4-3-2022

Piecing Together the Puzzle of Anxiety and Autism Spectrum Disorder: The Relationship between Anxiety and ASD

Autumn Bailey Schreiner

Follow this and additional works at: https://louis.uah.edu/honors-capstones

Recommended Citation

This Thesis is brought to you for free and open access by the Honors College at LOUIS. It has been accepted for inclusion in Honors Capstone Projects and Theses by an authorized administrator of LOUIS.
Piecing Together the Puzzle of Anxiety and Autism Spectrum Disorder: The Relationship between Anxiety and ASD

by

Autumn Bailey Schreiner

An Honors Capstone

submitted in partial fulfillment of the requirements

for the Honors Diploma

to

The Honors College

do

The University of Alabama in Huntsville

04/03/2022

Honors Capstone Director: Professor Katherine Morrison, MSN, RN

Property rights with the Honors College, University of Alabama in Huntsville, Huntsville, AL
Honors Thesis Copyright Permission

This form must be signed by the student and submitted as a bound part of the thesis.

In presenting this thesis in partial fulfillment of the requirements for Honors Diploma or Certificate from The University of Alabama in Huntsville, I agree that the Library of this University shall make it freely available for inspection. I further agree that permission for extensive copying for scholarly purposes may be granted by my advisor or, in his/her absence, by the Chair of the Department, Director of the Program, or the Dean of the Honors College. It is also understood that due recognition shall be given to me and to The University of Alabama in Huntsville in any scholarly use which may be made of any material in this thesis.

Autumn B. Schreiner
Student Name (printed)

__________________________
Student Signature

4/3/22
Date
Table of Contents

Dedication .................................................................................................................................. 3
Abstract ......................................................................................................................................... 4
Introduction .................................................................................................................................. 6
Review of Literature ......................................................................................................................... 6
Theoretical Framework ..................................................................................................................... 12
Product Development ....................................................................................................................... 13
Results ........................................................................................................................................... 14
Limitations ..................................................................................................................................... 15
Discussion ...................................................................................................................................... 15
Implications to Nursing Practice ...................................................................................................... 16
Conclusion ....................................................................................................................................... 16
Dissemination of Scholarly Work ...................................................................................................... 17
References ..................................................................................................................................... 18
Figures, Illustrations, Tables ............................................................................................................ 20
Appendix A: Anxiety Scale for Children–Autism Spectrum Disorder–Children ................................ 30
Appendix B: ASD & Anxiety Booklet ............................................................................................... 32
Appendix C: Making Connections’ Letter of Permission .................................................................. 40
Appendix D: Research Horizons Day Poster .................................................................................... 41
Dedication

For Bella, and all others like her, your strength is ever my inspiration.
Abstract

**Background:** Over the past three decades, many research studies have explored the relationships between the concurrent diagnoses of autism spectrum disorder (ASD) and anxiety disorders and a myriad of variables, such as gender differences, symptom presentation, age of diagnosis, intelligence quotient, and aggravating factors (van Steensel & Heeman, 2017; Vasa et al., 2017). However, the complete relationship between anxiety and ASD persists as a complicated phenomenon. As individuals with ASD tend to have atypical presentations of anxiety, it remains a complicated task in which to determine the comorbid presence of anxiety when also considering the similarity in presentation of ASD symptoms (White et al., 2015). As such a thorough analysis of risk factors and appropriate screening tools must be presented to patients and their caregivers for early identification and subsequent treatment of potential comorbid anxiety disorders prior to the development of maladaptive coping strategies.

**Project Development:** This project seeks to create a booklet that can increase awareness of, and provide more information on, the comorbidity of anxiety and ASD. A literature review was conducted to identify risk factors, potential etiology, and screening tools concerning the development of anxiety in individuals diagnosed with ASD. Risk factors and information concerning advocating for individuals with ASD and suspected comorbid anxiety are outlined in the booklet in addition to online resources to further assist in this understanding.

**Results:** The finished booklet was distributed virtually to Making Connections, an ASD networking group of the Autism Society of Alabama, and the University of Alabama in Huntsville’s Regional Autism Network.
**Discussion:** The purpose of this project is to improve the quality of life of individuals with ASD by providing the booklet to autism resource centers surrounding Huntsville, AL and thus increasing patients’ and their caregivers’ access to basic information about comorbid anxiety and resources they can utilize to mediate this.
Introduction

With approximately 40% of adolescents diagnosed with autism spectrum disorder (ASD) experiencing known comorbid anxiety and an undetermined percentage suffering but undiagnosed due to uncertainties in diagnostic criteria, it is undisputed that this vulnerable population needs effective interventions (Vasa et al., 2017). Before interventions can be established, however, a clear and unified understanding of the etiology and subsequent risk factors associated with anxiety disorders in the ASD population must first be established. Past studies have shown that adolescents with ASD present with a higher prevalence of comorbid anxiety disorders than their typically developing peers and that these anxious symptoms exist outside of their ASD diagnosis, rather than being characteristic of the autism spectrum itself (White et al., 2015). Furthermore, these anxiety symptoms have been found to worsen with the age of ASD individuals, tending to exhibit ‘flare-ups’ during adolescence as it marks both a social and biological milestone (van Steensel & Heeman, 2017). Thus, education to patients and their caregivers surrounding anxiety development must be present to accurately identify at risk individuals to subsequently provide the proper interventions for treatment. The purpose of this project is to compile peer-reviewed evidence concerning the development of comorbid anxiety in individuals with ASD and create an informational booklet describing these risk factors in addition to methodologies to empower patients and their caregivers as advocates.

Review of Literature

To identify evidence for literature review, an online evaluation of peer-reviewed scholarly articles was conducted via Primo Pathfinder, the primary discovery service available to students at the University of Alabama in Huntsville through Salmon Library. Keywords utilized included “Autism Spectrum,” “Females,” “Adolescence,” “Anxiety,” and “Youth,” yielding
6,263 results. To narrow this broad spectrum of findings and to locate the most relevant and recent research findings concerning comorbid anxiety and ASD, the search was filtered to include articles between the years 2015 and 2020. The 3,852 peer reviewed articles stemming from this search were further evaluated based on their relevance to the research question. Appraisal of the selected articles utilized in this study can be viewed within the review of evidence table in Table 1.

A cross-sectional descriptive study aimed to examine the difference in anxiety between male and female children with ASD was conducted through online surveys. The sample consisted of 48 ASD diagnosed children aged 9-12 years: 24 males and 24 females. Participants’ parents completed an online survey utilizing the Anxiety Scale for Children–Autism Spectrum Disorder–Parent (ASC-ASD-P), a 24-item questionnaire designed to capture both typical and atypical signs of anxiety in children on the autism spectrum (see Appendix A). The resulting scores from these surveys were screened via a Shapiro-Wilks test and were analyzed via descriptive statistics to determine significance. From this analysis, it was determined that gender did not pose a clinically significant difference in childhood rates of anxiety in individuals diagnosed with ASD. A small sample size (N=48), the use of convenient sampling, and the exclusion of the undiagnosed female individuals with ASD, due to their typically adolescent timing of diagnosis, remain as the limitations of this study. Strengths of this study include the reliability of the ASC-ASD-P questionnaire, the accountment of data skewing via matching participants in age, cognitive ability, and autism severity, and the inclusion of both typical and atypical presentations of anxiety regarding gender (Ambrose et al., 2020).
To address the double-hit theory of sex and ASD diagnosis in adolescent females with autism spectrum disorder, Oswald et al. (2016) conducted a cross-sectional study concerning the comparison of both parent- and self-reports of depressive and anxiety symptoms in both adolescent individuals with ASD and typically developing adolescent individuals. A total of 64 adolescents were selected for this study: 32 with an ASD diagnosis and 32 deemed typically developing. In a quiet testing room free of distraction, individuals alone save for one experimenter, answered a physical survey consisting of the Multidimensional Anxiety Scale for Children (MASC). Through this investigation of sex, developmental stage of adolescence, ASD severity and intelligence quotient (IQ), this study determined that while the double-hit theory was not supported, females with ASD were found to have a heightened risk for developing internalizing disorders. This study further confirmed that individuals with ASD experience greater symptoms of both depression and total anxiety when compared to their typically developing peers via both self-report and parent-report. Limitations include the small sample size (N=64), the cross-sectional approach rather than a longitudinal study, and the lack of inclusion of those with a low socio-economic status, as the individuals in this study fell within the upper middle class. These limitations may limit the generalizability and replicability of the study.

Despite these limitations, strengths of this study include the community sample, which is more representative of the ASD population when compared to a clinically referred sample, the control of extraneous factors such as IQ and sex, and the matching of subjects at the individual level versus the group level (i.e. participant to participant versus ASD group to typically developing group) (Oswald et al., 2016).

A phenomenological qualitative study was conducted to explore common themes found within the experiences and management strategies of adolescent girls with ASD in social
situations through the in-person interview of 10 adolescent females with ASD. Through interpretative phenomenological analysis (IPA) the researchers were able to see the participants’ perspectives regarding specific given situations and events. After saturation was achieved, it was found that female adolescents with ASD were highly motivated to develop and maintain friendship with typically developing peers, but when transitioning to adolescence, this task became increasingly difficult. Consequently, explicit strategies (masking and imitation) were developed to cope. While these coping mechanisms allowed for positive social experiences, they also resulted in psychological disadvantages such as suicidal ideations and emotional fatigue.

The allowance of parental presence during the interview process poses as a glaring limitation of this study as this could have influenced or inhibited participant responses. Further limitations include the self-selection of the participants and the high functioning status of the participants, both of which limit the extrapolation of the findings to all females on the autism spectrum. The primary, first-hand account of experiences lived by adolescent females with ASD remains as the greatest strength of this study. Furthermore, the identification of female coping strategies, such as masking, identify the poor fit in ASD-diagnostic criteria concerning the female population. In addition, clear developmental points where stressors were high were identified within this study, allowing for the possibility of gendered, developmental framework when assessing individuals with ASD (Tierney et al., 2016).

A systematic review was completed utilizing the online databases of PsychInfo, Pubmed, Web of Science, and ERIC to meta-analyze literature between the years 2010 and 2016 concerning the comparison of comorbid anxiety rates in ASD and typically developing individuals. A total of 833 studies were determined to be applicable to this review through the exclusion of articles lacking empirical data, consisting of solely case study reports, including
informant reports that were not parental or self, and/or utilizing interviews over questionnaires. The meta-analysis found that as age increases, the difference in anxiety levels between individuals with ASD and typically developing children and adolescents also increased, perpetuating the findings that youth with ASD experience higher levels of anxiety via both self and parental reports. Limitations to this study include the inclusion of research which used questionnaires that lacked specificity for ASD, the lack of inclusion of ASD individuals younger than age 6 and older than age 15, and the lack of inclusion of ASD individuals with lower functioning IQs (<70). A key strength of this study was the reveal of structural flaws and sources of bias in primary research studies. In addition, this meta-analysis gathered multiple sources of research concerning anxiety disorders and ASD to establish the bigger picture of the correlations found within this comorbid relationship. Through the establishment of this “bigger picture” consisting of multiple of variables from IQ to age, this meta-analysis allowed for the essential clinical implication of careful monitoring of children with ASD as they transition into adolescence (van Steensel & Heeman, 2017).

To identify research priorities on co-occurring anxiety and ASD, a systematic group process concerning 62 researchers and clinicians with experience working with youth diagnosed with ASD and comorbid anxiety was conducted. The self-selected sample of 62 individuals was further divided into two groups: Group A, consisting of 33 individuals, and Group B, consisting of 29 individuals. Group A generated a list of priorities via open-ended question online surveys developed by the researchers. Within these surveys, Group A ranked priorities and identified the top three priorities for each domain (measurement, neurobiology, and treatment). From these priorities, Group A generated research questions for each priority via in person round robin discussion groups. Group B was then utilized to evaluate the priorities and research questions
generated by Group A via an online survey. Through this methodology, it was found that treatment topics were of highest priority when compared to measurement and neurobiology topics, with “determining how ASD symptoms affect treatment response” and “implementing treatment in real world settings” to be of the highest expert priority ratings overall. Strengths of this study include the large, representative sample size of international clinicians and researchers, the facilitation of equal participation via nominal group technique, and the maintenance of anonymous voting. Limitations include the lack of infinite time to discuss the list of priorities during round robin discussion groups, the predominantly psychologist-based sample, and establishment of only 3 priority domains. These restrictions overall may have narrowed the focus of potential extraneous priorities (Vasa et al., 2017).

A case-control study examining the factorial equivalence of anxiety in youth with and without ASD aggregated Multidimensional Anxiety Scale for Children parent-report (MASC-P) and child-report (MASC-C) scores across a myriad of previous research studies to determine the metric and latent factor equivalence. The total sample size of this study was 451 individuals: 109 youths with anxiety disorders and ASD (99 male & 10 female, \(M_{age} = 11.67\) years) and 342 typically developing, gender-matched youths with anxiety disorders but without ASD (246 male & 96 female, \(M_{age} = 11.25\) years). Utilizing multigroup factorial invariance (MFI), MASC-C samples were found to have equivalent latent factors in youth both with and without ASD via structural equation modeling. However, when examining item means and covariances a lack of evidence for scalar or structural invariance was noted. MASC-P data was disregarded as it did not fit the measure’s established structure. Overall, the study found that the MASC-C cannot be believed to measure anxiety in youth with ASD as accurately as it measures typically developing youth. Limitations of this study include the probable cognitive and verbal limitations within both
sample groups, the lack of inclusion of a secondary measure of anxiety, and the possible limited replicability due to the itemized covariances on the MASC-C. Strengths of this study include the large, multisite sample of both typically developing youth and youth with ASD, the analytic rigor, and the applicability of the findings to future research (White et al., 2015).

In sum, increased feelings of stress during the transition to adolescence are present within both males and females diagnosed with ASD, increasing the risk for anxiety disorder development or exacerbation when compared to their typically developing peers. This risk is further heightened when addressing females with ASD, as they are impacted by gender-specific milestone markers at this transition. Female individuals with ASD have been found to adapt to these stressors by exhibiting coping strategies unique to their gender such as masking. However, these coping strategies have been shown to lead to poor mental outcomes overall. While the psychological etiology concerning the impact of gender-specific milestones is unknown, theories have been developed to explain the increased stressors that this population experiences.

**Theoretical Framework**

While various theories have been presented in attempt to explain the inner workings of individuals with autism spectrum disorder, the extreme male brain theory of autism (EMB) may assist in the analysis of heightened anxiety in ASD females. According to Baron-Cohen (2002), autism is an extreme presentation of the normal, systematic male profile, meaning that those with autism present with low to absent empathy and understand the world as governed through rules and regulations. The EMB viewpoint of autism explains the classic presentation of ASD: attention to detail, preference for structured environments, obsession with well-defined variables, and ability to perform certain tasks of interest at a high level (Baron-Cohen, 2002). The EMB theory not only backs typical signs and symptoms of ASD but also coincides with ASD’s
impaired empathizing symptomologies as evidenced by impaired social interactions (see Figure 1).

If we observe the extreme male brain theory as truth, the occurrence of anxiety diagnoses and ASD may be due to the stress of attempting to systemize the unpredictable aspects of life such as social interactions. This would further the discussion of increased rates of anxiety in females with ASD versus males with ASD as they experience a larger shift from their empathetic gender norms to the extreme systemization of the male brain type. Tierney et al. (2016) address this viewpoint claiming that due to the innate social drives and abilities present within the female brain type, females with ASD devise strategies such as masking to overcome the difficulties present within social settings. In their meta-analysis of anxiety and ASD, van Steensel and Heeman (2017) also address the social difficulties and demands present on adolescents with ASD, claiming that they are pressured into assimilating into ‘normal’ developmental milestones. For females with ASD, these pressures may be exacerbated as they have a higher etiologic load than their male counterparts to overcome to meet the typically developing female adolescent’s empathetic brain type.

**Product Development**

The final booklet is designed to provide information about identifying and seeking further assistance concerning comorbid anxiety disorders in children and adolescents with ASD to parents and caregivers. The first section is an introduction that explains the prevalence and subsequent reason that caregivers should be aware of anxiety and its presence in individuals with ASD. It also explains risk factors that have the potential to exacerbate anxiety in these individuals as typical signs and symptoms of anxiety are not universally applicable to this
population. Patients’ caregivers will also be advised on how to advocate to providers if they suspect their child or adolescent to have comorbid anxiety.

The major content of the pamphlet discusses the various factors surrounding comorbid anxiety and its connection to individuals with ASD, focusing on the pediatric population as they transition into adolescence (see Appendix B). Each page of the booklet outlines essential components in identifying and addressing comorbid anxiety including pertinent risk factors, the process of advocating for ASD-specific screening tools such as the ASC-ASD if comorbid anxiety is expected, and what treatment may entail. Steps that parents or caregivers can take independently to personally assess their child for comorbid anxiety are also included. Parents and caregivers are encouraged to complete these steps prior to visiting medical services for treatment. In addition, an infographic is providing outlining four simple steps to addressing anxiety disorders in this specific patient population: knowing risk factors, taking notes, speaking up, and spreading awareness. At the end of the booklet, online resources for parents and caregivers of children with anxiety are listed in addition to scholarly reading concerning the presentation of anxiety in individuals with ASD.

**Results**

The finished booklet is eight pages long, with an introduction, an infographic overviewing the main points of the booklet, three pages concerning the process of identifying, advocating, and treating suspected comorbid anxiety in individuals with ASD, and a page concerning online resources available to all. The booklet was distributed virtually to Making Connections, an ASD networking group of the Autism Society of Alabama, and the University of Alabama in Huntsville’s Regional Autism Network (see Appendix C).
Limitations

A limitation of this project is that the booklet does not provide a comprehensive list of all resources concerning anxiety and ASD within children and adolescents. Only six online resources are included in the booklet. As a result, other potentially available resources are not included. These online resources were found via Internet search consisting of anxiety treatment for children and adolescents, thus lacking the additional component of ASD. This may affect the validity of the individual guides within these resources when applied to this specific patient population. Finally, the effectiveness of the recommended screening tool (ASC-ASD) was not evaluated for validity concerning individuals with ASD and intellectual and learning disabilities. This scale is also only recommended for those between 8 and 15 years and is therefore not transferable to adults or younger children. Child or parent report bias also poses as a threat to the credibility of such a tool. Health disparities may be present due to demographic differences therefore affecting the availability of the provided resources and the outlined risk factors.

Discussion

Due to the high rates of comorbid anxiety in individuals diagnosed with ASD, it is vital that parents and caregivers of children with ASD not only be aware of the presence of comorbid anxiety disorders but also how to effectively identify and advocate for care to promote the best outcomes for these individuals. By providing the virtual booklet to Making Connections and the Regional Autism Network, patients and their caregivers may gain access to basic information concerning the risk factors and development of comorbid anxiety. Patients and their caregivers are encouraged to further this basic understanding through research to gain empowerment through advocacy. Healthcare providers are also encouraged to engage in interprofessional
collaboration and consider implementing ASD-specific anxiety scales into regular practice. Furthermore, this project may have the benefit of increasing awareness of concerning comorbid anxiety disorders and ASD, thus stimulating the potential for future research studies.

**Implications to Nursing Practice**

Although, research concerning the treatment of comorbid anxiety in individuals diagnosed with ASD was deemed of the upmost priority in past studies, it remains difficult to thoroughly address treatment when a substantial portion of the female population with ASD remains undiagnosed until adolescence. This difficulty is further perpetuated by the lack of accurate measurement of anxiety disorders for individuals on the autism spectrum. However, the findings of this literature review support the certainty of one treatment aspect as pertains to clinical practice: that females on the autistic spectrum must be monitored closely during their transition into adolescence to provide direct and immediate intervention should subsequent depressive symptoms develop as a result of heightened social anxieties. Through this analysis of risk factors and screening tools, coupled with proper patient and family education via booklet distribution, anxiety disorders in individuals with ASD can be identified and subsequently treated prior to the development of maladaptive coping strategies. Thus, enhancing quality of life for individuals with ASD as they grow.

**Conclusion**

The research articles reviewed displayed abundant, peer-reviewed evidence indicating that adolescent females with ASD may present a high risk for the development or exacerbation of comorbid anxiety disorders when compared to not only their male counterparts, but also typically developing female adolescents, and typically developing male adolescents. A
conclusive review of the literature identifies the transition to adolescence from childhood, in which rates of anxiety were found to be equivalent between both males and females with ASD, as a critical juncture in the female development of internalizing disorders as evidenced by self-report of typically developing peer imitation strategies in attempts to maintain childhood relationships. The compounded research reveals of the positive correlation between age and the difference in anxiety levels found between adolescents with ASD and typically developing adolescents supports the conclusion that age in relation to an ASD diagnosis exacerbates anxiety levels within this population. The sum of these factors directly supports the EMB theory of autism, proving that, for females with ASD, socio-communication pressures are exacerbated as they have a higher etiologic load than their male counterparts to overcome to meet the typically developing female adolescent’s empathetic brain type. Future research is recommended to determine if the stress of an ASD diagnosis impacts or exacerbates anxiety in female adolescents and to develop specified treatment criteria for this specific patient population.

**Dissemination of Scholarly Work**

A conceptual study concerning recommendations to further understand the etiology of atypical anxiety symptomologies in relation to demographic factors was presented locally at the University of Alabama in Huntsville’s annual Research Horizons Day. This conceptual project was displayed via poster format and was available for discussion with other individuals at the event (see Appendix D). Through this discussion I was able to collaborate with others on methodologies to expand this research and its adjuncts in the future.
References


Table 1: Research Compilation
Breakdown of current studies regarding Autism Spectrum Disorder and concurrent/comorbid anxiety

<table>
<thead>
<tr>
<th>Study Author/year/title</th>
<th>Objectives/Aim/Purpose</th>
<th>Research design / Sample/ Setting</th>
<th>Intervention (competencies &amp; methods)</th>
<th>Instruments &amp; data collection methods</th>
<th>Study findings/results</th>
<th>Strengths</th>
<th>Limitations</th>
<th>Implications and recommendations</th>
</tr>
</thead>
</table>
| Author: Ambrose, K. et al.  
Title: Exploring profiles of anxiety symptoms in male and female children  
Year: 2020 | To compare the parent-reported anxiety symptoms of male and female children (9-12 y/o) on the autism spectrum  
Aim: Examine the difference in anxiety between male and female children with autism spectrum disorder with matching age. | Quantitative (Descriptive Survey)  
Sample: 24 male and 24 female children with autism spectrum disorder with matching age. | No intervention performed, descriptive study only. | The ASC-ASD-P. This is a 24-Item questionnaire designed to capture both typical and atypical signs of anxiety in children on the | Male and female children (aged 9-12 years) had similar total anxiety scores per parent report.  
Results: No significant difference | This study addressed both the typical and atypical anxiety symptoms in individuals with ASD in relation to gender as well, which no previous study directly explored.  
Limitations: Due to the late diagnosis of ASD present in the female population, the undiagnosed female population with ASD is missing from this study, thus leaving the possibility of skewed results. In  
Implications and recommendation: Clinical practice implications mainly focus on informing clinicians to be aware of the similar presentation of anxiety signs/symptoms found in both gendered individuals with ASD versus the differing presentation of anxiety in typically developing counterparts. |
| **Author:** Oswald, T.M. et al.  
**Title:** Sex differences in internalizing problems during adolescence in Autism Spectrum Disorder  
**Year:** 2016 |
|---|
| **Objectives:** Compare both parent- and individual self-reports of depressive and anxiety symptoms in both adolescent individuals with ASD and typically developing adolescent individuals.  
**Aim:** To study the effects of sex and adolescence on internalizing symptoms (anxiety/depressive) in  
**Setting:** Quiet testing room with one experimenter |
| **Research Design:** Quantitative (Cross-Sectional Design)  
**Sample:** 32 adolescents with ASD and 32 typically developing adolescents  
**Intervention (competencies and methods):** No intervention preformed, observational/descriptive design only.  
**Instruments:** The Revised Child Anxiety and Depression Scale-Parent Version (RCADS-P). This scale is a 47-item parent report of how often a symptom of anxiety/depression is present on a scale from “never” to “always.” The Multidimensional Anxiety Scale for Children (MASC). This scale is a 39-item self-report that assesses the domains of physical symptoms, harm avoidance, social anxiety, and separatory/panic in order to determine anxiety levels in g females (p < 0.01) and ASD males (p < 0.05) which was also in line with parent report findings.  
**Study findings:** Females with ASD displayed greater depressive symptoms than both males with ASD and typically developing females.  
**Strengths:** First study to examine effects of sex and adolescence on anxiety/depressive symptoms in individuals with ASD compared to typically developing adolescents. Communitary sample was used in this study therefore representing the total  
**Limitations:** Small sample size limited power to detect interactions between age, ASD, and sex. Lack of confirmation of diagnosis and reliance of parent-reported symptomology. Self-selected cases may limit generalizability of study results.  
**Implications and recommendation:** Clinical practice implications mainly focus on furthering the therapeutic treatment of comorbid anxiety/depressive symptoms in adolescence with ASD. Recommend that during periods of developmental growth (particularly concerning adolescence), individuals with ASD be monitored for depressive/anxiety symptoms and  
**ASD:** Purpose: Determine if females with ASD are at a higher risk for developing internalizing disorders due to the “double hit” of sex and diagnostic factors. |
| Author: Tierney, S. et al.  
Title: Looking behind the mask: Social coping strategies of girls on the autism spectrum  
Year: 2016 | Objective: To acquire accounts of how females with ASD identify with and respond to the social challenges | Research design: Qualitative (Phenomenological)  
Sample: 10 | Intervention (competences and methods): No intervention preformed, interview only. | Instrument(s): Interpretative Phenomenological Analysis (IPA)  
which | Study findings: Results: Female adolescents with ASD were motivated  
Strengths: Clear identificatiion of developmental points in which adolescent females  
Limitations: Parental presence during interview could have influenced/inhibited participant | Implications: Understanding the use of socio-communication techniques found in adolescent females with ASD |

| | | | Data collection methods: Both adolescents and parents completed their respective questionnaires (RCADS-P for parents and MASC for adolescents) in a quiet testing room. Adolescents were monitored by one experimenter. | | | | 

| | | | | | | |
| Associated with adolescence. | Adolescents with ASD and autism spectrum disorder. | Enables the researcher to see the participant's perspective whilst acknowledging existing knowledge concerning the context of a situation/event. **Data collection methods:** Interviews were conducted to explore accounts of social experiences associated with ASD and autism spectrum disorder. | With ASD experience social distress and their specific methods to cope were evidenced by first-hand accounts. Responses. In addition, participants self-selected, thus limiting experiences discussed in the study/interview. Small sample size cannot elicit changes in current practice. | Allow clinicians to recognize strategies such as masking and provide adequate treatment/support for better patient outcomes. Results of study support the need for future research/development of theories surrounding gender differences within ASD. |

**Purpose:** To explore if adolescent females with ASD use social management strategies (masking) to hide sociocommunicative difficulties in order to fit in with peers.
<table>
<thead>
<tr>
<th>Author: van Steegel, F.J.A., &amp; Heeman, E.J.</th>
<th>Objective: To compare the anxiety levels of youth with Autism Spectrum Disorder (ASD) to typically developing children and clinically referred children meta-analytically. Aim: To meta-analytically examine if there are high anxiety levels in children with ASD. Purpose: Analyze factors impacting the nature/development of anxiety in children with ASD.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year:</strong> 2017</td>
<td><strong>Research design:</strong> Meta-Analysis <strong>Sample:</strong> Various peer-reviewed studies concerning ASD, samples and anxiety measures published between 2010 and 2016. <strong>Setting:</strong> Not applicable. <strong>Intervention (competence and methods):</strong> Not Applicable. <strong>Instruments:</strong> N/A. <strong>Data collection methods:</strong> Researchers examined 83 studies and compared anxiety measures, ASD measures, ASD group size/age/IQ, comparisons on groups, and report types (parent) versus child. <strong>Study findings:</strong> 1) Youth with ASD have higher levels of anxiety when compared to typically developing children. 2) Anxiety levels of children with ASD are generally higher than those in clinically referred children. 3) The type of comorbidity. <strong>Strengths:</strong> Revealed structural flaws and sources of bias in primary research studies. In addition, this meta-analysis pulled together multiple sources of research concerning anxiety disorders and ASD, in order to determine that anxiety levels in children with ASD are elevated across the board. <strong>Limitations:</strong> Studies analyzed did not use screening questionnaire specific to ASD, thus may have integrated measurement bias. Studies did not integrate children younger than 6 years of age, adolescents greater than 15 years of age, and individuals with IQs less than 70 thus under-representing these groups. <strong>Implications and recommendation:</strong> Implicates the importance of developing appropriate tailored screening instruments for anxiety in ASD. Recommend that high-functioning children with ASD be monitored for anxiety disorders as they transition to adolescence.</td>
</tr>
</tbody>
</table>
### Key Points:

**Objective:** To identify research priorities on co-occurring anxiety in ASD

**Aim:** To identify the most important research priorities for anxiety in ASD

**Sample:** Two groups

**Research design:** Qualitative (Nominal Group Technique/Systematic Group Process)

**Intervention (competencies and methods):** Not Applicable

**Instrument:** ‘Research Priorities’ Survey developed by two of the study authors which asked participants to list what they believed to be the major research priorities in the areas of anxious measurement, neurobiology, and treatment.

**Study findings:** Treatment topics were determined to be of highest priority when compared to measurement and treatment. Expert online survey developed by authors which listed priorities along with specific research questions and asked participants to provide neurobiology topics.

**Results:** The highest ranked treatment topics were: “Determining how ASD symptoms affect treatment response” (45% of experts rated priority) and “Implementing treatment in real world settings” (41% of experts rated priority) compared to the limited focus on psychopharmacology as a top treatment priority. The three priority domains established by the study authors (measurement, neurobiology, and treatment) may have limited the focus of potential priorities.

**Limitations:** Workshop did not allow infinite time to discuss initial list of priorities. Both groups consisted of predominately psychologists, thus possibly explaining the limited focus on psychopharmacology as a top treatment priority. The three priority domains established by the study authors (measurement, neurobiology, and treatment) may have limited the focus of potential priorities.

**Implications and recommendation:** The priorities determined in this study can be implicated to guide future research on ASD and anxiety. The study authors recommend that future research be conducted in three steps: (1) the consideration of these priorities at the level of policy and science funding, (2) continuation of multi-site international collaboration to ensure generalizability of findings via larger samples, and (3) continuation of updating priorities in research as future studies continue.
<table>
<thead>
<tr>
<th>Anxiety and Autism Spectrum Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>ratings (“strongly agree” to “strongly disagree”), rank the nine priorities from least important to most important, and comment on the feasibility of each priority (“least likely,” “neutral,” “likely”). <strong>Data collection methods:</strong> Group A generated a list of priorities via open-ended question surveys. Group A then ranked the priorities and identified the top three priorities for each domain (measurement, neurobiology, treatment) within an in-person workshop. Group A generated research questions for each priority via round robin.</td>
</tr>
<tr>
<td>to the measurement priorities of “Validating existing standardized anxiety measures to address the overlap between ASD and anxiety symptoms” (28%) and “Developing objective measures of anxiety” (24%). Neurobiological priorities were ranked lowly in general as all priorities in this category received &lt; 20% of experts rating.</td>
</tr>
</tbody>
</table>
| Authors: White, S.W, et al.  
Title: Anxiety in youth with and without Autism Spectrum Disorder: Examination of factorial equivalence  
Year: 2015 |
|---|
| **Objective:** To examine the equivalence of anxiety using well-established parent- and child-report measures across typically developing and ASD samples.  
**Aim:** Examine the metric and invariance of MASC-C and MASC-P.  
**Purpose:** Further information |
| **Research design:** Quantitative (Case-Control)  
**Sample:** 109 adolescents with ASD & 342 typically developing adolescents  
**Setting:** Multidimensional Anxiety Scale for Children (MASC-C & MASC-P) |
| **Intervention (competencies and methods):** Not Applicable |
| **Instruments:** Multidimensional Anxiety Scale for Children (MASC-C & MASC-P), both are 39-item scales that yield subscale scores for harm avoidance, physical symptoms, social anxiety, and separation anxiety/panic. Parents and/or children rate these categories from “never true about me” to “often true about me.”  
**Data collection methods:** ASD sample scores on MASC as it does in youth without ASD (typically developing).  
**Results:** ASD sample yielded MASC-C data which represented established latent factors but the levels and relations among those factors differed. MASC-P could not be utilized as they did not conform to the item-level.  
**Strengths:** Assists in understanding how, in what ways, to what extent, and under what conditions the use of screening tools such as the MASC-C can be utilized across varying groups (in this case, typically developing youth versus youth with ASD).  
**Limitations:** Participants include in the study could have subtle cognitive/verbal limitations thus influencing results. Replication of the study may be difficult due to the item-level.  
**Implications and recommendation:** Implications of this study pertain to the use of MASC to attempt to diagnose anxiety in clients with ASD within a clinical setting. Recommend future research on the structure of MASC in clinical samples of both anxious youth with and without ASD. |
| concerning methods to accurately measure anxiety in youth with ASD | were taken from six previous intervention studies for anxiety in youth with ASD. Typically developing sample scores on MASC were taken from a intervention trial for typically developing youths with anxiety disorders. | Both samples’ scores were compared (matching genders) to assess for differences, missing values, and the necessity of analytic adjustments. Confirmatory factor analysis (CFA) was run to examine overall fit. | to the established MASC structure. |
Figure 1: Visual of Brain Types

Brain types illustrated on the axes of empathizing (E) and systemizing (S) with numbers indicating standard deviation from the mean. Brain types are as follows: Balanced brain (Type B, purple zone), female brain (Type E, light green zone), male brain (Type S, light blue zone), extreme female brain (Extreme Type E, dark green zone), and extreme male brain (Extreme Type S, dark blue zone). Per the extreme male brain theory of Autism Spectrum Disorder, those with an ASD diagnosis should fall within the dark blue zone (Baron-Cohen, 2002).
### Appendix A

**Anxiety Scale for Children - Autism Spectrum Disorder - Child version (ASC-ASD)**

*Jacqui Rodgers, Sarah Wigham, Helen McConachie, Mark Freeston, Emma Honey, Jeremy Parr*

Newcastle University, Newcastle UK

---

Please put a circle around the word that shows how often each of these things happen to you. There are no right, or wrong answers.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. All of a sudden I feel really scared for no reason at all</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. I worry what other people think of me</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. My heart suddenly starts to beat too quickly for no reason</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I feel scared when I have to take a test in case I make a mistake</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I worry people will bump into me or touch me in busy or crowded environments</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I am afraid of being in crowded places (like shopping centers, the movies, buses, busy playgrounds) in case I am separated from my family</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I worry that I will do badly at my school work</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

8. I suddenly feel as if I can't breathe when there is no reason for this

9. I am afraid of new things, or new people or new places

10. I am afraid of entering a room full of people

11. I worry when I go to bed at night because I don't like to be away from my parents/family

12. When I have a problem I feel shaky

13. I suddenly start to tremble or shake when there is no reason for this

14. When I don't know what will happen, I can't do things

15. I worry when I think I have done poorly at something

16. I always need to be prepared before things happen

17. I feel afraid that I will make a fool of myself in front of people

18. I worry about being away from my parents

19. I worry that something awful will happen to someone in my family

20. I would feel scared if I had to stay away from home overnight because I like to be close to my parents/family

---

These materials are copyright ©Newcastle University 2015 except where otherwise stated these materials may be not be altered, amended or converted without prior permission of Newcastle University.

Developed with the generous support of The Baily Thomas Fund

Jacqui.Rodgers@ncl.ac.uk
<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>21. I worry about being in places that are too loud, or too bright or too busy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. I suddenly become dizzy or faint when there is no reason for this</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. I worry if I don't know what will happen e.g. if plans change</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. I worry that something bad will happen to me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix B
ASD & Anxiety Booklet

Anxiety &
ASD
GUIDE

1) Know

2) Take Notes

3) Speak Up!

4) Spread Awareness!

Risk Factors
INTRODUCTION

Why all the fuss about anxiety?

Well, studies have shown that children with Autism Spectrum Disorder (ASD) have a higher chance of having anxiety than their peers. Almost half (40%) of children with ASD have anxiety as well! While anxiety can be treated, it is important to notice signs early so that this treatment can begin as early as possible. This will help your child to not only feel better, but also stop them from feeling worse.

This booklet will explain steps you can take to be ready in the face of anxiety and will teach you how to spread the word about anxiety and ASD!
THINGS TO KNOW

Risk Factors?

As signs and symptoms of anxiety present differently in people with ASD, it is important to know risk factors that could potentially cause anxiety in these individuals.

Risk factors for ASD include:

- Female gender
  - As past studies have shown that females with ASD display unique traits such as masking*
- Teenage or adolescent age
  - This time marks both a social and biological milestone that anyone, regardless of diagnoses, experiences...remember how awkward and difficult high school was for you?

In a nutshell, simply be aware of these risk factors and regularly check-in on your child as they grow into their teenage years. Know your child's "normal" and be sure to record any change from this.

*Masking is basically copying someone else's behaviors. In this case, masking allows females with ASD to hide their true feelings and behaviors by copying those of their peers.
I’ve Identified Risk Factors...Now What?

Speak up! Reach out to organizations, providers, and support groups to find the next steps available in your region if you think that your child may be having anxiety. Suggest tools made specifically for people with ASD such as the Anxiety Scale for Children – Autism Spectrum Disorder (ASC-ASD) to get the best results. This process of “speaking up” is called advocating!

A little bit more about...

ASC-ASD

The ASC-ASD is a 24-question survey that can identify if a child (or adolescent) with ASD has anxiety symptoms.

These questions depict situations and are answered on a scale from 0 to 3, with 0 meaning the situation “never” happens and 3 meaning it “always” happens.

If you are concerned about your child’s ability to complete this survey, ask about the parent-report scale! This allows you to answer the questions instead.
TREATMENT

While the plan of care is up to your child’s doctor, there are still many steps you can take to help your child.

What can I do?

- Take the time to check-in with your child; Ask them about their day and let them know of your support
- Take notes of any behavior that you think is related to anxiety
- Be aware that while anxiety can occur at any time, the teenage years are the most likely
- Ask other people in your child’s life such as teachers if they have noticed any differences in your child’s behavior (Be sure to note this too!)
- Reach out to your child’s main doctor
- Prepare yourself and your child for interviews (interviews allow the doctor to understand what your child is feeling and understand your concerns)

The Future...

By knowing about and understanding the risk factors of anxiety in children with ASD, you are prepared! Early identification of anxiety means your child can get help faster and get back to being a kid!

By being an advocate for your child, you can change the way doctors look at ASD and spread the word about anxiety and ASD!
ADDITIONAL RESOURCES FOR SUPPORT/GUIDANCE

• American Academy of Child & Adolescent Psychiatry
  ○ Provides guidance on locating a Child and Adolescent Psychiatrist as well as guidance on psychiatric medications and easy-to-read educational resources concerning mental illness/disorders

• Anxiety & Depression Association of America
  ○ Explains general signs and symptoms of anxiety and/or depression in children and further describes the relationship between anxiety and depression
  ○ Website: https://adaa.org/find-help/by-demographics/children/anxiety-and-depression

• Child Mind Institute
  ○ Provides helpful guides to parents on how to assist their children with anxiety the day-to-day
  ○ Website: https://childmind.org/topics/anxiety/

• The Child Anxiety Network
  ○ Serves as a resource portal for both parents and providers of children with anxiety
  ○ Website: http://www.childanxiety.net/

• National Institute of Mental Health
  ○ Demonstrates the difference between natural/normal anxiety and anxiety syndromes
  ○ Website: https://www.nimh.nih.gov/health/topics/anxiety-disorders

• WorryWise Kids
  ○ Discusses all steps and answers questions regarding what to do if you believe your child is suffering from anxiety
  ○ Website: http://www.worrywisekids.org/
ADDITIONAL READING SOURCES


Appendix C
Making Connections Letter of Permission

To Whom It May Concern,

Making Connections ASD Networking Group has agreed to allow/post Autumn Schreiner Research Study on our Facebook Page as a way for her to reach families/children/adolescents affected by ASD for her research study. If you have any questions, please feel free to contact me at mc@autism-alabama.org or 256-541-1542 anytime.

Thank You,
Norma Pedersen, ASA Network Group Leader
mc@autism-alabama.org
256-541-1542
Like & Follow Us on Facebook: https://www.facebook.com/makingconnectionsasd
Appendix D
Research Horizons Day Poster

Research Horizons Day & Research Week
March 4-10, 2022

Piecing Together the Puzzle of Anxiety and Autism Spectrum Disorder: The Relationship between Anxiety and ASD (Concept Study)

Autumn B. Schreiner, Honors BSN Student, College of Nursing
Katherine Morrison, MSN, RN

Overview
- What is the relationship between anxiety levels in adolescents, ages 13-18 years, with Autism Spectrum Disorder (ASD)? Do the rates of anxiety between males and females with ASD differ?
- Method: Compounded results of an online version of the Anxiety Scale for Children - Autism Spectrum Disorder (ASC-ASD) as well as a demographic questionnaire, volunteer participants' results will be observed for any relationships between age, gender, overall anxiety scores, and sub categorical anxiety scores.

Impact
- Enhanced understanding of risk factors for the development of anxiety disorders with ASD
- Accurate and early identification and subsequent treatment of co-morbid anxiety
- Proper education on identifying anxiety triggers and characteristics of internalizing disorders
- Prevention of maladaptive coping strategies
- Better quality of life outcomes

Review of Evidence
- Approximately 40% of adolescents with ASD experience co-morbid anxiety (5)
- Uncertain etiology, diagnostic criteria, and risk factors associated with anxiety disorders in the ASD population (1)
  - Anxious symptoms exist outside of ASD diagnosis, rather than being a characteristic of the autism spectrum itself (3)
  - Anxiety symptoms worsen with age of ASD individuals, tending to exhibit 'flare-ups' during adolescence as it marks a social and biological milestone (2)

Next Steps...
- Data collection via recruitment and analysis to provide a thorough examination of age and gender to further unravel complexities and accurately identify at risk individuals for the subsequent development of proper interventions for future treatment

References

Acknowledgements
A sincere thank you goes out to Mrs. Katherine Morrison, Dr. Ann Bianchi, and the UAH Honors College, without whom this project would not be possible.