Overlooked and Under-diagnosed: Distinct Expression of Asperger's Syndrome in Females

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There exists a significant gender gap in both referral and diagnosis of Asperger's Syndrome. While the male to female prevalence ratio of autism spectrum disorders is approximately 4:1, the ratio for Asperger's Syndrome is closer to 10:1, prompting calls to understand the cause of this disparity. Clinical accounts provide mounting evidence to suggest that the female expression is subtler and somewhat distinct from the prototypical perception of the disorder. Specifically, females' nurturing peer groups, circumscribed interests seemingly aligned with typical behavior, decreased propensities for aggression, and sophisticated masking abilities may allow patients to escape notice. In addition, Asperger's comorbidity with psychiatric conditions such as depression and anxiety that are generally associated with females may confound clinicians' ability to detect the disorder. Thus, it is suggested that considerable numbers of females with Asperger's Syndrome are being overlooked and thereby not receiving treatment. Further research is recommended to create a more comprehensive characterization of the female phenotype, with the aim of improving accuracy of diagnoses and developing treatments tailored to females' specific needs.

Asperger's Syndrome (AS) is an autism spectrum disorder (ASD) of early childhood characterized by impaired social interactions, communication deficits, and isolated interests. A diagnosis of AS made in accordance with the criteria listed in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) encompasses six features: 1) presence of severe and sustained social impairment; 2) presence of restricted and repetitive behavior; 3) significant impairment in functioning; 4) no significant language delays; 5) no significant delays in development of cognition, self-help abilities, or adaptive behavior; 6) criteria are not met for any other Pervasive Developmental Disorder (PDD) or for Schizophrenia (American Psychiatric Association [DSM-IV-TR], 2000). Gillberg's criteria for diagnosis include the additional feature of motor clumsiness (Gillberg, 1991).

While classical autism usually manifests itself before the age of three, AS tends to become apparent during pre-school age, with the majority of cases diagnosed at an age of at least seven (Gillberg & Gillberg, 1989). Many patients have average to above average intellectual abilities, and often there is an increased likelihood to seek social companionship despite a lack of understanding of appropriate social behavior (Khouzam, El-Gabalawi, Pirwani, & Priest, 2004). Some researchers suggest that AS is indistinguishable from High Functioning Autism (HFA) (Freeman, 2002; Volkmar, 2001); others draw the distinctions that AS involves reduced severity of social and communication impairment, increased motor clumsiness, increased early attachment to family members, a verbal IQ exceeding performance IQ, and a more positive prognosis (Gillberg, 1989; Ozonoff & Farham, 1994; Gillberg, Steffenburg, & Schaumann, 1991; Klin & Volkmar, 1997).

An additional distinction is increased likelihood of isolated interests among AS patients. Individuals may be considered "active but odd," with strong desires to learn whatever they can about a particular topic, sometimes becoming obsessed to the extent that they do not wish to speak of anything else (Attwood, 2007). Patients have difficulties engaging in conversations involving reciprocal give-and-take, and they miss the nonverbal cues of their listeners that signal a desire to change topics or to end the conversation. Often becoming extremely knowledgeable about their particular fascinations, they tend to speak in a pedantic manner, earning them the repute of "little professors" (Ghaziuddin & Butler, 1997).

Prevalence rates of AS vary significantly, as a result of disparate sets of diagnostic criteria including the DSM-IV, International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10), and Gillberg's criteria. A 2003 review of six epidemiological studies reported prevalence rates ranging from 0.3-48.4 per 10,000. In all six studies, however, the prevalence of AS was lower than that of autism, with current estimates stating that autism is five times as prevalent. Therefore, the conservative estimate of autism prevalence at 10 per 10,000 suggests that AS prevalence is approximately 2 per 10,000 (Fombonne & Tidmarsh, 2003).

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Male vs. Female Demographics

Epidemiological studies have consistently indicated that autism spectrum disorders are more prevalent among males. While male to female ratios vary across investigations, the average ratio is reported to be approximately 3.5-4 to 1 (Fombonne & Tidmarsh, 2003). Moreover, no study has found greater numbers of females than males affected with autism (Lord, 1982).

While the higher prevalence of ASD among males is well reported, the underlying cause of the gender gap has yet to be definitively elucidated. Some researchers suggest that the gap mirrors neurological gender differences in typically developing individuals, with accounts of female superiority in language and male superiority in tasks involving visual spatial abilities (Wing, 1981). Another hypothesis is that boys' threshold for expressing the disorder is reduced (Volkmar, Lord, Bailey, Schultz, & Klin, 2004). Skuse (2000) proposes a genetic explanation, suggesting implication of the X chromosome in ASD; thus, girls' possession of a second non-affected chromosome helps mask expression of the phenotype. Baron-Cohen (2002) has proposed the "extreme male brain theory," which asserts that autism is an exaggeration of the typical male brain that emphasizes systemizing over empathizing. The cause of the ASD gender gap remains unsettled in the scientific community.

Similarly, Asperger's Syndrome is clinically and epidemiologically shown to be more prevalent in males. Hans Asperger, the pediatrician who defined AS in 1944, believed that the disorder affected exclusively boys, and one hundred percent of his patients were male (Attwood, 2007). Though females began to be diagnosed in the 1970s, epidemiological studies agree that the disorder affects boys significantly more than girls. In 1978, Wing and Gould reported a male to female ratio of 15:4; in 1979, Wolff and Barlow reported a ratio of 9:1; and in 1993, Ehlers and Gillberg reported a 4:1 ratio, similar to autism. Using the ICD-10 criteria, the World Health Organization (2006) presents the ratio as 8:1. While debate continues, a current generally accepted ratio for AS is approximately 10:1 (Stanford, 2003).

Diagnosis of AS cannot be determined via a blood test or other definitive technical procedure; rather, it is diagnosed at the discretion of the individual clinician, based on his or her assessment of the patient's communication skills and social development (Tantum, 1991). This results in challenges and inconsistencies in recognizing and diagnosing the disorder. Some clinicians follow the strictest interpretation of the criteria before making a diagnosis, hesitant to proclaim AS without overwhelming, unambiguous exhibition of symptoms. Another problem is that clinicians who have not worked much with the disorder are less likely to recognize it. These diagnosticians may interpret, for example, a patient's forced eye contact or ability to maintain a conversation as typical enough social interaction, thus dismissing AS (Stanford, 2003). In addition, the milestones of social development are less well defined than those of motor and language abilities (Wetherby, 2006); as a result, many clinicians decide to "wait and watch," leading to delayed diagnoses or none altogether. In fact, it is estimated that as many as 50% of children with AS remain undiagnosed and untreated (Szatmari, Archer, Fisman, Streiner, & Wilson, 1995). These diagnostic obstacles, however, would seem to apply equally to males and females. Is this the case?

Some researchers are now saying no. They believe that the lower male-to-female ratios for AS compared to ASD result not from true differences in expression, but rather from biases in perception of the disorder that allow affected females to "slip past the radar" (Attwood, 1998, p. 22). Before a diagnosis can take place, the patient must be referred for evaluation; and studies indicate that boys are referred at a rate ten times higher than that of their female counterparts (Wilkinson, 2008). Girls also tend to be diagnosed at later ages (Goin-Kochel, Mackintosh, & Meyers, 2006). The diagnostic criteria involve the same cutoff scores for both sexes (Steyaert & De la Marche, 2008), yet case studies indicate possible

differences in expression between males and females. In particular, they suggest that the female manifestation of AS is subtler, less well-characterized, and better masked by females' unique coping mechanisms. The outcome, some researchers suggest, is that considerable numbers of girls with AS are being overlooked.

This paper defends this notion, proposing that females are escaping notice in two arenas: referrals and diagnoses. That is, caretakers are less likely to suspect a social disorder, and clinicians are less likely to call it what it is. The implication is delayed diagnosis, or worse–no diagnosis at all. This paper examines several arenas that may confound recognition, namely: peer groups, isolated interests, non-aggressive behavior, camouflage, and comorbidities. As early diagnosis is critical for providing therapeutic interventions to mitigate social deficits and to help AS patients function in daily living, we conclude with a call for increased awareness of the potential problem and a recommendation for further research to better understand the female manifestation of the disorder.

A Note on Evidence

It should be noted here that the conclusions and recommendations in this paper are based primarily on the author's investigation of case studies and clinical accounts. Indeed, no widespread empirical investigation has been conducted to show, definitively, a gender gap in diagnosis. Thus, it is hoped that the evidence presented here will bring attention to a potentially very significant problem that can pave the way for further organized study.

Too Little, Too Late:
Reduced Referrals And Diagnoses
Peer Groups And Imaginary Friends

Many individuals with AS do desire social interaction, even if they have difficulties actually fulfilling these wants in naturalistic settings. The desire for friendship is illustrated in the following case study: "Most of Emma's focus centered on her desire to be social and have friends…[yet] she did not socialize with her peers…appearing to want to engage, but not knowing how to begin" (Elkis-Abuhoff, 2008, p. 266).

Despite social deficits, a young girl with AS may have an easier time forming friendships than a young boy. This phenomenon, however, is less likely due to the female's superior social intuition than it is the result of natural differences between male and female peer groups. Groups of male children tend to be antagonistic, while groups of girls exhibit a more nurturing character (Sansone & Sansone, 2008). Thus, a boy who does not behave in expected ways is more likely to be mocked or bullied. In Wing's (1981) clinical account, three out of the five males investigated reported victimization: "[Case 1] was much teased at school" (p. 123), "[Case 2] was bullied at school and remembers it as an unhappy time" (p. 124), "[Case 6] is often teased by his classmates" (p. 128). A young boy with AS may then complain to his teacher or parents, alerting caretakers of a potential problem and leading to subsequent referral to a clinician for evaluation and diagnosis (Attwood, 2007).

In contrast, a female who does not fit in with her peers may still develop a close friendship with another girl, with the latter treating the former in a maternal way (Attwood, 2007). That is, as the girl with AS tends to be socially inexperienced, an affectionate friend enjoys "taking care" of her, instructing her on proper behavior. In Wing's clinical account (1981), the only female investigated was, in fact, reported to be "accepted in school" (p. 125). To the teacher or parent's untrained eye, the girl with AS may seem capable of forming friendships; yet in actuality, the relationship may have arisen more from her friend's motherly desire to help a socially awkward peer than from the patient's ability to relate to and befriend another. Since inability to develop typical social relationships is a warning sign for AS, this young girl may escape notice. If and when the girl becomes separated from her maternal friend, however, her social deficits may become clearer, leading to a delayed referral (Attwood, 2006).

In addition, if the female with AS cannot relate to her peers, she may seek social fulfillment with imaginary friends or dolls. This behavior if often considered normal in young girls. However, the child with AS does not treat her imaginary social world in the same way that typically developing children do. She does not seek reciprocity, but rather behaves in a domineering way; that is, she tries to control rather than engage in her fictional social world (Attwood, 2006). Holliday-Willey exemplifies this phenomenon in her autobiography, Pretending to be Normal: Living with Asperger's Syndrome (1999):

> Far more interesting to me was the arranging of the supplies. Like with my tea parties, the fun came from setting up and arranging things. Maybe this desire to organize things rather than play with them is the reason I never had a great interest in my peers. They always wanted to use the things I had so carefully arranged. They would want to rearrange and redo. They did not let me control the environment … I much preferred the company of my imaginary friends (p. 18).

A similar image is illustrated in Wing's clinical account (1981): "She collected costume dolls, which she arranged in rows that must not be disturbed" (p. 125). A case study by Wilkinson (2008) provides further support: "She typically enjoyed activities such as dressing up, acting out Disney videos, playing with her Barbie dolls, and talking to an imaginary friend" (p. 6). A girl interested in tea parties or dolls, however, does not signal a clear case of atypical behavior and thus may be overlooked by caretakers who do not examine the specific ways in which she engages in her ostensibly normal interests (Attwood, 2006).

Isolated Interests

Individuals with AS often find fascination in specific subjects, known as circumscribed interests (CI). These interests typically increase in intensity over time, and patients may desire to spend the majority of their leisure time ascertaining information about the interest (Boyd, 2007). Among males, common circumscribed interests fall in the categories of transportation, science, electronics, movies, and music (Shrank-Fernandez, Kuipers, & Katz, 1986). Gillberg's case study (1985) describes a male who "developed a fanatical interest in meteorology and would never miss the weather forecast on the radio" (p. 391). Another account, collected by Stanford (2003), describes a man at a party with his wife's colleagues: "He'd only talk to people about the new handheld device he's working on, then he walked away when people tried to talk back to him" (p. 70).

Girls with AS develop obsessions with a similar degree of intensity, yet these interests tend to differ in content. Clinical testimonies indicate that young girls may become obsessively interested in subjects like animals or dolls (Prior 129), while teenage girls often take to classic literature, including poetry and writings of Shakespeare. As Attwood (2006) describes, these forms of literature have an "intrinsic rhythm that they [the patients] find enticing" (p. 5). Clinicians, however, are inclined and trained to think of Asperger's when they see children with encyclopedic knowledge of the prototypical male topics.

In addition, while a common reputation of AS patients is that they are "little professors," Attwood (2007) suggests that females may behave more like "little philosophers" (p. 47). They may evaluate social situations in profoundly intellectual ways, noticing and analyzing incongruities. They may ponder questions such as whether all people see the same color in the same way. They may think up elaborate fantasy worlds. However, parents and teachers tend to interpret such behavior as imaginative rather than indicative of a possible social disorder (Wagner, 2006). As the "little professor" stereotype is the one well-recognized as a potential signal of Asperger's, deviations from that stereotype are likelier to go unnoticed.

Reduced Aggression

Boys with AS who become frustrated in the social world may act out in aggressive ways. Girls, however, are both less hyperactive and less aggressive than boys (Gillberg & Coleman, 2000), and a female who cannot understand her social domain may avoid it altogether. Hiding her frustrations, she may wander toward the outsides of peer groups and evade participation in school and family functions (Attwood, 2007).

The following is a teacher's account of a young female diagnosed with AS: "In class, she was observed to be a quiet and reserved student who usually stayed on the periphery of the group. She was also described as shy, undemanding . . . unassuming and soft spoken" (Wilkinson, 2008, p. 4). Here is a report of another female patient who preferred the avoidance approach: "Emma expressed that she has a hard time looking to others for social cues, explaining that she has difficulty interpreting facial expressions, so she avoids looking at faces, or even looking at her own reflection in the mirror" (Elkis-Abuhoff, 2008, p. 268). In contrast, consider this account of a male adolescent with AS: "He assaulted a crying child on a railway station by putting his hands over its mouth to stop its noise" (Mawson, Grounds, & Tantam, 1985, p. 567). While it would be incorrect to generalize that all male patients express their frustrations through aggression, as some prefer evasion as well, reports suggest that, overall, males tend toward this coping mechanism more than their female counterparts (Gillberg & Coleman, 2000).

The aggressive reaction is difficult to ignore, raising suspicion of a social disorder and thereby leading to referral (Kopp & Gillberg, 1992). In fact, children are rarely referred for evaluation as a result of observed social or communicative impairment; rather, referrals tend to stem from observations of hyperactivity, physical aggression, or "bizarre behavior" (Ghaziuddin, 2002, p. 138). Reduced expression of these salient warning signs in females may lead teachers and parents to overlook problematic behavior. The female reaction to frustration may be mistakenly interpreted as shyness and ignored. That is, reclusive girls with AS may be accepted as "shy," "naïve," or "sweet," rather than pegged as socially impaired (Wagner, 2006, p. 20-21).

Camouflage

A patient in a perplexing social situation has an additional option beyond aggression or avoidance: camouflage of social deficits through masking mechanisms. Attwood (2006) suggests that girls with AS may contribute to making their own diagnoses difficult in that they tend to be more motivated than their male counterparts to hide their impairment. Cognizant of the importance of social interaction–even if they are not skillful in it themselves –girls may investigate in a systematic and intellectual manner the proper ways to behave and then attempt to copy them. As a result, they may exhibit seemingly appropriate behavior–achieved, however, not through instinct or automatic social learning, but through contrived imitation without underlying understanding (Attwood, 2006).

As an example, Attwood (2007) describes the trajectory of a girl with AS approaching a novel social situation. Initially, she does not understand the rules of group behavior. Fearful of making a social gaffe, she therefore "politely declines" to join the group and remains on the periphery, where she vigilantly observes and memorizes others' speech and actions (p. 46). Only then does she join her peers. On a broader scale, she may even memorize scripts of key phrases that she finds can apply across many situations. Holliday-Willey demonstrates this approach in her autobiography:

> I often found it desirable to become the other person. Not that I consciously set out to do that, rather it came as something I simply did ... At times I literally copied someone's looks and their actions. I was uncanny in my ability to copy accents, vocal inflections, facial expressions, hand movements, gaits, and tiny gestures. It was as if I became the person I was emulating. (p. 26-27)

This phenomenon then poses a controversial question for the female patient who uses camouflage as a coping mechanism. According to the DSM-IV's third criterion for diagnosing AS, the condition must cause significant detriments in functioning (DSM-IV-TR, 2000). If the patient can effectively hide her social deficits, imitating to the point that she can function in her social circle, does she even have a disorder?

A defense of her condition's validity is the notion that imitation allows for unhindered functioning only in familiar, rehearsed environments. That is, without the natural ability to determine appropriate social behavior, a patient is not equipped to adapt to her surroundings. As Attwood (2007) writes, "If the rules or nature of the game suddenly changes, the child is lost" (p. 46). The use of simple mimicry cannot provide sustained efficacy in the realities of the social world, in which rules do constantly change and the ability to modify behavior accordingly is necessary. Thus, it seems that sophisticated camouflaging ability is not sufficient grounds for dismissal of the disorder.

Comorbidities Predominant in Females

The final area of analysis, cormorbidities typically associated with females, is distinct from the others in that it does not involve gender differences in phenotypic expression of AS. Rather, it suggests that the demographics of related psychiatric conditions may obscure clinicians' ability to recognize the disorder. As such, while the other factors may lead to biases in both referrals and diagnoses, the cormobidity factor would lead only to bias in diagnoses.

Asperger's Syndrome has high comorbidity with other psychiatric disorders, with studies suggesting that comorbidity is present in more cases of AS than it is absent (Gillberg & Billstedt, 2000). One clinical investigation revealed that 65% of those AS patients evaluated had a comorbid psychiatric disorder (Ghaziuddin, Weidmer-Mikhail, & Ghaziuddin, 1998). These conditions include anxiety, depression, anorexia, schizophrenia, obsessive compulsive disorder (OCD), attention-deficit hyperactivity disorder (ADHD), bipolar disorder, sleep disorders, and Tourette's Syndrome (Ghaziuddin, 2002).

The clinical study by Ghaziuddin et al., (1998) reported that the most prevalent comorbidity was depression, and other investigations have confirmed that mood disorders–namely depression and anxiety–are the most common comorbid conditions (Howlin, 1997). In AS patients the depression often stems from a recognition of the importance of social skills combined with an awareness that they do not fit in with their peers (Ghaziuddin, 2002). In one case study reported by Wing (1981), a patient's depression escalated to the point that he attempted suicide: "[The patient] blamed himself for all his problems, describing himself as an unpleasant person, whom no one could like and who could not manage his own life" (p. 121). In fact, Gillberg (2002) suggests that depression is "probably the most common erroneous diagnosis in Asperger's syndrome" (p. 50).

Depression on the whole, however, is more common among females; epidemiological studies estimate that the condition is twice as prevalent in women (Wilhelm, Roy, Mitchell, Brownhill, & Parker, 2002). Numerous studies have agreed that females are more susceptible to the stresses leading to the condition and are more likely to exhibit symptoms (Ge & Conger, 2003). In particular, depression tends to be associated with female adolescents (Nolen-Hoeksema, Larson, & Grayson, 1999). As a result, when a child or teenage girl shows symptoms of depression or anxiety, a cormorbid AS may be missed.

That is not to suggest, of course, that patients who are diagnosed with depression should automatically be searched for Asperger's as well. While depression is highly comorbid with AS, the relationship is not necessarily reciprocal (that is, many individuals with AS have depression; but many individuals with depression do not have AS). Thus, it is recommended that a clinician perform a comprehensive examination and have a familiarity with the particular cues that may in fact indicate an underlying social disorder. While this recommendation

applies to both male and female patients, it is particularly important in the latter case where depression is more prevalent and thereby a more routine endpoint for diagnosis. One clinical study recounted that the majority of its female Asperger's patients were diagnosed with anxiety or another mood disorder before the AS was determined (Bashe & Kirby, 2005).

Another masking comorbidity is anorexia. Nearly one quarter of all girls with anorexia nervosa show symptoms of AS. These individuals may refuse food because of hypersensitivity to certain tastes, textures, colors, or smells, or because of strict adherence particular food preparation routines (Bogdashina, 2005). Yet, with anorexia up to three times as common in females than males (Carter, Stewart, & Fairburn, 2001), a clinician's focus on the diagnosis of anorexia may conceal its underlying relation to AS (Attwood, 2007).

Consequences: No Diagnosis, No Treatment

Though there is no cure for AS, there exist many options for treatment that lead to a better prognosis. In early childhood, children begin to face new situations in which they must learn to get along with other children, teachers, and staff members, and it has been shown that educational and behavioral therapies can help AS patients acclimate to their changing communities (Khouzam et al., 2004). Adolescence poses even greater challenges, as teenagers must deal with the onset of puberty and a social environment that tends to place even greater emphasis on assimilating with peers (Wing, 1981). Interventions during this stage of development are critical in helping patients foster the skills needed to engage in their environments and to cope with academic and social stresses. Finally, the skills garnered during adolescence ease the transition into adulthood, helping patients achieve independent living and success in social, scholastic, and vocational realms (Ryan, 1992; Khouzam et al., 2004).

As diagnosis is the first step towards treatment, individuals who escape diagnosis cannot receive the therapies they need, which encompass educational and behavioral supports, psychotherapy, and psychopharmacology (Khouzam et al., 2004). Clinical investigations have shown that delayed diagnosis in females is linked to social isolation, diminished academic performance, and an even greater risk for developing anxiety or depression (Wilkinson, 2008). In addition, untreated females may be increasingly vulnerable to sexual abuse due to their naïveté and inability to read nonverbal cues (Attwood, 2007).

CONCLUSIONS

The gender gap in Asperger's Syndrome is a relatively new and weakly researched phenomenon, with potential explanations based more on sporadic compilation of case studies than on empirical epidemiological investigations (Wilkinson, 2008). While there is no consensus that females are being overlooked, information from clinical accounts seems to provide substantial enough evidence to warrant further investigation of the subject. Case studies suggest that AS may express itself differently in girls and boys, and our current, ingrained perception of the Asperger's patient – namely, a socially inept but often extremely knowledgeable "little professor," who speaks pedantically about science and technology, who is often bullied, and who expresses his frustrations through aggression – may hold less accurate for the female with AS. Cormorbid conditions that are generally more expected in females may also confound proper diagnosis.

It follows that a comprehensive, detailed characterization of the female phenotype is greatly needed. With further research into gender-specific variations in expression, diagnosticians can subsequently be trained to recognize subtler and perhaps less archetypal manifestations of the disorder. Moreover, an improved understanding of the female phenotype may allow for the development of increasingly effective therapies. Treatment currently considered successful is based on research with mostly male subjects; and if females manifest AS differently, the techniques that work in boys may be less successful in girls.

Just as patients with AS express the disorder differently, based on disparate personalities, tendencies, and interests, so must the therapy cater to individual differences in order to achieve maximal effectiveness (Williams, 1995; Khouzam et al., 2004). As such, it is recommended that substantial further research into the female manifestation of AS is essential for diagnostic and treatment purposes. ■

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