (52% male), and 64 special education children (77% male). A combination of parent report measures and clinician evaluations found that 2.32% of the Autism Spectrum sample met DSM-IV criteria for Generalized Anxiety Disorder, and the severity of Generalized Anxiety Disorder symptoms were significantly greater than the symptom severity for the typically developing sample. Too few subjects met the criteria for Generalized Anxiety Disorder to test for significant differences between the four groups. It should be noted that this sample ranged in age from 3 to 5 years, and that the number of children diagnosed with Asperger's Disorder only made up 14% of the Autism Spectrum sample, while children with PDD-NOS made up 53% of the participants.

Green, Gilchrist, Burton, and Cox (2000) also assessed co-morbid disorders, although they used a sample of 20 adolescents with Asperger's Disorder (100% male) with a minimum full scale IQ (FIQ) of 70. The researchers used a modified version of the Isle of Wight Semi-structured Informant and Child Interviews to diagnosis the adolescents and used ICD-10 criteria; it was found that 35% of participants met criteria for Generalized Anxiety Disorder. These rates were not compared to a normative sample.

Obsessive Compulsive Disorder

Gadow et al.'s (2004) previously mentioned study also found that 5% of their Autism Spectrum sample met the criteria for Obsessive Compulsive Disorder. Besides this, Green et al. (2000) found that 25% of their smaller Asperger's sample met criteria for the same disorder. While this method shows potential prevalence rates in small samples, other studies have compared subjects with Asperger's to Obsessive Compulsive Disorder samples.

Ruta et al. (2010) evaluated obsessive compulsive behaviours by comparing 20 children and adolescents with Obsessive Compulsive Disorder (80% male) to 18 age matched children and adolescents with Asperger's Disorder (89% male) and to a control group made up of 22 age matched peers (77% male). Psychologists who were blind to the diagnosis administered the Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS), which resulted in a comprehensive view of obsessions and compulsions that were used as well as a severity scale for symptoms. The Asperger's group had significantly more saving/hoarding, repeating, and ordering obsessions, as well as hoarding compulsions when compared to the control group. On the other hand, they had significantly less contamination and aggressive obsessions, as well as checking compulsions when compared to the Obsessive Compulsive group. In severity, the Asperger's group on average had mild severity of symptoms, which was significantly worse than the severity for the normative sample and significantly less than the severity of the Obsessive Compulsive group.

Social Anxiety Disorder

Russell and Sofronoff (2005) performed a similar study, which compared 65 children with Asperger's Disorder (86% male) to a previously interviewed clinical sample of children with Social Anxiety Disorder as well as a control group. The researchers found that when using the children's responses to the Spence Children's Anxiety Scale, the children with Asperger's scored significantly higher than did the control group, but not significantly different from the clinically anxious group. The parents also rated their children with Asperger's as significantly more anxious than the control group, but rated their children as significantly more anxious than the clinically anxious sample. Similarly, using the Social Worries Questionnaire, parents revealed that their children with Asperger's had significantly more social worries than did the normative sample, while children rated themselves as not significantly different. There were, however, significant differences between parent and child reports within this study.

Parent reports from Gadow et al. (2004) showed that 5% of their Autism Spectrum sample met the diagnostic criteria for Social Anxiety Disorder. The same study found that the severity of social anxiety symptoms in the Autism Spectrum group was significantly higher than the other three samples: clinical, special education, and the normative samples.

Gender

Limited studies were available that compared levels of anxiety by gender. However, Gadow et al. (2004) found no significant differences between male and female subjects with Autism Spectrum Disorders on the severity of symptoms related to measures of Generalized Anxiety Disorder, Social Anxiety Disorder, and Obsessive Compulsive Disorder. Although no evidence was found to contradict these findings, it should be noted that the subjects were between the ages of 3 and 5, and there were no other studies that separated gender or contained all female samples to compare these results to.

Age

The previously mentioned studies included a variety of samples, and combined they show that people with Asperger's generally have higher levels of anxiety than do the normative population. The studies mentioned primarily focused on children and adolescents, and ranged from ages 3 to 18 (Bellini, 2006; Gadow et al., 2004; Green et al., 2000; Hess, Matson, & Dixon, 2010; Ruta et al., 2010; White & Roberson-Nay, 2009). To determine if this trend continued through adulthood, a review of anxiety in adulthood was also observed.

Kanai et al. (2011) reviewed self-report measures from 55 adults with Asperger's (65% male) and 57 controls (61% male). While they did not assess anxiety specifically, the Japanese version of the Schizotypal Personality Questionnaire contained an *excessive social anxiety* scale. The group with Asperger's scored significantly higher on the *excessive social anxiety* scale than did the control group.

Likewise, Hintzen, Delespaul, Van Os, & Myin-Germeys (2010) used an Experience Sampling Method to compare 8 adults with Autism Spectrum Disorders (88% male) to 13 controls (92% male). With this method, participants wore a watch that would beep at random times during the day, and when their watch alarm sounded, they were required to stop and record what they were doing, how they felt, and what thoughts they had. The study found that the Asperger's group felt significantly more anxious when in social situations, especially when around strangers.

Discussion

It seems that anxiety levels of those with Asperger's Disorder are higher than those of the normative population, but child reports are not significantly different from those suffering from anxiety disorders (Russell & Sofronoff, 2005; Ruta et al., 2010). On the other hand, parent questionnaires have found that children with Asperger's may be more anxious than clinically anxious samples (Russell & Sofronoff, 2005). Higher anxiety levels within Asperger's populations appear to be consistent across the life span and while one study found that there were no gender differences in anxiety levels of an Autism Spectrum sample, more research needs to be completed in this area (Bellini, 2006; Gadow et al., 2004; Hintzen et al., 2010; Ruta et al., 2010). Despite this, many people with Asperger's Disorder are not diagnosed with anxiety disorders, even when they exceed clinical cut off scores (White & Roberson-Nay, 2009).

Regardless of the consistent results, there are some discrepancies within the research; for example, Russell and Sofronoff (2005) and White and Roberson-Nay (2009) used Asperger's samples that were already in therapy due to anxiety, which could be why their rates of anxiety were so much higher than those of the normative population. Besides this, the samples in some studies used samples of children and adults with Autism Spectrum Disorder, and did not necessarily include how many subjects were diagnosed with Asperger's (Hess et al., 2010; Hintzen et al., 2010; White & Roberson-Nay, 2009). Many of the anxiety studies also used a combination of child and parent reports; these were used to gather a better overall picture of anxiety-related issues, however it was found that parents reported more symptoms of anxiety than did the children (Russell & Sofronoff, 2005).

Rates of anxiety disorders differed depending on samples and study methods. Gadow et al. (2004) used a large Autism Spectrum sample of children between the ages of 3 and 5; only 14% of this sample had a diagnosis of Asperger's Disorder. It is also important to note that these researchers used DSM-IV criteria, and found that 2.32% of the Autism Spectrum Disorder sample met Generalized Anxiety Disorder criteria, and 5% met criteria for Obsessive Compulsive Disorder. Green et al. (2000) found much higher rates of both disorders; they found that 35% of their sample met criteria for Generalized Anxiety Disorder and 25% met Obsessive Compulsive Disorder. Their sample consisted of 20 adolescent males with Asperger's Disorder, and used ICD-10 criteria to make diagnoses. Besides the differences in criteria and in the original diagnoses, the ages of participants may have been a large factor in the contrasting results. Gadow et al. (2004) used a very young sample, and anxiety issues may not have been as apparent at this age. Furthermore, parent reports were used in the study by Gadow et al. (2004), while semi-structured interviews were completed with both parents and subjects for the study by Green et al. (2000). Because of the small sample size in Green et al.'s (2000) study, the rates of anxiety disorders may be overestimated in this sample; however due to the young age of participants in Gadow et al.'s (2000) study, anxiety disorder rates may be underestimated. Neither study tested differences in their clinical sample and a normative sample for anxiety disorders, so it is unknown whether these rates are significantly different from control samples.

Even with these limitations, the research has consistently demonstrated that people with Asperger's Disorder have an increased need for anxiety issues to be addressed in regular therapy programs. Knowing that anxiety related issues are more prevalent within Asperger's samples demonstrates that school boards and counsellors should incorporate anxiety treatments into Individualized Education Plans, alongside treatments for other possible co-morbid disorders such as learning disabilities.

Co-morbid Learning Disabilities and Asperger's Disorder

Learning disabilities, or learning disorders, are prevalent in approximately 2 to 10% of the normative population (DSM-IV-TR, 2000). Learning disabilities can be briefly described as an abnormally low level of achievement in one specific area of functioning when compared to potential, often measured by FIQ scores; typically, learning disabilities are in the areas of reading, writing, or mathematics although researchers also focus on non-verbal learning disabilities (DSM-IV-RT, 2000). Non-verbal learning disabilities and specific learning disabilities are first examined in their relationship to Asperger's Disorder. Following this, gender is investigated for potential links to the development of learning disabilities in people with Asperger's Disorder.

Non-Verbal Learning Disabilities

Non-verbal learning disabilities are not currently in the DSM-IV, however they have been acknowledged as a learning disability by researchers (Ambery, Russell, Perry, Morris, & Murphy, 2006; Chen et al., 2010; Klin et al., 1995; Ryburn et al., 2009; Stein, Klin, & Miller, 2004). Non-verbal learning disabilities are generally described as having a Verbal IQ (VIQ) at least 12 points higher than Performance IQ (PIQ) and/or having significantly lower scores on non-verbal tests than on verbal tests (Ambery et al., 2006; Ryburn et al., 2009). Subjects must also have average to above average FIQ, although due to the samples used in the following studies, some FIQ requirements were as low as 65.

Klin et al. (1995) examined a sample of 21 adolescents with Asperger's Disorder (90% male) to a sample of 19 adolescents with HFA (89% male) to compare rates of non-verbal learning disabilities. Blind neurological assessments led to 18 of the Asperger's sample meeting criteria for non-verbal learning disabilities, while only 1 adolescent with HFA met diagnostic criteria. The Asperger's group had an average VIQ-PIQ difference of 23.81, while the HFA group had an average of -2.05, making the two groups significantly different.

More recent studies have compared Asperger's samples to the normative population. Ambery et al. (2006) found that there were no significant differences between their 27 adult Asperger's subjects (81% male) and 20 control subjects (80% male). While Klin et al. (1995) used neuropsychologist observations and a review of school records, Ambery et al. (2006) used the WAIS-R to measure IQ scores as well as a collection of eight highly reliable tests to measure memory, executive functioning, and language development.

Ryburn et al. (2009) also found no significant differences between a sample of 34 children with Asperger's Disorder and 20 control sample children. Their definition of non-verbal learning disabilities was based on achieving low scores on the trail making test, tactile performance tasks, and the grooved pegboard. FIQ was controlled for, because the control group had significantly higher FIQ scores than the Asperger's sample. While significant differences were not found overall, it was found that the Asperger's group had significantly lower scores on psychomotor and tactile tests.

Chen et al. (2010) examined a group of 14 children with Asperger's or HFA and compared them to a sample of 26 age-matched peers. The researchers used a French version of the Colored Raven's Progressive Matrices, and split the Asperger's group into two subgroups; one subgroup had FIQ scores over 90, while the other had FIQ scores between 65 and 89. The subgroup with FIQ scores between 65 and 89 had no significant differences from their age-matched peers. However, the subgroup with FIQ scores over 90 actually had significantly higher scores on the Colored Raven's Progressive Matrices test than their age-matched peers.

Specific Learning Disabilities

Possible connections between specific learning disabilities and Asperger's Disorder have been underrepresented in the literature. Despite brief mentions, such as claims that *one may argue that AS [Asperger's Syndrome or Disorder] is a learning disorder of a social nature*, few articles mention learning disabilities (Shtayermman, 2008, p. 303). Only one study found listed prevalence rates of a

specific learning disabilities within demographic findings; Stokes, Newton, and Kaur (2004) noted that 4% of their 25 subjects (100% male) were diagnosed with a specific learning disability.

Gender

Unfortunately there was a lack of articles that mentioned non-verbal learning disabilities or specific learning disabilities and divided their samples into gendered groups. Stokes et al. (2004) did have an all male sample, however specific learning disabilities was a demographic mention and was not a variable within their study; besides this, there are no all female samples to compare their results to.

Discussion

Conflicting results regarding non-verbal learning disabilities have been found. While early researchers, Klin et al. (1995), found that people with Asperger's had higher rates of non-verbal learning disabilities, they compared the Asperger's sample to adolescents with HFA. Although this rate of non-verbal learning disabilities is substantially higher than those found in other studies, this might be due to how the researchers diagnosed non-verbal learning disabilities. Subjects were diagnosed with non-verbal learning disabilities when they had a VIQ score at least 12 points above their PIQ and had at least 10 deficits and 5 assets that the researchers deemed typical of a non-verbal profile. Furthermore, the researchers also failed to test the subjects themselves; rather, they relied on school reports and short spans of observation.

However, even with the limitations presented, the study did not specifically contradict other research. The other studies mentioned compared samples of children and adolescents with Asperger's Disorder to the normative population. These studies suggest that there are no differences between rates of non-verbal learning disabilities in the normative population and in people with Asperger's; they never refute the possibilities that people with Asperger's may have higher rates of non-verbal learning disabilities than people with HFA.

Furthermore, there are small differences within the findings of Ryburn et al. (2009) and Chen et al. (2010). Ryburn et al. (2009) found their 14 subjects with Asperger's Disorder did not differ from the control group on verbal or non-verbal tests. On the other hand, Chen et al. (2010) found that when subjects were divided by FIQ scores, the subjects with Asperger's and FIQ scores over 90 had higher non-verbal abilities than did the control group; however, when the Asperger's group was combined, there were no differences between them and the control group.

While the division of subjects may explain the differences, the two studies also used different psychometric tests. Ryburn et al. (2009) used the Weschler Intelligence Scale for Children-III (WISC-III) and an assorted variety of other verbal and non-verbal tests while Chen et al. (2010) used a French version of the Colored Raven's Progressive Matrices. In a study of Autistic Disorder subjects and controls, the Colored Raven's Progressive Matrices and the WISC-III were given to all subjects; the difference between the scores was significantly higher for Autistic Disorder subjects than for the controls, which means the WAIS-III may underestimate the FIQ of people with Autistic Disorder (Dawson, Soulières, Ann Gernsbacher & Mottron, 2007). If the same is true for people with Asperger's Disorder, the Raven's Progressive Matrices may better represent FIQ; however, it remains that when the entire Asperger's group was examined, both studies found no significant differences between their subjects and control groups.

More recent research also suggests that possible links between non-verbal learning disabilities may in part be due to the diagnostic process. Stein et al. (2004) presented a case study of a misdiagnosed seven-year-old male to two professionals in the field of developmental disabilities. After these two professionals replied to the case study, their replies were posted online and other professionals were able to discuss the case; the case study, professional discussions, and online discussions were then published as a journal article. It appeared that some doctors, such as the original doctors mentioned in the case study, were fast to diagnosis disorders like Asperger's without actually ensuring that all criteria was met. The boy in the case study had been diagnosed with ADHD and Asperger's Disorder when he presented no stereotyped movements, behaviours, or interest which is one aspect of the DSM-IV criteria (DSM-IV-TR, 2000). It is now thought that the young boy better fits the description of a non-verbal learning disability; however, when there is no concrete definition of the disorder, or even a mention of it in diagnostic books such as the DSM-IV, it is difficult to correctly diagnose.

Although little information was found regarding specific learning disabilities or the possible influence of gender, these topics are important to note. Both areas should be researched in the future so that better

treatment options can be offered for those with Asperger's Disorder. Many studies exclude subjects who have co-morbid disorders, so it may be easier to study learning disabilities in this population with studies that have that specific goal. On the other hand, gender has already been seen as an under-studied area of Asperger's Disorder and any future research on gender differences would be greatly appreciated.

Transitioning to Adulthood

While many of the studies mentioned so far focused on children and adolescents with Asperger's Disorder, it is also important to examine adulthood. Research has traditionally focused on children and adolescents, although more research has surfaced in the last few years regarding adulthood (Barnhill, 2007). This section will incorporate late adolescence and early adulthood to examine educational experiences, employment, living arrangements, and the relationships of those with Asperger's Disorder.

Education

In the samples examined, most of the subjects in secondary schools attended inclusive education settings, and had access to special education services; a smaller variety of students were educated in self-contained special education classrooms (Camarena & Sarigiani, 2009; Humphrey & Lewis, 2008). The rates of high school graduation within these studies was similar to those of the normative population; a study of 21 married men with Autism Spectrum Disorders showed 100% high school graduation rates among their sample (Renty & Roeyers, 2007). An examination of highest attained level of education of 8 adult subjects with Autism Spectrum Disorders (88% male) found that 86.5% of their subjects had graduated from high school (Hintzen et al., 2010). Other samples were not as optimistic, although 58.3% of 12 young adults males had graduated from high school, which was comparable to 61.5% of the 13 participant age-matched control group (Jennes-Coussens, Magill-Evans, & Koning, 2006).

Humphrey and Lewis (2008) used interviews and the analysis of the journals of 20 students with Asperger's to assess the school experience of adolescents with Asperger's. The researchers found that many of the students disliked the attention that they received by having Educational Assistants (EA). Students who received support from an EA who focused on helping all students in the classroom tended to feel less singled out, and happier with their educational programming. They also found that changes in school schedules or especially loud classrooms or hallways created excessive anxiety in the adolescents.

Camarena and Sarigiani (2009) interviewed 21 adolescents with Autism Spectrum Disorders (95% male) to examine post-secondary aspirations. For the most part, they found that social worries were a larger concern for both parents and students than academic concerns, and 68% of the sample had little to no concept of their disability. Many of the students had difficulty listing the types of supports they had in place at school, and often insisted that academic supports were unnecessary to their academic success. However, both parents and students were fairly confident that the adolescents would attend a post-secondary institution and most of the students wanted to attend a program because of their intense interest in the subject matter. The mothers appeared to be most realistic, and often made comments differentiating between what they wished for their child and what they thought their child could achieve.

Despite the worries regarding post-secondary aspirations, many of the samples reviewed demonstrated high rates of post-secondary attendance and graduation. The highest post-secondary graduation rate found was 76% of 21 married males with an Autism Spectrum Disorder, although this sample is the same sample mentioned earlier which had a high school graduation rate of 100% (Renty & Roeyers, 2007). In another sample with high graduation rates, 50% of a sample of 8 Autism Spectrum Disorder (88% male) had graduated from a post-secondary institution (Hintzen et al., 2010). One study showed lower rates of participation in post-secondary education, however this sample of 25 adolescents and adults with Asperger's only included current educational or employment status; while only 16% of the Asperger's sample was enrolled in a post-secondary institution, 36% of the sample were still enrolled in high school and thus ineligible to attend a post-secondary institution at the time of the study (Stokes et al., 2007).

Employment

Despite often having high levels of education, levels of employment for young adults and adults with Asperger's appear slightly lower. Hintzen et al. (2009) reported that 0% of their 8 Asperger's subjects (88% male) were working; while 25% were attending educational institutions, 37.5% were incapable of work, and the remaining subjects were either unemployed or on sick leave. Jennes-Coussens et al. (2006) found similar rates, as 50% of their 12 Asperger's participants (100% male) were unemployed. Of the remaining 6 participants, 3 were employed full time, and 3 were employed on a part time basis; it

should be noted, however, that 3 of the unemployed participants were attending school at the same of the study (Jennes-Coussens et al., 2006). Similarly, a study 25 young adults with Autism Spectrum Disorders (64% male) found that 52% of their subjects were in educational institutions, while 20% worked full time, and 24% were unemployed (Stokes et al., 2007). In contrast, a study of 21 married males with an Autism Spectrum Disorder had a full time employment rate of 86% (Renty & Roeyers, 2006).

Hagner and Cooney (2005) wanted to determine factors that led to the successful employment of people with Autism. A total of 14 adults subjects with Autism Spectrum Disorders (86% male) were included, as they had positive appraisals in their current position, and had been working in that position for a minimum of 6 months. For all subjects, supervisors were interviewed to see how they performed at work and what their work environment entailed. The employers suggested that the main differences in employing people with Autism Spectrum Disorders were the modifications they made for this sample. Modifications had been made for 86% of the sample, and were often used to keep a rigid routine within the workplace, or to decrease the social demands for the job. Besides this, some employers found they occasionally had to use different techniques with their Autism Spectrum employees, including being more specific, or explaining social cues. Overall, the employees tended to be fairly *social and interactive*, although 93% of employees had some form of job coach available to them (p. 94).

Hilier, Fish, Cloppert, and Beversdorf (2007) used a similar subject base to implement Aspirations, a program made up of 8 weekly sessions in which subjects discussed issues and barriers involved in the employment of people on the Autism Spectrum. There were 13 subjects in this study (85% male), and their mean age was 19. Subjects in this study filled out 3 questionnaires to measure both pre- and post-program scores: The Index of Peer Relations, The Autism Spectrum Quotient, and The Empathy Quotient. Besides this, observations were recorded during the sessions by two observers, and both parents and subjects were able to give feedback when the program ended. The results showed that The Empathy Quotient had significantly decreased by a small amount at the end of the program, which meant that clients had a slightly better understanding of empathetic reasoning after the 8 sessions. Parents and subjects also reported feeling that the subjects were more social with family members after Aspirations, although this cannot be qualitatively tested within this study.

Living arrangements.

Living arrangements were not included as a demographic variable in most studies. However, a study of 12 young males with Asperger's showed that the majority of the sample lived with their parents (75%); of the 25% of subjects that did not live with family, 8% lived by themselves and 16% lived with roommates or friends (Jennes-Coussens et al., 2006). There were no significant differences between the living arrangements of the young adults with Asperger's and the control group of 13 age-matched males, however it should be noted that the participants in both groups were young, with an average age of 20.3 for the Asperger's group and 20.5 for the control group.

Hintzen et al. (2010) mentioned the living arrangements of 8 older adults with Autism Spectrum Disorders (88% male) with an average age of 28.3. They found the majority of subjects still lived with their parents or other relatives (50%); 2 adults (25%) lived with their partner and their children, and 25% lived in a psychiatric institution. Although a control group was present, the living arrangements were not tested for differences. However, a similar trend appears, where most of their subjects lived with family members.

Two studies had inclusion criteria that stated participants must have been living with a partner or spouse and have at least one child residing at home (Lau & Peterson, 2011; Renty & Roeyers, 2007). Renty and Roeyers (2007) studied 21 adult males with Autism Spectrum Disorders and their families, while Lau and Peterson (2011) examined 33 families where one spouse and at least one child had Asperger's, as well as 49 families who had a child with Asperger's. Although they did not explicitly state living arrangements, it can be assumed that most of these families lived in single-family homes, although some families may have lived with their extended families.

Relationships

Social impairments are a crucial aspect of the Asperger's diagnosis (DSM-IV-TR, 2000). Despite these impairments, it is nearly impossible to avoid social interaction or the development of relationships in the social world in which we live. It is important to examine relationships in the Asperger's population to allow for appropriate supports and social skills training to be implemented if and when needed.

Relationships will be examined in terms of peer and friend relationships, romantic relationships, and family relationships.

Peer and friend relationships. Stokes et al. (2007) examined 25 adolescents and adults with Autism Spectrum Disorders (64% male) and found that the parent responses for the Autism Spectrum Disorders sample were lower in social functioning scores than the 38 participant control group (84% male). The Social Functioning Scale used in this study was highly reliable despite containing only six questions. Furthermore, it was found that the Autism Spectrum Disorder subjects gathered significantly less of their social learning from their peers than did the controls.

Whitehouse, Durkin, Jaquet, and Ziatas (2009) studied the quality of friendships in a group of 35 adolescents with Asperger's (80% male) and 35 age and gender matched controls (83% male). The Asperger's group had significantly lower scores on all six subscales of the Friendship Quality Questionnaire, although lower scores on the *conflict and betrayal* subscale meant that there was significantly less conflict in the friendships of the Asperger's group. This study also found that the motivation for friendships was significantly different; while the control group made friendships for intrinsic reasons, such as companionship, the Asperger's group made friends for extrinsic reasons, such as having a high number of friends. Coinciding with these results, Carrington, Templeton, and Papinczak (2003) interviewed 5 students with Asperger's Disorder (80% male) and found that the students lacked understanding of what a *friend* is. Most of these subjects could list friends, however it was thought to be a technique to appear *normal* as opposed to quality relationships (Carrington et al., 2003).

Unfortunately, when Humphrey and Lewis (2008) interviewed 20 adolescents with Asperger's Disorder they found a variety of negative side effects of peer relationships for Asperger's subjects. While obsessive interests were occasionally an icebreaker, more often they appeared to single out students with Asperger's as different from their peers. More so, the social naivety of many of the subjects allowed peers to easily exploit the general desire to fit in. Nearly all of the subjects had experienced bullying at some point in the educational career; both verbal and physical abuse appeared to occur fairly frequently when analyzing journal entries by the participants. Despite this, several of the participants had positive relationships with a small selection of peers.

Romantic relationships. Stokes et al. (2007) also found that Autism Spectrum parent responses were significantly lower on the Romantic Functioning subscale than did the control sample when age was controlled for. The Asperger's group was also significantly more likely to find romantic interests in celebrities, and attempt to contact these interests. The Asperger's group was significantly more likely to perform rare unwanted behaviours, such as inappropriate touching or making inappropriate comments; however, they were significantly less likely to contact a romantic interest after they had been asked to stop by either their interest or by family members.

Jennes-Coussens et al. (2006) found that 50% of the 12 young adult participants (100% male) had never dated. At the time of the study, only 2 of the subjects were dating, although the remaining 4 had dated previously. Although the rate appears high, it was not significantly different from the control sample.

Despite potential difficulties in forming romantic relationships, many adults with Asperger's are married and have children. Renty and Roeyers (2007) looked at marital adaption in 21 adult males with Autism Spectrum Disorders and their families. Each subject was married or cohabitating with a partner, had been living together for at least one year, and had at least one child living at home. The males who had higher perceived friend and partner support as well as higher received supports had higher rates of marital adaption. Besides this, having lower perceived friend support or higher rates of avoidant behaviours were correlated with higher levels of psychological distress.

Similarly, Lau and Peterson (2011) examined 33 couples where one spouse had Asperger's, and at least one child under 18 had an Autism Spectrum Disorder; within these 33 couples, 22 subjects had Asperger's themselves, while 11 were married to someone with Asperger's, and only one member from each couple was included within the study. Furthermore, a sample of 49 couples had only a child with Asperger's, and 75 couples made up a control group involving no family members with Asperger's. The researchers found that global scores on the Modified Quality Marriage Index did not differ significantly between groups. Despite this, when the total score was used on the Modified Quality Marriage Index, the partners with a spouse and child with Asperger's had significantly lower scores than the control

partners; however, these scores did not differ significantly from the spouses with Asperger's or from parents with a child on the Autism Spectrum.

Family relationships. In the above-mentioned study, Lau and Peterson (2011) found that the control group parents had significantly higher scores on the Parenthood Satisfaction questionnaire than all three experimental groups. The remaining three groups did not differ from one another. Another study also found that adults with Autism Spectrum Disorders spent significantly more time with family members than the control group, however little else was mentioned on adult familial relationships (Hintzen et al., 2010).

Discussion

Camarena and Sarigiani (2009) found that both the adolescents and parents they interviewed had high aspirations for post-secondary school. These aspirations cannot be generalized, as the parents in this sample were highly educated and highly valued education. While other samples may not be as keen on a post-secondary education, the graduation rates mentioned in other studies appear to demonstrate the same concept.

It appears that while many subjects with Asperger's Disorder were highly educated, or at least as educated as control groups, these educational levels did not help to secure full time employment. The current mismatch of education and employment levels may show a need for employment planning and services. The previously mentioned Aspirations program may be one step in this direction; this program did not seem to significantly increase job related measures, however it never evaluated whether subjects were more likely to be employed afterwards (Hilier et al., 2007). Hagner and Cooney (2005) noted that successful employees often had accommodations made for them, which demonstrates the need to educate employers of people with disabilities.

The majority of data mentioned in the Transition to Adulthood section was demographic data on samples selected for specific reasons. While several studies had the purpose of demonstrating successful adults with Asperger's Disorder, others aimed at creating interventions or determining where services were needed to help adults with Asperger's Disorder. This means that generally both the negative and positive attributes of the disorder were examined. For example, while some participants were perfectly able to live independently, others were so disabled by the disorder or co-morbid disorders that they lived in psychiatric facilities. Likewise, while some adults with Asperger's were happily married and had children, others were socially isolated.

Regarding relationships, both positive and negative features were found. While some students had rewarding friendships, others were verbally and physically bullied. As adolescents with Asperger's aged, some found rewarding romantic relationships while other groups never dated. Most of the differences found were not significantly different from controls, or were not compared to a control group.

In one specific study, parent report data was used to measure relationship functioning for young adults and adolescents with Asperger's and controls (Stokes et al., 2007). Parent report and child report accuracy have been debated previously in this paper, however this study did not use any subject data, and the subjects were not children. That being said, the accuracy of parent reports on relationship based questions, such as the Romantic Functioning Scale or the Social Functioning Scale may be biased; for example, participants were even asked what kind of relationship behaviours their son or daughter had performed, many of which the parent may not have been aware of.

One main theme was apparent throughout this section. Adults with higher levels of social functioning appeared to have more relationships, an easier time in educational settings, be more likely to live independently, and have higher rates of employment. This can be seen in the study by Renty and Roeyers (2007) who examined 21 married males with Autism Spectrum Disorders and found that 100% had finished high school, 76% had a post-secondary degree or diploma, and 86% were employed on a full time basis. Although no research was found specifically in this area, a trend seemed to occur across the research. Many of the adults researched had been diagnosed later in life, sometimes as late as their 40s and 50s after they had already established employment and relationships. It is thought that the diagnosis or stigma of Asperger's Disorder may further impede the social development of children and adolescents with Asperger's. While the effect of stigmas could differentiate between those with childhood and adulthood diagnoses, it may also be that the prognosis of Asperger's becomes more positive with age. Although this suggestion has not specifically been researched, it would be beneficial

to compare adults with a late Asperger's diagnosis and adults who were diagnosed in childhood to see if there are in fact differences in social functioning.

Similarly, do children or adolescents who know their diagnosis fare better or worse than children or adolescents who do not know their diagnosis? A study by Camarena and Sarigiani (2009) found that 68% of their 21 students with Autism Spectrum Disorders had little to no concept of their diagnosis or the strengths and weaknesses that came with their diagnosis. Many of these students could not list the special education services they required in the school, and often insisted that they did not require help with educational or social functioning. It can be assumed that even though the students were not knowledgeable about their diagnosis, their parents as well as teaching and support staff were. An investigation into possible stigmas of the diagnosis when the child is not aware of their disorder would be beneficial, as this could further discuss the self-fulfilling prophecy effect or examine if acceptance of the disorder is beneficial to functioning.

Conclusion

Anxiety levels are higher in children, adolescents, and adults with Asperger's Disorder than in the normative population. In many cases, the level of anxiety does not constitute an anxiety disorder, however higher rates of anxiety disorders have also been found in some Asperger's samples. Furthermore, it appears that anxiety disorders may go undiagnosed in clients with Asperger's Disorder; this indicates that there is a need for better diagnostic tools to assess anxiety levels in people with Asperger's Disorder. It is unknown whether gender influences anxiety levels in Asperger's samples, although one study of young children with Autism Spectrum Disorders suggests that there are no significant differences between males and females (Gadow et al., 2004). It would be beneficial to further study gender differences in Asperger's samples.

That being said, levels of non-verbal learning disabilities are not significantly different in Asperger's samples than in the normative population. Only one study mentioned specific learning disabilities, although learning disabilities were often an aspect of exclusion criteria. Although the percentage of participants with learning disabilities was within the estimated range from the normative population, it would be valuable to further study possible links between the two disorders (Stokes et al., 2004). No research on the effects of gender on learning disabilities for the Asperger's population were found, and as previously mentioned, further research is necessary in this area.

Educational attainment and employment were pretty typical in most samples of the normative population. Graduation rates of both secondary and post-secondary school were generally as high as, if not higher than the normative population. Despite this, employment levels were often lower, although this may in part be due to the sample selection of several studies. Some studies aimed specifically at showing improvements in the employment situation or studied adolescents and young adults that may have been attending educational institutions. Living arrangements did not differ from the control group in the one study that tested for differences, however it should be noted that a proportion of people with Asperger's live in psychiatric institutions (Hintzen et al., 2010; Jennes-Coussens et al., 2006).

Relationships appeared to be more difficult for people with Asperger's Disorder, however many people still had rewarding relationships with friends, romantic interests, and family members. Although many adolescents were able to list friends, one study found that they had difficulty describing the word *friend* (Carrington et al., 2003). Another study found that friendships were made for extrinsic reasons in people with Asperger's, and intrinsic reasons for people without Asperger's (Whitehouse et al., 2009). Bullying appeared to be an issue in schools, although it was not mentioned in adulthood. Romantic relationships formed for some people with Asperger's, and although one sample found that 50% of their subjects had never dated, this finding was not significantly different from the control group (Jennes-Coussens et al., 2006). While unwanted behaviours towards romantic interests were significantly more likely to occur in the Autism Spectrum group, those with Autism Spectrum Disorders were also significantly more likely to stop unwanted contact when asked; this may demonstrate a misunderstanding of social cues as opposed to a malicious act (Stokes et al., 2007).

In conclusion, people with Asperger's Disorder may need additional supports in social interactions, however their experience of transitioning to adulthood and with learning disabilities is much the same as that of the normative population. Furthermore, it is important to develop counselling programs for people with Asperger's Disorder that include treatment for anxiety, as anxiety appears to be an aspect of the Asperger's diagnosis. Future research is necessary, although may be more beneficial on the entire

Autism Spectrum, as the DSM-V is removing Asperger's Disorder as a diagnosis in favour of a ranging spectrum of disorders (American Psychiatric Association, 2010). Despite this, many people will still retain the Asperger's diagnosis for years to come, and gender specific research is crucial in fully understanding the small proportion of females diagnosed with this disorder.

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