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# Improving the Perception, Assessment and Diagnosis of Females with Autism

Sydney Anne Steen
*Bethel University*

# IMPROVING THE PERCEPTION, ASSESSMENT AND DIAGNOSIS OF FEMALES WITH AUTISM

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# IMPROVING THE PERCEPTION, ASSESSMENT AND DIAGNOSIS OF FEMALES WITH AUTISM

SYDNEY STEEN

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Advisor's Name: Meghan Cavalier, Ed.D.

Program Director's Name: Katie Bonawitz, Ed.D.

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Abstract

This literature review examines current biases in perception, assessment, and diagnosis of Autism Spectrum Disorder (ASD) for females. Males lead in the number of diagnoses of ASD, however, many of the assessments used to evaluate for ASD are based on male autistic tendencies rather than female. This lack of inclusion is causing many females to be missed in early detection of ASD diagnoses. This literature review looks at female characteristics of ASD to be considered during evaluation for ASD and what future implications need to be considered in the education systems to best reach females with ASD.

Table of Contents

# CHAPTER I: INTRODUCTION

## Introduction

Autism Spectrum Disorder (ASD) is a prevalent neurodevelopmental condition affecting a significant number of children in the United States, with a current prevalence rate of 1 in 59 (CDC, 2018). The increasing number of ASD diagnoses has resulted in greater recognition of the challenges faced by individuals with ASD and their families, leading to the need for specialized health, educational, and social support (Hyman et al., 2020). However, despite increased awareness, there remains an unequal gender distribution within ASD diagnoses, with boys being diagnosed at a significantly higher rate than girls (CDC, 2018). The current literature indicates that the gender ratio for ASD is approximately three to one, indicating a potential diagnostic gender bias that may result in girls with ASD being at risk of not receiving a timely diagnosis (Harrop et al., 2015).

Addressing the diagnostic gender bias in ASD is crucial, as it has significant implications for identifying and providing appropriate services for girls with ASD. Failure to identify girls on the spectrum may lead to the denial of access to essential special education services, impeding their educational, behavioral, and social development (Gould, 2017). This gender disparity has only recently come to the forefront of research, highlighting the importance of understanding the distinct characteristics of ASD in girls to prevent their underdiagnosis (Dean et al., 2017). One contributing factor to the diagnostic gender bias is the masking of symptoms displayed by girls with ASD. Research suggests that girls may employ compensatory behaviors to mask social challenges, making their symptoms less visible compared to boys with ASD who often exhibit more overt social impairments (Dean et al., 2017). Consequently, educators and diagnosticians

may overlook potential clues to ASD in girls, leading to missed diagnoses and inadequate support.

To address this critical issue, it is imperative to explore the biases in perception, assessment, and diagnosis of girls with ASD. This literature review seeks to investigate the factors contributing to the gender disparity in ASD diagnoses and explore potential avenues for improving the diagnosis process for girls. Understanding the existing biases and challenges in recognizing ASD in females will serve as a foundation for developing more effective strategies to identify and support girls on the autism spectrum. By addressing gender bias, educators and healthcare professionals can enhance the accuracy and early detection of ASD in girls, ultimately improving outcomes and providing appropriate interventions.

**Research Rationale**

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder. In the United States, one in 59 children are diagnosed with ASD. Simply, autism is common. Children can be diagnosed at young ages and this can create significant health, educational, and social needs for individuals with ASD (Hyman et al., 2020). Research shows that in the last decade, the occurrence of children with ASD in schools has increased (McDonald et al., 2019). However, while the numbers of ASD continue to increase, the increase of an uneven gender ratio of ASD continues as well. There are limited studies on girls with ASD separate from boys (Harrop et al., 2015). This uneven gender ratio of three to one in the research indicates that there is a diagnostic gender bias and that girls who are meeting the criteria for ASD are at the risk of not receiving a diagnosis. This risk of not receiving a diagnosis leads to the risk of not qualifying for the special

education services that these girls require in order to be successful educationally, behaviorally, and socially. In order to conquer these obstacles, it is necessary to investigate the biases of perception, assessment, and diagnosis of girls with ASD.

It is only recently that gender differences in males and females on the Autism Spectrum have been researched. This has provided the emphasis that females are being missed on the spectrum. Studies show that girls were less likely to receive an ASD diagnosis based on standardized diagnostic tools (Gould, 2017). In order to investigate this issue, it is important to comprehend the differences that exist within characteristics of boys and girls with ASD. Collective research suggests that girls with ASD have the ability to mask their symptoms. Studies show that girls tend to use compensatory behavior to mask social challenges which lessens the visibility of these. In contrast, boys with ASD show social impairment more clearly. One trigger characteristic of ASD is social challenges; however, unless educators continue to look for clues to ASD by social isolation, girls on the spectrum will continue to be left unidentified (Dean et al., 2017).

As the numbers for ASD diagnoses continues to rise, there must be investigation surrounding how to prevent girls on the spectrum from being missed and left unidentified. This will begin with the evaluation of the diagnosis process and how to implement changes to increase the ability to identify girls on the spectrum in the early stages. The focus of this literature review will be the biases of perception, assessment, and diagnosis of girls with ASD and how to potentially improve the diagnosis process.

**Definitions of Terms**

Important terminology, used throughout this paper is defined as follows:

*Autism Spectrum Disorder:* Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by persistent challenges in social communication and interactions, along with the presence of restricted and repetitive behaviors and interests. Individuals with ASD may exhibit a wide range of symptoms, varying in severity and impact on daily functioning. ASD is often diagnosed during early childhood, and early intervention and support are crucial for improving the overall quality of life for individuals affected by the disorder (American Psychiatric Association, 2013).

*Diagnosis:* Diagnosis refers to the process of identifying and classifying a specific medical or psychological condition based on a comprehensive assessment of symptoms, signs, and relevant information. In the context of Autism Spectrum Disorder, diagnosis involves evaluating an individual's developmental history, behavioral patterns, and social communication skills to determine if they meet the criteria outlined in diagnostic manuals such as the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) or the International Classification of Diseases (ICD-10) (American Psychiatric Association, 2013).

*Restricted and repetitive behaviors:* Restricted and repetitive behaviors (RRBs) refer to a core symptom category of Autism Spectrum Disorder. These behaviors are characterized by rigid adherence to routines, repetitive motor movements, preoccupation with specific interests, and resistance to change (American Psychiatric Association, 2013).

*Social Communication:* Social communication refers to the ability to engage in reciprocal and meaningful interactions with others. It involves using verbal and nonverbal cues to convey

information, emotions, and intentions. Social communication skills encompass aspects such as understanding and responding to social cues, maintaining appropriate eye contact, taking turns in conversations, and understanding social norms and rules (American Psychiatric Association, 2013).

**Guiding Research Question**

The guiding research question for this thesis was: What are the current biases in perception, assessment, and diagnosis of ASD for females? In order to investigate this research question, it is necessary to evaluate the current three to one ratio of males to females that exists in the diagnosis of ASD. Additionally, it is essential to understand how students are being diagnosed with ASD (qualifications, characteristics, and assessment tools). In order to better understand the gender differences in ASD presentation, it is important to look at research to comprehend where the biases are stemming from in order to alter them.

# CHAPTER II: LITERATURE REVIEW

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by persistent challenges in social communication and restricted and repetitive behaviors. Historically, ASD has been perceived as a predominantly male disorder, leading to a male-biased diagnosis. However, recent research has shed light on the underrecognition of females with ASD, revealing a smaller gender discrepancy than previously presumed (Milner et al., 2019). The diagnosis of ASD in females is influenced by various factors, including gender-related social behaviors, biases in diagnostic criteria and assessment tools, and societal expectations. Research by Dean et al. (2017) explored gender differences in social behaviors between girls and boys with ASD during recess, indicating that girls with ASD may use compensatory behaviors to mask their characteristics, while boys' social challenges are more evident. Milner et al. (2019) highlighted the gender disparities in the recognition and assessment of ASD, pointing to the use of predominantly male samples and reliance on male-centered stereotypes in research and diagnosis. Endocrine factors have also been implicated in ASD development (Wilson et al., 2020). Understanding these influencing factors is crucial for improving the diagnosis and support for individuals with ASD, regardless of their gender.

## Influencing Factors of the Diagnosis of ASD in Females and Males

Dean et al. (2017) investigated the gender differences in the social behaviors of girls and boys with autism spectrum disorder (ASD). The study used a concurrent mixed method to examine the social behaviors of 96 elementary school children during recess. The population consisted of 24 girls and 24 boys, as well as 24 girls and boys that were not diagnosed on the spectrum. The students with ASD had a confirmed diagnosis, had average intelligence, and

received their education in the general education classroom (Dean et al., 2017). The study examined which gender-related social behaviors aid girls in the masking of their ASD characteristics.

The results of this study indicated that the social landscape of the girls supported the camouflage hypothesis that girls with ASD can use compensatory behaviors to mask ASD characteristics. These compensatory behaviors included staying within close proximity to peers and weaving in and out of activities (Dean et al., 2017). In comparison, the landscape of the males' socialization created an easier field to detect the social challenges of boys with ASD. The boys with ASD tended to play in isolation, whereas boys not on the spectrum tended to play organized games. The results show a male bias in the perception of autism spectrum disorder and show that if this bias in perception continues, more females will continue to be left unidentified (Dean et al, 2017).

Autism spectrum disorder is presumed to be a male dominating diagnosis; however, recent research has directed its attention to a smaller gender discrepancy than previously presumed (Milner et al., 2019). Milner et al. (2019), pointed out that the ratio of male to females with autism is estimated to be three to one. This ratio presents a lack of presence of females diagnosed with autism spectrum disorder, which creates the assumption that females are at risk of being missed. Milner et al. (2019), pointed out a number of reasons for this issue. The use of solely male samples in some autism research which may have led to the biased understanding of the full spectrum of autism (Milner et al., 2019). Two, the recognition of autism and the current methods for diagnosis are based on the stereotypes of autism as a male condition. Three, females

with autism are able to mask or camouflage their autistic characteristics to hide various challenges whether those are social or emotional (Milner et al, 2019). Camouflaging has been linked to the increase of stress and anxiety in comparison to those who do not camouflage. These factors may have all had a role in the male preponderance in autism and created the increase of autistic females who do not receive the necessary diagnosis and support (Milner et al, 2019).

Milner et al.'s (2019) study consisted of 18 females with a clinical diagnosis of autism or self-diagnosed autism and four mothers of autistic girls in the United Kingdom. The participants, individuals between 11 and 55 years old and both clinically diagnosed and self-diagnosed, were allowed to participate to ensure that the groups were as inclusive as possible. The participants participated in discussions guided by the use of a topic guide which included 15 questions for the female autism group and 16 questions for the parents. There were three main topics: diagnostic pathway, impact of autism, and resilience and coping. The results indicated that "lack of understanding about female autism symptomatology, including camouflaging behavior and interest in social relationships, is suspected to lead to many women receiving a late or delayed diagnosis" (Milner et al., 2019, p. 2400). Participants who remained undiagnosed up until 18 years of age or older, were less likely to receive adequate educational support in comparison to those who received an earlier diagnosis while in education (Milner et al., 2019).

Hagit et al. (2021) reported that girls who are suspected to have ASD have the ability to perform better in social and emotional tasks than boys, which leads to the camouflage effect resulting in the underdiagnosis of girls with ASD. In fact, girls with higher IQs were less likely to meet the criteria on the ADI-R which presented the analysis that lower functioning girls with

ASD are similar to their male counterparts while higher functioning girls with ASD present differently than high functioning boys (Hagit et al, 2021). Hagit et al (2021) focused on the assessment tools used to diagnose ASD. The research questions this study targeted was to seek to understand the differences in social and emotional awareness or skills that exist between males and females with ASD. This study tackled the factor of diagnostic tools to understand how to fill the gap that exists within diagnosing girls with ASD in a timely manner. The purpose of this report was to describe pilot research findings which suggest the use of the Social Attribution Task developed by Klin (2000) in the diagnosis of children who undergo the diagnosis process of ASD. The SAT requires "participants to watch a short clip that shows geometric figures moving in synchrony with one another, when the action of one geometric figure is contingent on the action of another" (Hagit et al, 2021, p. 3). The SAT is applicable for individuals ages six and above. In this study, the SAT was used in order to adequately assess the performance of girls with ASD and to compare their performance to the boys' scores. The sample included a group of 12 girls and a group of 12 boys with IQ in the normal range, who had been diagnosed with ASD (Hagit et al., 2021).

The results of this study indicated no significant difference between the boys and girls in five of the six contents in the SAT index (Hagit et al., 2021). The lack of a significant difference in the scores suggested that girls with ASD do not have a better social understanding than boys. However, the results of this study indicated that girls with autism use emotional expressions and are more able to label others' internal states than autistic boys (Hagit et al., 2021). The results

demonstrated the relevance of the camouflage effect amongst girls with ASD yet pointed out that the SAT avoids the camouflage effects.

Each of the three research studies summarized above, investigated the factors that have contributed to male dominance in the diagnosis of autism spectrum disorder (Dean et al.,2017; Hagit et al., 2021; Milner et al., 2019). The three studies presented various approaches to their research yet contained some similarities in findings and research motivators. Each of the studies presented the camouflage effect as a crucial component to the underdiagnosis of girls with ASD. The three studies focused on various components that are leading to the underdiagnosis of girls with ASD. Dean et al. (2017) focused on the gender differences in social behavior. In contrast, Hagit et al. (2021) focused on the assessment tools being used to diagnose children with ASD and the effect that gender differences present in the use of these tools. Milner et al (2019) pointed out the issues in the use of solely male samples in autism research, the girls' masking of ASD, and the idea that the recognition and assessment of autism is based on the male centered bias of autism diagnosis. Overall, each study produced information that can be used to better the understanding, diagnosis, and perception of girls with ASD so that education establishments and society may better serve and support them.

Gould et al. (2017) conducted an examination of existing research, clinical observations and personal narratives to explore the under-recognition of girls and women with ASD. The study used a qualitative approach, involving literature analysis and synthesis to identify common themes and patterns related to the gender bias in ASD diagnosis and identification. REsults showed that there were several key findings related to the under-recognition of girls and women

on the autism spectrum. It was revealed that the traditional diagnostic criteria and assessment tools for ASD were developed primarily based on male samples which lead to the identification of predominantly male-typical symptoms. Due to this, the unique presentation of ASD in females often goes unnoticed, causing girls and women not meeting the criteria for diagnosis or receiving a misdiagnosis (Gould et al., 2017). The research also indicated that women and girls on the spectrum may employ social strategies to mimic neurotypical behaviors, thus making it harder to recognize their underlying social communication and sensory challenges. This masking behavior may lead to delayed or inaccurate diagnosis as their difficulties remain hidden in social situations.

Gould et al. (2017) emphasized the role of gender stereotypes and social expectations in perpetuating the under recognition of females with ASD. Societal norms often expect females to be more socially skilled and empathetic, leading to the dismissal of ASD symptoms as personality traits or emotional sensitivity. Consequently, girls and women with ASD may not receive the appropriate support and interventions they need (Gould et al., 2017). The findings of this study presented significant implications for clinical practice, research, and public awareness. Raising awareness about the under-recognition of girls and women on the spectrum can lead to increased knowledge and understanding among healthcare professionals, educators, and the general public. This awareness can promote earlier and more accurate diagnosis, ultimately improving outcomes and quality of life for females with ASD. Furthermore, the study underscores the importance of gender-sensitive diagnostic criteria and assessment tools. Having these instruments tailored to capture the unique presentation of ASD in females can help address the current gender bias and enhance the identification of females on the spectrum (Gould et al.,

2017). Gould's (2017) study sheds light on the critical issue of under-recognition of girls and women on the autism spectrum. By addressing the gender bias in diagnostic criteria, fostering awareness about the masking behavior, and challenging gender stereotypes, professionals and society at large can work towards a more inclusive and comprehensive understanding of ASD in females. Improved recognition and support for girls and women with ASD can pave the way for better access to appropriate interventions and enhance their overall well-being and life outcomes.

Wilson et al. (2020) conducted an extensive literature review to explore endocrine insights into the pathophysiology of ASD. The study involved a qualitative analysis of existing research papers, animal studies, and clinical investigations that examined the relationship between endocrine factors and ASD.Wilson et al. (2020) sought to identify common themes and trends related to hormonal dysregulation and its potential impact on the development and symptoms of ASD. Key findings were revealed regarding endocrine insights into the pathophysiology of ASD. Firstly, evidence was found of hormonal dysregulation in individuals with ASD, particularly involving sex hormones and the hypothalamic-pituitary-adrenal (HPA) axis (Wilson et al., 202). Dysregulation of these endocrine systems has been linked to altered stress response, emotional regulation, and social behavior, which are core features of ASD. Prenatal exposure to sex hormones and other endocrine disruptors may influence early brain development and shape neural circuits involved in social and communication functions (Wilson et al., 2020). This suggested a potential link between endocrine disruptions during critical periods of brain development and the risk of ASD.

Wilson et al. (2020) explored the interplay between endocrine factors and genetic susceptibility to ASD. It was found that certain genetic variants associated with ASD may interact with endocrine signaling pathways, leading to altered brain development and behavioral outcomes (Wilson et al., 2020). Modulating endocrine signaling pathways, such as with hormone therapies or dietary interventions, may hold promise in ameliorating some of the core symptoms and improving the quality of life for individuals with ASD (Wilson et al..

The findings of this study had significant implications for understanding the multifaceted etiology of ASD and exploring potential avenues for intervention and treatment (Wilson et al., 2020). By recognizing the role of endocrine dysregulation in ASD, researchers and clinicians can consider a more holistic approach to diagnosis and intervention, targeting both neurological and endocrine factors. By exploring the interplay between endocrine systems and genetic susceptibility, professionals can work towards developing targeted interventions and treatments to improve outcomes and enhance the quality of life for individuals with ASD (Wilson et al., 2020).

In the continuation of comprehending the ASD presentation of females, Kreiser and White (2014) sought to examine the emphasis of gender differences in ASD diagnosis. Research was explored beyond biogenetic models (emphasis on biological and genetic factors) to consider sociocultural influences that might contribute to the differential expression of ASD in females. Kreisser and White (2014) found potential underidentification of ASD in females, specifically those without concurrent intellectual impairment. This is due to the subtle yet significant gender-related differences in symptom expression. For example, females may exhibit fewer

stereotyped behaviors associated with ASD but may show increased rates of internalizing problems (Kreiser and White, 2014). As mentioned in prior research results, the underdiagnosis in females could be caused by assessment tool biases and diagnostic practices. In order for more research to continue the understanding of gender differences in ASD, improved assessment practices and policies that account for gender-specific symptoms must be developed (Kreiser and White, 2014).

## Current Biases in Perception of ASD in Females

There are diverse biases that exist in the perception of ASD in females. In order to address a variety of biases that are present in the perception of ASD in females, this section has been divided into three subsections. The three subsections discuss *clinician biases and interpretation bias*, *diagnostic criteria and measurement bias*, and *Social Expectations and Gender Disparity.*

### *Clinician Biases and Interpretation Bias*

There are various factors that contribute to the biases in perception of ASD in females. Clinician biases were detected by several studies as a hindrance to the diagnosis of ASD in females. A wide ranged population-based study determined that boys were more likely than girls to have a diagnosis of ASD despite both sexes demonstrating ASD symptoms in the educational and clinician records (Lockwood et al., 2020). It was suggested that clinicians may exclude females from ASD diagnosis due to an interpreting bias. When other conditions were present in females, the clinicians evaluating the girls were more likely to exclude a classification of ASD than in boys in similar prognosis (Lockwood et al., 2020). In some papers that utilized interviews

with adolescent girls with ASD and their parents, it was found that parents experienced medical professionals to be hesitant to give girls full ASD diagnosis and would typically opt for other diagnoses. Furthermore, reports of healthcare professionals noted a reluctance to diagnose a female as autistic due to a lack of awareness of ASD in females, as it was originally perceived to be a male incidence (Lockwood et al., 2020).

There has been indication of a strong bias in literature regarding misdiagnosis or lack of diagnosis of females who present with high functioning ASD characteristics. Within the past several years, the diagnostic gender bias within ASD has been presented in the research and clinical environments. However, there has been a lack of full understanding of the developmental trajectory and presentation of females with ASD (Fulton et al., 2017). This gender bias creates underidentification of females with ASD. The underidentification of females with ASD have significant consequences for the females going undiagnosed as well as the overall diagnostic process for ASD. Due to the underdiagnosis, females with ASD struggle to receive appropriate treatment and services due to the difficulties in obtaining diagnosis (Fulton et al, 2017).

Research on gender bias identified four main ways gender bias can occur: females lack of contact with diagnostic pathways in comparison to males, emphasis of behavioral manifestations that are presented in males in diagnostic criteria, inconsistent interpretation of diagnostic criteria for males and females, and females present with more muted or subtle manifestations than males in regards to impairments necessary for diagnosis (Fulton et al, 2017). Males with ASD present more external behaviors than females, which acquires the attention of health professionals and therapists to bring them to diagnostic pathways. Since females do not present such external

characteristics, they often do not have the same contact with diagnostic pathways, thus leading to diagnosis. The behavioral manifestations in males are often what the diagnostic criteria for ASD includes. Females, as mentioned in the previous section of this literature review, have the ability to camouflage and mimic others to fit social rules leading to a later or no diagnosis (Fulton et al., 2017). Practitioners present bias and inconsistency when diagnosing males and females with ASD tendencies. For example, practitioners place higher emphasis on repetitive behaviors commonly associated with males with ASD ,which leads to more diagnosis of males with ASD, but commonly excludes many females who present with ASD. Even when females do present the same core symptoms, females tend to present in more muted and subtle ways than males. This leads to females' manifestations not appearing to be "clinically significant impairments in social, occupational, or other important areas of current functioning" (American Psychiatric Association, 2013, p. 50) that is necessary for a diagnosis in ASD (Fulton et al., 2017).

### *Diagnostic Criteria and Measurement Bias*

Research identified that the differences in presentation of sexes in some disorders are particularly evident in ASD. These diverse presentations affect the measurement bias, which hinders the early detection of ASD in females and contributes to the ratio of prevalence (Burrows et al., 2022). Burrows et al. (2022) evaluated direct assessments of ASD symptoms in children from 6 to 9, 12 to 15, and 24 and 36 to 60 months of age with infant siblings of children with ASD. The goal of the study was to acquire information with how accounting for measurement bias in age and sex would affect the gender ratio of ASD diagnosis. The team examined

trajectories of social communication (SC) and restricted and repetitive behaviors (RRBs) and adjusted according to age- and sex- based biases (Burrows et al., 2022).

The results of Burrows et al.'s (2022) study highlighted the difficulties that are associated with some subjective methods to diagnose ASD. While there is a precedent of DSM-defined criteria for the diagnosis of ASD, many of these features of the assessment incorporate biases based on the influence of generations of male ASD samples on which the criteria is based. Results of research also indicated that when sex and age related measurement biases are accounted for, results provide more balanced ratios of ASD diagnosis in males and females. This research proved that measurement bias can affect the rate at which females are diagnosed with ASD and that in order to have adequate representation of females with ASD there needs to be measurement bias accounted for based on the differences in how the two genders present their ASD characteristics (Burrow et al., 2022).

Similarly, Murray et al. (2017) investigated the screening practices and whether they put females with ASD at a disadvantage based on their diverse presentation. Current screening instruments have been developed based on “male typical” ASD symptoms and have not been calibrated to incorporate tendencies that are specific to females. Due to this emphasis on male-typical characteristics of ASD in most assessments, this indicates that there is a systematic bias towards females in the detection process of ASD (Murray et al., 2017).

Many of the screeners, assessments, and diagnostic criteria of ASD are heavily influenced by predominantly male characteristics of ASD. It has been documented that females present differently than males and that at times, when females do not show the severity of

symptoms similar to their male peers, they are left undiagnosed or misdiagnosed (Kirkovski et al., 2013). To this day, there is a strong bias within literature regarding the clinical presentation of ASD in males. In order to broaden the knowledge of gender differences in ASD and how to identify these during screeners, it is important to improve the public's, teacher's, and clinicians' understanding of these issues (Kirkovski et al., 2013).

The presentation of ASD is a broad spectrum of some repetitive and restricted behaviors (RRBI), social communication issues, cognitive impairments, as well as diverse intelligibility and language skills. According to Kirkovski et al.'s review (2013), studies indicated that there is an altered phenotypic profile across the spectrum of females with ASD. Other reviewed research showed that in the areas of restricted and stereotypical interests among females and males, these stereotypical symptoms were more prevalent in males than females. There is discussion that genetic factors may play a role in the sex differences in susceptibility to ASD. This discussion indicated that females may be genetically protected or require a higher genetic load to show clinical features of ASD to the level necessary for a diagnosis. This proposal may contribute to the uneven gender ratio of prevalence of ASD (Kirkovski et al., 2013).

In order to continue the trajectory of understanding bias in diagnotic materials, Simcoe et al. (2023) execute a comprehensive study to determine the effectiveness of a modified version of the Questionnaire for Autism Spectrum Disorder (Q-ASC-M). The modified questionnaire consisted of items that were created in order to assess ASD traits that were more prevalent in females (Simcoe et al., 2023). Some subscales were able to differentiation between ASD femaels and neurotypical females such as: gendered behavior, sensory sensitivity, compliant behaviors,

imagination, and imitation (Simcoe et al., 2023). Additionally, Simcoe et al. (2023) discovered that females on the spectrum scored higher than males on the spectrum on the subscaes that measured gendered behavior, sensory sensitivity, social masking, and imitation. Simcoe et al.'s (2023) discoverings suggest that the modified questionnaire could aid in the early detection of ASD in young girls and further empahsized the importance to recognize gender-specifc ASD traits.

Cariveau et al. (2021) continued the investigation of the various gender disparities among youth seeking treatment for ASD. Data was analyzed from a cohort of individuals seeking treatment in order to identify potential variations in the presentation of ASD in males and females. Such variations included symptom severity, adaptive functioning, and response to treatment (Cariveau et al., 2021). Cariveau et al. (2021) found notable differences in the presentation of ASD symptoms and adaptive functioning based on gender. This finding highlighted the significance of considering gender-specific factors in the diagnosis and addressing of ASD among youth. Moreover, it emphasized the need for tailored interventions that account for these variations (Cariveau et al., 2021). Similar to Cariveau et al. 's (2021) curiosity regarding variations in presentation of ASD in females versus males, Dillon et al. (2023) continued this delve into sex differences among children and adolescents in a national cohort for ASD. However, Dillon et al. (2023) aimed to analyze both intrinsic and extrinsic factors that contributed to these disparities and placed focus on the behavior patterns, cognitive functions, and environmental influences in order to understand the nuanced differences between sexes in the ASD population. Revelations from this study indicated that both inherent and external elements impacted the manifestation of ASD symptoms in males and females. This

placed an emphasis on the necessity for comprehensive assessments and tailored interventions that account for these diverse influences (Dillon et al., 2023). Consistent with previous research Dillon et al. (2023) provided valuable insights into further comprehending the complex variations of ASD in the genders as well as placed urgency on development of a holistic approach to address these differences.

### *Social Expectations and Gender Disparity*

An explanation that appeared in many studies determined that the differences between female and male presentation of ASD is highly based on the notion of increased social expectations of females. This is supported by the notions that the adult perception of gender roles influences their interactions with children as well as their perception of ASD symptoms in children (Kirkovski et al., 2013). Typically, social activities between females relies more on communication and sharing of interests than male social interactions do. Individuals with ASD prefer to engage in activities that do not require social interaction such as video games, sports,or watching movies. An additional bias that has been suggested is that since females have spent more time in predominantly male special education classrooms, the curriculum may have been more focused on the male gender. This results in the impeding females' ability to develop and interact with other females (Kirkovski et al., 2013).

Throughout the years, epidemiological studies have noted a strong male bias in ASD. Postorino et al. (2015), investigated the longitudinal gender differences in developmental profiles of 30 male and 30 females in preschool with ASD. Autism Spectrum Disorder is a broad umbrella term that is overall characterized by persistent shortfalls in social interaction and

restricted and repetitive patterns of behavior. Epidemiological studies have indicated a significantly higher prevalence of ASD in males than females. Studies have noted that gender disparity in the disorder could be caused by a strong social gender bias, which causes parents and clinicians to have inconsistent perceptions and expectations for boys in comparison to girls (Postorino et al., 2015). Studies have also hypothesized that the data could reflect a bias that exists within the diagnostic criteria due to differentiated behavior phenotypes in males and females. These biases create the danger for girls to go undiagnosed or misdiagnosed. Although there have been studies done regarding the gender disparity in the rates, there is limited research in which gender differences in ASD symptoms determine which biases need to be conquered in order for females with ASD to be identified appropriately (Postorino et al., 2015).

Research suggested that females show a decreased amount of repetitive behaviors and a lack of consistent differences in social communication symptoms. Results of research indicated the possibility that high-functioning females with ASD are differentially underidentified (Frazier et al., 2014). When females present a lack of repetitive symptoms but show social interaction or communication difficulties, it presents the dilemma of underidentification of ASD due to the lack of traditional symptoms/severity (Frazier et al, 2014). Traditional attributes of ASD are associated with male interest and characteristics as mentioned above. The tendency of underidentification of females with ASD is supported by moderator analysis. This analysis indicated that larger sex differences at older ages and modification of sex differences in IQ as well as adaptive behavior by race and income may insinuate the underidentification of females (Frazier et al., 2014). The research collected in this area suggests that evaluators be aware of the difference between males and females when it comes to presentation of ASD while conducting

evaluations. There should also be a consideration of looking for female-specific indicators. Another suggestion from the research is the consideration of qualification of the Social Communication Disorder as an alternative to ASD for females when they do not qualify fully for ASD (Frazier et al., 2014). The suggestion to qualify females for a different disorder in order to receive a diagnosis to get the treatment needed supports that there is a bias in the diagnostic criteria that females are being excluded from the opportunity to receive appropriate diagnosis of ASD.

Antezana et al. (2019) investigated the gender differences in restricted and repetitive behaviors (RRBs) and interests in children with ASD. Focus was placed on the understanding of how these behaviors and interests manifest differently between males and females with ASD. Assessments were conducted on a sample of children with ASD and their RRBs and interests were analyzed. Various domains of RRBs were examined such as: repetitive motor movements, insistence on sameness/routine, and restricted interests. The aim of this study was to identify potential gender disparities in the frequency and intensity of these behaviors and interests (Antezana et al., 2019). Results showed that gender differences in the presentation of RRBs and interests in children with ASD exists. Males with ASD demonstrated a higher frequency and intensity of RRBs in comparison to females. Males showed a greater engagement in repetitive motor movements and insistence on sameness. In contrast, females with ASD displayed a higher prevalence of restricted interests compared to males (Antezana et al., 2019). The findings of this study presented the suggestion that gender differences in RRBs and interests may have implications for understanding the unique expression of ASD in males and females. These findings help establish a better understanding of the heterogeneity within the ASD population

and place importance on considering gender differences in research, assessment, and intervention approaches (Antezana et al., 2019).

Santos et al. (2022) conducted a comprehensive literature review to investigate the male sex bias in ASD, ADHD, and schizophrenia. The study employed a qualitative approach, analyzing existing research papers, clinical studies, and meta-analyses to identify common trends and patterns related to the prevalence and characteristics of these disorders in males. The study by Santos et al. (2022) revealed several key findings regarding the male sex bias in neurodevelopmental disorders. Firstly, the researchers found a consistent male predominance in the prevalence of ASD, ADHD, and Schizophrenia across different age groups and populations. This suggests a shared aspect of increased vulnerability to these disorders in males. Secondly, the study highlighted differences in the timing of onset between males and females for each disorder. Earlier age of onset in males compared to females was seen in ASD and ADHD, while schizophrenia tended to have a later onset in males (Santos et al., 2022). These variations in age of onset may have implications for understanding the underlying mechanisms and risk factors associated with each disorder.

Santos et al. (2022) identified gender-specific symptom presentations in neurodevelopmental disorders. For example, females with ASD and ADHD may exhibit more internalizing symptoms, while males tend to display more externalizing behaviors. Santos et al. (2022) explored potential genetic and hormonal factors that could contribute to the male sex bias in these disorders. Differences in sex-specific gene expression and hormonal regulation may play a role in shaping the vulnerability and manifestation of neurodevelopmental disorders in males.

The findings of this study have important implications for understanding the male sex bias in neurodevelopmental disorders.

By recognizing the shared aspects and differences in prevalence, symptomatology, and etiology between males and females, clinicians and researchers can develop more targeted and gender-specific approaches to diagnosis, treatment, and intervention (Santos et al., 2022). Santos et al. (2022) highlighted the need for increased awareness and consideration of gender-specific factors in research and clinical practice. By understanding how these disorders may manifest differently in males and females, professionals can ensure that assessment and support are tailored to meet the unique needs of each individual. Santos et al.'s (2022) study provided valuable insights into the male sex bias in neurodevelopmental disorders, specifically ASD, ADHD, and schizophrenia. Santos et al. (2022) emphasized the importance of recognizing gender-specific patterns and characteristics in these conditions, ultimately guiding the development of more effective and individualized approaches to diagnosis and treatment. By addressing the male sex bias in neurodevelopmental disorders, professionals can work towards improving outcomes and quality of life for all individuals affected by these complex conditions (Santos et al., 2022).

In the advancement of gender disparity in ASD research, Lemon et al. (2011) focused on executive functioning as it plays a crucial role in cognitive processes, particularly in individuals diagnosed with ASD. The study was conducted with focus on response inhibition (a key component of executive functioning) in order to further explore gender differences in ASD (Lemon et al., 2011). Lemon et al. (2011) shed light into gender-related variations in response

inhibition such as that females with ASD demonstrated significant delays in stopping time which indicated poorer inhibition skills when compared to typically developing females. However, males with ASD did not display impairments in response inhibition. Lemon et al.'s (2011) findings provide the suggestion that females with ASD may possess a distinct neurobehavioral profile which potentially require diverse clinical approaches in comparison to males with ASD.

Similar to Lemon et al.'s (2011) research, Lugo et al. (2022) investigated the variations in manifestations of ASD in females when compared to male peers. ASD presentation in females compared to males was examined with a lens focused on neurobehavioral functioning. Participants of the study consisted of individuals diagnosed with ASD and typically developing of both genders (Lugo et al., 2022). Results demonstrated that while males with ASD did not show impairments in response inhibition, as found by Lemon et al. (2011), which indicated gender-specific variations in neurobehavioral profiles.The outcomes of Lugo et al.'s (2022) and Lemon et al.'s (2011) studies, produced crucial implications for clinical intervention and assessment approaches in ASD in which emphasis be placed on gender-specific considerations.

In order to better understand the variations in ASD symptomatology between males and females, May et al. (2014) explored the longitudinal trajectory of symptoms in high-functioning children with ASD with a focus on the impact of gender. This research revealed potential gender-specific trajectories in symptom manifestation (May et al., 2014). May et al. (2014) delved into a one-year follow up of high-functioning children with ASD, examining variations in autistic, attention, and anxiety symptoms concerning gender differences. Females with ASD demonstrated a decline in attention symptoms over time,whereas males demonstrated a plateau.

Also, females showed higher levels of anxiety initially compared to males, but a significant decrease in anxiety symptoms during the follow-up period (May et al., 2014). May et al.'s (2014) research emphasized the need to consider gender-specific patterns in symptomatology in order to create tailored interventions and support strategies so that all individuals with ASD may prosper.

**Barriers in the Assessments used to Diagnose and Screen for ASD in Females**

In the rising numbers of ASD diagnosed, females continue to have less diagnoses than males. In the past, ASD has been thought to be a predominantly male disorder and a recent review showed a three to one ratio in male to female diagnoses (Lockwood et al., 2020). While some females with ASD present similarly to males with ASD, there are significant differences that are becoming increasingly apparent between how the two genders with ASD present. This study identified six behavior barriers to the diagnosis of ASD in girls/young women as behavioral problems, social and communication abilities, language, relationships, additional diagnoses/difficulties, and restricted and repetitive behaviors and interests (Lockwood et al., 2020). In relation to behaviors, the review of literature indicated that when comparing females and male behaviors, it was found that ASD girls were found to be more hyperactive and present more behavioral problems than girls who did not meet ASD criteria. In contrast, in males there was no difference in this area (Lockwood et al., 2020). Several studies have indicated that social communication abilities are an influential factor of diagnosis of females with ASD. Research shows that autistic social traits (AST) are more detectable in males in early ages (seven years old) whereas in females these traits typically are slightly more detectable by early to mid-adolescence (13 years old). This information leads researchers to detect that at younger

ages, females are able to better camouflage with social norms whereas overtime, it becomes more difficult and the camouflaging is not effective (Lockwood et al, 2020).

Lockwood et al., (2020) reviewed the study done by Dqorynski et al. 's (2012) study looking at diagnostic criteria of ASD. The study showed that girls meeting diagnostic criteria for ASD demonstrated severely lower levels of verbal cognitive ability than boys. Evidence indicated that verbally able girls are significantly older at age of diagnosis than boys (Lockwood et al., 2020). The Childhood Autism Spectrum Test (CAST) Research further suggests that girls often require an additional language difficulty in order to get an ASD diagnosis, whereas this is not the case for boys. In alternative studies focusing on relationship and social skills, it was observed how male and female adolescents with high-functioning ASD demonstrated in the social skills domain. The study determined that females demonstrated similar friendship and social functioning as typically developing males (Lockwood et al., 2020). Lockwood et al. (2020) reviewed three studies that evaluated the gender differences in restrictive and repetitive behaviors/interests (RRBIs). Lockwood et al. (2020) noted that males show more RRBIs than females and that when RRBIs are being used as a predictor of ASD diagnosis, it is more accurate with males than females. These studies also revealed that cognitive impairments increase the possibility of having an ASD diagnosis documented in boys, but not in girls. This detail presents the idea that when a cognitive impairment is identified in a female, the likelihood of an ASD assessment taking place decreases (Lockwood et al., 2020).

Based on Lockwood et al's (2020) literature review, there were five identified barriers to female diagnosis: compensatory behaviors, parental concerns, others' perceptions, lack of

information/resources, and clinician bias. Within the literature review, six studies were observed to evaluate how compensatory behaviors act as barriers to female diagnosis for ASD. When girls were observed in social situations, it was more difficult to identify whether or not social difficulties were present due to their ability to mask challenges. In comparison, boys with ASD were more identifiable based on social interaction challenges. Due to this, females are less likely to be identified with ASD within a school setting (Lockwood et al., 2020). When investigating parental concerns, parents express ASD concerns 1.46 more often for boys than for girls. After conducting research surrounding interviews with adolescent girls with ASD and their mothers, it was identified that when parents offered concerns regarding ASD, they were met with skepticism from others (Lockwood et al., 2020). An additional barrier to the diagnosis of ASD in females is a lack of information and resources. When eleven mother-daughter duos were interviewed, parents expressed that finding information that would help their daughter with ASD was very difficult. The information available was exclusively regarding boys with ASD (Lockwood et al., 2020).

Evans et al. (2019) explored the sex/gender differences in the screening process for ASD and its implications for evidence-based assessment. This study focused on the challenges and biases that may arise during the assessment for ASD in males and females and what ways these differences impact the effectiveness of screening measures. Existing literature was reviewed to identify the potential reasons behind the observed sex/gender disparities in ASD screening. Predominantly male samples have been referred to during the development of many screening tools and diagnostic criteria for ASD, thus leading to the potential bias and limitation to accurately identifying ASD in females (Evans et al., 2019). This study placed the emphasis on

the need for more gender-informed approaches to ASD screening. It suggested that screening measures should consider the specific symptoms and presentation patterns that are typically more prevalent in females with ASD. In addition to this, the study discussed the importance of the consideration of both biological sex and gender identity when assessing for ASD, due to unique experiences and challenges individuals who do not conform to traditional gender norms have faced (Evans et al., 2019). Evans et al. (2019) proposed that in order to improve ASD screening and assessment, there needs to be a development of gender-sensitive screening tools and the incorporation of broader domains of functioning beyond core ASD symptoms. The team also highlighted the importance of collaboration and increased awareness among clinicians and researchers in regards to sex/gender differences in ASD. UltimatelyEvans et al. (2019) highlighted the significance of considering sex/gender differences in ASD screening and assessment (Evans et al., 2019).

Timely and accurate diagnosis is crucial for early intervention and appropriate support for individuals with ASD. The diagnostic process for ASD can be complex thus leading to delays in access to services. The study conducted by Rutherford et al. (2018) focused on improving the efficiency and quality of the children's ASD diagnostic pathway. A comprehensive study was conducted to evaluate and enhance the diagnostic pathway for children with ASD. Research was influenced by the experiences and insights of professionals who work within the diagnostic process. This list of professionals include clinicians, psychologists, educators, and healthcare providers (Rutherford et al., 2018). A qualitative approach was utilized using interviews, focus groups and documented analysis in order to gather data and identify key areas for improvement. The results showed significant variations in assessment practices and diagnostic criteria among

different professionals and services. This demonstrates a lack of standardization in diagnostic approaches led to delays and inconsistencies in the diagnostic process.

Furthermore, collaboration was highlighted between the diverse disciplines of those involved in the diagnostic process. Effective communication and cooperation between professionals involved in the diagnostic pathway were found to be an essential component to the improvement of the process and its effectiveness (Rutherford et al., 2018). Another key component noted in order to increase the efficiency of the diagnostic process, is the significance of involving parents and caregivers in the diagnostic process. When it is ensured that families were well-informed and supported through the entirety of the assessment journey, it was found to positively impact the overall quality of the diagnostic pathway. The study identified challenges related to the availability and access to assessment services, especially in more remote or underserved areas. Addressing the geographic disparities and ensuring equitable access to timely assessment is a critical area for improvement (Rutherford et al., 2018). Ongoing professional development and training for those who are involved in an ASD diagnosis is crucial to optimize the diagnostic pathway. The enhancement of the clinician's knowledge and expertise in recognizing early signs of ASD and using evidence-based assessment tools will increase the effectiveness of the diagnosis process (Rutherford et al., 2018). By addressing the identified areas of improvement and implementing evidence-based practices, professionals can work towards a more streamlined and effective diagnostic process, ultimately benefiting children with ASD and their families.

As research further investigated the issue of the lack of diagnosis as well as the misdiagnosis of females on the spectrum, the topic of sex/gender biases were sought into. A mixed-methods investigation was conducted to explore diagnostician sex/gender bias and challenges in assessing females for ASD (Tsirgiotis et al., 2022). Both qualitative and quantitative approaches were utilized to gather data. This included surveys, interviews, and document analysis. The study involved clinicians, diagnosticians, and other professionals involved in the diagnostic process to gain insights into their experiences and perspectives. The research aims to shed light on the impact of gender bias on the diagnostic process and highlight potential areas for improvement in identifying and supporting females on the autism spectrum. The study by Tsirgiotis et al. (2022) yielded several significant findings related to diagnostician sex/gender bias and challenges in assessing females for ASD. Firstly, the research identified gender biases among diagnosticians, with a tendency to associate ASD more frequently with males than females. This bias might influence the recognition and referral of females for ASD assessment, leading to potential underdiagnosis or misdiagnosis.

Tsirigiotis et al. (2022) highlighted challenges in accurately assessing females for ASD due to atypical or camouflaging behaviors. Females on the autism spectrum may present with different symptomatology than males, making it harder to recognize their social communication and sensory challenges. This masking behavior can lead to delayed or inaccurate diagnoses, as their difficulties may go unnoticed during the evaluation process.Training and education for diagnosticians to improve their awareness of gender differences in ASD presentation is crucial. Increasing knowledge and understanding of the unique characteristics of ASD in females can lead to more accurate and early diagnoses. Tsirgiotis et al. (2022) explored the potential impact

of diagnostician sex on diagnostic outcomes. The study found that female diagnosticians were more likely to recognize ASD symptoms in females and make appropriate referrals for assessment.

Tsirgiotis et al. (2022)'s findings have critical implications for addressing diagnostician sex/gender bias and challenges in assessing females for ASD. By recognizing and addressing the biases that may exist within the diagnostic process, professionals can work towards providing more equitable and accurate assessments for all individuals, regardless of gender. The need for gender-sensitive training and education for diagnosticians was highlighted in this research. By improving their understanding of gender-specific manifestations of ASD, professionals can enhance their ability to recognize and diagnose females on the autism spectrum. Tsirgiotis et al.'s (2022) study provided insights into diagnostician sex/gender bias and the challenges in assessing females for ASD. The research underscored the importance of raising awareness and providing gender-sensitive training for diagnosticians to improve the diagnostic process for all individuals with ASD. By addressing the gender biases and challenges, professionals can work towards more equitable and accurate diagnoses, ultimately leading to better support and interventions for females on the autism spectrum.

**Social Communication in Females Versus Males with Autism Spectrum Disorder**

Conlon et al. (2019) investigated the  gender differences that exist in pragmatic communication in school-aged children with Autism Spectrum Disorder (ASD). Pragmatic communication refers to the ability to effectively and appropriately use language in social interactions, taking into account the context, social cues, and shared understanding between

communication partners (Conlin et al., 2019). The study focused on understanding how males and females with ASD differ in their use of pragmatic language skills, which involve using language in social contexts. Assessments were conducted on a large sample of school-aged children with ASD. The researchers used these assessments to analyze their pragmatic language skills. The results revealed significant gender differences in pragmatic communication. These results identified that females with ASD demonstrated better overall pragmatic language skills compared to males with ASD. Specifically, females showed higher levels of initiating and responding to social interactions, as well as using appropriate nonverbal cues and maintaining conversations (Conlon et al., 2019). The findings of this study suggested that females with ASD may possess certain strengths in pragmatic communication compared to males with ASD. These findings contribute to a better understanding of the unique characteristics and challenges faced by females with ASD in their social communication abilities.

Dworzynski et al. (2012) sought out to further evaluate the similarities and differences between boys and girls who are both above and below the diagnostic threshold for Autism Spectrum Disorders (ASD). The study examined the gender differences in social communication and repetitive behaviors in a large sample of individuals with and without ASD. The researchers conducted a comprehensive assessment of autistic traits in both boys and girls, comparing those who met the diagnostic criteria for ASD and those who did not. Dworzynski et al. (2012) measured social and communication difficulties, as well as repetitive behaviors, using standardized measures.

Dworzynksi et al.'s (2012) findings revealed that girls and boys with ASD demonstrate similar levels of social and communication difficulties when they meet the diagnostic criteria. However, below the diagnostic threshold, girls with ASD exhibited fewer repetitive behaviors compared to boys. This suggests that girls with ASD may present differently and have a somewhat different profile of symptoms compared to boys, particularly when their symptoms are less severe (Dworzynski et al., 2012). This is conclusive with what other literature in this field has found. The work conducted by Dworyzkinski et al. (2012) highlighted the importance of considering gender differences when assessing and diagnosing ASD. It suggested that there may be distinct presentation patterns and symptom profiles in girls and boys with ASD, especially in milder cases. Understanding these differences is crucial for accurate identification and appropriate support for individuals with ASD, taking into account potential gender-specific symptom manifestations (Dworzynski et al., 2012).

McVey et al. (2017) sought to research the impact of the Program for the Education and Enrichment of Relational Skills (PEERS), social skills intervention on social behavior in girls with ASD. The goal was to determine whether gender infleunced the effectiveness of the intervention. McVey et al. (2017) used an intervention-based method to observe the impact of the PEERS intervention. The PEERS program was overall proven to be beneficial for females in ASD and lead to improvements in social behaviors, it was found that in this scenario, gender did not significantly influence the intervention's effectiveness (McVey et al., 2017). It is crucial to investigate studies that sought to investigate disparities and found none because it is increasing

the reliability and accuracy of the interventions being adminsitered to individuals on the spectrum and increased fidelity of these strategies.

**Special Education for Children with ASD**

McDonald et al. (2019) explored the patterns of special education service utilization among children with ASD. The research aimed to provide valuable insights into the current utilization of educational services and identify potential areas for improvement to better support children with ASD. The researchers conducted a comprehensive investigation into special education service use by children with ASD. A quantitative approach was taken, utilizing data from large-scale surveys and national databases. McDonald et al. (2019) analyzed patterns of special education service utilization, including classroom placement, service duration, and types of interventions received by children with ASD. The study by McDonald et al. (2019) yielded important findings regarding special education service utilization among children with ASD.

Firstly, the research revealed that a significant proportion of children with ASD receive special education services, highlighting the importance of tailored support for this population. The study identified variations in the types of services and interventions received by children with ASD. These included a range of classroom placements, such as inclusive settings, self-contained classrooms, and specialized schools (McDonald et al., 2019). Additionally, children with ASD accessed a variety of therapeutic and support services, including speech therapy, occupational therapy, and behavioral interventions. Furthermore, McDonald et al. (2019) found that factors such as socio-economic status, geographic location, and severity of ASD symptoms influenced the likelihood and extent of special education service use. These disparities

suggest the need for addressing potential barriers to access and ensuring equitable opportunities for children with ASD to receive appropriate educational support (McDonald et al., 2019).

Menzes et al. (2023) conducted a comprehensive study to examine the disparities in special education services for youth with ASD. A quantitative approach was utilized to analyze national data from surveys and databases to identify patterns and trends related to service utilization. The study aimed to understand how various factors, such as demographics and geographic location, influence the access to and provision of special education services for youth with ASD (Menezes et al., 2023). The study revealed significant disparities in accessing special education services for youth with ASD in the United States. Disparities were highlighted based on socio-economic status, with youth from lower-income families experiencing greater challenges in accessing specialized services. Menzies et al. (2023) identified disparities in service provision based on racial and ethnic backgrounds. Youth from certain minority groups were found to have less access to specialized services, indicating potential systemic inequities in service delivery (Menezes et al., 2023). Additionally, geographic location played a crucial role in disparities. Youth residing in rural areas had limited access to specialized educational services, leading to potential delays in diagnosis and intervention (Menezes et al., 2023).

Moreover, the research conducted by Menezes et al. (2023) found variations in service utilization based on the severity of ASD symptoms. Youth with more severe symptoms were more likely to receive specialized services, while those with milder symptoms may not receive the support they need. This study provided critical implications for addressing disparities in special education services for youth with ASD (Menezes et al., 2023). Understanding the factors

influencing unequal access and provision of services can guide policymakers and educators in developing targeted interventions to bridge the gap. The research also emphasized the need for increased awareness and resources to support families from disadvantaged backgrounds and underserved communities (Menezes et al., 2023).

By addressing financial, racial, and geographic barriers, professionals can work towards creating a more inclusive and equitable educational system for youth with ASD. Menezes et al.'s (2023) study shed light on the disparities in special education services for youth with ASD in the United States. Addressing financial, racial, and geographic barriers to ensure equitable access to specialized support for all individuals with ASD is important in order to comprehend disparitie. By implementing targeted interventions and increasing resources, professionals can work towards providing more inclusive and effective educational services for youth with ASD, ultimately improving their developmental outcomes and overall quality of life (Menezes et al., 2023).

**Chapter Summary**

The research surrounding the diagnosis of ASD in females highlighted disparities in the recognition and assessment. This effectively challenged the historical perception of ASD as a primarily male dominating diagnosis (Milner et al., 2019). The studies shed light on the underrecognition of females with ASD attributed to various factors such as gender-related social behaviors, biases in diagnostic criteria or assessment tools and the ability for girls to mask their ASD characteristics (Dean et al., 2017; Hagit et al., 2021; Milner et al., 2019). Research findings pointed out the necessity for an advancement in the understanding of ASD which includes

acknowledging the diverse manifestations across genders. Emphasis was additionally placed on the need for more inclusive diagnostic approaches (Hagit et al., 2021). It is imperative that these diagnostic gaps get addressed in order to ensure equitable access to resources and interventions for individuals with ASD regardless of their gender. This would foster better outcomes and support for all individuals on the spectrum (Dean et al., 2017; Milner et al., 2019). Additionally, the research conducted showed the complexities of identifying and diagnosing girls and women with ASD (Gould et al., 2017). The research conducted by Gould et al. (2017) identified that gender bias is prevalent in both diagnostic criteria and assessment tools.

Biases in the perception of ASD in females presented as significant challenges in diagnosis and recognition throughout research (Fulton et al., 2017; Lockwood et al., 2020). Various forms of these biases looked like clinician bias, interpretation biases and diagnostic criteria/measurement biases. These biases hindered the identification of ASD in females (Fulton et al., 2017); Lockwood et al., 2020). Diagnostic criteria and measurement biases present delays and affect the early detection of ASD in females which ultimately contributes to the discrepancies in the prevalence ratios (Burrows et al., 2022). Gender-specific nuances in ASD symptoms also affect the diagnostic process, leading to underidentification and underserved females within the spectrum (Frazier et al., 2014). In order to accurately identify and support females with ASD, research pointed out that it was necessary for these biases to be understood and addressed. The biased nature of many screening tools and diagnostic criteria contributed to the underdiagnosis of females with ASD (Kirkovski et al., 2013). Various research deciphered that the understanding and addressing of these biases would create advancements in the

interventions for females on the spectrum (Burrows et al., 2022; Fulton et al., 2017; Gould et al., 2017;Lockwood et al., 2020; Murray et al., 2017; Wilson et al., 2020).

The research examined the impact of endocrine on the pathophysiology of ASD which revealed findings related to hormonal dysregulation and its potential to impact on ASD development (Wilson et al., 2020). The acknowledgment of the interaction between endocrine systems and genetic susceptibility provided new insights into targeted therapies and interventions to improve outcomes for individuals with ASD (Wilson et al., 2020). Furthermore, studies highlighted the consistent gender-specific symptom presentations in neurodevelopmental disorders, such as ASD, which suggested a need for tailored approaches in diagnosis, treatment and interventions (Santos et al., 2022).

Collectively, the studies that were investigated in this literature review emphasize the critical need for gender-sensitive diagnostic criteria, screening tools and interventions to address the lack of recognition of females with ASD (Kirkovski et al., 2013; Lockwood et al., 2020; Murray et al., 2017). When the distinct gender differences in ASD are understood and acknowledged, professionals are able to develop more accurate and appropriate approaches to fit the needs of both males and females on the spectrum.

# CHAPTER III: CONCLUSION

## Summary of Literature

The diagnosis of Autism Spectrum Disorder (ASD) in females has been influenced by various factors. Research has shown that girls with ASD may use compensatory behaviors to mask their ASD characteristics, making it harder to detect their social challenges compared to boys with ASD. This "camouflage effect" may contribute to the underdiagnosis of females with ASD (Dean et al., 2017). There has been a presumption of a significant gender discrepancy in the diagnosis of ASD, with a higher prevalence in males. However, recent research indicates that the ratio of males to females with ASD may be closer to three to one, indicating a smaller gender difference than previously presumed (Milner et al., 2019). This may be due to the use of predominantly male samples in autism research, leading to a biased understanding of the full spectrum of autism.

The recognition and assessment of autism have been based on male-centered stereotypes, which can lead to the underdiagnosis of females who may present differently or camouflage their autistic characteristics (Milner et al., 2019). Girls suspected to have ASD may perform better in social and emotional tasks compared to boys with ASD, leading to a "camouflage effect" and underdiagnosis of females. Assessment tools used to diagnose ASD may have gender-specific biases, further contributing to the underrecognition of girls with ASD (Hagit et al., 2021). Clinician biases and interpretation bias have also been identified as hindrances to the diagnosis of ASD in females. Clinicians may be more likely to exclude a diagnosis of ASD in females due to interpreting bias and may opt for other diagnoses even when ASD symptoms are present. Gender bias in diagnostic criteria and measurement can also

contribute to the underdiagnosis of females with ASD (Lockwood et al., 2020). Overall, addressing the biases in perception and diagnosis of ASD in females is crucial for early identification and appropriate support and intervention. Raising awareness about the unique presentation of ASD in females, developing gender-sensitive diagnostic criteria and assessment tools, and considering endocrine factors in the etiology of ASD can lead to improved outcomes and quality of life for girls and women on the autism spectrum (Burrows et al., 2022; Gould et al., 2017; Murray et al., 2017).

In conclusion, the research on social expectations and gender disparity in Autism Spectrum Disorder (ASD) highlights significant differences in how males and females with ASD are perceived and diagnosed. The studies suggest that increased social expectations placed on females and biases in diagnostic criteria contribute to the underidentification or misdiagnosis of females with ASD as indicated in the research conducted by Kirkovski et al. (2013). The study conducted by Milner et al. (2019) indicated that the presentation of ASD symptoms in females is often influenced by social expectations, leading to a potential camouflaging of challenges in social interactions. Females with ASD may exhibit different patterns of behaviors, and their difficulties may not align with the traditional male-centric diagnostic criteria (Milner et al., 2019). As a result, they may be overlooked or diagnosed later in life compared to their male counterparts. Research findings also reveal gender-specific symptom presentations in ASD. Females may exhibit fewer repetitive behaviors, making them less likely to meet the diagnostic criteria based on traditional male-oriented assessments (Hagit et al., 2021; Milner et al., 2019). This underidentification of females with ASD emphasizes the need for gender-sensitive approaches to assessment and diagnosis.

**Professional Application**

As a special education teacher, applying the information on gender disparity in Autism Spectrum Disorder (ASD) can significantly improve the identification, assessment, and support for females with ASD. Some steps that can be taken to apply this knowledge on a professional level are in the areas of awareness and education. It is crucial for Special Educators to stay updated on research and information regarding the gender disparities in ASD (Dean et al., 2017). It is important that as a profession there is familiarity with studies that highlight gender-specific symptom presentations in females (Dwyorzinksi et al., 2012; Frazier et al., 2014). In addition to staying updated on information, it is also important to share this knowledge with colleagues, parents, and other educators to raise awareness about the unique challenges girls with ASD face (Fulton et al., 2017).

Another key component that needs to be applied at a professional level is using gender-sensitive approaches when assessing students for ASD in the Special Education evaluation process (Hagit et al., 2021). Additionally, it is vital to collaborate and communicate with other professionals, healthcare providers, colleagues, and parents to ensure a comprehensive understanding of each student's strengths and challenges (Hyman et al., 2020). When open communication is encouraged, it allows for information about gender-specific presentations of ASD to be shared in order to facilitate an accurate array of assessments and interventions (Kirkovski et al., 2013).

As special education teachers differentiate instruction is a heavily practiced teaching style. It is crucial in this sense to create personalized support plans to meet the diverse needs that females with ASD may have based on the various patterns of behaviors and difficulties

(McDonald et al., 2019). It is important to create a supportive and inclusive environment that fosters social interactions and emotional regulation (Milne et al., 2019). Special education teachers also have the opportunity to advocate for equitable access to special education services for all students with ASD regardless of socio-economic status, race, gender, or geographic location. In order to apply this knowledge on a professional level, there needs to be collaboration withs school administrators to address the barriers that may be existing so that adequate interventions are available to all students with ASD receive the support they require (Murray et al., 2019).

By implementing these strategies and applying the research findings on gender disparity in ASD, special education teachers can play a crucial role in improving the lives and outcomes of female students with autism spectrum disorder (Postorino et al., 2015). The commitment to recognizing and addressing these gender-related challenges will contribute to a more inclusive and supportive learning environment for all students.

**Limitations of the Research**

While the information from research provided valuable insights, there are some limitations that may impact findings. The study by Dean et al. (2017) used a relatively small sample size of 24 girls and 24 boys with ASD, as well as 24 typically developing girls and boys. Small sample sizes may limit the generalizability of the findings and may not fully represent the diversity within the ASD population. The lack of diversity in the samples used in some studies, such as Milner et al. (2019), which included only 18 females with ASD from the United Kingdom, may limit the applicability of the findings to more diverse populations. Some studies, like the one conducted by Burrows et al. (2022), employed a cross-sectional design,

which captured data at a single point in time. Hagit et al. (2021) and Murray et al. (2017) highlighted the presence of measurement bias in assessment tools used to diagnose ASD. Measurement bias may affect the accuracy of ASD diagnosis, particularly in females, leading to underidentification as noted in Hagit et al. (2021) and Murray et al. (2017). Gould et al. (2017) and Frazier et al. (2014) emphasized the lack of understanding and awareness about the unique presentation of ASD in females among clinicians, educators, and the general public. This lack of understanding may contribute to the underrecognition of females with ASD. Gould et al. (2017) and Frazier et al. (2014) suggested that gender-related social expectations and biases can influence how ASD symptoms are perceived and interpreted by clinicians and others.

While the research by Wilson et al. (2020) explored the potential role of endocrine factors in ASD, the understanding of the interaction between hormones and ASD is still in its early stages. More comprehensive studies are needed to fully elucidate the contributions of endocrine dysregulation to ADD. Some studies have indicated that the gender bias in ASD diagnosis may be influenced by factors such as race and socioeconomic status (Frazier et al., 2014). However, not all studies have included diverse samples to capture these nuances fully. The inclusion of self-diagnosed participants in some studies, such as in Milner et al. (2019), may introduce potential biases, as self-diagnoses may lack the rigor and accuracy of professional evaluations.

Overall, while the research sheds light on the gender disparities in the diagnosis and recognition of ASD in females, it is essential to acknowledge these limitations when interpreting and applying the findings. Further research with larger and more diverse samples,

longitudinal designs, and a focus on understanding gender-specific presentations of ASD is needed to develop more inclusive and accurate diagnostic approaches for all individuals on the autism spectrum. As a special education teacher, it is crucial to be aware of these limitations and to advocate for gender-sensitive diagnostic practices to ensure equitable support for all students with ASD, regardless of their gender.

**Implications for Future Research**

The assessment and diagnosis process of ASD in females is a complex and nuanced area that requires further research. The existing research has revealed various factors that influence the underdiagnosis of females with ASD. For example, compensatory behaviors can lead to the "camouflage effect" (Dean et al., 2017). In order to increase the understanding of ASD in females, future research should address limitations and biases that have existed in previous studies.

The use of relatively small sample sizes, as seen in studies by Dean et al. (2017) and Milner et al. (2019), creates a challenge to generalizability and may not fully capture the diversity within the ASD population. Future research should aim to have larger more diverse sample sizes to ensure a comprehensive understanding of the varied presentations of ASD. Additionally, the use of cross-sectional designs, as shown by Burrows et al. (2022) limit the ability to capture the dynamic nature and developmental trajectories of ASD symptoms over time. Longitudinal designs would provide a different perspective on how ASD manifests in females throughout different stages in life. Another point to consider is the identification of measurement bias in assessment tools as highlighted by Hagit et al. (2021) and Murray et al.

(2017). These biases emphasize a need for the development and validation of assessment tools that are free from gender-specific biases. Addressing these measurement biases is crucial for accurate ASD diagnosis, especially in females. Previous research suggested that gender bias in ASD diagnosis may be influenced by factors such as race and socioeconomic status (Frazier et al., 2014). Future research should incorporate diverse samples in order to effectively capture the interactions between gender, race, and socioeconomic status in the diagnosis of ASD.

Overall, addressing the limitations and seeing the implications for research is important to advance the understanding of ASD in females. Larger and more diverse samples, longitudinal designs and validated assessment tools are essential to develop more accurate and inclusive diagnostic approaches for individuals on the spectrum of either gender.

**Conclusion**

In conclusion, the existing body of research on gender differences in autism spectrum disorder (ASD) has shed light on the biases and challenges that contribute to the underdiagnosis and misdiagnosis of females with ASD. Multiple studies have pointed to the "camouflage effect," where females may mask their ASD characteristics through compensatory behaviors, leading to delayed or missed diagnoses (Dean et al.,2017; Hagit; 2021; Milner et al., 2019). This effect, along with gender biases in diagnostic criteria and assessment tools that are based primarily on male presentations of ASD, has contributed to the male preponderance in ASD diagnosis. Dean et al. (2017) highlighted the gender-related social behaviors aiding girls in masking their ASD characteristics, while Milner et al. (2019) pointed out the issues arising from using solely male samples in autism research and the need to recognize and assess autism beyond male-centered

stereotypes. Hagit et al. (2021) explored the use of the Social Attribution Task to identify gender differences in social and emotional awareness in children with ASD.

Moreover, research has shown that clinician biases and interpretation biases play a role in the underrecognition of females with ASD. The emphasis on male-typical ASD symptoms in diagnostic criteria and assessment tools has hindered the early detection of ASD in females, further contributing to the gender disparity (Dworzynski et al., 2012). Bias in measurement and social expectations that differ between males and females also impact the identification and support of girls with ASD (Gould et al.,2017) . To address these limitations and promote equitable diagnosis and support, future research should focus on using larger and more diverse sample sizes, conducting longitudinal studies to track developmental trajectories, and developing gender-sensitive diagnostic criteria and assessment tools (Dwyorzinksi et al., 2012; Frazier et al., 2014). Additionally, research should explore the role of endocrine factors in the pathophysiology of ASD, provide professional training and awareness on gender-sensitive diagnostic practices, and adopt an intersectionality approach to consider the influence of various identities and experiences in diagnosis and support (Wilson et al., 2020).

By incorporating these recommendations, professionals, educators, and researchers can work together to improve the recognition and understanding of girls with ASD. This, in turn, will lead to earlier and more accurate diagnoses, ensuring that individuals of all genders receive the appropriate interventions and support they need to thrive (Simcoe et al., 2023). In summary, addressing gender differences in the diagnosis of ASD is essential to create a more inclusive and comprehensive understanding of the disorder. By recognizing and rectifying biases in research,

assessment, and clinical practices, individuals with ASD, regardless of their gender, can receive timely and appropriate interventions for better outcomes and quality of life (Santos et al., 2022).

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