

A Comparison of Autism Spectrum Disorder and Anorexia Nervosa: Examining the Gender

Gap

Klara Manning

Department of Psychology

University of Minnesota

### Abstract

There is a large disparity in the prevalence rate of autism spectrum disorder and anorexia nervosa between males and females. Similarities in the underlying symptomatology and neurocognitive profiles of the two disorders may help explain this disparity. There may be a subgroup of females with high functioning autism spectrum disorder that are initially misdiagnosed with anorexia nervosa. This would have long-term implications in the therapy administered, recovery rate of anorexia nervosa, and the life course of autism spectrum disorder.

## A Comparison of Autism Spectrum Disorder and Anorexia Nervosa: Examining the Gender Gap

This review investigates the possible connection between the psychiatric diagnoses of anorexia nervosa and autism spectrum disorder, outlining the gender disparity in the two disorders, and examining the commonality of symptoms to explain these gender disparities. The similar etiologies, neurocognitive profiles, and communication deficits suggest that the disorders may have a connection. This would have large implications in the treatments prescribed for both disorders, as well as the life outcomes of the patients.

### **Autism Spectrum Disorder**

The Diagnostic and Statistical Manual of Mental Disorders (5th ed. ; DSM-5; American Psychiatric Association, 2013, p. 33) defines Criterion A of autism spectrum disorder (ASD) as “Persistent deficits in social communication and social interaction across multiple contexts, as manifested by the following, currently or by history: (1) deficits in social-emotional reciprocity, (2) deficits in nonverbal communicative behaviors used for social interaction, (3) deficits in developing, maintaining, and understanding relationships.” Criterion B states, “Restricted, repetitive patterns of behavior, interests, or activities, as manifested by at least two of the following, currently or by history: (1) stereotyped or repetitive motor movements, use of objects or speech, (2) insistence or sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior, (3) highly restricted, fixated interests that are abnormal in intensity or focus, (4) hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of the environment” (American Psychiatric Association, 2013, p. 33). These traits must emerge early in development and cause significant disruption in functioning. The severity of the diagnosis

is defined by the degree of impairment in social communication and ritualized behaviors. Finally, the observed traits must not be better explained by another condition or disorder. Depending on the severity of the symptoms, the diagnosis is classified into three levels, based on how much support the individual may need. Diagnoses are accompanied with specifications regarding potential intellectual and language impairments.

Rigidity and adherence to rituals affect one's ability to adapt. Cognitive and behavioral inflexibility has been observed in many domains of behavior including play, social interaction, and eating (Koegel et al. 2011). Ahearn, Castine, Nault, and Green (2001) found that 87% of children with ASD were moderately or extremely selective with their food intake. Ledford and Gast (2006) highlighted how children based their selectivity on a variety of features. For example, some children held biases against specific food groups, whereas other children based their preferences on the texture or color of food. If not treated early, this could lead to severe malnourishment, and deficits in physical development.

### **Etiology**

Researchers have yet to identify a direct cause of ASD, however, they have investigated a genetic component in the etiology of ASD. The risk of having ASD increases if one of the parents has ASD, and the prevalence of ASD in siblings of affected individuals is 3-9%, and 50% among monozygotic twins (Gupta, 2004). Immune dysfunction is correlated with ASD, but the causal direction of these two variables is unknown. Stanovich (2013) explains the directionality problem by emphasizing the difference between correlation and causation. Researchers have questioned a neurological basis of ASD, but findings remain inconclusive. It is plausible that dysfunction in the brainstem may affect

some of the symptoms of ASD, such as transitioning between activities and abnormal sensory processing (Gupta, 2004). The literature's general consensus is that ASD involves a genetic component, but requires multiple environmental triggers to fully manifest.

### **Prevalence Rates and Gender Disparity**

Approximately 1 in 68 children is diagnosed with ASD, and these rates have increased over the past few decades (Baio, 2014). However, there appears to be a gender difference in the prevalence of ASD. Specifically, 1 in 42 boys develop ASD, whereas only 1 in 189 girls develop ASD (Baio, 2014). The average age of diagnosis fell between 2 and 5.6 years of age (Sullivan, 2013). Based on these prevalence rates, boys are nearly 5 times more likely to be diagnosed with ASD as girls. Furthermore, girls with autism are frequently diagnosed at a later age, and often initially misdiagnosed with another disorder, such as anxiety, ADHD, and anorexia nervosa. (Rivet & Matson, 2011).

### **Anorexia Nervosa**

The DSM-5 considers a diagnosis for anorexia nervosa (AN) based on three main criteria. The individual consistently restricts caloric energy, resulting in an extremely low body weight for his or her age, sex, and physical health. Next, the individual has an intense psychological aversion to gain weight and fears becoming fat, despite a severely low body weight. And finally, the individual has a distorted perception of how their body or weight is perceived (American Psychiatric Association, 2013). The intensity of their aversion to food is observed through rigid, ritualized eating behaviors, designed for minimal caloric consumption (or avoiding meals altogether). Psychiatrists differentiate between subtypes of (1) restricting or binge-eating/purging, and (2) in partial remission or in full remission

(American Psychiatric Association, 2013). AN is characterized by a consistent disregard and denial of the severity of the condition.

### **Etiology**

Researchers have investigated many factors that may contribute to the manifestation of AN. The results of many studies suggest the heritability of AN. Holland, Sicotte, and Treasure (1988) proposed a model of the etiology of AN that takes into account both genetic and socio-cultural influences. This was based on the fact that there is an increased prevalence of AN in ballet and model schools (Holland et al., 1988). In both of these institutions, there is an emphasis on extreme thinness. Models are considered more desirable and marketable with a lower weight, and ballerinas must maintain a low weight for specific dance sequences. Individuals with a genetic vulnerability for developing AN could be more or less likely to develop the disorder based on their environment.

### **Prevalence Rates and Gender Disparity**

A gender gap exists in the percentage of women and men with AN. Specifically, 1% of women have AN, whereas only .3% of men have AN (Hudson, Hiripi, Pope Jr., & Kessler, 2012). However, it is noted that the actual percentage may be much higher, since many suffering with AN deny the severity of their symptoms and neglect treatment options. AN has the highest mortality rate of all psychiatric disorders, killing as many as 20% of people with the disorder (Hudson et al. 2012).

### **Different Rates of Gender in AN and ASD**

There are large sex differences in the prevalence of ASD and AN. The ratio of males to females with ASD is 4 to 1 (Kogan et al., 2009), and the ratio of females to males with AN is 3 to 1 (Pooni et al., 2012). As symptoms of ASD are examined on a spectrum, the traits

can be observed throughout the general population. Individuals receive diagnoses of ASD when the severity of their traits causes a disruption in their social and communication abilities, and abnormal patterns of development.

Anckarsater et al. (2012) assessed the presence of ASD symptoms in a sample of individuals with AN, specifically for sociocommunicative problems. They found that these individuals exhibited higher levels ASD symptoms, especially for neurocognitive and personality problems, when compared to controls. In a literature review, Rivet and Matson (2011) found that females with ASD more frequently (1) are not diagnosed, (2) experience a delay in diagnosis, and (3) are misdiagnosed with other disorders than males with ASD.

### **Comparison of Symptoms**

Many psychologists have connected the parallels between AN and ASD in an attempt to explore the gender gap of the two disorders. The similarities in the neurocognitive profiles of AN and ASD were statistically significant for emotional theory of mind, task switching, and attention to detail, as compared with healthy controls (Oldershaw et al., 2011). Both groups had difficulty detecting emotion in voices. For task switching, both groups had great difficulty in adapting from established rules to new rules, which exemplifies poor cognitive flexibility. The AN and ASD groups also had comparable average times for finding hidden shapes within patterns, which suggests they have similar heightened attention to detail (Oldershaw et al., 2011).

Courty et al (2013) analyzed the cognitive traits of ASD within the AN population. Researchers used an AN group, an ASD group, and two age-matched control groups corresponding to both experimental groups. As compared with a healthy control group, the AN group had similar deficits to the ASD group in attention switching, perspective taking,

cognitive inflexibility, and emotional introspection. The AN group had a low awareness and recognition of their own emotions, and the emotional states of others. In consequence, they had a difficult time reacting appropriately to other people's emotions, and had deficits in social adjustment (Courty et al., 2013). These traits are consistent with a diagnosis of ASD, and this supports that the underlying symptomatology of AN and ASD is very similar.

While heightened attention to detail is common in the neurocognitive profile of ASD, it was the strongest predictor for later receiving a diagnosis of AN (Coombs et al., 2012). Females who were eventually diagnosed with AN exhibited communication deficits and had weak central coherence, both of which are widespread in ASD symptoms. Weak central coherence was defined as "a cognitive style biased towards detailed processing of information rather than a natural tendency to integrate information into a context" (Coombs et al., 2012, p. 327). This suggests that within their theory of mind, they have a limited capacity to understand current events, and predict their long-term effects. Significant overlap in these traits shows that the neurocognitive profiles and underlying symptoms of ASD and AN are very similar. Previous research provided evidence that ASD traits are commonly observed within adult AN populations, however, these traits were not yet analyzed in youth populations. Pooni et al. (2012) asserted that deficits associated with ASD are a risk factor in the onset and maintenance of eating disorders and found clinically significant levels of ASD symptomatology among youth populations, when compared to a healthy control group. The most prevalent traits of ASD symptomatology were ritualized behaviors, self-injurious behaviors, and social impairment (Pooni et al., 2012).

The ritualization and rigidities of behavior are direct effects of deficits in cognitive flexibility. Ritual behaviors are defined as daily behaviors that require a specific sequence



of steps (Hsu et al., 2009). Their study found that 19.7% of ASD patients had a rigid travelling routine, and 11.1% had strict eating rituals (Hsu et al., 2009). Adhering to these ritualized behaviors induces stress amongst the patient's family, and deviating from the ritual causes severe distress within the patient. According to Rivet and Matson (2011), ritual behaviors were more prevalent for males with ASD than females with ASD. Females with AN also engaged in rigid daily routines, including but not limited to cleaning, homework, or job tasks (Tchanturia et al., 2012).

### **Gender Differences in the Prevalence of ASD and AN**

Although the ratio of males to females diagnosed with ASD is 5 to 1 overall, this discrepancy is not as profound amongst ASD patients with lower IQs (Baio, 2014; Rivet & Matson, 2011). In a study conducted by Rivet and Matson (2011), 100% of females with ASD had an IQ below 55, whereas only 57% of males with ASD had an IQ below 55. This supports the idea that there may be a subgroup of higher functioning females with ASD that remains undiagnosed.

Females with ASD have more severe communication deficits (Frazier et al., 2014). The researchers asserted that ASD is underrepresented in females, particularly high functioning ASD. However, females with ASD generally show language and communication impairments later than males (Rivet & Matson, 2011). This may contribute to the delay in diagnosing females with ASD. One possible explanation for this is our society's differing social expectations for both genders. Typically developing (TD) females have stronger social skills than TD males (Rivet & Matson, 2011). If females show normative social development at two years of age, when autism is usually diagnosed, their impairments may later be falsely attributed to another cause, rather than ASD.

Anckarsater et al. (2012) longitudinally assessed ASD communication deficits among AN subjects four times, over a period of 18 years. In order to avoid biases, they used different raters for each checkpoint, with high levels of inter-rater reliability. They consistently diagnosed the same 1/3 of AN subjects with ASD. Diagnoses for ASD were primarily based on the DSM-IV, but the most reoccurring traits were cognitive inflexibility, ritualistic behaviors, and deficits in social interaction (Anckarsater et al., 2012). The researchers made the distinction between the subgroup with AN comorbid with ASD, and those with AN without ASD, amongst the entire sample with AN. The subgroup represented a minority of the sample, and diagnoses of ASD cannot be applied to the entire population of people suffering with AN.

Many psychologists have arrived at the consensus that ASD symptomatology is disproportionately represented within AN patients. There is a considerable amount of overlap in the socio-cognitive deficits and neurocognitive profiles observed in both disorders. This may influence psychologists' ability to effectively diagnose and treat ASD and AN, as they administer different courses of treatment.

### **Interventions**

Beginning interventions for ASD towards the end of adolescence is not nearly as effective as intervening in early childhood (Myers & Johnson, 2007). Although there is much comorbidity between these two disorders, they require vastly different treatment paths. Huke and colleagues (2014) found a significant positive relationship between ASD traits in AN patients, when compared with a healthy control group. They also asserted that these underlying ASD traits contribute towards the likelihood of females developing AN throughout adolescence. Because of the large gender discrepancies observed in both

disorders, a subgroup of females with higher functioning ASD may be misdiagnosed with AN. This would greatly impact the course of the disorder, the therapy required, and the success of the treatment administered.

### **Treatment for Autism Spectrum Disorder**

Due to the variability in the severity and levels of functioning of those diagnosed with ASD, treatment for ASD greatly varies based on individual needs. Many interventions for ASD work on improving social skills, safety, sensory functioning and processing, reciprocal play, and communication (Myers & Johnson, 2007). Overall, the goals of therapy for ASD focus on improving the patient's level of independent functioning, and reducing maladaptive behaviors. Interventions are generally more effective in accomplishing these goals if they are administered in early childhood, and in more inclusive settings.

Behavioral therapy is used the most commonly, and seeks to replace maladaptive behaviors with pro-social behaviors (Myers & Johnson, 2007). One of the most recognized techniques of behavioral therapy is applied behavioral analysis (ABA). ABA incorporates positive and negative reinforcement to increase or decrease the frequency of targeted behaviors (Myers & Johnson, 2007). ABA-based therapy sessions are conducted individually, and are tailored to individual patients. Often therapy takes place in replications of common social settings (for example, a classroom environment) to encourage greater transferability of skills. Early, intensive ABA-based intervention is associated with long-term gains in IQ, language, academic performance, adaptive behavior, and social behavior. Administering therapy outside of a clinical setting provides a broader context for the therapy, which helps individuals with ASD account for deficits in central coherence. Teaching social skills earlier in an inclusive setting promotes faster social

adaptation, and the ability to initiate interactions and appropriately respond to others (Camargo et al., 2014).

Occupational therapy and sensory integration therapy are also common methods of therapy for ASD. The overarching goal of occupational therapy is to increase the patient's independent functioning and ability to adapt in different situations. For younger patients, occupational therapists may help promote the development of self-care skills, such as getting dressed, using utensils to eat, and personal hygiene (Myers & Johnson, 2007). Other occupational therapy sessions focus on academic and social skills, where therapists encourage reciprocal play and interactions with others. Whereas occupational therapy focuses on teaching specific skills to patients, sensory integration therapy focuses on improving neurological processing and adaptive behavior (Myers & Johnson, 2007). Sensory integration therapy sessions involve sensory stimulation, such as feeling new surfaces or trying new foods, followed by helping the patient react appropriately (Pfeiffer et al., 2011).

There is not a medication specifically used for the treatment of ASD. However, many patients receive medications for accompanying symptoms such as aggression, self-destructive behavior, obsessions, impulsivity, irritability, anxiety, or other disruptive behaviors (Myers & Johnson, 2007). Most commonly, selective serotonin-reuptake inhibitors (SSRIs) and stimulants are prescribed to improve these behaviors. Up to 45% of children and adolescents and up to 75% of adults with ASD are prescribed medications. Increased age and levels of challenging behavior, and decreased adaptive and social skills, are associated with medication use.

### **Treatment for Anorexia Nervosa**

Effective treatment for AN has occurred in outpatient, inpatient, and day clinic settings. When evaluating inpatient facility outcomes, Schlegl and colleagues found that 60% of patients improved their conditions, 30% maintained their conditions, and an estimated 10% worsened their conditions. Motivation was the largest predictor of clinically significant improvements, and social insecurity was negatively correlated with clinically significant improvements (Schlegl et al., 2014). Improving interpersonal skills should be emphasized in the treatment of AN. This would greatly improve the transition out of treatment facilities. Medications have been prescribed for the commonly comorbid conditions of depression and anxiety, but there is not a specific medication used in the treatment of AN (Bulik et al., 2007). Most therapy administered for AN is based on the cognitive-behavioral perspective of psychology.

Fairburn (2005) found that cognitive-behavioral therapy (CBT) is more effective than nutritional counseling in the treatment of AN. CBT is an active method of therapy that explores the connections between thoughts, feelings, and behaviors (National Alliance on Mental Illness, 2012). Therapists encourage patients to challenge maladaptive thoughts. For example, a patient with AN may think, "Eating this sandwich will make me fat." Through CBT, the therapist would help the patient react to the thought with, "Eating this sandwich will not make me fat, it will help me sustain energy and nutrition necessary to survive."

Cognitive remediation therapy (CRT) directly targets thought processes, rather than the thought content that CBT examines. It is administered in individual sessions with the patient. CRT aims to improve central coherence, help patients find meaning in their behavior, understand the results of their actions, and help patients improve their cognitive

flexibility (Coombs et al., 2012). As these are core deficits in the neurocognitive profiles of patients with AN, improving these domains may reduce the self-injurious behaviors of AN. Although individuals with AN may resist gaining weight and adhering to a meal schedule, often patients have more motivation and greater success in improving social skills (Coombs et al., 2012). This may be more effective than other methods of therapy, as motivation to recover is the strongest predictor of adhering to treatment (Schlegl et al., 2014). Making progress towards recovery in another domain of therapy, such as improved social skills, may gain the patient's trust in the therapist's credibility and the treatment facility. If CRT is administered later in the treatment process, the patient may have greater resistance to changing behavior and recovering, and an overall greater level of distrust.

### **Conclusion**

The gender disparity in the prevalence rates and the many parallels between ASD and AN suggest that they may be related. There may be a subgroup of females with high functioning ASD that are misdiagnosed with AN. With similar etiology, neurocognitive profiles, and sociocommunicative deficits, researchers should conduct further investigation of these disorders. The therapies administered for ASD and AN are vastly different, however, both are more effective if conducted earlier in the course of the disorder. This exemplifies the importance of early and accurate diagnoses. Currently, Rivet and Matson (2011) suggest that females that may have ASD should be compared with TD females relative to age and appropriate IQ, not TD males or males with ASD. Further research could examine more effective ways to identify ASD earlier in females.

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