ADDRESSING PROVIDER AWARENESS OF GENDER DIFFERENCES IN THE PRESENTATION OF AUTISM SPECTRUM DISORDER

by

Komal Wells

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As members of the DNP Project Committee, we certify that we have read the DNP project prepared by Komal Wells, titled Addressing Provider Awareness of Gender Differences in the Presentation of Autism Spectrum Disorder, and recommend that it be accepted as fulfilling the DNP project requirement for the Degree of Doctor of Nursing Practice.

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LAND ACKNOWLEDGEMENT

We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui. Committed to diversity and inclusion, the University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service.

DEDICATION

I dedicate this project to all who have had a hand in helping me reach my goals.

To my dad: The dream you visualized when I was a baby has finally been realized. I know you are proud of me. Your constant and unwavering support means the world to me!

To my husband: Malcolm, without you, I would not be where I am. You have fiercely supported me and challenged me to become the best version of myself. Your love and dedication to us make my world brighter. I know these past few years have been tough, but I thank you for letting me see my dream through. I love you. I am here.

To my children, Anya and Ahyan: I know you do not understand why mommy is busy all the time, but you have supported me anyway. You love me on my worst days and the two of you make me so much better. I love you both so very much.

To my mom: I am slowly becoming you and that is the best thing that I could ever hope for. Being able to barely come close to filling your shoes is a blessing. Your example in my life is what has shaped me into who I am. My work ethic and my drive come from you. I am relentless because you dared to be. I am so thankful to have a mother who does not know the meaning of quitting.

You all made sacrifices for me to be able to reach the finish line. I am so grateful for each of you, and I thank you for everything you have done and continue to do for me.

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ABSTRACT

Purpose. Through continued research in autism spectrum disorder (ASD), it is being discovered but not readily accepted that females present differently than their male counterparts. ASD has been known to be a male; childhood disorder that is diagnosed per the criteria highlighted in the DSM-V-TR. This quality improvement project focused on increasing the knowledge base of mental health providers regarding gender differences in the presentation of autism spectrum disorder via an educational presentation regarding camouflaging of ASD traits in females.

Background. ASD has been evolving for the past 100 years and has recently been understood as a spectrum condition. Throughout the spectrum, there are vast presentations with no two individuals with ASD being completely alike. Females are readily misdiagnosed or underdiagnosed with ASD due to their ability to camouflage or mask the traits that are known to be key indicators of ASD. Without an ability to decipher camouflaging, providers are at a disadvantage in recognizing ASD in females; however, implicit bias on the acceptance of different presentations also continues to cause hindrance in diagnosis.

Methods. Twenty-seven mental health providers with various clinical roles and years in practice were invited to join an educational presentation; eight participants joined. All eight participants completed a pre-implementation survey before the presentations and a post-implementation survey after the completion of the presentation. Data was collected via the responses to the survey and descriptive statistics were used to analyze the data.

Results. Outcome measures indicated an increase in knowledge regarding the gender presentation of ASD in the providers who attended the educational presentation. This project

found that showing how camouflaging presents in females was a key aspect in increasing the providers' knowledge.

Conclusions. The educational presentation was effective in increasing the knowledge base of the participating mental health providers and aided in creating dialogue in the practice regarding better assessment of existing and future patients.

INTRODUCTION

Autism spectrum disorder (ASD) has mainly been perceived as a childhood male disorder, with females being more commonly misdiagnosed, left undiagnosed, or receiving a diagnosis late in adulthood. In a study conducted by the National Autistic Society (Suckle, 2021), 41% of ASD females surveyed stated they experienced a misdiagnosis. Delayed diagnosis is detrimental in ASD as most interventions are most effective in early childhood and less effective as age progresses (Kavanaugh et al., 2023). Misdiagnosis of females also leads to additional mental and emotional turmoil, as therapeutic modalities that can aid them with ASD are never explored. The misdiagnosed women go through life attempting to fit into a society that is not sensitive to their needs while feeling as if something is wrong with them. The distress of never quite fitting in and having starkly different needs than others can lead to the development of other mental health conditions, such as anxiety and depression (Tang et al., 2021). The ability of these females to mask their ASD traits is known as camouflaging and is one of the main causes leading to misdiagnosis or delayed diagnosis (Tubio-Fungueiriño et al., 2021). The following quality improvement (QI) project is designed to address the knowledge base of mental health providers regarding gender differences in the presentation of ASD by implementing an educational presentation at a mental health clinic in Indianapolis, Indiana.

Background Knowledge and Significance

Evolution of Autism

The conception of autism began in the early 1900s. In 1905, Sigmund Freud utilized the term *autoerotism* in describing an infantile hallucinatory thought linked to self-soothing, which is followed by the infant’s engagement with external reality (Evans, 2013; Eisenstat et al., 2023).

In 1908, Eugen Bleuler, a Swiss psychiatrist, coined the term *autism*, which was published in 1911, describing his observation of severely withdrawn patients with schizophrenia (ABA Centers of America [ABACA], 2022). The term *autism* is derived from Greek, with *autos* meaning self and suffix *ism* implying a characteristic, condition, or theory (Eisenstat et al., 2023). Bleuler's work was regarded in schizophrenia, and within the context of schizophrenia, the concept of autism was derived. Bleuler understood the idea of autism as diving into self through withdrawing from the external world via a lack of contact with shared reality (Eisenstat et al., 2023). Autism continued to be described by psychologists and psychiatrists for years as withdrawing into self under many different terms.

In 1943, Leo Kanner, an Austrian-American child psychiatrist, began to study children who faced challenges with social interactions (ABACA, 2022). All of the 11 children studied by Kanner faced the same challenges of difficulty adapting to change, auditory sensitivity, food allergies, and general resistance to spontaneity (ABACA, 2022). These children also showed to have an excellent memory with above-average academic potential and a tendency to respond in echolalia, which is the repetition of words or phrases (ABACA, 2022). Kanner utilizes the term *autism* in describing these children as they were also disengaged with their external environment. Then, in 1944, Hans Asperger studied another group of children possessing traits similar to those studied by Kanner; however, Asperger found his group of children to have above-average language skills with no echolalia (ABACA, 2022; Eisenstat et al., 2023). For quite some time, the discoveries of Kanner and Asperger were thought to be coincidental, but now, it is known that the two were familiar with each other's work, and one may have been influenced by the other (Evans, 2013).

After Asperger's research, the field of autism began to pick up speed. In 1960, Bruno Bettelheim studied children with autism and linked its root cause to the emotional coldness of mothers, coining the phrase *refrigerator mothers* (ABACA, 2022; Eisenstat et al., 2023). In 1964, Bernard Rimland, who was a parent to a child with autism, disagreed with Bettelheim's psychoanalytical theory of *refrigerator mothers*, as he believed autism to have a neurobiological link (Eisenstat et al., 2023). Also, between 1964 and 1965, a congenital rubella epidemic spread across the United States, leading to approximately 20,000 infants being born with congenital rubella (Eisenstat et al., 2023). This epidemic led Stella Chess, an American psychiatrist, to correlate autism to a neurologic injury due to an increased prevalence of autism among children born with congenital rubella (Eisenstat et al., 2023). The genetic and biological basis to autism was finally recognized in 1977 by Susan Folstein and Michael Rutter, who conducted a study of 21 pairs of twins, where one twin was diagnosed with autism, and the other was not, further disproving the previous psychoanalytical theories regarding autism (Eisenstat et al., 2023).

In 1980, Asperger's work was translated into English, and Asperger's syndrome was introduced into autism research by Lorna Wing, a psychiatrist who pioneered the concept that autism was more of a spectrum (National Autistic Society [NAS], 2023). Wing's idea was heavily referenced by Asperger's, as he noted the differences between autistic children with different cognitive abilities (NAS, 2023). In 1987, the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) published their third edition and recognized autism as a discrete condition with specific diagnostic criteria (ABACA, 2022). In 1994, the fourth edition of the DSM included Asperger's syndrome as a separate diagnosis, which expanded autism to higher-functioning individuals (ABACA, 2022). Controversy struck in 1998 when a small study concluded the link between vaccine use and autism (ABACA, 2022). Although the study was quickly disproven and retracted, the inception of the *what-if* thought process remains alive today. At this point, the autism research had taken the concept away from its earlier schizophrenic and psychoanalytical roots and solidified it into the realm of cognitive deficits regarding language development (Evans, 2013).

In 2013, Asperger’s syndrome was removed from the DSM-V, giving rise to *autism spectrum disorder* as the umbrella term for diagnostic purposes (ABACA, 2022). In 2018, thought to be destroyed patient case files of Asperger's were discovered, shedding light on his research practices. The prime years of Asperger’s career were spent in Nazi-era Vienna, where he conducted research leading to the discovery of his affiliation with the National Socialism ideology and race hygiene policies regarding euthanasia of children with mental deficiencies (Czech, 2018). Due to the discovery of 1,012 case files between the years of 1938 and 1944, what was scrubbed of Asperger’s true research and possible nature to further the autism research, is now the leading cause of why the term Asperger’s syndrome is no longer used (Czech, 2018; NAS, 2023). Although the concept of autism being a spectrum condition remains highly relevant with the contribution of Asperger's, reliance solely on his work is no longer acceptable (NAS, 2023).

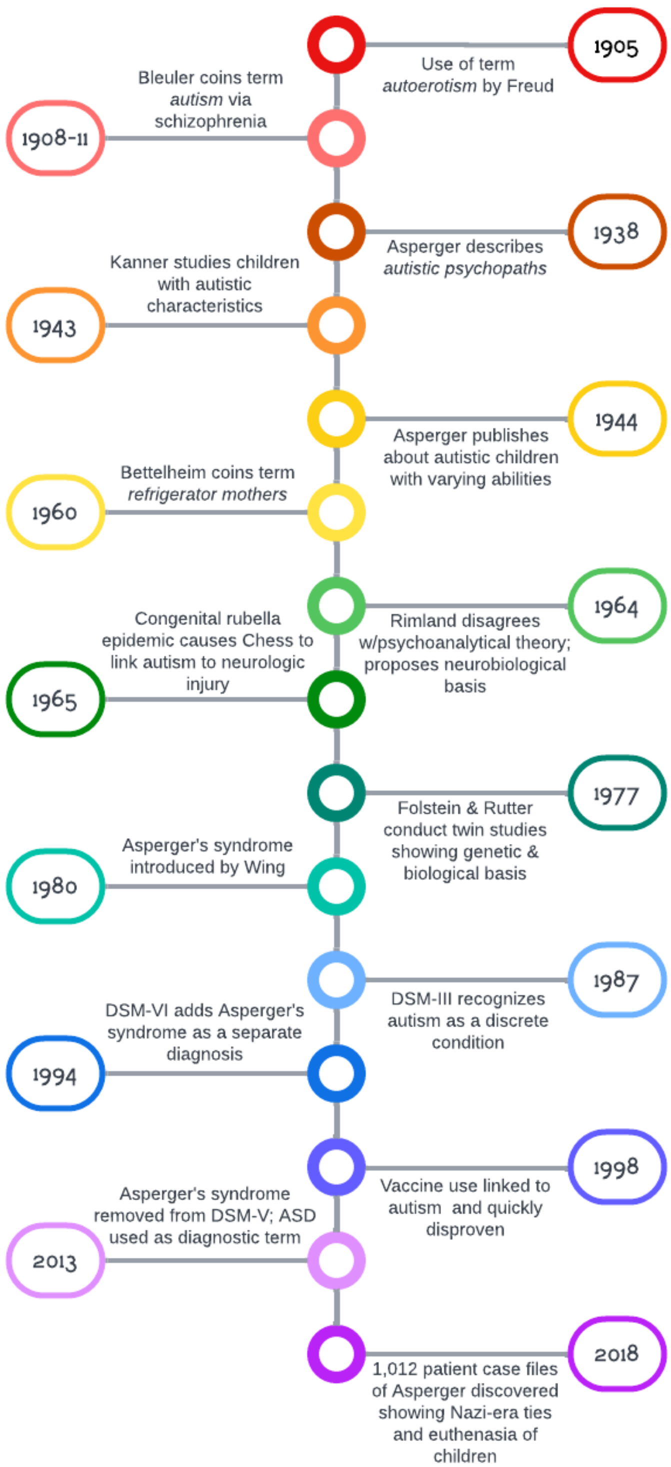
From Autistic Psychopaths to Autism Spectrum Disorder

Due to the research of Asperger’s work on autism, it was found that he was the one who described children with distinct psychological characteristics as *autistic psychopaths* in 1938 (Czech, 2018). Five years before the study conducted by Kanner in 1944, Asperger had described autistic psychopathy, making it the first scientific account of autism being recognized as a syndrome (Czech, 2018). Asperger's contributions are significant to the field of autism and his research has led the way for autism to get recognition as a spectrum disorder; however, Asperger's ideologies and his willingness to send children to their demise severely overshadow his contributions.

After over 100 years of research, autism has only recently been able to be understood as a spectrum condition that can occur in individuals with varying abilities. From the spectrum of low functioning to high functioning, who is to say only a few variations can exist? ASD is an ever-evolving field of research that continues to show that there are an infinite number of possibilities along the spectrum. Individuals who were once thought of as *psychopaths* and then were attempted to be understood through the lens of schizophrenia are now present in every walk of life, in each area of the world. And once again, the field of ASD research is gaining speed. Up until now, researchers and providers have sat with the notion that ASD is a male child disorder, with the typical presentation outlined in the DSM-V, without thoroughly recognizing the possibility of the female phenotype.

Figure 1

The Evolution of Autism



The Female Autistic Phenotype

ASD research in females has been largely based on small sample sizes (Bitsika & Sharpley, 2019) and is further complicated due to the camouflaging of symptoms in front of clinicians and the exhibition of more severe behaviors in front of their parents (Kavanaugh et al., 2023). Recently, a growing body of research has been conducted on the female presentation of ASD as more providers are speaking out regarding the diagnosis of ASD being more challenging when the client is a female (Tsirgiotis et al., 2022). The use of camouflaging or masking has been linked as one of the main causes of possible misdiagnosis in females (Bargiela et al., 2016). Masking impairments and pretending to fit in, coupled with less severe social issues, lead females to glide under the radar of ASD. Autistic females also tend to imitate and mimic others to understand social cues and maintain social norms; however, the constant masking and mimicking causes mental exhaustion and identity confusion (Bargiela et al., 2016). Mimicking others to appear typical has also led some women into manipulative and abusive situations (Bargiela et al., 2016). Women are also being measured on scales meant to diagnose individuals who display a male-like profile, and serious concerns remain if the current screening instruments can detect subtle camouflaging (Moseley et al., 2018).

Quantifying abnormality in a female with ASD traits related to a neurotypical female requires work in terms of changing the perception of how ASD *looks* (Tsirgiotis et al., 2022). Males presenting with a milder ASD presentation and females presenting with a typical ASD presentation both pose challenges for providers, as any deviation from the classic male presentation of ASD leads to confusion (Jamison et al., 2017). Per the acknowledgment in the DSM-V (American Psychological Association [APA], 2021), gender differences exist in the presentation of ASD. Characteristics of complex imitation, regarding camouflaging, are more prominent in females than males (Sedgewick al., 2016). High-functioning females diagnosed with ASD showed impaired social and structural language but also engaged in camouflaging, which gave the perception of a social advantage, where none existed (Burton et al., 2020). Menstruation is a large part of a biological female's life, and Steward et al. (2018) discovered that with ASD, menstruation can amplify pre-existing issues, such as sensory issues and emotional dysregulation. Bargiela et al. (2016) highlighted autistic individuals making deliberate attempts to mask by attempting to learn neurotypical social norms. Further, Moseley et al. (2018) raised serious concerns regarding screening instruments not being able to detect camouflaging, which hinders accurate diagnosis in women.

Local Problem

Per the Autism Society of Indiana (ASI) (ASI, 2023), the criteria for the diagnosis of ASD are based on the DSM-V, which notes gender variations; however, there are no resources to identify such variations. The statistics noted are from a 2018 study conducted by the Centers for Disease Control and Prevention (CDC) stated that the prevalence of ASD in boys versus girls is 4.2:1 (Maenner et al., 2021). It has been further noted by ASI (2023) that autism is the fastest-growing yet most underfunded developmental disorder. Due to ASD not receiving the attention it needs, girls and women may continue to go misdiagnosed or underdiagnosed until the research advances enough to create an effective screening tool that takes masking and camouflaging into account. At a local mental health clinic in Indianapolis, Indiana (IN), a team of providers responsible for seeing patients under the guidance of their medical director encounters individuals with ASD every week. The medical director, with expertise in ASD, requests that his team of mental health providers be offered education on the gender differences in the presentation of ASD to be able to improve clinical observations regarding the typical and the atypical presentation of ASD to better serve the people of their community.

Intended Improvement

This Doctor of Nursing Practice (DNP) quality improvement (QI) project intended to address the knowledge of providers of American Telepsychiatry and Associates located in Indianapolis, IN, regarding the gender differences in the clinical presentation of ASD. This QI project aimed to influence the knowledge base and improve the diagnostic ability of providers by providing education regarding gender differences and the atypical presentation of ASD in females.

Project Purpose

The purpose of this quality improvement (QI) project was to increase the awareness of providers regarding the gender differences between the clinical presentation of ASD in males and females and to be more cognizant of atypical signs presented by females to decrease the misdiagnosis and underdiagnosis of autism in females.

Project Question

Does an educational presentation regarding gender differences in females with Autism Spectrum Disorder increase the knowledge base of mental health providers at an outpatient psychiatric clinic in Indianapolis, Indiana?

Project Objectives

The proposed project included the following objectives:

1. Implement an educational intervention with mental health providers at American Telepsychiatry and Associates regarding the gender differences in the presentation of ASD.
2. Conduct a pre- and post-implementation survey to assess for changes in knowledge and the intent to utilize the information provided.
3. Evaluate the intervention's effectiveness in raising awareness of gender differences in the presentation of ASD for better diagnosis of females.
4. Provide an executive summary with the results of the project back to the site.

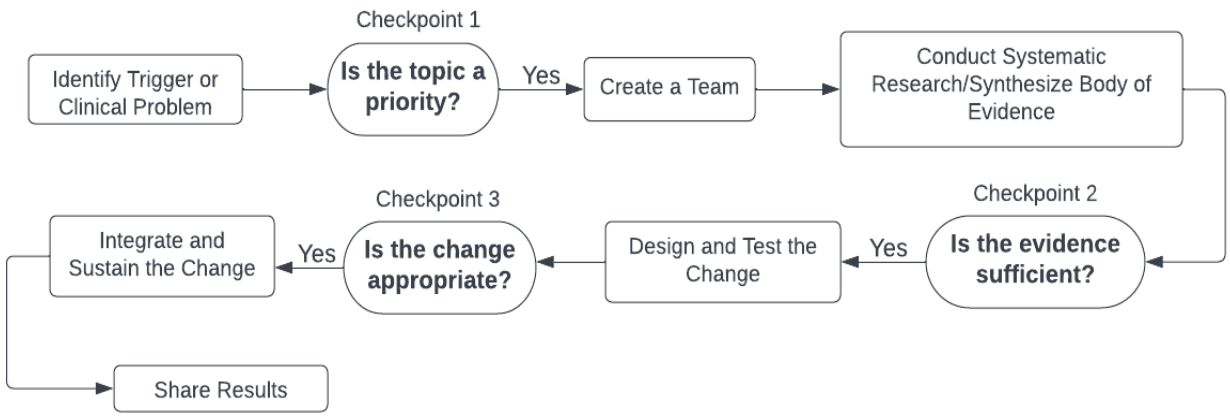
Theoretical Framework

The Iowa Model of evidence-based practice was created in 1994 by Marita Titler and others from the University of Iowa Hospitals and Clinics (Iowa Model Collaborative [IMC], 2017). It is a practice model aimed at guiding clinicians on using evidence to improve healthcare outcomes (Rycroft-Malone & Bucknall, 2010). The Iowa model was inspired by Everett Rogers' Diffusion of Innovation (DOI) theory, revised in 1983 (IMC, 2017). The model begins by identifying an issue, or a "trigger," which leads staff to question existing health practices and whether improvement is possible (Rycroft-Malone & Bucknall, 2010). If ample evidence is not found via literature review, conducting a study is given consideration (Rycroft-Malone & Bucknall, 2010); however, before forming a team, it must be decided whether the topic is a priority for the organization (IMC, 2017). A team is developed in collaboration with clinicians, psychiatrists, and other affected disciplines to begin conducting clinical research to address the identified problem to improve patient care (Rycroft-Malone & Bucknall, 2010). Findings from the study are then combined with existing research to develop further and begin implementing the practice changes (Rycroft-Malone & Bucknall, 2010). If conducting a study is found to be difficult, evidence can be compiled by synthesizing existing research to guide practice (Rycroft-Malone & Bucknall, 2010).

In 2017, the IMC was created to revise further and validate the original Iowa model (Hanrahan et al., 2019). In the revised Iowa model, triggers are simplified; however, a priority topic is still given high consideration as a decision point (IMC, 2017). The priority of the organization was expanded to include other settings, and if a topic was deemed of low importance, choosing another topic was suggested (IMC, 2017). Forming a team requires interprofessional involvement by using key stakeholders and handing targeted tasks to crucial personnel (IMC, 2017). The step to synthesize the body of evidence now includes other types of evidence outside of research, and if insufficient evidence exists, the model suggests designing and piloting the change (IMC, 2017). The last parts of the model depend on seeing if the change is appropriate. If the change is inappropriate, alternatives or redesigning the study is recommended; however, if the change is appropriate, the change can be integrated and sustained into evidence-based practice ([EBP] IMC, 2017). The Iowa model's intended users are practitioners who are guided through the process of how to apply evidence into practice (Rycroft-Malone & Bucknall, 2010). The model can be applied to various settings by various healthcare disciplines; however, one drawback of the model is the collaborative approach in forming a team, as the model does not allow a single practitioner to complete the research to create EBP guidelines (Rycroft-Malone & Bucknall, 2010).

Figure 2

The Iowa Model of EBP



(Adapted from Iowa Model Collaborative, 2017.)

To apply the Iowa model to the local problem, the model has been simplified and adapted, as shown in Figure 2. The trigger or clinical problem is the misdiagnosis or underdiagnosis of ASD in females. The priority of this topic is determined by the increasing prevalence of ASD worldwide and, more specifically, in the United States (US), with increasing evidence showing the existence of gender differences in clinical presentation. Worldwide, one in every 100 children is diagnosed with ASD (Zeidan et al., 2022), and one in 44 children has been identified with ASD in the US, with a disproportionate prevalence in males versus females (CDC, 2021). Even with such a significant number of individuals diagnosed with ASD, females remain underrepresented due to their atypical clinical presentation causing them to be missed in early diagnosis (Kavanaugh et al., 2023). Furthermore, a request for education on recognizing the atypical presentation of females has been identified as a need for ATA, lending the clinical problem to be a priority for further study.

The interprofessional team consisted of psychiatrists, nurse practitioners, and therapists as the main source of providers responsible for the diagnosis of ASD in their practice. Synthesis of the existing body of evidence was beneficial in determining the disparities between the clinical presentation of males and females with ASD. For further analysis, a survey of practitioners can be conducted to assess their knowledge of the atypical presentation of ASD in females.

The sufficiency of the quality improvement (QI) would depend upon the amount of existing research and the data pool of individuals who can complete the survey. If the data is deemed sufficient, it can be added to the existing body of research highlighting a need for gender variation in the diagnosis of ASD due to the atypical presentation in females. The appropriateness of the change can be determined by identifying the change in awareness of providers who complete the survey after being presented with existing data. Barriers to addressing the clinical problem are the availability of existing research, acquiring a sample size for significant data collection via survey method, and ultimately creating a change in the awareness of providers to account for the learned differences presented.

Literature Synthesis

A literature synthesis can aid in establishing an understanding of the existing state of knowledge regarding the given subject. The direction of the further study can be guided through the review of the current literature found by examining databases, conducting a refined search, and highlighting the strengths, weaknesses, gaps, and limitations of the current research.

Evidence Search

An evidence search was conducted through the CINAHL Plus with Full Text database via the University of Arizona library resources. The search terms with the field specified as TI Title included “autism or ASD or autism spectrum disorder or Asperger’s or Asperger’s syndrome or autistic disorder or Aspergers” AND “girls or women or females or young woman or girl or female or young women.” The search options were further specified by searching between the published years of 2018 and 2023, and results were limited by selecting full text, English language, and peer-reviewed. The search produced 73 articles, of which 17 articles were initially chosen based on relevancy to the project. Of the 17 articles, six articles were removed after reading the abstracts due to the article’s lack of relevance to the current project.

Comprehensive Appraisal of Evidence

The information gathered from the 11 articles provides evidence for the gender differences in the clinical presentation of ASD in females. The studies chosen provide a mix of quantitative, qualitative, mixed-methods, and a systematic review to get a more complete view of the current research. The main themes emerging from the comprehensive appraisal of evidence highlight camouflaging or masking, the severity of behaviors in females, an atypical female presentation of ASD, and a lack of updates to current diagnostic criteria.

Camouflaging or Masking

To camouflage, one must be able to blend into her surroundings in order not to be noticed easily. To put on a mask is to hide the identity or nature of the mask wearer. Throughout the available literature, both terms (camouflaging & masking) are used interchangeably when discussing the phenomenon of females hiding ASD traits to blend in with their typically developed peers. Females with ASD engage in camouflage in social situations by copying behaviors or personality traits to adjust to their environments (Tubio-Fungueiriño et al., 2021). Camouflaging or masking of ASD traits was found to be present in females, which is discussed as one of the contributory factors in the missed or delayed diagnosis of ASD in females (Bitsika & Sharpley, 2019; Green et al., 2019; Suckle, 2021; Tubio-Fungueiriño et al., 2021). Per difficulty with social interactions being part of the DSM-V diagnostic criteria of ASD, a lack of understanding of camouflaging and a limited provider ability to recognize camouflaging behaviors can lead to a missed diagnosis (Bitsika & Sharpley, 2019; Tubio-Fungueiriño et al., 2021). The desire to fit in with others can be driven by societal codes and norms, leading females with ASD to hide their true selves (Suckle, 2021). Camouflaging is also referred to as a coping strategy to prevent people from seeing the social difficulties of a person with ASD (Green et al., 2019). Examples of camouflaging include actively keeping eye contact, using learned words or phrases, mimicking nonverbal actions and facial expressions, standing at a distance, and altering the volume and tone of speech (Green et al., 2019). Engaging in camouflaging behavior is a conscious choice, at times due to social expectations; however, through aging, adult women may engage in camouflaging without actively trying (Tubio-Fungueiriño et al., 2021). Whether a conscious or subconscious choice, camouflaging can lead to internal distress leading to mental and physical exhaustion in persons with ASD (Green et al., 2019).

Severity of Behaviors

Externalizing behaviors, such as aggression, are prevalent in nearly one-third of school-aged children diagnosed with ASD (Neuhaus et al., 2022). Aggression can either be verbal or physical and has been identified as the primary concern of parents and elementary school teachers (Neuhaus et al., 2022). Due to females maturing faster than males and showing more advantages in social skills, it has been found that even if the severity of ASD traits is identical in presentation for both genders, females are expected to have a greater ASD severity for the provider to have the same confidence in diagnosing ASD in females rather than males (Bitsika & Sharpley, 2019; Tsirgiotis et al., 2022). Females with less severe behaviors make the providers less confident, possibly leading to negative ASD results while conversely causing the female severity threshold to be higher than males (Neuhaus et al., 2022). If the severity threshold is higher, only a few females may reach that threshold, continuing the cycle of misdiagnosis (Neuhaus et al., 2022). Masked versus unmasked symptoms can appear quite different in severity. Inconsistency in perceived symptoms severity and confidence regarding which criteria are met leads to decreased confidence of providers in providing an ASD diagnosis (Neuhaus et al., 2022).

The relationship between social skills and social motivation is moderated by aggression (Neuhaus et al., 2022). High emotional dysregulation, such as aggression, diminishes the correlation between stronger social skills and stronger social motivation, suggesting that emotional difficulties interfere with the ability to benefit from social motivation (Neuhaus et al., 2022). For female youth with ASD, higher rates of aggression had greater negative associations with social skills than their male counterparts, leading to more detrimental social effects when females are aggressive (Neuhaus et al., 2022). This leads to the possibility that camouflaging begins at a very early age, and to be recognized as having ASD traits, females had to exhibit a higher range of behaviors at a higher severity than males (Bitsika & Sharpley, 2019).

Atypical Presentation

Females with ASD present with more internalizing symptoms, such as anxiety and depression, and more coping strategies, such as camouflaging or masking (Tang et al., 2021). ASD females also display more imaginative play skills, have difficulties making and maintaining friendships, and demonstrate excessive echolalia patterns, which are repetitive words or phrases (Tang et al., 2021). ASD females are also less likely to present with a preoccupation with objects and exhibit restricted, repetitive behaviors (RRBs); but are more likely to display compulsive behaviors, insist on sameness, and engage in self-injurious behaviors (Tang et al., 2021). Females are also more socially motivated than their male ASD counterparts and are more likely to have proprioception, vestibular issues, and fears regarding sensory stimuli (Tang et al., 2021).

ASD is typically identified by delays in language or social communication; however, a delay in reaching motor milestones is more prevalent in girls than boys. (Gabis et al., 2020). In a study by Gabis et al. (2020), 60% of girls diagnosed with ASD presented with motor delays, highlighting that poor motor development was related to increased ASD symptoms in girls. Current ASD screening tools that do not consider motor delays can be contributory factors to missed ASD diagnosis in girls, decreasing the chances of initiating early interventions (Gabis et al., 2020).

Rhode Island Consortium for Autism Research and Treatment (RI-CART) and Simons Foundation Powering Autism Research for Knowledge (SPARK) databases represent over 80,000 participants with ASD, with 20,045 being female (Kavanaugh et al., 2023). The databases showed certain themes in the female presentation of ASD, such as low severity of RRBs, later onset of parental concerns, and intact language and intellectual capabilities (Kavanaugh et al., 2023). The databases with such a large sample size aid in counteracting the perception of the singular, classic male ASD presentation of manifestation of RRBs, deficits in language, and early childhood symptom onset (Kavanaugh et al., 2023). The databases further aid in shedding light on the atypical presentation of ASD traits in females due to being screened through current early childhood screening methods (Kavanaugh et al., 2023).

Within ASD, high-functioning ASD (HFASD) females have been found to perform better in a range of pragmatic language and semantic tasks in comparison to HFASD males (Sturrock et al., 2020). HFASD females have also been found to perform better in emotion measures than HFASD and typically developed males (Sturrock et al., 2020). Considering their higher language and communication skills, females with HFASD may appear more socially adept and may not meet current diagnostic criteria for difficulties related to social communication (Sturrock et al., 2020; Tang et al., 2021). Not meeting criteria due to appearing socially adept leads to a delayed diagnosis, which results in poor access to services and a lack of early interventions (Sturrock et al., 2020). Even with higher-than-usual social skills, HFASD females still underperformed as compared to their typically developed female peers; however, the difference is subtle and easily overlooked (Sturrock et al., 2020). It is important to note that HFASD females struggle with typically developed peers in social interactions and have difficulties creating and maintaining friendships (Sturrock et al., 2020). Such struggles lead to internal turmoil, which cannot be supported due to a lack of timely diagnosis leading to further mental health difficulties (Sturrock et al., 2020).

Current Diagnostic Shortcomings

Females with ASD who are missed in childhood and diagnosed in adulthood appear to function adequately until a point is reached, where they experience difficulties functioning in gendered neurotypical norms and expectations (Hamdani et al., 2023). Camouflaging of ASD traits plays a significant role in traits going unrecognized due to the current diagnostic criteria being focused on the classic male childhood presentation with overt difficulties in social interactions and RRBs (Hamdani et al., 2023). Implicit assumptions of providers deter from adequate clinical observation related to ASD traits in females because, on the surface, they appear to be doing fine (Hamdani et al., 2023). Lack of recognition of camouflaging traits in females in current diagnostic tools is a significant hindrance the females with ASD. (Hamdani et al., 2023).

Some 71% of children with ASD experience mental health problems (Suckle, 2021). Mental health issues, such as anxiety, immune system concerns, demand avoidance, obsessive-compulsive behaviors, post-traumatic stress, and eating disorders, are often precursors to delayed diagnosis in females (Suckle, 2021). Persistent mental health issues, such as debilitating anxiety, severe mental health illness, and suicide risk, show that females must spiral down to receive any help (Suckle, 2021). In the DSM-V (APA, 2021), no acknowledgment exists regarding ASD in females is often first seen through secondary behavioral symptoms and it is only diagnosed after a myriad of other conditions have been exhausted (Suckle, 2021).

In witnessing the same severity of symptoms in both genders, ASD symptoms are still perceived as being more severe in females than males (Tsirgiotis et al., 2022). When a male and female presentation is identical, a female presentation may still be considered more atypical and more severely autistic, which suggests the need for greater ASD symptomatology required for females to meet the criteria (Tsirgiotis et al., 2022). If greater severity of symptoms is required for a diagnosis, then females with less severe symptoms will receive a negative ASD diagnosis. Providers have stated that there is a difference in the ASD presentation of males and females (Tsirgiotis et al., 2022). Difficulty in assessing and recognizing the different presentations between males and females has been regarded as one of the most important reasons for the misdiagnosis of ASD in females (Tsirgiotis et al., 2022). Some providers have raised concerns regarding the female presentation of ASD and the current instruments and criteria by which ASD is defined (Tsirgiotis et al., 2022). Furthermore, the lack of acknowledgment in all mental health professionals regarding the presence of a distinct female presentation of ASD, while continuing to uphold the traditional typical male view of ASD, lends itself to females continuing to be misdiagnosed or receive a delayed diagnosis (Tsirgiotis et al., 2022).

Strengths of Evidence

The strengths of the evidence are related to the statistical significance of the results, the availability of large databases of ASD research, and the exploration of the female presentation of ASD being conducted from a plethora of viewpoints. Tang et al. (2021) conducted one of the first studies regarding the assessment of gender and the severity levels of ASD, while Tsirgiotis et al. (2022) were the first to study diagnostician bias and allowed for a contrast of data allowing for further expansion of research. The evidence also includes the utilization of the Gender Exploration of Neurogenetics and Development to Advance Autism Research (GENDAAR), Rhode Island Consortium for Autism Research and Treatment (RI-CART), and Simons Foundation Powering Autism Research for Knowledge (SPARK) databases to add to the existing

ASD research (Kavanaugh et al., 2023; Neuhaus et al., 2022). To further add to the strengths of the available research, qualitative research conducted via audio-recorded and professionally transcribed interviews of autistic females and parents of autistic daughters is also represented (Hamdani et al., 2023).

Weaknesses of Evidence

Aside from the studies that conduct data analysis of different autism databases, one of the weaknesses of the evidence is the sample size of the individuals represented. Many studies are also conducted in different countries allowing for a cultural variable to be taken into consideration. The argument for the presence of an atypical female presentation of ASD is still fairly new and not widely accepted, which poses difficulty in finding relevant studies regarding the topic. The actual practice of screening and assessment of children for ASD is still heavily based on what is now being called the male presentation.

Gaps and Limitations

Limitations of the evidence are regarding the generalizability due to geographic locations and cultural aspects of some of the samples. Many of the participants represented in the data sets are included based on parental accounts, leaving a knowledge gap obtained from in-person assessments. Many studies had small sample sizes allowing for concerns regarding a type II error, which also leads to a lack of statistical significance. The gaps in these studies can be remedied by conducting larger-scale studies on the same topics; however, the true limitation of the availability of an adequate sample size of ASD females due to underdiagnosis proves difficult.

METHODS

Project Design

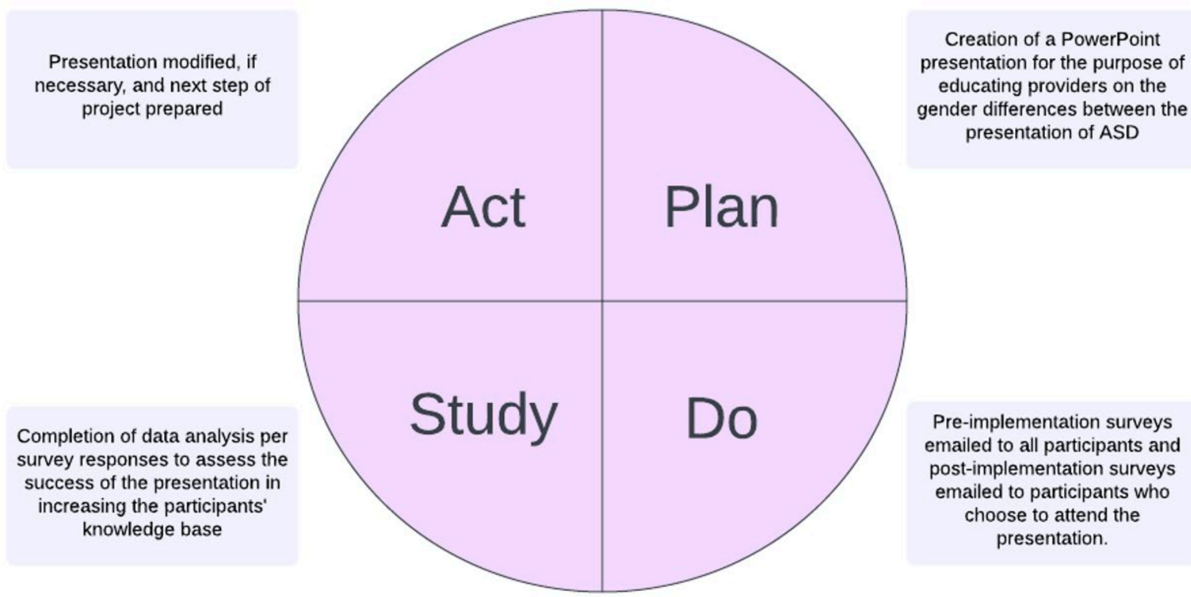
The QI project intended to increase mental health providers' knowledge base to improve their diagnostic ability by providing education regarding the gender differences and atypical presentation of ASD in females. The project design was a single implementation site, pretest-posttest study. The providers were sent a pretest via electronic mail (e-mail) to be completed before the presentation of the education slides. The presentation was conducted virtually through Zoom teleconference to reach more providers from the office, as many of them travel to different sites throughout their workday. After completion of the virtual presentation, a posttest was emailed to the providers who attended the presentation. A descriptive quantitative approach was used to determine the effectiveness of the slide presentation in reaching goals. The project aimed to gather self-reported data utilizing pre- and post-implementation surveys to assess knowledge gained through the presentation. Project participants were better equipped with a greater knowledge base to seek to identify camouflaging in females, review motor milestones with parents, and engage in clinical observation regarding social interactions of ASD females.

Model for Implementation

The implementation of this project was conducted through the plan-do-study-act (PDSA) Cycle Model for Improvement, developed by the Institute of Healthcare Improvement ([IHI], 2022). After a QI project has been determined, the PDSA cycle can be used to test the proposed change in a real setting to determine if it is an improvement (IHI, 2022). There are many reasons to test a proposed change, such as assessing which proposed change may lead to a desired outcome, how much improvement can be expected, if the proposed change will work in the desired environment, minimizing resistance during implementation, and evaluating effects, impact, and costs of the change (IHI, 2022). The PDSA cycle is a scientific method that allows a team to plan a change, trial it, observe the results, and then act upon them (IHI, 2022).

Figure 3

PDSA Cycle Applied to ASD QI Project



After the determination of the QI project with a proposed change, the first part of the cycle is to *plan*, which requires planning the proposed change and collection of data (IHI, 2022). Planning involves stating the goal of the test, making predictions regarding potential outcomes, and developing a plan to test the proposed change (IHI, 2022). For the planning stage of this QI project, a PowerPoint slide presentation was created to educate providers on the gender differences between the presentation of ASD. The presentation was concise and visually appealing, and the length was kept under ten minutes. Predictions of the proposed change were that providers who attend the presentation will have an increase in their knowledge base regarding the gender differences in the presentation of ASD.

In the *do* stage of the PDSA cycle, the proposed change is carried out on a smaller scale (IHI, 2022). This stage allows the team to carry out the project, which allows them the opportunity to document any problems that arise and make observations (IHI, 2022). Data analysis also begins in this stage to further assess the potential impact of the proposed change (IHI, 2022). For the do stage, participants were recruited appropriately via email, and a pre-implementation survey was emailed to all potential participants. Completion of the pre-implementation survey was used as an indication of intent to participate in the QI project. To the participants who attended the presentation, a post-implementation survey was emailed.

In the *study* stage of the PDSA cycle, data is thoroughly analyzed, and the results are studied (IHI, 2022). This stage involves the completion of data analysis and leads to summarizing the results and reflecting on the outcome (IHI, 2022). For the study stage, data analysis was completed per the responses from the pre-and post-implementation surveys. The effectiveness of the presentation in increasing the knowledge base of the participants was assessed in this stage.

In the *act* stage of the PDSA cycle, depending on what was determined during the past two stages, the proposed change is further refined and modified for further implementation (IHI, 2022). For this stage, the presentation will be modified, if deemed necessary, to be able to present the information to a larger, multidisciplinary audience.

Setting and Stakeholders

The setting for the QI project was the American Telepsychiatry and Associates (ATA) office in Indianapolis, IN. Authorization of implementation was provided by the owner and medical director of ATA. Key stakeholders for this project are the owner of ATA, psychiatric mental health nurse practitioners (PMHNP), therapists, and office staff. The primary stakeholders were the owners of ATA, nurse practitioners (NPs), and therapists, as they would be the ones receiving the educational slide presentation and providing their feedback. The owner of ATA is also one of the autism specialists in Indianapolis, IN, and has a large patient base of individuals diagnosed with ASD. The owner of ATA is particularly interested in his providers being part of the QI project to be better equipped to recognize the differences in ASD presentations between males and females.

Planning the Intervention

Before determining the QI project, the implementation topic and other ideas were discussed with the owner of ATA, and verbal approval was obtained for project implementation before beginning the literature synthesis, which was then completed to determine the necessity for and inform the QI project. In planning the implementation, it was determined that ATA has 20 NPs, six therapists, one office manager, and one medical director. All of the providers at ATA were sent an email with a pre-implementation survey to assess their baseline knowledge regarding the gender differences between the presentation of ASD. The pre- and post-implementation surveys were created virtually for the ease of gathering data and to keep the process of completing a survey quick and simple for the providers.

Three days were allotted to allow the providers to complete the pre-implementation survey. The slide presentation was presented virtually via Zoom teleconference to reach a wider audience in the ATA office due to providers traveling to different sites during their work week. The slide presentation was under 10 minutes to respect the time of the providers volunteering to participate. After completing the slide presentation via Zoom, the providers who attended the presentation were emailed a post-implementation survey to assess the knowledge gained after viewing the educational presentation.

Participants and Recruitment

The project included NPs and therapists employed by the ATA. There were 20 nurse practitioners, six therapists, one office manager, and one medical director employed at ATA. All providers at ATA were invited to participate in the project except the office manager. There were limited exclusion criteria considering the small scale of the project. Convenience sampling/availability sampling was used for recruitment. The providers were invited via email, and participation in the project was voluntary. Of the 27 providers employed at ATA, the goal of the sample size for the QI project was at least 10 providers.

Consent and Ethical Considerations

The participants in the QI project received the disclosure form with the intent to complete a study via paper format before the implementation of the project. The participation of all providers was completely voluntary. Participation was free of any risk to the providers, aside from the time spent completing the surveys and attending the presentation. The project was completed virtually to allow the participants to join from their respective locations. The intent to participate in the project was assumed when the provider agreed to and completed the pre-implementation survey. All questions on the survey were also voluntary, and the providers were not required to complete the surveys in their entirety. Demographic information was collected to describe the participant group. No other personal identifiers were collected to maintain the providers' privacy. No conflicts of interest existed to the current knowledge of the student.

Data Collection

Data was collected only from the providers who volunteered to attend the presentation. The data was collected via the pre- and post-implementation surveys conducted through Qualtrics and sent to the providers via their email. The pre-implementation survey was sent to all providers invited to attend the presentation. The post-implementation survey was only sent to providers who attended the presentation. The pre- and post-implementation survey consisted of 10 questions to assess baseline knowledge and then the knowledge gained after the presentation.

Data Analysis

Data was collected from the pre- and post-implementation surveys using the Qualtrics results feature. Data analysis was conducted via Microsoft Excel and descriptive statistics were used to analyze and interpret the data. The effectiveness of the educational presentation was analyzed by comparing the pre- and post-implementation surveys by noting knowledge gained through response change in the identical set of questions. The identical questions across both surveys were *Pre Q5/Post Q1, Pre Q6/Post Q2, Pre Q8/Post Q4, Pre Q9/Post Q5.* A sixth question *Pre Q10/Post Q6* also revealed a change in provider knowledge; however, it was determined that the wording of the question was not completely clear to the participants and may have skewed responses. Data outcomes are represented using column and bar graphs, and tables were used to show the pre- and post-implementation survey responses along with the measured difference between the responses.

RESULTS

Participants and Demographics

Of ATA's 27 providers, who were invited to the educational presentation via Zoom teleconference, eight participated. All eight participants completed the pre-implementation survey before the educational presentation. Demographic information was collected on professional roles, years in practice, and expertise in diagnosing ASD. Of the eight participants, one was a psychiatrist, four were NPs, and three identified as therapists. For years in clinical practice, 50% reported practicing from 0-5 years, 12.5% reported practicing from 6-10 years and 11-15 years, and 25% reported practicing more than 21 years. Using Benner's theory (Thomas & Kellgren, 2017), the expertise of the participants regarding the diagnostic criteria for ASD was noted, as represented in Figure 4. One question was presented in the pre-implementation survey to assess the baseline knowledge of the participants. The question asked about which persistent deficits were presented as mentioned in criteria A regarding ASD diagnosis in the DSM-V-TR. All eight participants selected *social communication and interactions*, which was the correct answer.

Figure 4

Provider Expertise Regarding ASD Diagnostic Criteria

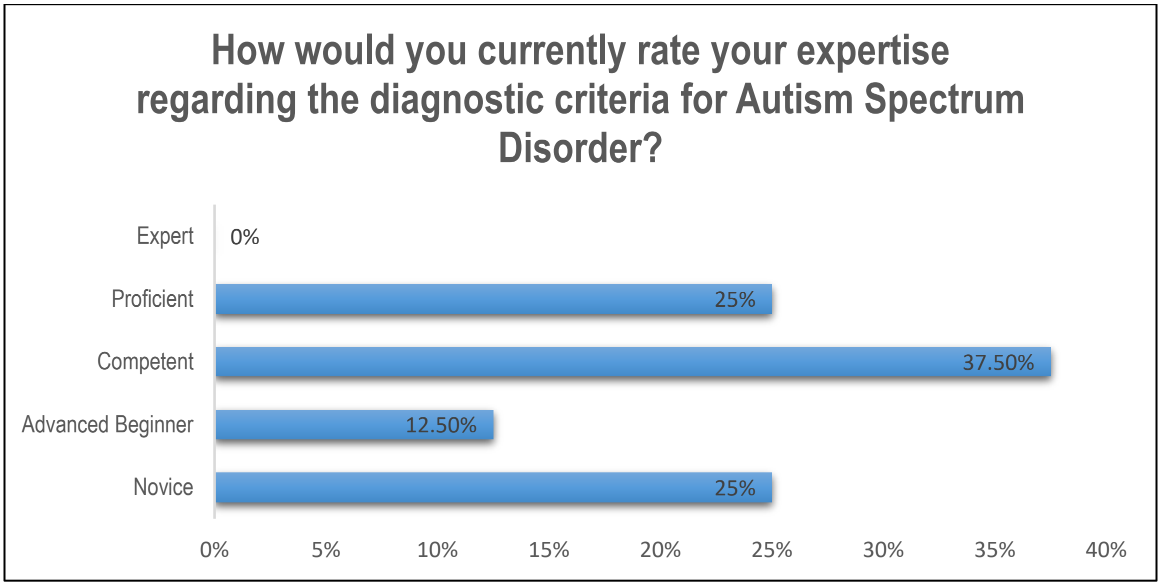
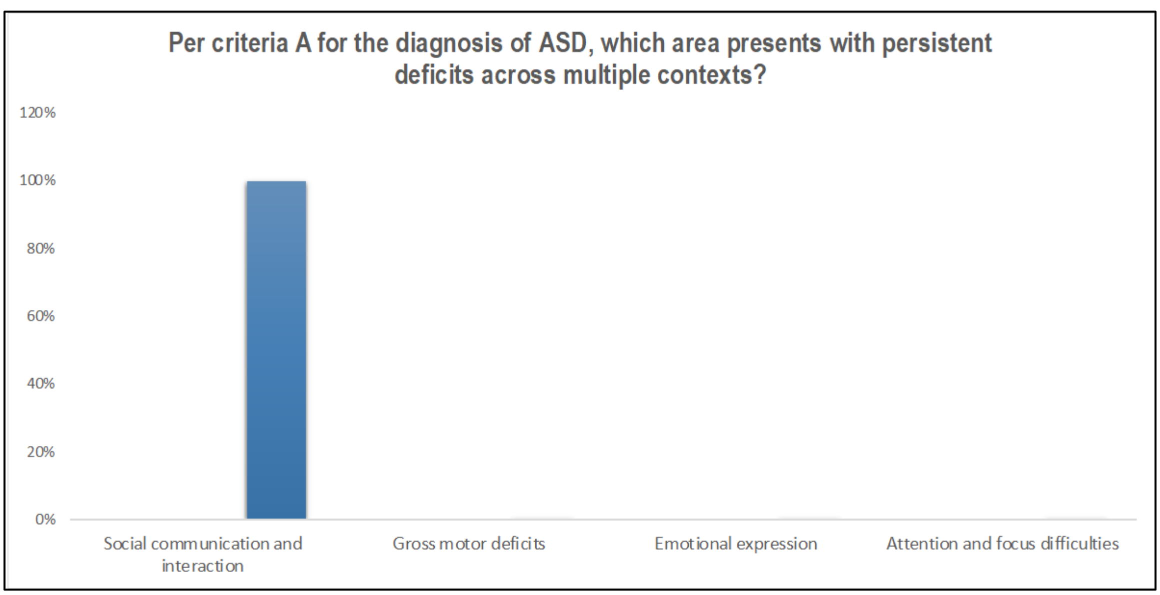


Figure 5

Baseline Provider Knowledge of Criteria A for ASD



Outcomes

The question posed for this QI project was: Does an educational presentation regarding gender differences in females with Autism Spectrum Disorder (ASD) increase the knowledge base of mental health providers at an outpatient psychiatric clinic in Indianapolis, Indiana? Six questions in the pre- and post-implementation surveys were utilized to assess the baseline and increase in knowledge base after the educational presentation. The questions are represented in Tables 1-6 and highlight the changes in the knowledge base of the participants regarding gender differences in ASD. The results with the greatest change from pre-implementation to post-implementation are represented in Figures 6-8.

Table 1

The Outcome of Pre Q6 and Post Q1

There are gender differences in the presentation of ASD traits that can be difficult to identify using the current diagnostic criteria presented in the DSM-V-TR.

	Pre	Post	Difference
Strongly agree	37.5%	100%	62.5%
Somewhat agree	25%	0%	-25%
Neither agree nor disagree	25%	0%	-25%
Somewhat disagree	12.5%	0%	-12.5%
Strongly disagree	0%	0%	0%

Figure 6

The Outcome of Pre Q6 and Post Q1

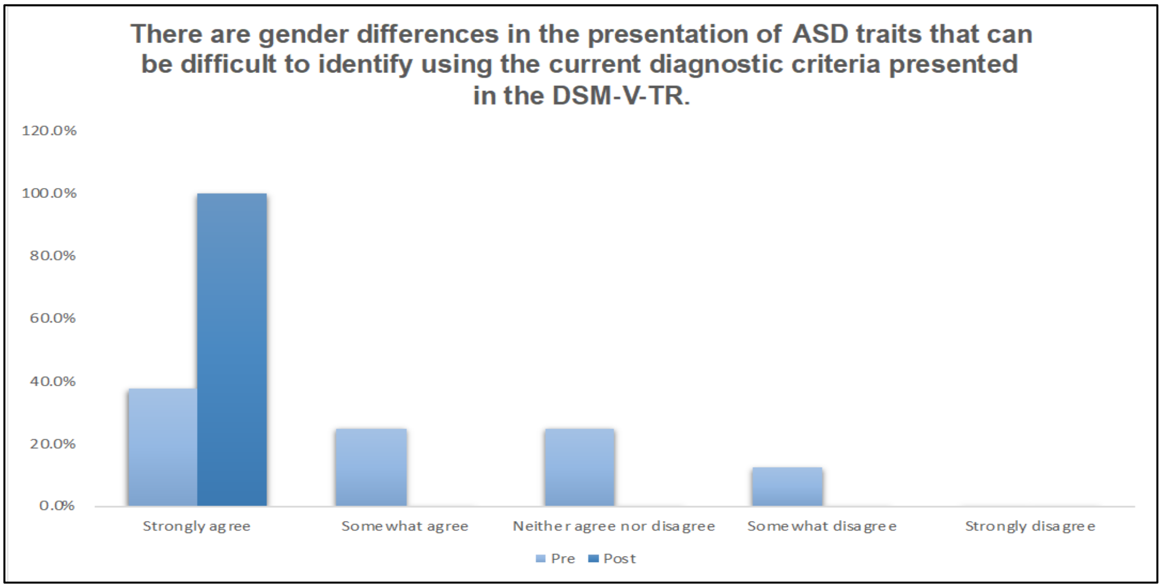


Table 2

The Outcome of Pre Q5 and Post Q2

Restricted, repetitive behaviors are presented in all individuals with ASD regardless of gender.

	Pre	Post	Difference
True	50%	12.5%	-37.5%
False	50%	87.5%	37.5%

Table 3

The Outcome of Pre Q7 and Post Q3

It is not possible to camouflage or mask symptoms or traits of ASD.	Pre	Post	Difference
Strongly agree	25%	12.5%	-12.5%
Somewhat agree	0%	0%	0%
Neither agree nor disagree	0%	0%	0%
Somewhat disagree	25%	0%	-25%
Strongly disagree	50%	87.5%	37.5%

Table 4

The Outcome of Pre Q8 and Post Q4

Abnormalities in eye contact are a key aspect of ASD as all individuals with ASD have difficulties in keeping eye contact.	Pre	Post	Difference
Strongly agree	25%	25%	0%
Somewhat agree	12.5%	0%	-12.5%
Neither agree nor disagree	0%	0%	0%
Somewhat disagree	50%	12.5%	-37.5%
Strongly disagree	12.5%	62.5%	50%

Figure 7

The Outcome of Pre Q7 and Post Q3

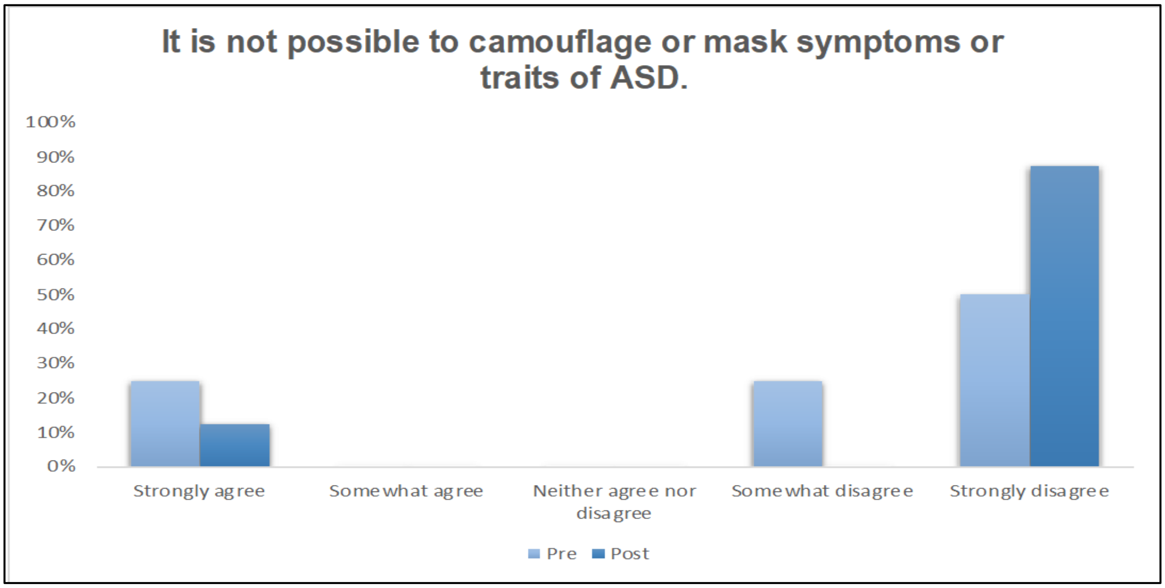


Table 5

The Outcome of Pre Q9 and Post Q5

Current diagnostic criteria are adequate in identifying individuals with ASD regardless of gender.

	Pre	Post	Difference
Strongly agree	37.5%	0%	-37.5%
Somewhat agree	0%	0%	0%
Neither agree nor disagree	25%	0%	-25%
Somewhat disagree	25%	37.5%	12.5%
Strongly disagree	12.5%	62.5%	50%

Figure 8

The Outcome of Pre Q9 and Post Q5

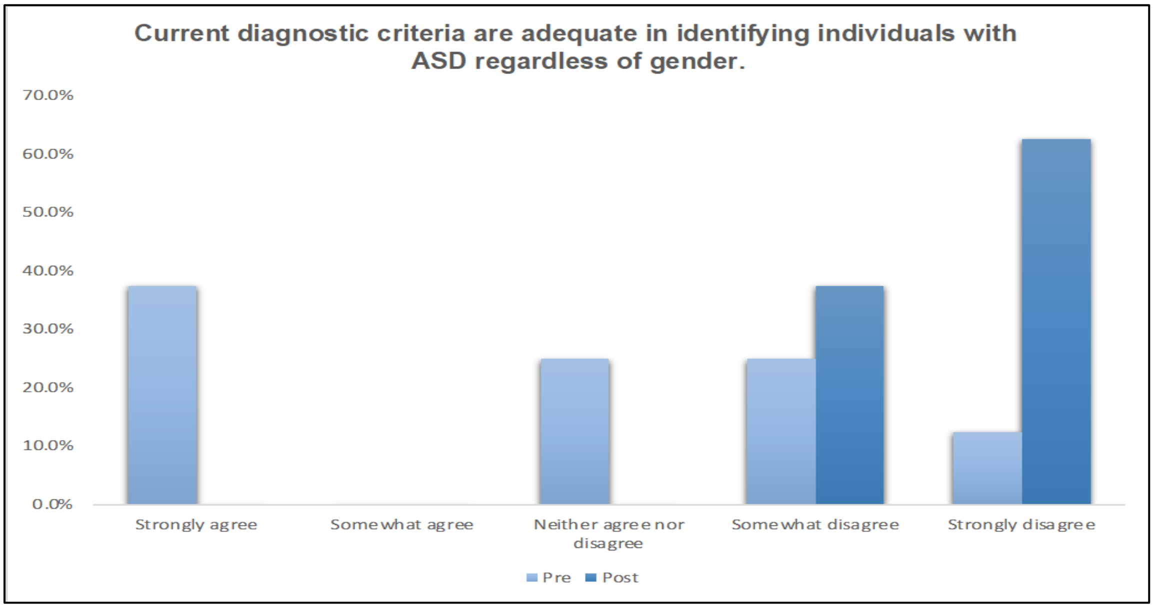


Table 6

The Outcome of Pre Q10 and Post Q6

Females who receive an ASD diagnosis late in life are being misdiagnosed because symptoms and traits of ASD are prevalent and apparent in childhood.			
	Pre	**Post**	**Difference**
Strongly agree	12.5%	62.5%	50%
Somewhat agree	0%	0%	0%
Neither agree nor disagree	12.5%	0%	-12.5%
Somewhat disagree	25%	0%	-25%
Strongly disagree	50%	37.5%	-12.5%

DISCUSSION

Summary

The purpose of the QI project was to increase the knowledge base of mental health providers regarding gender differences in the clinical presentation of ASD. Per past and ongoing research, it has been evident that gender differences in the presentation of ASD exist; however, not much is widely known regarding the female capability of camouflaging. The DSM-V-TR mentions the existence of gender differences; however, does not highlight how to decipher the differences. There are no separate diagnostic criteria for females and camouflaging is not mentioned as a phenomenon that occurs in ASD females. Due to a lack of understanding of the camouflaging of ASD traits, providers are not able to be well-equipped to diagnose a female with a muted ASD presentation.

The literature synthesis for this QI project highlighted four themes including camouflaging or masking, the severity of behaviors in females, an atypical female presentation of ASD, and a lack of updates to current diagnostic criteria. The QI project intervention was an educational presentation for a group of mental health providers at a local clinic in Indianapolis, IN. The presentation was conducted via Zoom teleconference to minimize the need for travel to the clinic for providers working at different sites and eight providers participated. The use of online surveys before and after the presentation aided in the assessment of knowledge increase regarding gender differences in the clinical presentation of ASD.

Correlation to Theoretical Framework

The QI project was created by the Iowa model of EBP. The trigger or clinical problem was the misdiagnosis or underdiagnosis of ASD in females. The topic has been deemed a priority due to the increasing prevalence of ASD worldwide. Locally, the topic was a priority as a need was identified by the local clinic for education regarding the female presentation of ASD to aid in better diagnosis of future clients. The interprofessional team comprised one psychiatrist, four nurse practitioners, and three therapists, all of whom have been familiar with ASD. The literature synthesis guided the QI project by revealing themes in current research. Although vast, the amount of research stating the need for further research is more common. There is still a disparity in research regarding the study of female subjects with ASD, as they are difficult to find due to the camouflaging of ASD traits. Research does exist that highlights the reasons a gender difference in the presentation of ASD exists; however, continued research with a larger female sample size would further aid the existing body of research.

Implementation of the educational presentation with accompanying pre- and post-implementation surveys shows an increase in the knowledge of the providers who attended the presentation. Education regarding camouflaging via highlighted facts and a case study were shared with the providers to aid in understanding how camouflaging can look in a female with ASD. The results of the post-survey are hopeful in showing that the change was appropriate as learning new information was achieved successfully. The next steps in the model are to integrate and sustain the change and share the results, which will be shared via the plan for sustainability and the provided executive summary for the clinical site.

Interpretation

The data reflects the efficacy of the education presentation in increasing the knowledge base of providers regarding gender differences in the presentation of ASD. There was a variation noted in the self-perceived provider expertise regarding the diagnostic criteria for ASD. Figure 4 shows the variation in responses and 62.5% of the participants stated either competency or proficiency regarding their expertise. It was noteworthy that none of the participants, including the psychiatrist, claimed expertise regarding the diagnostic criteria for ASD. Figure 5 represents the baseline knowledge of providers regarding Criteria A for ASD, and 100% of the providers showed familiarity with the criteria.

In assessing knowledge gained through the educational presentation, a positive change was noticed in the post-implementation survey responses. The identical set of questions showed a meaningful change in the beliefs of the providers' knowledge regarding gender differences in the presentation of ASD. Following the educational presentation, a multidisciplinary discussion was sparked regarding an existing patient who had previously been known to be aggressive and manipulative. Due to the presentation, the providers reflected upon the possibility of the patient being on the spectrum, which had not been considered a possibility before. All providers who participated in the educational presentation reported with 100% agreement that the current diagnostic criteria in the DSM-V-TR does not consider gender differences.

Restricted, repetitive behaviors and difficulties with eye contact have been highlighted as key aspects of ASD, which was consistent with the beliefs of the providers before the educational presentation. Post-presentation, over 75% of participants changed their answers to coincide with the new information presented. The change in answers in the post-implementation survey proved as evidence of the change in perception of the providers as they learned new information regarding camouflaging in females and how it can change the presentation of previously known key features that defined ASD until now.

ASD continues to evolve as researchers dive deeper into the understanding of the true vastness of the spectrum. The DSM continuously evolves as new information is discovered to remain the main source of knowledge regarding mental health disorders. For healthcare providers, learning is a lifelong process, and evidence-based practice hinges upon continued learning. It is detrimental to the health and safety of patients who become paired with providers unwilling to change their thought processes with evolving evidence. Taking the information presented in the educational presentation into consideration, 100% of the participants expressed some level of disagreement regarding the current diagnostic criteria being sufficient in diagnosing across genders. The participants created meaningful change in their practice with the recognition that current criteria are incomplete.

Lastly, one question (*Pre Q10/Post Q6*) sparked confusion among providers regarding the verbiage of the question, and upon assessing the question, it does lack clarity. The pre-implementation survey responses are dispersed quite evenly from agreement to disagreement; however, the post-implementation survey responses were split between *strongly agree* (62.5%) and *strongly disagree* (37.5%). The split in responses is further evidence of a poorly written question, which should be revised for any further iterations of this QI project.

Ultimately, the educational presentation was successful in increasing the knowledge base of the providers who joined the presentation. The providers' post-implementation responses showed learning had occurred after attending the educational presentation. The educational presentation was well-received by the providers and it was relayed to the principal investigator (PI) that they all learned information that they were unaware of before the presentation. There was discussion regarding the information presented concerning the patients they have seen in the past and are currently seeing in their residential facilities. The survey responses, along with the discussion following the presentation show an increase in the knowledge base of the providers.

For future recommendations regarding further iterations of this QI project, it would be valuable to add impact evaluation as a survey question regarding the likelihood of the providers willing to incorporate the changes they learned into their clinical practice. It would be meaningful to assess if the providers would address future female clients more keenly with camouflaging in mind. Impact evaluation can also be assessed by noting the number of diagnoses before and after the educational presentation. Meaningful change can be assessed by seeing an increase in the number of ASD diagnoses after the educational presentation, showing an increase in the knowledge base of the providers and their ability to adequately assess across genders.

Implications

Practice

For practice implications, using the knowledge gained from the educational presentation, providers were more prepared on what to look for in terms of camouflaging. During one interaction, there was a small discussion regarding a young patient who was thought to be aggressive and manipulative; however, after the presentation, the discussion regarding this patient changed to attempting to view her as possibly being autistic. The possibility of the patient being autistic was never considered before the educational presentation and the therapist who mentioned the possibility stated that she was going to look further into the patient's case. Once a provider knows what to look for or what questions to ask regarding camouflaging behavior, she can assess her future patients more keenly. For ATA, as a clinical site, addressing existing patients in residential facilities can create a meaningful impact. Most patients overseen by ATA at residential facilities are young children or adolescents, with the females being admitted for aggression or other behavioral issues. Per the discussion that unfolded following the educational presentation, ATA can seek to reevaluate the female patients for ASD. For future patients, the providers who attended the presentation are better equipped to assess for signs of camouflaging, which can further aid in the reasoning behind conducting an ASD evaluation. ATA stands to create meaningful change in the Indianapolis community by being a more cognizant clinic to aid in the recognition of females with ASD.

Education

Lack of knowledge regarding gender differences in the presentation of ASD continues to be an obstacle due to lack of data and implicit bias due to years of perceiving ASD as a male, childhood disorder. ASD is still evolving in revealing its vastness and the true length of the spectrum remains to be seen. Further education is required, especially in terms of the recognition of camouflaging and how the masking of ASD traits presents itself in different individuals. It is also up to the providers to self-educate as research is beginning to show that ASD is not just what we have known of it over the past 100 years. Continued learning in healthcare is imperative in keeping up with evidence-based practice and being set in ways and thinking in black-and-white terms regarding any disorder is a hindrance to those we aim to serve.

Research

The implications for education and research are intertwined. The literature synthesis for this QI project revealed themes in research that are currently being studied; while simultaneously stating that the lack of research exists due to not being able to find participants easily. Camouflaging of ASD traits makes it difficult for researchers to find participants because essentially, they do not know who they are looking for. The research that has been conducted has had small sample sizes except for the GENDAAR, RI-CART, and SPARK databases. As the education regarding camouflaging of ASD traits becomes more known and providers begin to identify more females with autism, researchers can begin to take note of further studying the clinical presentation of females.

Policy

The Interagency Autism Coordinating Committee (IACC) (IACC, n.d.) began tracking funding allocated for ASD research in 2008. The IACC's (n.d.) Strategic Plan breaks down research funding into seven questions: 1) screening and diagnosis, 2) biology, 3) risk factors, 4) treatments and interventions, 5) services, 6) lifespan issues, and 7) infrastructure and surveillance. Per the 2021-2023 IACC (n.d.) Strategic Plan, the recommendation is to increase annual autism research funding to $685 million by 2025, requiring an approximate $55.2 million annual increase from the 2020 budget. For the 2021-2023 plan, aside from focusing on the seven general areas of research, the IACC (n.d.), identified three critical areas as needing more focus, which include *research on disparities and the development of culturally responsive tools and services*. This area of growth in research addresses the need to close gaps in outcomes due to differences across sex/gender and race, ethnicity, and culture. The plan for funding allocation to address the existing gaps in research is a hopeful step toward creating screening tools adequate to identify females with autism.

Limitations

This QI project had a few limitations. For this project, convenience sampling was utilized. Convenience sampling includes the risk of selection bias as the participants of this project are all employed at one clinical site. Providers with biases related to the topic may or may not have chosen to participate in the project, further leading to a risk of selection bias. A small sample size can also be a limitation. Of the 27 participants invited, only 8 participants joined the presentation. Even with a potential sample size of 27 participants, only 29.6% participated in the project; however, of the ones who joined, there was a 100% response rate between the pre-and post-implementation survey. Between the eight participants, there was a variation in clinical role and years in practice, which can be viewed as a potential strength towards a plan for sustainability.

DNP Essentials Addressed

This QI project addressed three DNP essentials. First, *DNP Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking* states the role of the doctorally prepared nurse in eliminating health disparities, promoting patient safety, and affecting health outcomes (American Association of Colleges of Nursing [AACN], 2006). This QI project addresses the health disparities experienced by females with ASD, who are readily misdiagnosed or underdiagnosed due to a lack of provider knowledge. In increasing the knowledge base of providers to recognize the camouflaging of ASD traits, this QI project takes a step towards closing the gap of the health disparities experienced by females and promotes patient safety by leading to a more accurate diagnosis for future patients. A more accurate diagnosis earlier in life leads to positive health outcomes as earlier support and access to resources can create a healthier lifestyle. *DNP Essentials III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice* states the importance of scholarship and research (AACN, 2006). This QI project addresses clinical scholarship and research as it utilized a literature synthesis and existing evidence to guide the direction of the project. Findings from the information gathered by synthesizing the existing evidence-based research were disseminated throughout this project and presented to mental health providers in hopes of improving healthcare outcomes for future patients.

Lastly, *DNP Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes* relates to multi-disciplinary collaboration to create change in healthcare (AACN, 2006). This QI project had participants from different clinical roles who attended the educational presentation and were able to benefit from the information presented. In discussion after the presentation, a therapist was able to identify a patient who may benefit from re-evaluation according to the information presented in the educational presentation. Working collaboratively, the nurse practitioner agreed upon the re-evaluation of the patient, leading to interprofessional collaboration in improving patient and health outcomes for an existing patient.

Conclusions

This QI project aimed to address the providers' knowledge regarding gender differences in the clinical presentation of ASD. The QI project was guided through the literature synthesis, which highlighted the themes of camouflaging/masking, the severity of behaviors in females, an atypical female presentation of ASD, and a lack of updates to current diagnostic criteria. The project was designed using the PDSA cycle, with each step being addressed to create a change. The educational presentation was created to highlight camouflaging and how the behaviors of ASD may appear in a female who is masking in a public or unfamiliar setting. A case study was presented to further show a day in the life of a female with ASD to aid in the understanding of masking during the day and decompressing and disassociating in private. Pre- and post-implementation survey responses were collected before and after the presentation to assess any knowledge gained via the presentation. The outcomes show a positive change and an increase in the knowledge base of the providers regarding their understanding of the female presentation in terms of camouflaging. The project objectives were met and an executive summary will be provided to the clinical site. The project question has been answered, as yes, an educational presentation can increase the knowledge base of mental health providers regarding gender differences in females with ASD.

Plan for Sustainability

The electronic version of the presentation was requested by the site owner, who is the Medical Director of ATA. The QI project was created in accordance with the priority set forth by the site owner regarding his practice. The presentation shows examples of how camouflaging can be determined in future clients, along with a case study of a female with ASD, further explaining the characteristics and camouflaging traits of a female on the spectrum. For continued education of providers who were unable to attend the initial presentation, the presentation can easily be shared virtually. For training of future employees of ATA, the orientation process can include the recognition of camouflaging symptoms in females to aid in the development of better assessment skills of a provider who is just beginning her practice. Per the use of the PDSA cycle, for the *act* stage, the QI project and the educational presentation should be reviewed to assess for any need for changes. To use the presentation for a larger audience, the addition of more case studies may be beneficial.

Plan for Dissemination

An executive summary will be presented to ATA highlighting the findings of the QI project, which show positive change regarding an increase in the knowledge base of providers. The educational presentation is readily available for the clinical site to disseminate to additional providers who were unable to join the initial presentation, and to other sites interested in the information. To increase the knowledge base of future patients, the presentation can be developed into educational flyers or brochures highlighting information regarding the female presentation of ASD. More awareness regarding gender differences in the presentation of ASD can lead to empowerment for future patients by aiding in validating their experiences.

APPENDIX A

SITE APPROVAL/THE UNIVERSITY OF ARIZONA INSTITUTIONAL REVIEW BOARD AUTHORIZATION LETTER

American Telepsychiatry & Associates
1311 West 96th Street
Indianapolis, IN 46260

July 20, 2023

University of Arizona Institutional Review Board
c/o Office of Human Subjects
1618 E Helen St
Tucson, AZ 85721

Please note that Ms. Komal Wells, University of Arizona Doctor of Nursing Practice student, has permission of American Telepsychiatry & Associates to conduct a quality improvement project at our facility for her project, “Assessing Provider Awareness of Gender Differences in the Presentation of Autism Spectrum Disorder.”

Ms. Wells will conduct a survey of providers at American Telepsychiatry & Associates. She will recruit providers via email with the disclosure form with the intent to complete a study, along with a pre-implementation survey. The email will provide description of the project, what the providers will be asked to do, the time commitment involved and a link to the online survey. Ms. Wells understands that the participation in the project is voluntary and up to the discretion of the providers. Ms. Wells’ activities will be completed by December 2023.

Ms. Wells has agreed to provide my office with a copy of the University of Arizona Determination before she recruits participants. She will also provide an executive summary of the results of the project to the site.

If there are any questions, please contact my office at (317) 732-7609.

Signed,

V. Osman, MD

Vahid Osman, MD
Board Certified Psychiatrist & Clinic Owner

University of Arizona IRB
845 N Park Ave., Suite 537A
Tucson, AZ 85719
Fax: 520-621-9810
VPR-IRB@arizona.edu

NOT HUMAN RESEARCH

September 14, 2023

Komal Wells

Dear Komal Wells:

On 9/13/2023, the IRB reviewed the following submission:

Type of Review:	Initial Study
Title:	Addressing Provider Awareness of Gender Difference s in the Presentation of Autism Spectrum Disorder
Investigator:	Komal Wells
IRB Submission ID:	STUDY00003558
Sponsor:	None
Prime Sponsor:	None
IND, IDE, or HDE:	None
Documents Reviewed:	• Advisor Attestation, Category: Institutional Approval; • Disclosure Form, Category: Consent Form; • Email Recruitment Letter, Category: Recruitment Materials; • IRB Protocol for Determination of Human Research form, Category: IRB Protocol; • Post-Implementation Survey, Category: Data Collection Tool; • Pre-implementation Survey, Category: Data Collection Tool; • Provider Presentation Outline, Category: Participant Material; • Site Authorization Letter, Category: External Site Authorization;

The IRB determined that the proposed activity is not research involving human subjects as defined by DHHS and FDA regulations.

THE UNIVERSITY OF ARIZONA
Research
Innovation & Impact

University of Arizona IRB
845 N Park Ave., Suite 537A
Tucson, AZ 85719
Fax: 520-621-9810
VPR-IRB@arizona.edu

IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are research involving humans in which the organization is engaged, please submit a new request to the IRB for a determination. You can create a modification by clicking **Create Modification / CR** within the study.

All Covered Individuals must disclose all sponsored and non-sponsored Research Projects to the Office for Responsible Outside Interests (OROI) prior to Conducting Research if the individual is an Investigator. Please visit the OROI website for more information.

We value your feedback and would appreciate you taking the time to complete our survey about your experience with the IRB staff:
https://uarizona.co1.qualtrics.com/jfe/form/SV_ehQ04WxNA06b42i.

If questions arise at any time during your study, please email the general IRB inbox at VPR-IRB@arizona.edu.

APPENDIX B

CONSENT DOCUMENT (DISCLOSURE FORM)

Addressing Provider Awareness of Gender Differences in the Presentation of Autism Spectrum Disorder

Komal Wells

The purpose of this project is to gather baseline knowledge regarding gender differences in the presentation of Autism Spectrum Disorder (ASD), provide an educational presentation highlighting the gender differences, and then evaluate the effectiveness of the presentation in increasing the knowledge base of participants via a pre-and post-implementation survey.

If you choose to take part in this project, you will be asked to complete a pre-implementation survey, attend a slide presentation via Zoom, and complete a post-implementation survey. It will take approximately 5 minutes to complete each survey and the educational presentation will be 10 minutes. There are no foreseeable risks associated with participating in this project. You will receive no immediate benefit from your participation. Your responses are anonymous. Your name will not be collected or linked to your answers.

If you choose to participate in the project, participation is voluntary, refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may withdraw at any time from the project. In addition, you may skip any question that you choose not to answer. By participating, you do not give up any personal legal rights you may have as a participant in this project.

For questions, concerns, or complaints about the project, you may call Komal Wells, DNP-PMHNP Candidate at 317-457-0965 or wellsk@arizona.edu

You agree to have your responses used for this project.

APPENDIX C

RECRUITMENT MATERIAL (RECRUITMENT EMAIL)

Hello, my name is Komal Wells. I am a DNP student in the Psychiatric Mental Health Nurse Practitioner specialty. American Telepsychiatry & Associates has agreed to be the implementation site for my DNP project. The purpose of this project is to gather baseline knowledge regarding gender differences in the presentation of Autism Spectrum Disorder (ASD), provide an educational presentation highlighting the gender differences, and then evaluate the effectiveness of the presentation in increasing the knowledge base of participants via a pre-and post-implementation survey.

If you choose to take part in this project, you will be asked to complete a pre-implementation survey, attend an educational presentation via Zoom, and complete a post-implementation survey. It will take approximately 5 minutes to complete each survey and the educational presentation will be 10 minutes or less. Your responses are anonymous. Your name will not be collected or linked to your answers.

The link provided below will take you to the pre-implementation survey. By clicking the link, you are consenting to participate in the project. Your participation is voluntary, and refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may withdraw at any time from the project. In addition, you may skip any question that you choose not to answer. By participating, you do not give up any personal legal rights you may have as a participant in this project.

For questions, concerns, or complaints about the project, you may call or email Komal Wells, DNP-PMHNP Student at 317-457-0965 or wellsk@arizona.edu

Thank you for your time. I hope you enjoy the educational presentation.

Sincerely,

Komal Wells
MSN, RN, DNP-PMHNP Student
wellsk@arizona.edu

APPENDIX D

EVALUATION INSTRUMENTS (PRE- AND POST-IMPLEMENTATION SURVEYS)

Pre-Implementation Survey

1. What is your clinical role?
    a. Psychiatrist
    b. Nurse Practitioner
    c. Therapist

2. How many years have you been in practice?
    a. 0-5
    b. 6-10
    c. 11-15
    d. 16-20
    e. 21+

3. How would you currently rate your expertise regarding the diagnostic criteria for Autism Spectrum disorder (ASD)?
    a. Novice
    b. Advanced beginner
    c. Competent
    d. Proficient
    e. Expert

4. Per Criteria A for the diagnosis of ASD, which area presents with persistent deficits across multiple contexts?
    a. Social communication and interactions
    b. Gross motor deficits
    c. Emotional expression
    d. Attention and focus difficulties

5. Restricted, repetitive behaviors present in all individuals with ASD regardless of gender.
    a. True
    b. False

6. There are gender differences in the presentation of ASD traits that can be difficult to identify using the current diagnostic criteria presented in the DSM-V-TR.
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

7. It is not possible to camouflage or mask symptoms or traits of ASD.
    a. Strongly agree
    b. Somewhat agree

   c. Neither agree nor disagree
   d. Somewhat disagree
   e. Strongly disagree

8. Abnormalities in eye contact are a key aspect of ASD as all individuals with ASD have difficulties in keeping eye contact.
   a. Strongly agree
   b. Somewhat agree
   c. Neither agree nor disagree
   d. Somewhat disagree
   e. Strongly disagree

9. Current diagnostic criteria are adequate in identifying individuals with ASD regardless of gender.
   a. Strongly agree
   b. Somewhat agree
   c. Neither agree nor disagree
   d. Somewhat disagree
   e. Strongly disagree

10. Females who receive an ASD diagnosis late in life are being misdiagnosed because symptoms and traits of ASD are prevalent and apparent in childhood.
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

Post-Implementation Survey

1. There are gender differences in the presentation of ASD traits that can be difficult to identify using the current diagnostic criteria presented in the DSM-V-TR.
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

2. Restricted, repetitive behaviors present in all individuals with ASD regardless of gender.
    a. True
    b. False

3. It is not possible to camouflage or mask symptoms or traits of ASD.
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

4. Abnormalities in eye contact are a key aspect of ASD as all individuals with ASD have difficulties in keeping eye contact.
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

5. Current diagnostic criteria is adequate in identifying individuals with ASD regardless of gender.
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

6. Females who receive an ASD diagnosis late in life are being misdiagnosed because symptoms and traits of ASD are prevalent and apparent in childhood.
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

7. I learned new information regarding the atypical presentation of ASD in females that I did not know previously.
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

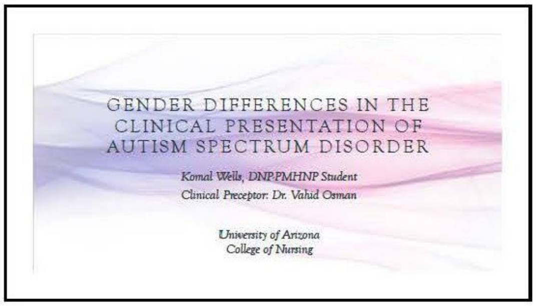
8. The presentation was clear, easy to understand, and relevant to my current role as a mental health provider.
    a. Strongly agree
    b. Somewhat agree
    c. Neither agree nor disagree
    d. Somewhat disagree
    e. Strongly disagree

9. Please list one specific change you plan to make to your clinical practice after attending this presentation.

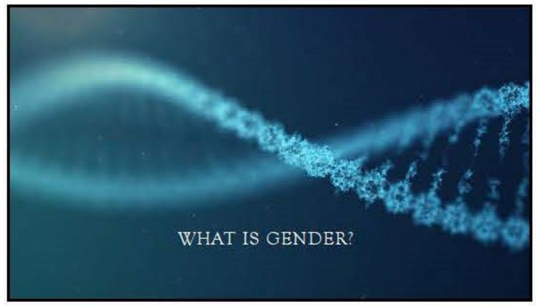
10. Please provide any additional comments or recommendations that you have for future improvements of this presentation.

APPENDIX E

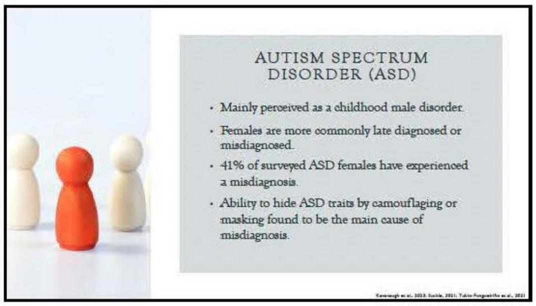
PARTICIPANT MATERIAL


GENDER DIFFERENCES IN THE CLINICAL PRESENTATION OF AUTISM SPECTRUM DISORDER
Komal Wells, DNP PMHNP Student
Clinical Preceptor: Dr. Vahid Osman
University of Arizona
College of Nursing

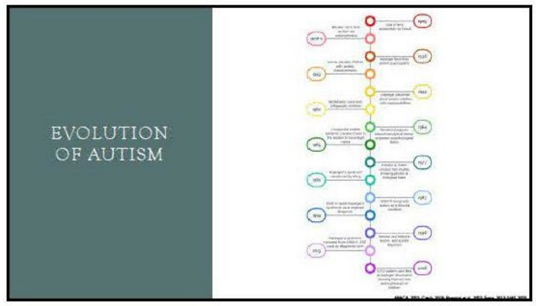
1


WHAT IS GENDER?

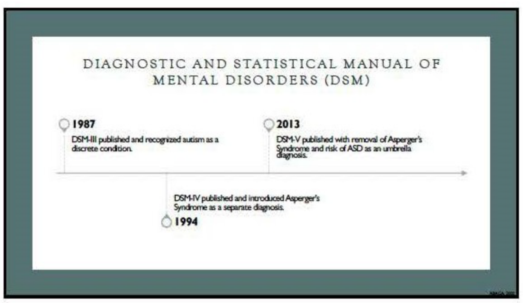
2


AUTISM SPECTRUM DISORDER (ASD)
• Mainly perceived as a childhood male disorder.
• Females are more commonly late diagnosed or misdiagnosed.
• 41% of surveyed ASD females have experienced a misdiagnosis.
• Ability to hide ASD traits by camouflaging or masking found to be the main cause of misdiagnosis.

3


EVOLUTION OF AUTISM

4


DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS (DSM)
1987
DSM-III published and recognized autism as a discrete condition.
2013
DSM-V published with removal of Asperger's Syndrome and risk of ASD as an umbrella diagnosis.
DSM-IV published and introduced Asperger's Syndrome as a separate diagnosis.
1994

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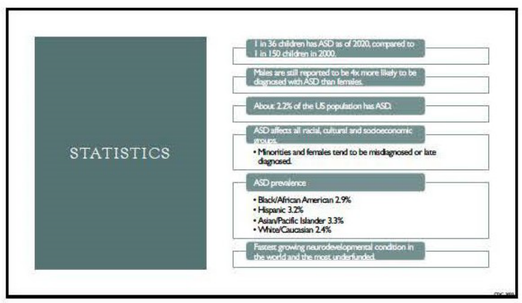
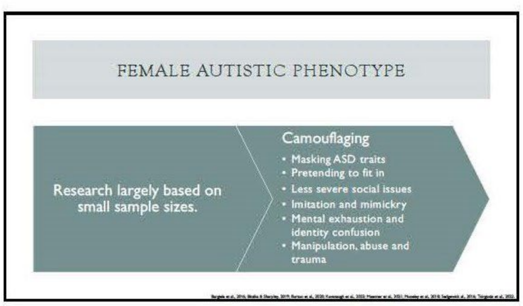
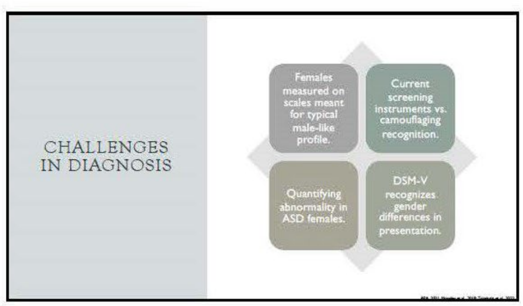

STATISTICS
1 in 36 children has ASD as of 2020, compared to 1 in 150 children in 2000.
Males are still reported to be 4x more likely to be diagnosed with ASD than females.
About 2.2% of the US population has ASD.
ASD affects all racial, cultural and socioeconomic groups.
• Minorities and females tend to be misdiagnosed or late diagnosed.
ASD prevalence
• Black/African American 2.9%
• Hispanic 3.2%
• Asian/Pacific Islander 3.3%
• White/Caucasian 2.4%
Fastest growing neurodevelopmental condition in the world and the most underfunded.

6


FEMALE AUTISTIC PHENOTYPE
Research largely based on small sample sizes.
Camouflaging
• Masking ASD traits
• Pretending to fit in
• Less severe social issues
• Imitation and mimickry
• Mental exhaustion and identity confusion
• Manipulation, abuse and trauma

7


CHALLENGES IN DIAGNOSIS
Females measured on scales meant for typical male-like profile.
Current screening instruments vs. camouflaging recognition.
Quantifying abnormality in ASD females.
DSM-V recognizes gender differences in presentation.

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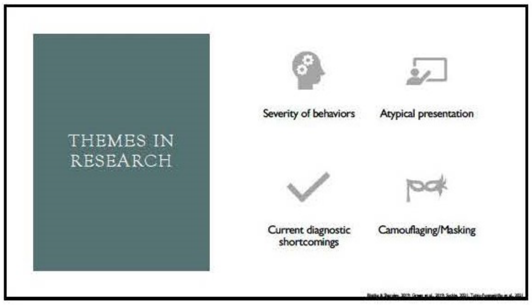

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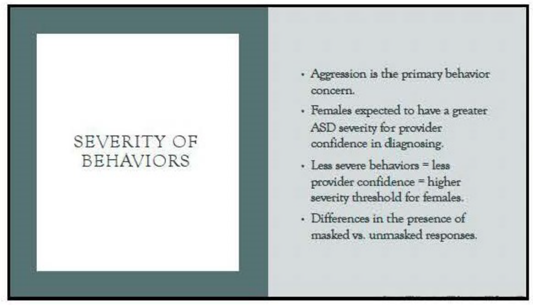

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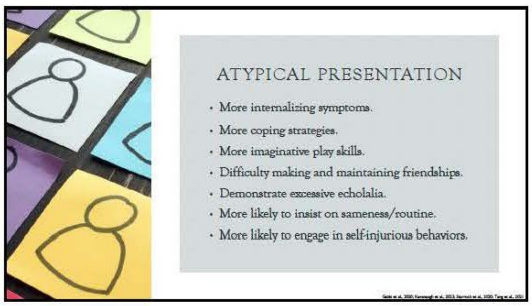

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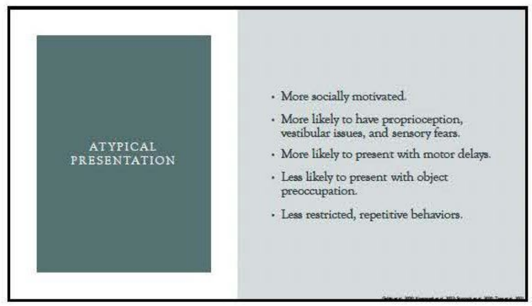

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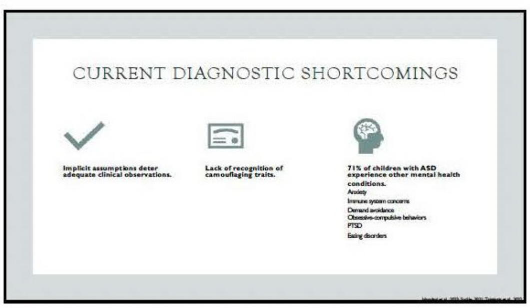

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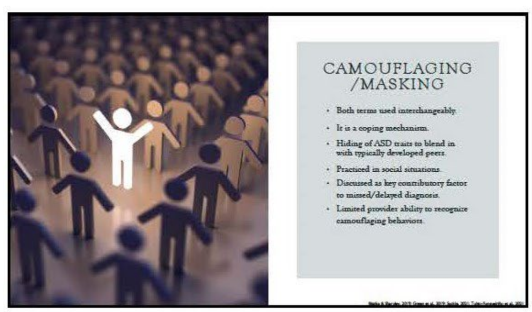

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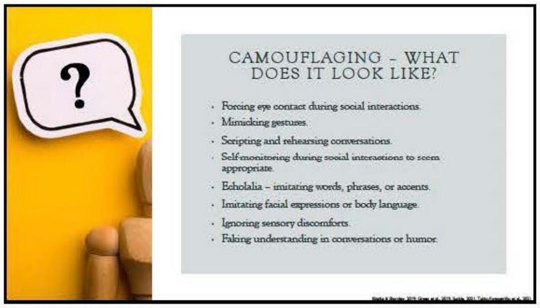

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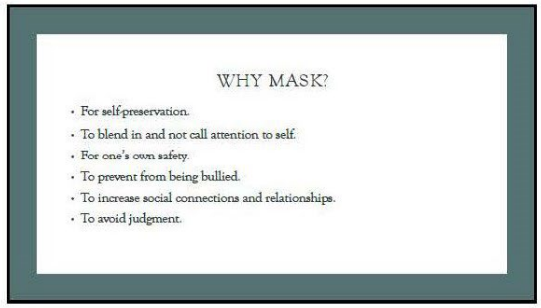

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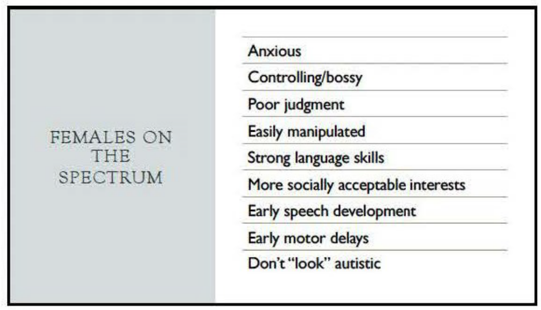

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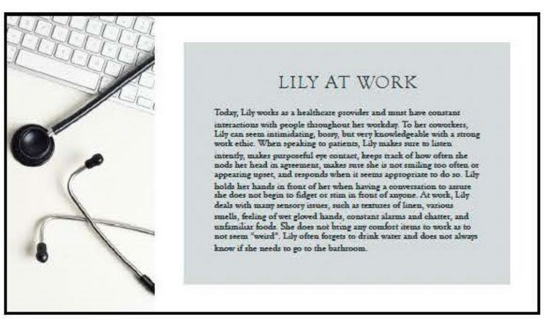

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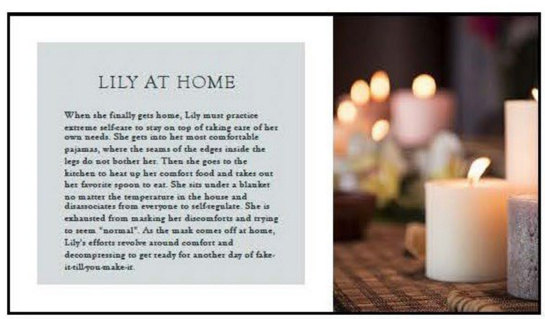

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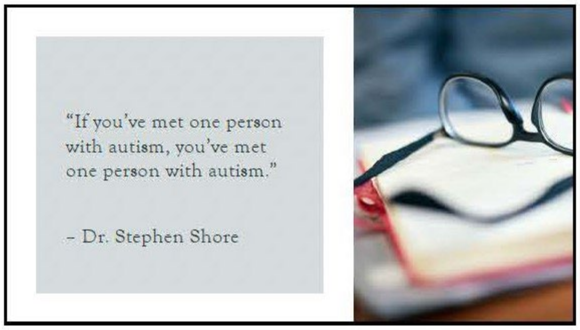
"If you've met one person
with autism, you've met
one person with autism."
– Dr. Stephen Shore

25

APPENDIX F

LITERATURE REVIEW GRID

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Strengths and Limitations
Bitsika & Sharpley 2019	Effects of diagnostic severity upon sex differences in behavioural profiles of young males and females with autism spectrum disorder.	Quantitative	- Results identified specific ASD-related behaviors significantly and meaningfully more severe in females as rated by parents. - Consistently, females had higher, meaning worse, scores than males regardless of age. - Female camouflaging of ASD behavior possibly begins before school age. - Due to camouflaging, females who exhibit a wider range of more severe behavior may be identified as having ASD.	Strengths: - Statistical power and the two-step procedure, which reduced the likelihood of a Type I error. - Well-established measure of ASD-related behaviors, as well as matching for age, IQ, and severity of ASD. Limitations: - Limitations to generalizability due to age, geographic locations, cultural sources, and using the SR-2 data rather than another scale. - Although no associations were found, the possibility of menarche and the existence of other psychiatric conditions across cultures needs to be considered.
Gabis, Attia, Roth-Hanania, & Foss-Feig 2020	Motor delay – An early and more common "red flag" in girls rather than boys with autism spectrum disorder.	Quantitative – retrospective review of records	- Motor milestones in most children with ASD are within normal range except walking which is at the late end of the normal range in girls. - 38% of girls in the study had an overt motor delay. - ASD screening methods not taking into account motor delays can cause girls to be missed in their diagnosis. - In young children, motor delays can be attributed to growth developmental delay; however, this study shows the possibility of ASD as a factor as well.	Strengths: - Large sample size (n = 467). Limitations: - Developmental milestones until the first evaluation was based on parent reports. - Cultural aspect as a study conducted in Israel.
Green, Travers, Howe, & McDougle 2019	Women and autism spectrum disorder: Diagnosis and	Qualitative – Literature review	- Gender specificity in ASD supported by current research.	Strengths:

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Strengths and Limitations
	implications for treatment of adolescents and adults.		- Differences in phenotypes, comorbid psychiatric conditions, and camouflaging further contribute to the missed or delayed diagnosis of ASD in females.	- Several different factors are studied and highlighted throughout. Limitations: - No mention of the number of research studies reviewed.
Hamdani, Kassee, Walker, Lunsky, Gladstone, Sawyer, Ameis, Desarkar, Szatmari, & Lai 2023	Roadblocks and detours on pathways to a clinical diagnosis of autism in girls and women: A qualitative secondary analysis.	Qualitative secondary analysis	- Several factors contribute to missed or delayed diagnosis in girls: age of pre-diagnosis signals or red flags; other mental health diagnoses given first; limited understanding based on male presentation; and lack of resources for diagnostic services. - Autistic features going unnoticed by providers were a recurring point of discussion in the interviews.	Strengths: - Audio-recorded and professionally transcribed interviews taken at face value from accounts of 22 girls and 15 parents with autistic daughters. - Robust descriptions of 34 participant accounts of their experiences offered sufficient power and insight into the contributary factors of a missed diagnosis. Limitations: - Primary data was not generated with a specific research question regarding the secondary analysis. - Data from self-diagnosed women were excluded.
Kavanaugh, Schremp, Jones, Best, Sheinkopf, & Morrow 2023	Moderators of age of diagnosis in >20,000 females with autism in two large US studies.	Quantitative – analysis of two large independent data sets	- Analysis of RI-CART and SPARK databases. - Largest sex differences found in the clinical presentation of low repetitive/restricted behavior severity, later onset of parental concerns, and intact language and intellectual abilities. - Atypical presentation accounts for the largest discrepancy between males and females.	Strengths: - Large data set. - Found statistically significant and consistent results in both databases. Limitations: - Primary variable of age at diagnosis based on parental recall. - ASD diagnosis was based on parental report of clinical diagnosis; however, over 90%

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Strengths and Limitations
				were validated by in-person assessment.
Neuhaus, Kang, Kresse, Corrigan, Aylward, Bernier, Bookheimer, Dapretto, Jack, Jeste, McPartland, Van Horn, Pelphrey, & Webb 2022.	Language and aggressive behaviors in male and female youth with autism spectrum disorder.	Quantitative – data analysis from the GENDAAR Consortium	- Findings regarding aggression in females with ASD did not hold similarities with males with ASD. - Females with ASD are likely to experience more severe social effects related to their aggression, but the causes or predictors of the aggression are still not well known. - Aggressive behavior in ASD females was found to be unrelated to age, race, parental education, family income, or the child's communication abilities.	Strengths: - Use of the GENDAAR consortium study participants from 4 different sites across the country. - N = 145, sufficient data provided for adequate analysis. Limitations: - Data with a coarse, broader measure of aggression. - Data does not distinguish between finer forms of aggression or nuanced behaviors.
Sturrock, Yau, Freed, & Adams 2020	Speaking the same language? A preliminary investigation, comparing the language and communication skills of females and males with high-functioning autism.	Quantitative	- High-functioning ASD girls perform better socially than high-functioning ASD males but still underperform as compared to typically developed females. - High-functioning ASD females may not meet diagnostic criteria for social communication struggles, which can lead to a missed or later diagnosis of ASD.	Strengths: - Provides preliminary data in the realm of high-functioning ASD. - Adds to the current body of research working on diagnostic assessments and interventions for different presentations of ASD in males and females. Limitations: - Small sample size raising concerns for type II error. - Lack of statistical significance due to smaller size can be remedied by a larger scale study. - Participants were chosen by researchers to represent the missed diagnosis subtype.
Suckle 2021	DSM-5 and challenges to female autism identification.	Qualitative data analysis	- Masking or camouflaging can present in many forms and is used	Strengths: - Summary of evidence-based amendments to the female

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Strengths and Limitations
			predominantly by females to mask autistic traits. - The two main diagnostic principles in the DSM-V are broad enough to include the female presentation but in practice, the criteria is followed more narrowly.	presentation of ASD is clearly outlined. Limitations: - Not an actual study, but rather an amalgamation of factors that show a need for amending diagnostic criteria.
Tang, Li, Baulderstone & Jeyaseelan 2021	Presenting age and features of females diagnosed with autism spectrum disorder,	Quantitative – Cross-sectional study	- Study finds specific gender-based differences in the presentation of ASD between males and females. - Using current diagnostic criteria translates to females showing a less severe presentation of ASD due to not meeting some criteria. - Age did not seem to differ significantly, but clinical features and level of severity showed gender-based differences. - High-functioning ASD females can be completely missed using current diagnostic DSM criteria.	Strengths: - Added to current research findings and showed consistency with prior literature. - First study to assess gender and severity levels of ASD as related to DSM-V criteria. Limitations: - Assigning severity levels can introduce bias. - The cohort of participants was male-dominated, leaving a smaller sample size of females. - Children who underwent an assessment but were not diagnosed were excluded from the sample, leaving no control group comparison.
Tsirgiotis, Young, & Weber 2022	A mixed-methods investigation of diagnostician sex/gender bias and challenges in assessing females for autism spectrum disorder.	Mixed-method	- Sex/gender differences were not meaningfully associated with the confidence of the diagnostician on whether the criteria for ASD were met or not. - ASD-related behaviors were rated to be more severe in females. - Even though 90% of diagnosticians say that assessing a female client for ASD is more difficult, the study findings did not correlate.	Strengths: - One of the first studies to examine diagnostician bias. - Provides data that contrasts other studies allowing for more expansion of research. - Provides qualitative and quantitative data per direct examination of gender bias in ASD. Limitations:

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Strengths and Limitations
			- Possible increased attention via social media is responsible for diagnosticians paying more attention to the female presentation of ASD.	- Recruitment bias - Preconstructed case studies did not allow for diagnosticians to form their questions or use their reasoning. - Majority of the diagnosticians were female, which possibly influenced their perception of what to look for in a female ASD presentation.
Tubío-Fungueiriño, Cruz, Sampaio, Carracedo & Fernandez-Prieto 2021	Social camouflaging in females with autism spectrum disorder: A systematic review.	Quantitative – Systematic review	- One of the causes related to camouflaging can be social expectations. - Although still struggling with social interactions, ASD females were found to be more capable of understanding the need for friendship and intimacy than ASD males. - Finding support camouflaging in ASD females, which is based on imitating their peers and masking their symptoms.	Strengths: - Systematic review of studies from January 2009 to September 2019 on several databases. - Provides the element of camouflaging to be considered in the diagnosis of females with ASD. Limitations: - Inclusion criteria resulting in 13 empirical articles

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