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Socioeconomic Factors and Comorbid Conditions in Children with Autism Spectrum Disorder

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Abstract

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Disorder

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William Paris

MBA, Colorado State University, 2013

BS, California Polytechnic State University, 1994

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

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Abstract

Autism spectrum disorder (ASD) is a neurodevelopmental disorder that impacts children and adults. Comorbid conditions such as anxiety, depression, behavioral issues, and low socioeconomic status negatively impact health care quality in children with ASD. Missing from the academic literature is the quantification of the relationship between parental education and employment and health insurance coverage on the prevalence of comorbid conditions in children with ASD. The purpose of this cross-sectional quantitative analysis was to examine and quantify the relationship between parental education and employment, health insurance coverage, and the reporting of comorbid conditions (anxiety, depression, behavioral issues) in a nationally representative dataset. Using ecological systems theory as a theoretical framework, this study focused on identifying opportunities to help bring about positive social change. Here, secondary data from the National Survey of Children's Health totaling 1,692 ASD records were analyzed through binary and multiple logistic regression to assess possible relationships. Mental health insurance coverage and parental education predicted a statistically significant association of 64% and a 31% odds of reporting comorbid conditions in ASD children, respectively. Accordingly, addressing comorbidities may reduce the psychosocial issues that affect children with ASD. Implications from this study pertain to the reallocation of resources and subsequent development of social programs, leading to positive social change for these communities and decreasing the number of children impacted with comorbid conditions.

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Dedication

I would like to dedicate this dissertation to my family. Without your love and support I would not have been able to continue with my educational endeavors. To my wife, thank you for your patience and encouragement throughout this process. To my children, it is my hope that you will see the value of continuing to challenge yourself and further enhance your knowledge of the world through education. Thank you to my good friend and colleague Moe Hassan for taking this journey with me and walking me through the many questions I had regarding Microsoft Word or SPSS. You are truly a great friend. Lastly, to all the individuals and families that are impacted with autism, I thank you for your courage and hope that science will progress to help you live healthy and happy lives.

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Chapter 1: Introduction to the Study

Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder impacting children and adults characterized by deficits in social communication and interactions, nonverbal communicative behaviors, and developing and maintaining relationships (Park et al., 2016). The parent-reported prevalence of US children with ASD is estimated at 1 in 40 and has been steadily increasing in recent years (Kogan et al., 2018). While the exact cause of ASD is unknown, accumulating evidence supports the role of genetics and environmental influences on the developmental course of the disorder (Mandy & Lai, 2016). Genetic heritability of ASD has been estimated between 40% and 90% (Sanchack & Thomas, 2016). Improved diagnostic criteria, increased parental awareness, and an increase in risk factors such as births to older parents may be driving the rise in autism cases. Prenatal risks for ASD include advanced parental age and maternal metabolic conditions such as diabetes and obesity (Mandy & Lai, 2016). ASD is a heterogeneous disease impacting children along a spectrum of clinical features. Deficits in children that should warrant an evaluation by specialists include issues with social communication, language delays, repetitive patterns of behavior, interests, or activities (Sanchack & Thomas, 2016). A reliable diagnosis of ASD can typically be made by 24 months of age (Guthrie et al., 2013).

The prevalence of comorbid conditions can significantly impact a timely diagnosis for children with ASD (Kogan et al., 2018). A delay in diagnosis can lead to a delay in treatment and special services, impacting children's long-term outcomes

(Christensen et al., 2019). Eighty-three percent of children with ASD have a co-occurrence of one or more non-ASD developmental diagnosis (Schieve et al., 2012). The authors assessed the frequency of emotional and behavioral issues using questionnaires sent to parents and teachers caring for young children with ASD. The authors reported that three-quarters of the 4-to-8-year-olds with autism had parent-reported emotional and behavioral problems, and two-thirds had teacher-reported problems. Physical and mental comorbidities can increase the disease burden for children with ASD and lead to an increase in caregiver stress (DesChamps et al., 2020). Anxiety and depression have been identified as common comorbidities in ASD (Uljarević et al., 2020). The authors identified an increase in severity for anxiety and depression to be higher in adolescents, which slightly declined in older adulthood. According to the literature, suicidality was present in 10.9%-50% of the ASD samples from a systematic review (Segers & Rawana, 2014). The risk factors identified for suicidality in ASD included behavioral problems, ethnicity, low socioeconomic status (SES), and low education level. Although there is no cure for ASD, most treatments are focused on decreasing the comorbidities' symptoms (Sanchack & Thomas, 2016).

Parental education and employment status are cited as integral components of a family's SES (Yang et al., 2020). Disparities in care based on SES have been identified in diagnosing ASD and the subsequent care (Durkin et al., 2010; Kelly et al., 2019; Yu et al., 2020). A lack of or suboptimal health insurance coverage resulting from unemployment or high costs can lead to inadequate care for children with ASD (Flores et al., 2017). Kerns et al. (2017) reported an association between SES and adverse

childhood experiences. Parents in low SES have reported a lack of insurance and high out-of-pocket costs, potentially due to their employment status (Pickard & Ingersoll, 2016). The increased healthcare costs for children with ASD can lead to stress and financial strain for low SES families. Mothers of children with ASD are more likely to be unemployed and earn less money (Cidav et al., 2012). Parental employment was significantly less in parents of school-aged ASD children compared with other mothers (Callander & Lindsay, 2018). Parental educational attainment has been demonstrated to impact healthcare quality and treatment services utilization (Nguyen et al., 2016). Additional research is warranted exploring associations between parental education and parent employment status and the reporting of comorbidities in children with ASD.

ASD places a significant financial burden on society and the families treating children with ASD. Leigh and Du (2015) estimated the 2015 US economic burden of ASD, including annual direct medical, direct non-medical, and productivity costs, at $268.3 billion and project it to grow to $460.8 billion in 2025. The authors identified the financial impact on education as the most significant component to their estimate. The additional costs of caring for a child with ASD in the United States, including health care and non-healthcare related expenses, were estimated at $17,081 per year above caring for a child without ASD (Lavelle et al., 2014). The economic burden continues to grow as more individuals are diagnosed with ASD, and the disorder persists into adulthood (Kogan et al., 2018). It is estimated that 80% of adults with ASD are underemployed or unemployed (Rogge & Janssen, 2019). The impact of these high costs on society

combined with the many comorbidities associated with ASD make this disorder a significant public health issue.

This study examined the potential relationship between children from homes in low SES and inadequate health insurance coverage, and the parental reporting of comorbid conditions. This research could lead to positive social change by stimulating additional research on these variables' causative factors. If these factors are identified, public health interventions or social programs can be implemented to reduce these factors. Families from low SES are disadvantaged in many ways. This research could encourage public health officials to develop programs or offer services for families with ASD children. These services may be targeted towards decreasing the risk of comorbidities and the subsequent financial burden they place on families.

What follows in Chapter 1 is the background of the literature on ASD in children, the role of SES and comorbidities in ASD, the problem statement, the purpose of the study, the research questions and hypotheses, the theoretical framework, the nature of the study, the definitions, the assumptions, and the scope and delimitations.

Background

According to the literature, ASD occurs in 1% to 4% of the population (Zablotsky et al., 2015). ASD is not considered a single disorder but a multi-factorial disorder characterized by deficits in social behaviors, communication skills, and non-verbal interactions (Park et al., 2016). Genetics may have a role in the disorder's etiology as chromosomal abnormalities have been identified in some individuals (Rylaarsdam & Guemez-Gamboa, 2019). Siblings born in families with an ASD member are at a greater

risk for being diagnosed with ASD (Szatmari et al., 1998). Environmental factors, including pre-natal, peri-natal, and post-natal factors, may contribute to the risk for ASD (Karimi et al., 2017). Despite these findings, the exact cause of ASD is unknown. Future research is needed to understand the potential interplay between genetic and environmental factors leading to ASD. Identifying these risk factors can lead to interventions or strategies targeting those that are modifiable.

Evaluating the role of SES and its influence on ASD diagnosis and treatment is necessary to identify potential disparities. In the literature, SES is often referred to as poverty level, parental educational attainment, and employment status (He et al., 2018; Yu et al., 2020). SES has been acknowledged to impact the diagnosis and subsequent care of children with ASD (Durkin et al., 2017; Eilenberg et al., 2019; Emerson et al., 2016; Thomas et al., 2012). Additionally, parental education and employment status have been recognized as factors negatively impacting the care and treatment of children with ASD (Assari et al., 2019; Gipson et al., 2014; Hidalgo et al., 2015; Kelly et al., 2019; Connor Morrow Kerns et al., 2017; Nguyen et al., 2016).

Comorbid conditions can lead to worse health outcomes and an increase in healthcare-related services (Casanova et al., 2020). In ASD, common comorbid conditions such as anxiety, depression, and behavioral issues have been identified (Chandler et al., 2016; Uljarević et al., 2020). Anxiety may result from poor communication issues that impact children with ASD (Sanchack & Thomas, 2016). Depression and behavioral issues in ASD may result from hopelessness, peer victimization, or disease severity (Greenlee et al., 2020; Segers & Rawana, 2014;

Uljarević et al., 2020). Medical management, counseling, and alternative therapy options are common treatment approaches for comorbid conditions.

An association between SES and autism diagnosis and care have been described in detail in the literature (Delobel-Ayoub et al., 2015; Durkin et al., 2017; Thomas et al., 2012). Children with ASD are at an increased risk of developing comorbid conditions (Sanchack & Thomas, 2016). I identified a gap in the literature assessing the association between parental education, parental employment status, and health insurance coverage, and the reporting of comorbid conditions for children with ASD. The goal of this study is to address this gap to further the understanding of the association between SES factors and comorbid conditions. Children with ASD suffering from comorbid conditions are at an increased risk for adverse life outcomes (Eilenberg et al., 2019; Connor Morrow Kerns et al., 2017). Additionally, this study will evaluate for a relationship between health insurance coverage for mental health services and the reporting of comorbid conditions. It is essential to understand the association early on so that services and programs can be implemented to address the adverse health outcomes associated with the identified comorbid conditions.

Problem Statement

In 2020, the Centers for Disease Control and Prevention reported the prevalence of ASD as 1 in 54 children (Maenner et al., 2020). Children with ASD are at risk for neurodevelopmental complications, including depression, anxiety, and behavioral issues (Aggarwal & Angus, 2015; Romero et al., 2016). SES has been identified to be a risk factor for diagnosis, treatment, and identifying comorbid conditions (Gipson et al., 2014;

Kelly et al., 2019; Connor Morrow Kerns et al., 2017). Healthcare costs treating children with ASD and their associated comorbid conditions can add further financial stress to families from low SES (Lavelle et al., 2014). ASD children with comorbid conditions can lead to caregiver stress (DesChamps et al., 2020).

Comorbid conditions in ASD can lead to missed diagnosis and misdiagnosis such as personality disorder and depression (Fusar-Poli et al., 2020). A timely and accurate diagnosis is critical to ensure that children are treated with evidence-based therapies (Zuckerman et al., 2017).

According to Constantino et al. (2020), children from African American families had their ASD diagnosis delayed by more than 3 years after their parents first reported concerns to their healthcare provider. A delay in diagnosis in low SES groups exacerbates their child's care and can put an additional financial strain on the family (Pickard & Ingersoll, 2016; K. A. Smith et al., 2020). Parental educational attainment has been associated with an earlier ASD diagnosis and the utilization of interventional services (Hrdlicka et al., 2016; Nguyen et al., 2016). Parental employment status may indicate that the family has medical insurance and the financial resources to provide optimal care for their child (Callander & Lindsay, 2018; Pickard & Ingersoll, 2016).

Further research is needed to understand the potential association between parental education, parental employment, and health insurance coverage for mental health services on the reported comorbidities for children with ASD. Parents in low SES may be reporting a higher prevalence of comorbid conditions resulting from inadequate care and

a delay in diagnosis. An increase in comorbid conditions can lead to a higher financial burden for families and the public health system.

Purpose of the Study

The purpose of this quantitative, cross-sectional study was to examine the relationship between household SES, defined as household education, parental employment status, health insurance coverage for mental health services and the reporting of comorbidities in children with ASD (Yang et al., 2020). For this study, the independent variables are household education, household employment, and health insurance coverage for mental health services. The dependent variables are the comorbid conditions of depression, anxiety, and behavioral issues. The confounding variable identified is gender. Evaluating potential relationships between these variables can inform the development of programs and interventions to address disparities in care for children with ASD. While the study does not assess causative factors, it can further advance understanding of this growing public health concern.

Research Questions

RQ1: Is there a relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender?

$H_0 1$: There is no relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

H_a1: There is a relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

RQ2: Is there a relationship between household employment status and the prevalence of a comorbid condition (depression, anxiety, behavioral) among children with autism when accounting for gender?

H_02: There is no relationship between household employment status and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

H_a2: There is a relationship between household employment status and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

RQ3: Is there a relationship between health insurance coverage for mental health services and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender?

H_03: There is no relationship between health insurance coverage for mental health services and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

H_a3: There is a relationship between health insurance coverage for mental health services and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

Theoretical Framework

I developed the research questions to evaluate whether a relationship exists between the child's environment and their reported medical conditions. The ecological systems theory (EST) states that individuals will encounter different environments during their life and that these environments may impact their behavior in numerous ways (Eamon, 2001). The theory is divided into five parts: microsystem, mesosystem, exosystem, macrosystem, and chronosystem. Each level of the theory can impact the development of a child, which is critical to understand in the context of children with ASD and their socio-economic environment. The microsystem refers to the immediate environment for which the child lives, such as the relationships and interactions the child has with their family, school, or neighborhood (Wright & Benigno, 2019). Mesosystem assesses the interrelationship between two or more structures of the microsystem (Kuhn et al., 2018). This may include the connection between the family structure for children with ASD or the relationship between the medical community and the child. Exosystem refers to the larger social system in which the child does not directly function (Bronfenbrenner, 1977). Despite not being directly involved in these interactions, the child may still feel the system's positive or negative effects. These adverse effects may reside around parents' work schedules. Macrosystem refers to how customs or cultural values may influence the environment (Cuvo & Vallelunga, 2007). Children with ASD may belong to households where culture or education may impact the amount of care they receive. Families in a low SES may not have the necessary resources to provide optimal care for children with ASD. Ineffective healthcare may lead to a higher

prevalence of comorbidities in children (Carrilero et al., 2020). Chronosystem consists of life events and how these events change over time (Bronfenbrenner, 1986). The family structure for children with ASD may change throughout their life. Environmental changes within these structures may impact how a child reacts. These reactions can potentially lead to comorbid conditions such as depression or behavioral issues.

Nature of the Study

A quantitative analysis using a cross-sectional design was undertaken for this study. Secondary data were used to assess descriptive and inferential statistics for the described population and variables. The secondary data set captures parental responses in a survey and reports the results in numeric form. This provides a means for conducting a quantitative analysis using the data set. A cross-sectional study evaluates the outcome and exposure of the population at one point in time (Setia, 2016). This design is ideal for assessing the possible relationship between the described variables in children with ASD. Multivariate logistic regression allows for assessing multiple factors' simultaneous effect on a dichotomous outcome (Ranganathan et al., 2017). Logistic regression statistics enable the researcher to account for the impact of confounding variables on the dependent and independent variables (Sperandei, 2014). Gender has been identified as a potential confounding variable for this study as ASD is 4.3 times as prevalent in boys than girls (Maenner et al., 2020).

The National Survey of Children's Health (NSCH) is the secondary data set that was used to assess the association between the chosen variables in children with ASD (CAHMI, 2019). The survey was conducted in 2018 and 2019 and included data from

59,963 individuals. Data were collected through a combination of mail questionnaires and web-based responses. The survey collects national and state-level data on the physical and emotional health of children 0-17 years of age from the United States. A minimum of one child aged between 0-17 is required in the household to complete the survey. All of the data from the NSCH survey is publicly available online for analysis.

Definitions

Terms and abbreviations found throughout this study are listed and defined as:

Anxiety: Anxiety was self-reported by the survey respondent based on being told by a physician or health care professional that the condition was present or had ever been present (CAHMI, 2020).

Behavioral issues: Behavioral issues were self-reported by the survey respondent based on being told by a physician or health care professional that the condition was present or had ever been present, including oppositional defiant disorder or conduct disorders (CAHMI, 2020).

Comorbid conditions (comorbidity): Comorbidity refers to the existence of one or more health conditions in a person that coexist with the primary health issue (Valderas et al., 2009). While many potential comorbidities are associated with ASD, depression, anxiety, and behavioral issues will comprise this study's comorbid conditions.

Depression: Depression was self-reported by the survey respondent based on being told by a physician or health care professional that the condition was present or had ever been present (CAHMI, 2020).

Health insurance coverage for mental health issues: Health insurance coverage was self-reported as always, usually, sometimes, never, or did not receive mental health services as part of their health insurance coverage (CAHMI, 2020).

Parental education: The level of parental educational attainment was categorized as less than high school, high school or GED, some college, and college or higher (CAHMI, 2020).

Parental employment: Parental employment is characterized by children who live in households where one of the adult primary caregiver employed at least 50 out of the past 52 weeks (CAHMI, 2020).

Socioeconomic status (SES): The position of an individual or family within a society is based often on their social or economic standing (Shafiei et al., 2019). While many factors are commonly used to assess SES, parental education and parental employment will be used for this study.

Assumptions

When researchers analyze secondary data, they must assume that the individuals reporting and collecting the data have done so accurately (Cheng & Phillips, 2014). The NSCH data set relies on accurate parental reporting of diagnoses and comorbidities and not medical records from a trained clinician. Parents may be unaware or cannot recall if these comorbid conditions impacted their child. Inaccurate reporting of these variables would affect the validity of this study. Anxiety, depression, and behavioral issues have heterogenous presentations ranging from mild to severe (Dooley & Kunik, 2017). The severity of the depression and anxiety impacting an individual changes with age. These

changes may become unnoticed by the parent, affecting the reporting of these comorbid conditions. I assumed that the parental reporting of comorbid conditions was accurate for this study.

Scope and Delimitations

In this study, I aimed to assess whether there was any association between SES and the reporting of comorbid conditions in children with ASD. The NSCH data set provided data on all of the applicable variables for this analysis. The prevalence of ASD in the United States has increased in recent years (Kogan et al., 2018). Disparities in care for children of ASD from a low SES have been described in the literature (Constantino et al., 2020; Durkin et al., 2017; K. A. Smith et al., 2020). The economic impact of ASD on individual families and society makes this a growing public health concern (Lavelle et al., 2014; Rogge & Janssen, 2019). Identifying whether associations exist between SES, health insurance coverage, and the reporting of comorbidities may inform public health officials on strategies to mitigate this problem.

The NSCH represented a national survey to assess the health and well-being of children and their families from all 50 states, including the District of Columbia (United States Census Bureau, 2020). Initially, households received a mailed invitation to evaluate eligibility and determine whether a child resided in the house. In 2019, the national sample included 184,000 households, of which 68,500 were screened, and 35,760 were determined to be eligible for the topical questionnaires. Of those, 29,433 completed the topical interview. In 2018, the national sample included 176,000 households, of which 71,000 were screened, and 38,140 were determined to be eligible

for the topical questionnaires. Of those, 30,530 completed a topical interview. There were approximately 1,176 surveys per state conducted in 2018 and 2019. The generalizability of a study and its population can impact the findings' external validity (Steckler & McLeroy, 2008). The methodology for the survey may affect the generalizability to other populations. Initially, households were mailed a survey and asked to either respond through mail or the web. This may impact the heterogeneity of the sample as individuals living in SES may not have internet access.

Limitations

Several limitations should be considered when interpreting the results of this study. Cross-sectional studies are used to assess for a relationship between variables at a given time and cannot prove causation, impacting the internal validity of this study's results (Kesmodel, 2018). Any association between SES and comorbid conditions in children with ASD will need to be further researched to evaluate causality. Self-reported surveys are limited in terms of reliability and validity (Althubaiti, 2016). Response bias resulting from perceived personal questions may occur from the parent or caregiver of the child with ASD (Rosenman et al., 2011). Recall bias is common in survey research resulting from individuals forgetting about a health condition that may have occurred (Althubaiti, 2016). Parents of children with ASD may not recall all of the comorbid conditions that have impacted their child. Evaluating the variables of the survey is limited to the questions and data that comprise the survey. The NSCH survey was limited in the questions asked to parents and caregivers. Restricting the variables of the survey can impact this study's external validity.

Significance

I identified a gap in the literature regarding the association between SES and the prevalence of comorbid conditions in children with ASD. I sought to address this gap with this study, which can inform public health leaders to the extent of the problem facing this population. Children with ASD report higher comorbid conditions that place them at risk for premature mortality (Hirvikoski et al., 2016; Sanchack & Thomas, 2016). Comorbidities in low SES families can lead to a further financial strain on household budgets (Lavelle et al., 2014; Zablotsky et al., 2014). Comorbid conditions may be due to misdiagnosis by healthcare providers or a lack of health insurance benefits that lead to a delay in treatment for the underlying condition impacting the child's quality of life, education, social skills, and communication skills (Elder et al., 2017; Zuckerman et al., 2017). Comorbid conditions can continue to burden children with ASD as they enter adulthood (Miot et al., 2019). This study is essential for broadening the knowledge on the issues facing ASD children.

Summary

Children with ASD are at an increased risk for comorbid conditions. These conditions, such as depression, anxiety, and behavioral issues, can have severe consequences for children with ASD and their families. Disparities in care for children with ASD are prevalent in families of low SES. These disparities may be a result of many factors including a lack of health insurance coverage. The contribution of health insurance coverage on the reporting of comorbid conditions will be explored in this study. ASD and their associated comorbid conditions significantly impact the public

health and educational system in the United States. Based on the literature, a gap was identified regarding the association between parental education, parental employment, and health insurance coverage for mental health services and the reporting of comorbid conditions in children with ASD. Bronfenbrenner's EST guided the framework for this study utilizing data from the NSCH. The EST components and its focus on evaluating how a child's environment impacts their development make it an ideal theory to guide this study. The NSCH data set provides data on many variables affecting a child's health, including the variables of interest for this study. A few of the limitations and assumptions to consider are potential biases and the accuracy of the data. This study will add to the existing body of literature regarding the impact that SES has on the parental reporting of comorbid conditions in children with ASD and can lead to positive social change.

In Chapter 2, I provide a thorough review of the literature on ASD, EST, SES, health insurance coverage, and comorbid conditions. A comprehensive review of EST and how it pertains to children with ASD is evaluated in the chapter. The search strategy provides the key terms and search engines used is reviewed. Chapter 3 includes an evaluation of the methodology, including the rationale for the study design. Chapter 4 provides the results of the multiple logistic regression. In Chapter 5, an interpretation of the analysis findings is discussed, including the study's limitations, recommendations, and implications.

Chapter 2: Literature Review

Introduction

The prevalence of ASD has been increasing in the United States due to improvements in the diagnostic criteria and increased parental awareness (Kogan et al., 2018). One estimate utilizing diagnosis data from qualified healthcare professionals estimated the prevalence of ASD at 1 in 54 (Maenner et al., 2020). An additional analysis using parent-reported data estimated the prevalence of ASD at 1 in 40 (Kogan et al., 2018). ASD is a public health challenge as it adds a significant financial burden on society and the families providing care for children with ASD. Cakir, Frye, and Walker (2020) used prevalence data for ASD and estimated the number of new ASD cases in the United States between 1990-2019 at 2 million. According to the authors, the total societal costs, including direct and indirect costs, was estimated at $7 trillion during this period. The incremental annual healthcare costs for a family caring for children with ASD were estimated to be $3,930 (Zuvekas et al., 2020).

Assessing the impact of socioeconomic status on ASD prevalence has yielded mixed results. Studies conducted in the United States have identified an increased prevalence in ASD with an increasing SES (Durkin et al., 2017; Thomas et al., 2012). A higher SES may indicate an increased awareness by parents about autism and better access to healthcare. However, studies conducted in Europe and Scandinavia did not identify the same association between a higher SES and ASD observed in the US studies (Delobel-Ayoub et al., 2015; Larsson et al., 2005; Lehti et al., 2015).

Children with ASD are significantly impacted by comorbid conditions such as anxiety, depression, and behavioral issues (Sanchack & Thomas, 2016). Psychiatric disorders occur in approximately 70% of children with ASD, and 41% will have two or more comorbid conditions, including social anxiety and behavioral issues (Young et al., 2020). Premature mortality has been observed in individuals living with ASD attributed to multiple causes, including suicide (Hirvikoski et al., 2016). Race, gender, SES, and educational attainment have been identified as risk factors for suicidality in ASD (Segers & Rawana, 2014). A gap in the research was identified assessing the impact that parental education, parental employment status, and health insurance coverage for mental health services have on the reporting of comorbid conditions. Comorbid conditions can add to families' financial hardship caring for children with ASD and lead to a delay in diagnosis and treatment. A delay in diagnosis or improper treatment further increases the financial burden to the public health system.

In the current study, I sought to determine whether an association existed between SES, health insurance coverage, and the reporting of comorbid conditions for children with ASD. The purpose of this quantitative, descriptive, nonexperimental study was to assess for any associations between household SES defined as parental educational attainment and parental employment, health insurance coverage for mental health services with the reporting of comorbidities defined as anxiety, depression, and behavioral issues. Understanding whether an association exists can inform on public health strategies addressing ASD and in the development of resources that improve the care of children with ASD. Kryzak et al. (2015) successfully implemented a community

sibling support program to improve ASD knowledge and address depression and anxiety. The authors reported that by implementing a community support program, improvements were made in sibling self-reported anxiety and depression and ASD knowledge. Similar support programs may be initiated as result of evaluating relationships between comorbid conditions in children from low SES families.

The literature review search strategy was to determine the background, magnitude of the problem, and the gap in the data related to children with ASD. The theoretical foundation, EST, is described in detail and its application to the current study. Chapter 2 will provide a thorough review of the literature pertaining to ASD, SES, and comorbidities. SES is defined as educational attainment and employment status. Comorbidities for the current study related to ASD are defined as anxiety, depression, and behavioral issues.

Literature Search Strategy

This study's literature review incorporates current and seminal data relating to EST, ASD, comorbidities in children with ASD, health insurance coverage, and SES. I conducted a thorough review of the literature using the CINAHL & MEDLINE databases. These databases allow the user to search for articles in numerous journals and incorporate a filter to narrow the search. The search was filtered for peer-reviewed articles published within 5-6 years (2015-2020/2021). However, to establish a historical perspective on the seminal data, later years were allowed. I incorporated earlier literature published on the EST and its application to ASD into the literature search. Multiple search terms were used in various combinations, including *autism spectrum disorder,*

ASD, socioeconomic status, access to healthcare, health insurance coverage, mental health services, comorbidities, comorbidities in children, anxiety, depression, behavioral issues, parental education, parental employment status, and *ecological systems theory*.

Theoretical Foundation

Theories in public health provide a means for explaining behaviors and suggest ways to change these behaviors (Glanz et al., 2015). The components of theories include concepts, constructs, and variables used to provide a thorough understanding of events. Constructs provide the researcher with the primary element to the project, which are further developed into constructs. When variables are matched to constructs, they identify what should be assessed. EST guided and informed the potential relationship between parental SES and the reporting of comorbid conditions in children with ASD.

Ecological Systems Theory

The EST has evolved from the initial premise to its current form. In 1958, Anne Anastaci proposed to scientists in the field of psychological science the need to understand how hereditary traits and an individual's environment factor into their development (Bronfenbrenner & Ceci, 1994). Years later, Urie Bronfenbrenner built upon her work and proposed that the environment in which individuals reside consists of a set of systems that influence their development (Bronfenbrenner, 1977). Interdependent interactions within these systems throughout life's stages shape human development (Algood et al., 2011). The development of these systems and their interactions became known as the EST. The theory's focus has evolved from one with an initial focus on human development to one more focused on the individual (E. M. Rosa & Tudge, 2013).

EST is used to understand how people and their environment are connected and the

impact their environment has on social reality (Bronfenbrenner, 1977). In its current

form, the EST consists of micro-, meso-, exo-, macro-, and chronosystems (Eriksson et

al., 2018; E. M. Rosa & Tudge, 2013). As an example, the individual or the child can be

depicted in the center with concentric rings extending outward representing the

interaction of the micro-, meso-, exo-, and macrosystems (Eisenmann et al., 2008). As

people and systems change with time, chronosystems represents the passage of time

(Bronfenbrenner, 1986).

Bronfenbrenner (1977) describes the microsystems as a relationship between the

developing child and their environment. The child's environment can include their home

and school setting. A child's interpersonal relationship with those in their direct setting

also comprises their microsystem (Algood et al., 2011). Wright & Benigno (2019)

assessed the impact of siblings, members of the microsystem, in speech development in

children with ASD. The authors identified that siblings of children with ASD could have

an influential role in their development by serving as a communication partner in social

interactions and school environments.

The mesosystem represents interactions between two or more microsystems, each

impacting the child (Algood et al., 2013; Bronfenbrenner, 1986). Children with autism

are bidirectionally influenced by instruction within their home and school (Cuvo &

Vallelunga, 2007). Social contexts can affect individuals within the child's mesosystem,

indirectly affecting the children with ASD. Parental stress associated with raising a child

with ASD can further exacerbate the development of children with ASD (Kuhn et al.,

2018). Additionally, the peer-mediated intervention has been identified as a promising approach to address social skills in children with ASD, which can have a positive impact in school settings (Chang & Locke, 2016).

The psychological development of a child not only depends on the environments that they interact in but also depends on the settings that their parents reside for which the child may never directly engage (Bronfenbrenner, 1986). These settings represent the exosystems and may include the parent's workplace or social network. An exosystem's social context affects the individual in the child's life, thereby indirectly affecting the child with ASD (Cuvo & Vallelunga, 2007). Aggression and adverse life events for children with ASD are associated with mothers' distress (Weiss et al., 2013). Weiss et al., 2013 identified social support systems as a critical element in minimizing family distress. Socioeconomic factors for the family can lead to stress, impacting the psychological development of children with ASD. Families living in poverty receive low social support levels, leading to increases in parental psychological stress (Eamon, 2001).

The macrosystem of EST represents the "blueprint" that partly determines the social structures and activities occurring in the more immediate system levels (Bronfenbrenner, 1977). Bronfenbrenner (1977) refers to macrosystems as the institutional patterns of culture, such as economic, social, educational, legal, and political systems. State and federal regulations and health insurance practices can affect children's development (Cuvo & Vallelunga, 2007). Macro social policies such as access to healthcare, employment opportunities, and quality schools can enhance children's socioemotional development, which may differ by race or SES (Eamon, 2001). SES has

been identified as a factor in accessing acute care, specialized services, and educational services for families of children with ASD (K. A. Smith et al., 2020). The authors identified that disparities in care were observed for Hispanic and African American families. Lack of access to specialized care and treatment can lead to a misdiagnosis or the reporting of comorbidities in children with ASD.

Life events and individual changes can occur over a child's life span, influencing their development (Bronfenbrenner, 1986). The chronosystem considers the impact of time in the development of children. Chronic poverty and economic deprivation can negatively impact children's socioemotional development (Eamon, 2001).

EST can be useful in assessing the interactions of its systems with childhood development. The different systems within the theory do not necessarily occur in sequential order, and each one is of equal importance in the child's development (Bronfenbrenner, 1977). These interactions between and within the systems may help explain the potential reporting of comorbid conditions in children with ASD.

Literature Review: ASD, Socioeconomic Status, and Comorbidities

The following will be an extensive review of current and historical literature relating to children with ASD, SES, health insurance coverage, and comorbidities. In the literature review's socioeconomic section, I will analyze data concerning the impact of parental education and parental employment on children with ASD (Yang et al., 2020). The discussion of comorbidities in children with ASD will be divided into three sections focused on literature pertaining to anxiety, depression, and behavioral issues.

ASD and Socioeconomic Status

Studies conducted around the world have yielded mixed results when assessing the relationship between ASD and SES. European and Scandinavian studies using epidemiological data found no association between SES and ASD prevalence (Delobel-Ayoub et al., 2015; Larsson et al., 2005; Lehti et al., 2015). Universal healthcare in these countries may mitigate disparities in care in acquiring an ASD diagnosis regardless of family SES. However, He et al. (2018) used a Chinese national database to identify that children in families with a socioeconomic disadvantage had a greater risk of ASD.

Durkin et al. (2017) identified a positive SES gradient in ASD prevalence in the United States using population-based surveillance, census, and survey data. The prevalence difference between the high and low SES was constant overtime at 3.9/1000 (95% CI 3.3-4.5) in 2002 and 4.1/1000 in 2006-2010 (95% CI 3.6-4.6). Educational attainment and poverty were used as indicators for SES. The authors postulated that their findings suggest that ASD may be more frequently identified in high SES communities with good healthcare access. Maenner et al. (2020) assessed the impact of demographic characteristics such as race and ethnicity on the median age of ASD diagnosis and the co-occurrence of intellectual disability. The authors identified that Black children were less likely to have a first evaluation for ASD by age 36 months compared to White children. ASD diagnosis was further delayed in Black children identified with an intellectual disability compared to White children. SES of the family can impact the rate of comorbid conditions in children with ASD. A study by Rosa et al. (2016) was the first to identify a

relationship between the family's SES and the risk of comorbid conditions such as anxiety in a high functioning ASD group.

The prevalence of ASD with intellectual disabilities (ID) has been shown to be highest in areas with the highest level of deprivation, high adult unemployment, lower educational attainment, and single-parent families (Delobel-Ayoub et al., 2015). The authors evaluated children aged 8 from a childhood disability registry in France. In their analysis, the authors reported the prevalence risk ratio (PRR) regarding ASD with ID in the most economically deprived group at (PRR=1.89, 95% CI 1.39-2.58), high adult unemployment (PRR=1.62, 95% CI 1.20-2.20), lower educational attainment (PRR=1.43, 95% CI 1.05-1.96), and single-parent families (PRR=1.66, 95% CI 1.22-2.28).

SES can have a significant role in treatment services and care for children with ASD. Hong and Singh (2019) examined the factors that place children and families with limited resources at a disadvantage in getting an ASD diagnosis and therapeutic services. The researchers interviewed 21 single Black female caregivers of children with ASD that rely on state Medicaid health insurance. The barriers to care identified in the study were bureaucratic processes and the geographic location of treatment services. These issues were compounded by limited income, employment options, and social capital. Pickard and Ingersoll (2016) examined the relationship between SES and access services for ASD children. Parents in low SES report structural barriers impeding their ability to receive optimal care for their children with ASD, such as work schedules and transportation issues. Lower SES parents reported being less aware of their child's service options compared to families in higher SES. Carr et al. (2016) assessed the impact of SES on the

attendance at caregiver-mediated treatment for core deficits in children with ASD. The authors reported that the odds of low attendance compared with good attendance decreased by 4% for each unit increase in SES (95% CI 0.92-1.0). The demands of attending may limit those in low SES due to cost, transportation, or geographic location.

The literature supports the notion that families' SES impacts the identification, treatment, and care for children affected with ASD (Carr et al., 2016; Delobel-Ayoub et al., 2015; Durkin et al., 2017; Maenner et al., 2020; Pickard & Ingersoll, 2016). As previously stated, SES in this study is defined as parental education and parental employment status. In the next three sections of this review, I will evaluate the literature related to these variables on children with ASD.

Parental Education

The importance of parental education on health outcomes in lower SES households has been demonstrated in various diseases (Assari & Caldwell, 2018; Lado & Lipman, 2016; Malhotra et al., 2016). According to Assari, Caldwell and Bazargan (2019), parental education is associated with better health outcomes in adolescents; however, the association was less significant for Hispanics and Blacks, suggesting the role of additional factors affecting the health outcome differences in these groups. Lower educational attainment levels are associated with a low level of health literacy, impacting the care provided to the child (Gipson et al., 2014).

Differences in attaining a diagnosis of ASD have been observed based on maternal educational status (Kelly et al., 2019). Using data from the Born in Bradford Cohort comprising 13,857 children, the authors assessed the relationship between SES

and autism diagnosis using logistic regression. Obtaining an ASD diagnosis for their child based on a higher maternal educational status was twice the rate, 1.5% (95% CI 1.1-1.9), compared with mothers from a lower academic level 0.7% (95% CI 0.5-0.9). Hidalgo, McIntyre and McWhirter (2015) identified the importance of maternal education on parent-reported satisfaction from receiving an ASD diagnosis and treatment services for their child. The authors reported that lower educated mothers were more satisfied with these services compared to higher educated mothers. It was suggested that the difference observed may be due to higher educated mothers being more informed on best practices for their children compared to lower educated mothers, r(46)=.33, p=.02. Fountain et al. (2011) examined ten birth cohorts of children from California and identified that children with ASD of highly educated parents were diagnosed earlier. This result was confirmed by Hrdlicka et al. (2016), who also demonstrated that higher parental education was associated with an earlier ASD diagnosis.

Parental education may have a role in household health literacy and ineffective parental caregiving. Gipson et al. (2014) explored whether disparities existed in identifying comorbidities and medication prescribing habits in children with Attention-deficit/Hyperactivity Disorder (ADHD). The authors identified racial and socioeconomic inequalities that resulted from young maternal age and a lower level of parental education.

Nguyen et al. (2016) investigated the role of sociodemographic factors on the utilization of intervention services for children with ASD. Participants included 696 children with ASD that were part of a population-based study focused on identifying

genetic and environmental contributions to ASD risk. Maternal education was significantly associated with the utilization of additional intervention services. The authors determined that children of mothers with some college education or vocational training were 24% less likely to utilize the services than children of mothers with a bachelor's degree (PR=0.76, 95% CI 0.61-0.95). Lack of awareness of these additional services in the lower educational attainment group may partly explain the discrepancy observed.

Social support from the family, schools, and the community has a significant role in the well-being and care of children with ASD (Kapp, 2018). Sharabi and Marom-Golan (2018) evaluated the role of parental educational attainment on involvement and social support for their child with ASD. Mothers reported higher levels of participation in their child's care regardless of educational attainment. Fathers educational attainment predicted a small but significant contribution to their involvement in their child's care. A lack of equitable distribution of child-care responsibilities between parents can lead to stress for both the mother and child with ASD, leading to child behavioral issues (L. E. Smith et al., 2012).

Parental Employment

The assessment of parental employment status on childhood health and development has yielded mixed results. Although parental employment provides the necessary financial resources to provide for their child, parental time away during early development can have adverse health consequences. McDonnell and Doyle (2019) reported that full-time maternal employment increases the likelihood of childhood

obesity. Lombardi and Coley (2017) described that more time away from parenting was linked to children's behavioral functioning deficits. However, according to Pedersen et al. (Reinhardt Pedersen et al., 2005), children from families with both parents unemployed had an increased prevalence of recurrent psychosomatic symptoms and chronic illnesses. Sleskova et al. (2006) explored the effect of parental employment status on the health of adolescents. The authors reported that having an unemployed father negatively influenced adolescents' well-being and maternal unemployment led to self-esteem issues for adolescents. Mork et al. (2014) demonstrated a positive correlation between parental unemployment and children's hospitalizations. As parental employment is a component to SES and a variable within this analysis, it is crucial to understand the discrepancy within the literature on the impact parental employment status has on childhood health and development.

Karpur et al. (2019) evaluated a secondary dataset to assess the factors that predispose children with ASD for being at-risk to have unmet medical needs. The authors reported that parental employment status predicted higher odds of unmet health care needs (OR=1.78 95% CI 1.21-2.60). Family-level adverse conditions such as loss of income and unemployment can negatively affect the child's mental health and lead to behavioral issues (Connor Morrow Kerns et al., 2017; Rigles, 2017b).

In a study by Callandar and Lindsay (2018), the authors evaluated the influence of ASD on parental employment for parents caring for ASD children aged between 0 and 11 years. The researchers found that a significantly larger percentage of parents caring for children with ASD were not in the labor force. The most common reason for not

participating in the workforce was the need to care for their child. This work was supported by an earlier study conducted by Cidav et al. (2012) that examined parental labor participation changes, hours worked, and annual earnings in families caring for a child with ASD. Using secondary data, the authors reported that mothers of children with ASD earn 35% less than mothers with other health limitations and were 6% less likely to be employed. Although no differences were observed for the fathers' labor outcomes, family earnings are 21% less than those of children with other health limitations. A lack of employment or lower earnings further complicates the additional financial demand that caring for a child with ASD places on families (Lavelle et al., 2014). Parental employment issues and their associated financial strains can exacerbate parental stress related to caring for a child with ASD (DesChamps et al., 2020). Parental Anxiety resulting from unemployment and financial issues can adversely affect the health of the child (Kristjansdottir et al., 2020). As a result, there is a need for additional research assessing the impact of parental employment on the lives of children with ASD.

Health Insurance Coverage

A fundamental role of health insurance is to provide access to health care professionals for health-related issues or routine visits at a low or reduced cost (Dey & Bach, 2019). Although employment status is an important factor in obtaining health insurance, other factors such as high cost, ineligibility, or the perception it is not needed have been cited as reasons for not acquiring health insurance. A lack of health insurance can have significant health implications for families and their children in the United States (Washington, 2001). Kogan et al. (2008) evaluated a large national database to

assess the health care experiences of children with ASD. The authors reported that children with ASD reported challenges accessing health care and having a higher rate of unmet medical needs. In a qualitative analysis with primary health care providers, Nolan et al. (2016) reported cost and coverage as a barrier to providing a Medical Home for children with ASD. In a study using data from the NSCH, Ahmedani and Hock (2012) reported that families without health insurance reported a delay or non-receipt of needed health services for their child with ASD. Additionally, Zablotsky et al. (2014) identified that families of children with ASD and a comorbid condition reported poorer insurance coverage compared with families whose child was diagnosed as having only ASD. The authors reported an inverse relationship between insurance coverage and timeliness of care.

The literature supports the importance of having adequate health insurance in receiving optimal medical care. A lack of insurance coverage for all needed services can significantly impact parents obtaining a thorough evaluation and treatment for their children with ASD. Further research is needed to assess what role having health insurance has on the reporting of comorbid conditions in children with ASD.

ASD and Comorbid Conditions

It is well documented that children with ASD are impacted by various comorbid conditions (Kogan et al., 2018; Sanchack & Thomas, 2016). In an analysis assessing comorbid conditions in a pediatric ASD population, Simonoff et al. (2008) identified that 70% of ASD children had at least one comorbid condition, and 41% had two or more. The authors reported that psychiatric disorders comprised the most common

comorbidities. Similar rates have been reported by Levy et al. (2010), noting that approximately 83% of children with ASD having one or more comorbid conditions. Soke et al. (2018) reported a higher prevalence rate at 95% of comorbid conditions in children with ASD. The potential discrepancy in this prevalence rate may be due to the inclusion of more comorbid conditions in their analysis compared to other studies. Rydzewska et al. (2019) investigated the prevalence of comorbid conditions within a whole country population of children and adolescents aged 0-24 with and without autism. The authors identified mental health conditions as 16 times more common in the ASD group than the general population (OR=15.72 95% CI 13.35-18.52).

Comorbid conditions in children with ASD can lead to development and relationship issues (Storch et al., 2012). Vohra et al. (2017) reported that comorbid conditions impact the family regarding financial strain, household stress, employment, and an added time-burden required to care for their child. In a study by Dovgan and Maurek (2019), children with comorbid conditions experienced a more significant limitation in their daily activities and healthcare services access. The authors reported that comorbid conditions in ASD children added a higher degree of stress and frustration in parents trying to access healthcare services for their child.

It is necessary to define the comorbid conditions being evaluated in this analysis as the definition has varied across multiple studies. Depression, anxiety, and behavioral issues were selected for this study as they are prevalent within this population and can be associated with long-term health complications. The remainder of this literature review will focus on these conditions and evaluate their impact on children with ASD.

ASD and Anxiety

Anxiety impacts approximately 40% of children and adolescents with ASD (Uljarevic et al., 2016). Anxiety is a heterogenous condition presenting in different ways, but the most common types impacting children are separation anxiety, specific phobia, obsessive-compulsive disorder, and social anxiety disorder (van Steensel et al., 2011). Social anxiety is associated with poor social skills and reduced social motivation (Spain et al., 2018). Disease severity, communication issues, or repetitive behaviors related to ASD may influence the degree of anxiety experienced (Vasa & Mazurek, 2015). Magiati et al. (2016) reported that anxiety appears to be age-dependent, with older versus younger children experiencing a higher prevalence of anxiety. Additionally, the authors said that the severity of anxiety was dictated by repetitive speech/behavior symptoms in 6-18-year-olds. Keen et al. (2019) found wide variability in parent-reported anxiety symptomatology in ASD children. The authors reported a high rate of separation anxiety and anxiety associated with uncertainty.

Communication issues impacting children with anxiety can complicate an accurate and timely diagnosis (Glod et al., 2017). If not identified and treated, anxiety can lead to additional issues, including chronic health issues, depression, aggression, or suicidality (Segers & Rawana, 2014). Furthermore, anxiety can lead to sleep disturbances that can heighten the risk for additional health complications (Caporino et al., 2017; Mahrer et al., 2012). Kerns et al. (2015) evaluated the association between anxiety disorders and parent-reported depression, self-injury, functional communication, and social skills. The authors identified that anxiety was related to more self-injurious

behavior and depression. Self-injury behaviors were not determined to be a reflection of ASD severity alone but augmented by the presence of anxiety. In a study by Adams et al. (2020), the authors reported that ASD children with high anxiety levels experienced a lower overall Child Health-Related Quality of Life Score and had poorer scores on physical, emotional, and school functioning domains within the Pediatric Quality of Life Inventory Assessments. The authors concluded that anxiety symptomatology may be a significant contributing factor to quality-of-life outcomes for ASD children.

The literature substantiates the negative impact that anxiety as a comorbid condition has on children with ASD. Anxiety can increase the need for counseling services or medication use for children with ASD. These services can place an additional financial burden on families and health systems. Further research is needed to evaluate the impact of anxiety in children with ASD.

ASD and Depression

In the general population, depression impacts 3.2% of children aged 3-17 years (Ghandour et al., 2019) and 12% of adolescents (Merikangas et al., 2010). Prevalence rates from studies in youth with ASD ranged from 6%-26% (DeFilippis, 2018). The variability in these studies resulted from reporting features, datasets, and the scale used to measure depression. To evaluate the prevalence of depression in ASD, Hudson et al. (2019) conducted a meta-analysis to assess the lifetime and current prevalence of depression in children, adolescents, and adults with ASD. The authors identified 66 articles that met the inclusion criteria for the analysis and reported a pooled lifetime prevalence of depression at 14.4 % and the current prevalence rate at 12.3%. The authors

concluded that individuals with ASD are 4-times more likely to experience depression at some point during their lifetime. The risk for depression has been observed to increase with a higher intelligent quotient and higher levels of functioning (DeFilippis, 2018). It is believed that this may be due to having a more heightened social awareness with an increasing IQ (Chandrasekhar & Sikich, 2015). Salazar et al. (2015) reported a prevalence of depression in children aged 4 to 9 years with an IQ <70 between 6% and 19%. The authors identified that both depression and anxiety symptoms were associated with a higher IQ. However, others have postulated that depression is just as prevalent in lower functioning ASD; it is more challenging for these individuals to self-report their depressive symptoms (Turygin et al., 2013).

Social isolation and peer victimization have been identified as risk factors for depression (Greenlee et al., 2020). Hedley et al. (2018) evaluated the contribution of loneliness and social support to depression and suicidality in individuals with ASD. The authors identified that lower social support levels and a higher degree of loneliness were associated with depression and suicidality. Additionally, greater severity of ASD traits increased loneliness and lower levels of satisfaction with social support systems. This analysis supports the results of a study conducted by Rai et al. (2018), demonstrating that by the age of 10, children with ASD have a high rate of depression that occurs as a result of bullying and social communication impairments.

Children with ASD are at an increased risk for depression due to many factors (Hudson et al., 2019). This comorbid condition can occur in childhood and continue into adulthood. Depression can have severe consequences, including premature mortality and

increase caregiver stress (Dovgan & Mazurek, 2019; Hirvikoski et al., 2016). Comorbid

conditions, including depression, increases the financial burden for families caring for

children with adolescents. Given this significant impact, more research is needed to

understand the connection between ASD and depression in order to develop strategies to

mitigate the problem.

ASD and Behavioral Issues

According to the literature, externalizing behaviors refer to a child's outward

behavior toward others (Hill et al., 2014). Aggression, obsessive-compulsive disorder,

oppositional defiant disorder, conduct disorder, and ADHD have been described as

indicative of externalizing behaviors (Ogundele, 2018). Behavioral problems have been

estimated to occur in 8-23% of children with ASD (Georgiades et al., 2011; Hartley et al.,

2008) and often occur in combination with other comorbid conditions (Dovgan &

Mazurek, 2019). Temper tantrums or hostility displayed toward others may result from a

child experiencing anxiety (Brookman-Frazee et al., 2018) and have been associated with

ASD disease severity (Jang & Matson, 2015). In a cross-sectional study of 530 children

aged 3 to 12 years old with ASD, Anixt et al. (2020) reported that 93% of parents noted

problematic behaviors in their child. The top three behaviors identified in the study were

ADHD, irritability, and aggression. Chandler et al. (2016) utilized the Developmental

Behavior Checklist (DBC) to measure the frequency, features, and persistence of

emotional and behavior problems in children with ASD. From their sample of 277

parents and 228 teachers, the authors reported that three-quarters of the ASD children had

parent-reported behavioral problems and two-thirds had teacher-reported behavioral

issues. Another interesting finding written by the authors was that a high DBC score was associated with more significant autism symptomatology and parental unemployment. Additionally, children with a higher IQ score were reported to have more behavioral issues than children with a lower IQ score.

Behavioral issues associated with ASD can lead to problems at home and school (DesChamps et al., 2020; Munkhaugen et al., 2019). The literature describes an association between ASD and behavior problems with a lower quality of life (Kuhlthau et al., 2018). The family's financial burden cannot be understated as children with behavioral issues may need to receive counseling and medication (Parish et al., 2015). Educational costs associated with ASD place an enormous financial burden on society, demonstrating a serious public health issue (Rogge & Janssen, 2019). Additional research is needed to evaluate the impact of behavioral problems in children with ASD.

<div align="center">**Confounding Variables**</div>

ASD and Gender

Sex differences in the prevalence of autism have been described in the literature. The prevalence ratio for autism in males to females is 4:1 (Gockley et al., 2015). One explanation for the sex difference is the "female protective effect," which states that females may be protected from some of the symptoms of ASD (Robinson et al., 2013). Hormonal differences and genetic variants observed in females have been proposed as a potential explanation for this protective effect (Jacquemont et al., 2014; Werling & Geschwind, 2013). Some of the discrepancies in diagnoses may be due to differences observed in repetitive behaviors between the sexes (Van Wijngaarden-Cremers et al.,

2014). Additionally, females with ASD experience more internalizing behaviors than males, and males experience more externalizing behaviors than females (Bölte et al., 2011; Mandy et al., 2012). Externalizing behaviors may lead to bias in reporting and diagnosing ASD. The internalizing behaviors exhibited by females may lead to misdiagnoses, such as anxiety or depression (Solomon et al., 2012). However, other studies have observed similar autism-related behaviors between the sexes, indicating additional research is needed to explain differences in prevalence rates (Harrop et al., 2015). Given the sex differences observed in ASD, there is the potential that sex may confound this study's results.

Summary

This cross-sectional study using a secondary dataset evaluated the impact of parental education, parental employment, and health insurance coverage for mental health services on the reporting of comorbid conditions impacting children with ASD. Evaluating relationships between these variables can help identify disparities in care and inform public health officials on the development of programs and resources to address these problems. The theoretical framework for this study, Bronfenbrenner's EST, guided and informed the examination of ASD and SES. The EST stages and its application to children with ASD make it an ideal theory to guide this study.

A relationship between SES and the diagnosis and care for children with ASD has been demonstrated from the literature provided in this review. The impact of maternal and paternal educational attainment has been evaluated in studies and identified to lead to disparities in care. Additionally, parental employment status has been determined to

predict unmet medical needs for the care of children with ASD. ASD has a heterogeneous clinical presentation impacting children with a variety of symptoms. Depression, anxiety, and behavioral issues have been identified as being highly prevalent in this population. These comorbid conditions can have serious health consequences for the children and their families. The literature describes that children with ASD are often impacted by multiple comorbid conditions and how one condition can lead to another, such as anxiety leading to depression. Health insurance coverage has an integral role in receiving optimal medical care. Families of children with ASD have reported inadequate insurance as a key barrier to receiving timely care and a thorough health evaluation.

Little information can be found in the literature regarding the relationship between parental education, employment status, and health insurance coverage for mental health services on the reporting of comorbid conditions in children with ASD. The addition of comorbid conditions to a neurodevelopmental disorder such as ASD can have negative long-term consequences for the child. Additional research is warranted evaluating potential risk factors associated with ASD and comorbid conditions. As described in the literature, the family's SES significantly impacts the care of children with ASD. Evaluating the relationship between SES and comorbidities in children with ASD can lead to additional research and ultimately improve health outcomes.

Chapter 3 will encompass a thorough discussion of the study design and rationale. The methodology will be reviewed, including a discussion on the data collection procedures for the NSCH database. An explanation will be provided for the data analysis plan for the study. Lastly, ethical considerations and threats to validity will be addressed.

Chapter 3: Research Method

Introduction

This cross-sectional quantitative analysis assessed for a relationship between SES, defined as parental education and parental employment, health insurance coverage for mental health services, and the reporting of comorbid conditions in children with ASD. Identifying if relationships exist between these variables can lead to positive social change by informing health officials on the need for programs and strategies to address these disparities. The results of this study will add to the current body of literature on how SES and health insurance coverage impacts the reporting of comorbid conditions for children with ASD.

The following chapter will provide information regarding: (a) the research design and rationale for this study, (b) the variables examined, (c) the target population, sampling, sampling procedures, and power analysis for the sample size, (d) recruitment procedures, (e) the instrumentation used to collect the data for the secondary dataset, (f) potential threats to validity, and (g) ethical procedures.

Research Design and Rationale

The independent variables in this study were parental education, parental employment, and health insurance coverage for mental health services. Parental educational attainment was defined as less than high school, high school or GED, some college, and college degree or higher. Parental employment, a binary question with a yes or no response, was assessed by inquiring whether the child lived in a household where one of the adult primary caregiver was employed at least 50 out of the past 52 weeks.

Health insurance coverage for mental health services evaluated how often the child's health insurance offered benefits or covered services that meet their mental healthcare needs. Survey participants chose always, usually, sometimes, or never regarding their health insurance program.

The dependent variables were the reporting of a comorbid condition. A child was considered to have a comorbid condition if their parent or guardian had been told that their child had anxiety, depression, or behavioral problems. In the survey assessing for anxiety or depression, the parent or guardian was asked, "Has a doctor or other health care provider ever told you that this child has [comorbid condition]?" In the survey assessing behavioral problems, the parent or guardian was asked, "Has a doctor, other health care provider, or educator ever told you that this child has behavioral or conduct problems?" The responses for each comorbid condition were dichotomized as yes or no.

Since ASD is 4.3 times as prevalent in boys than girls, gender has been identified as a potential confounding variable in this study (Chandler et al., 2016). In the NSCH data set, the parent or guardian was asked, "What is the child's sex?" The question allows the survey respondent to provide a binary response of 1=male and 2=female.

Using a cross-sectional study allows for evaluating the population's outcome and exposure at one point in time (Setia, 2016). Cross-sectional designs are often used in evaluating population-based surveys, such as the NSCH. The cross-sectional design is ideal for assessing a relationship between the described variables. The variables within the NSCH are in a quantifiable format allowing for a quantitative assessment.

Using a secondary data set, such as the NSCH, to evaluate associations between variables saves time and resources. The NSCH is a large, publicly available data set. The quantitative variables for the assessment were loaded into SPSS for analysis. Given the data set's size, a cross-sectional design is ideal for evaluating associations between SES and health insurance coverage and the reporting of comorbid conditions in children with ASD. A logistic regression analysis was used to assess the existence of any statistically significant associations between these variables. The NSCH data set data are collected from families residing in all 50 states in the United States, including the District of Columbia. Given the survey's enormity and its respondents, the results may be generalizable to a broader population. The inability to provide input into the research questions and the assumption of accuracy are potential limitations to using secondary data for research. The results of this analysis will add to the current knowledge of factors that are associated with comorbid conditions in children with ASD.

Methodology

Population

The purpose of the NSCH is to obtain national and state-level physical and emotional health data on children aged 0-17 years old residing in the United States (CAHMI, 2019). Households were contacted by mail to assess whether one or more children under 18 lived in the house. If more than one child resided in the home, one child was randomly selected to be the survey subject. A parent or guardian familiar with the child's health completed the questionnaire either on paper or the web. In the 2018-2019 combined data set, 59,963 surveys were completed, 30,530 were completed in

2018, and 29,433 were completed in 2019. There were approximately 1,176 surveys per state. By using a combined data set, a larger sample size is provided for the study. Based on an estimated parent-reported prevalence rate for ASD of 1 in 40 (Kogan et al., 2018), it is estimated that there will be approximately 1,500 children with ASD in the NSCH survey.

Sampling and Sampling Procedures

A sample of approximately180,000 addresses from the Census Master Address File was used for the survey each year it was conducted in 2018 and 2019 (United States Census Bureau, 2020). The sample frame used administrative records-based flags to create three strata. Stratum 1 consisted of addresses linked to children using administrative records such as census data, social security data, and IRS tax forms. Stratum 2a consisted of addresses that were probabilistically linked to children using administrative records and block group characteristics. Stratum 2b were the remaining addresses, of which less than 3% of these addresses were households with children.

Power Analysis

Sample size calculations assess the number of patients needed in a study to answer the proposed research questions (Pourhoseingholi et al., 2013). A power analysis using G* Power version 3.1 software was used to calculate the sample size needed for this cross-sectional study. Based on the estimated parent-reported prevalence rate for ASD of 1 in 40 (Kogan et al., 2018) and the number of surveys conducted in the 2018-2019 combined NSCH of 59,963 (CAHMI, 2020), it is estimated that the sample size will be approximately 1,500 children with ASD in the NSCH survey. A z test and logistic

regression statistical test power analysis was conducted a priori to calculate the sample size, power, and effect size. An odds ratio of 1.3 was estimated, and the statistical significance was an α of 0.05. The power was set to be 0.95% (95% confidence interval). Based on these factors, G*Power reported an estimated sample size of n=1,188.

NSCH Recruitment

The NSCH was conducted online, over the phone, and through the mail (United States Census Bureau, 2020). Surveys were conducted in English and Spanish. Households in the United States were randomly selected to receive the initial survey to assess whether one or more children aged 0 to 17 lived in the household. If a child did not reside in the household, the survey ended. If children were identified as living in the household, a screener would gather some initial data on the children, such as race, English proficiency, housing status, and special health care needs. Once the initial screening was completed, one child from each household was randomly selected to be the survey subject. Web-based respondents were immediately taken to the topical questionnaire web page upon completion of the screener questionnaire. Households using a mailed-in survey were sent the appropriate survey materials, which indicated the child selected for the survey. A parent or guardian with knowledge of the health of the child was asked to complete the survey. Interviewers were available by phone to assist individuals with completing their survey.

NSCH Participation

Participation in the NSCH is voluntary. In 2018 and 2019, there were a total of 59,963 surveys conducted (CAHMI, 2020). Households in the United States were

randomly selected and contacted to ascertain whether a child under 18 years resided in the house. If multiple children resided in the house, one child was randomly chosen to be the focus of the survey. The parent or guardian of the child who knew the most information regarding the child's health participated in the survey. Financial incentives were offered to participate in the survey.

Data Collection

The NSCH survey required an initial screener questionnaire to assess whether a child under 18 resided in the household (United States Census Bureau, 2020). If a child was identified, the household was offered to participate in the survey by completing the topical questionnaire. In 2018, data were collected from June to January (CAHMI, 2019). The initial sample included 176,052, of which 30,530 topical questionnaires were completed. Responses to the survey were captured through a web-based platform, phone interview, or returned through the mail. One parent or guardian who was aware of the child's health was asked to complete the survey. Respondents to the survey were 63% mothers, 28% fathers, 6% relatives or caregivers, and 3% not identified. The survey took 39 minutes to complete.

In 2019, the survey was conducted from June to January (CAHMI, 2020). The initial sample included 180,000 households, of which 29,433 topical questionnaires were completed. The internet, paper, and phones were the tools used to collect the data for the survey. Respondents to the survey were 62% mothers, 30% fathers, 7% relatives or caregivers, and 1% not identified. The survey took 37 minutes to complete.

Accessing the NSCH Data

The NSCH data set is a publicly available resource. Request for the NSCH data sets can be made online by completing the request form. Data sets include all records and variables from the survey. A formatted and labeled file is provided that can be utilized in SPSS. Codebooks for the survey are provided online.

Instrumentation

The NSCH is an annual cross-sectional, address-based survey that collects information on the physical and mental health of children aged 0-17 years in the United States (CAHMI, 2019). The survey has gone through numerous revisions since its inception in 2003. Since 2016, the survey has become an annual assessment conducted by the Health Resources and Service Administration's Maternal and Child Health Bureau. The screener questionnaire consists of two sections. The first section focuses on assessing the presence of children within the households, and the subsequent section assesses the demographics of any children. Once it is determined that a child is present, surveys can be completed using the web, paper, or telephone. The web survey was programmed using the U.S. Census Bureau Centurion system for internet data collection (United States Census Bureau, 2020). The web-based interview was self-administered by the respondent. Verification steps were implemented to ensure accuracy. Paper instruments were designed to match the web-based survey to minimize the influence of mode on responses. Pre-populated paper surveys with the child's name and sex were mailed to the respondent for completion upon request. A national call center was provided for individuals with questions on the survey or those that preferred to complete it over the

phone with an interviewer. Additionally, email assistance for questions on the survey was provided for respondents.

Operationalization of Variables

Operationalizing variables for a study refer to the definition and measurement of the variables. In the current study, the independent variables are parental education, parental employment, and health insurance coverage. These variables were assessed for an association to the dependent variables of anxiety, depression, and behavioral issues. Parental education (Table 1) measured the highest level of education among reported adults. The variable was defined as less than high school, high school, and more than high school. Parental employment (Table 2) was categorized as binary in which the primary adult caregiver was asked whether they were employed 50 out of the past 52 weeks. Health insurance coverage-mental or behavioral needs (Table 3) measured whether the insurance plan offered benefits or covered services that meet these needs.

The dependent variables (Table 4) anxiety, depression, and behavioral issues followed a similar measurement format and coding. Parents were asked to report whether they have been told that their child suffered from one of these comorbid conditions. Responses were binary with 1=Yes and 2=No. Gender (Table 5) was the covariate used in this study. The parent or guardian recorded a binary response of 1=male and 2=female.

Table 1

Parental Education

Code	Definition

1	Less than high school
2	High school or GED
3	Some college
4	College degree or higher

Table 2

Parental Employment

Code	Definition
1	Yes
2	No

Table 3

Health Insurance Coverage-Mental Behavioral Needs

Code	Definition
1	Always
2	Usually
3	Sometimes
4	Never

Table 4

Dependent Variables

Variable	Survey question	Coding

Anxiety	Has a doctor or other health care provider ever told you that this child has anxiety problems?	1=Yes 2=No
Depression	Has a doctor or other health care provider ever told you that this child has depression?	1=Yes 2=No
Behavioral issues	Has a doctor, other health care provider, or educator ever told you that this child has behavioral or conduct problems?	1=Yes 2=No

Table 5

Covariate Variable-Gender

Code	Definition
1	Male
2	Female

Data Analysis Plan

SPSS version 25 was utilized to analyze the NSCH dataset for this study. The 2018 and 2019 combined data sets were requested and downloaded into the software program. This study will assess three sets of questions and hypotheses:

RQ1: Is there a relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender?

$H_0$1: There is no relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

H_a1: There is a relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

RQ2: Is there a relationship between household employment status and the prevalence of a comorbid condition (depression, anxiety, behavioral) among children with autism when accounting for gender?

H_02: There is no relationship between household employment status and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

H_a2: There is a relationship between household employment status and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

RQ3: Is there a relationship between health insurance coverage for mental health services and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender?

H_03: There is no relationship between health insurance coverage for mental health services and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

H_a3 There is a relationship between health insurance coverage for mental health services and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

A descriptive statistical analysis was conducted for the variables ASD, diagnosis, anxiety, depression, behavioral issues, parental education, parental employment, health insurance coverage for mental health services, and gender. Frequencies and confidence intervals for these variables were assessed. The next step in the study was to conduct an inferential analysis. This included conducting a simple logistic regression and multiple logistic regression to determine an odds ratio. The simple logistic regression was performed to evaluate the odds ratio between the independent variables and the outcome variable (Stoltzfus, 2011). Odds ratios are often used in cross-sectional studies that seek to measure an association between exposure and outcome (Szumilas, 2010). The odds ratio assesses the effect size between the given variables in the analysis. A multiple logistic regression analysis was conducted to evaluate the effect of multiple predictor factors, both continuous or categorical, on a single dichotomous variable (Ranganathan et al., 2017). A p-value of 0.05 or below was used to determine whether a statistically significant relationship exists between the test variables. In the current study, simple logistic regression was performed to evaluate a relationship between the independent variables, parental education, parental employment, health insurance coverage, and the parental reporting of comorbid conditions in children with ASD. Multiple logistic regression assessed the relationship between the independent variables, parental education, parental employment, health insurance coverage, and the reporting of comorbid conditions for ASD children while controlling for gender. This study meets the assumptions of logistic regression analysis as described by Stoltzfus (2011), including a having binary dependent variable, observations that are independent of each other, and a

large sample size. The tests chosen, including multiple logistic regression, align with the study purpose to evaluate the association between a dichotomous dependent variable and multiple independent variables (Ranganathan et al., 2017).

Threats to Validity

Internal validity examines a study's trustworthiness by assessing how a study was designed and evaluated, including considering the role of bias throughout the study (Andrade, 2018). The NSCH dataset requires parents or guardians to recall whether the child was previously diagnosed with anxiety, depression, or behavioral issues. Additionally, respondents may be unwilling to share personal information as the NSCH survey inquires on intimate topics and medical issues. The potential for recall bias and response bias threatens the internal validity of this study.

External validity examines the generalizability of the study results to broader populations (Andrade, 2018). The variables for assessment in the NSCH survey were limited to the questions asked by the interviewer. Additional factors to consider in assessing the validity are the tools used to conduct the survey. Individuals in a low SES may not have access to the web or phones, including landlines or cellular. These limitations may impact the external validity of the study results.

Researchers can take steps to minimize the threats to the validity for their studies. These steps include ensuring that interviewers are adequately trained before conducting interviews with research subjects to ensure consistency. Training of interviewers was an element of the NSCH survey (United States Census Bureau, 2020). The NSCH survey is a validated and tested tool that has been conducted yearly since 2016. The Data Resource

Center for Child & Adolescent Health provides many details on the NSCH survey to minimize potential threats to validity, including sampling process, methodology report, and source and accuracy statement.

Ethical Procedures

Despite being a survey focused on children aged 0-17 years of age, a parent or guardian was administered the survey to complete on the health of the child. Confidentiality was maintained throughout the process, and information on the child and parent has been de-identified (United States Census Bureau, 2020). All personnel that come into contact with confidential information are required to sign a nondisclosure affidavit. Individuals participating in the survey were informed of the survey procedures and protocols, including the survey's voluntary nature. Institutional review board (IRB) approval through Walden University will be obtained before evaluating the dataset. Ethical procedures outlined by IRB will be strictly adhered to. The IRB process will certify that this study does not pose any ethical concerns. Data from the survey will be kept on an external hard drive and will not be accessible to outside individuals.

Summary

This study was conducted to examine whether there is an association between SES, health insurance coverage for mental health services, and comorbid conditions in children with ASD. A quantitative cross-sectional design was undertaken utilizing data from the NSCH survey. An application to use the dataset from the NSCH survey was submitted and approved. The secondary data was loaded into SPSS for analysis. Multiple

logistic regression was conducted with the described variables. IRB approval through Walden University will ensure ethical guidelines and protocols are followed.

Chapter 4 will provide the results of the study. An explanation of the procedures undertaken with the descriptive statistics and data analysis will be provided. Additionally, the results of the simple logistic regression will be explained.

Chapter 4: Results

Introduction

The purpose of this quantitative cross-sectional study was to assess for relationships between parental education, parental employment, health insurance coverage for mental health services, and the parental reporting of comorbid conditions in children with ASD. Evaluating and identifying if relationships exist between these variables may educate public health officials regarding the disparities that exist by SES and inform on strategies or interventions to mitigate the problem. An evaluation of secondary data from the NSCH was used for this study. In this chapter, information on the data collection for the survey is provided along with a descriptive analysis of the study population's demographics. The results are reported for the inferential statistical analysis as they relate to the research questions and hypotheses. The chapter concludes with a summary of the findings.

Research Questions and Hypotheses

The following research questions and hypotheses were created to assess for potential relationships between parental education, parental employment, health insurance coverage, and the reporting of comorbid conditions in children with ASD:

RQ1: Is there a relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender?

$H_0 1$: There is no relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

$H_a 1$: There is a relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

RQ2: Is there a relationship between household employment status and the prevalence of a comorbid condition (depression, anxiety, behavioral) among children with autism when accounting for gender?

$H_0 2$: There is no relationship between household employment status and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

$H_a 2$: There is a relationship between household employment status and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

RQ3: Is there a relationship between health insurance coverage for mental health services and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender?

$H_0 3$: There is no relationship between health insurance coverage for mental health services and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

H_a3: There is a relationship between health insurance coverage for mental health

services and the prevalence of a comorbid condition (depression, anxiety,

behavioral issues) among children with autism when accounting for gender.

Data Collection

For this study, the NSCH 2018-2019 combined study served as the source for the

data. The NSCH survey required an initial screener questionnaire to assess whether a

child under 18 resided in the household (United States Census Bureau, 2020). If a child

was identified, the household was offered to participate in the survey by completing the

topical questionnaire. In 2018, data was collected from June to January (CAHMI, 2019).

The initial sample included 176,052, of which 30,530 topical questionnaires were

completed. Responses to the survey were captured through a web-based platform, phone

interview, or the mail. One parent or guardian who was aware of the child's health was

asked to complete the survey. Respondents to the survey were 63% mothers, 28% fathers,

6% relatives or caregivers, and 3% not identified. In 2019, the survey was conducted

from June to January (CAHMI, 2020). The initial sample included 180,000 households,

of which 29,433 topical questionnaires were completed. Respondents to the survey were

62% mothers, 30% fathers, 7% relatives or caregivers, and 1% not identified.

IRB approval from Walden University was obtained before obtaining the

secondary dataset. The NSCH data set was coded to assess each research question. The

following are baseline descriptive and demographic characteristics for the 2018-2019

NSCH. The gender breakdown for the combined survey was 52.2% male and 47.8%

female. The primary language of the households surveyed was English (93%), and the

ethnicities consisted of White/non-Hispanic (69.2%), Hispanic (11.9%), Black/non-Hispanic (6.4%), and other/multi-racial (12.5%).

The study's covariates were children with ASD, comorbid conditions, parental education, parental employment, health insurance coverage for mental health services, and gender. In Table 6, the frequencies for these covariates from the total sample population are provided. For this study, the comorbid conditions consisting of anxiety, depression, and behavioral issues were combined and coded as having or not having one or more of these comorbid conditions.

The estimated parental-reported prevalence rate for ASD is 1 in 40 (Kogan et al., 2018). In Table 1, the ASD population for the survey was 2.7%, providing an equitable sample that is representative of the U.S. population and aligning with the estimates. No discrepancies with the data collection described in chapter 3 have been identified.

Results

Descriptive Statistics

In the 2018-2019 combined survey, 59,963 surveys were completed from 50 states, including the District of Columbia, representing an equitable distribution across the United States (CAHMI, 2020). A descriptive analysis was conducted, which included the frequencies and the percentage of the total population and the population of children with ASD with or without the reporting of a comorbid condition. The following is provided in the descriptive analysis: children with ASD, ASD with comorbid conditions, parental educational level, parental employment, and health insurance coverage for mental health services. Additionally, descriptive statistics are provided for the covariates

of gender. ASD was reported in 1,692 of the survey study subject participants. The 1,692

children diagnosed with ASD in the NSCH represent the target population used in this

analysis.

Table 6

NSCH Demographics for Study Covariates

Covariate	Frequency	%
Total population	59,963	100
Gender		
Male	31,300	52.2
Female	28663	47.8
ASD	1,692	2.7
Comorbid condition		
Depression	3,165	5.3
Anxiety	6,693	11.2
Behavioral problems	4,889	8.2
Household education level		
Less than high school	1,498	2.5
High school or GED	7,873	13.1
Some college	14,139	23.6
College or higher	36,453	60.8
Household employment		
One adult caregiver employed at least 50 of past 52 weeks-Yes	54,319	90.6
One adult caregiver employed at least 50 of past 52 weeks-No	4,327	7.2
Health insurance coverage-mental health services		
Always	5,292	8.8
Usually	3,175	5.3
Sometimes	1,754	2.9

Never	1,329	2.2

Comorbid Conditions

Table 6 provides the frequencies and percentages of the children from the total population who report having anxiety, depression, or behavioral issues. Comorbid conditions were re-coded for the target population to answer the research question evaluating children with ASD with and without comorbid conditions. These conditions are provided individually and in their recoded form in Table 7.

Table 7

ASD and Comorbid Conditions

Covariate	Frequency	%
ASD population	1,692	2.7
ASD and comorbid condition		
Depression	336	19.7
Anxiety	852	50.1
Behavioral problems	959	56.3
ASD and one or more comorbid condition	1,253	74.1
ASD with no comorbid condition	439	25.9

Socioeconomic Status and Health Insurance Coverage

Table 6 provides the frequencies and percentages for educational level, employment status, and health insurance coverage for the total population of the NSCH

survey. Table 8 provides the frequencies and percentages of the recoded ASD comorbid condition variable for each independent variable. SES was defined as parental employment status (children who live in a household where one of the adult primary caregivers is employed at least 50 out of the past 52 weeks) and parental education level (less than high school, high school or GED, some college, and college degree or higher). Health insurance coverage was defined as evaluating how often health insurance offered benefits or covered services that meet the child's mental or behavioral health needs (always, usually, sometimes, and never).

Table 8

ASD Demographics for Study Covariates by Frequency of Comorbidities

Covariate	One or more comorbid Frequency	One or more comorbid %	No comorbid Frequency	No comorbid %
Household education level				
Less than high school	25	2.0	12	2.7
High school or GED	178	14.2	66	15
Some college	390	31.1	112	25.5
College or higher	660	52.7	249	56.7
Household employment				
One adult caregiver employed at least 50 of past 52 weeks-Yes	1,036	82.7	376	85.6
One adult caregiver employed at least 50 of past 52 weeks-No	192	15.3	52	11.8
Health insurance coverage-mental health services				
Always	428	34.2	110	25.1
Usually	312	24.9	62	14.1
Sometimes	223	17.8	35	8.0
Never	66	5.3	21	4.8

Covariates

As a result of males reporting a higher incidence of ASD than females, gender was identified as a covariate for this analysis (Gockley et al., 2015). Table 6 reported the frequency and percentages of gender in the total NSCH population and Table 9 reports the frequency and percentage of gender for the ASD population from the NSCH survey.

Table 9

Gender for ASD Population

Covariate	Frequency	%
Gender		
Male	1,345	79.5
Female	347	20.5

Statistical Assumptions

This study used simple logistic regression and multiple logistic regression to address the research questions. Assumptions for logistic regression include independence of errors, linearity in the logit for continuous variables, multicollinearity (Stoltzfus, 2011). It is assumed that the outcome variable will have a linear relationship with the predictor variable in ordinary regression models. When conducting logistic regression, variables are categorical violating this assumption. Logit or log data can be used to control for this.

Logistic Regression

Simple Logistic Regression

A simple logistic regression analysis was performed to evaluate whether parental education, parental employment, and health insurance coverage had a relationship between the reporting of comorbid conditions in children with ASD. For this analysis, the significance values were set at $p<0.05$, and confidence intervals were set at 95% for the upper and lower limits.

Parental Education and ASD Comorbidities

RQ1: Is there a relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism?

H_0: There is no relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism.

H_a: There is a relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism.

A simple logistic regression analysis was performed to evaluate whether a relationship existed between parental education level and the prevalence of a comorbid condition among children with ASD. Using a college degree or higher as the reference standard, the unstandardized Beta weight for the predictor variable less than high school were; B=-.241, S.E.=.359, Wald=.450, p=.502. The unstandardized Beta weight for high

school or GED were B=.017, S.E.=.162, Wald=.011, p=.915. The unstandardized Beta

weight for some college education was B=.273, S.E.=.130, Wald=4.373, p=.037. The

estimated odds ratio indicates a significantly higher odds of approximately 31%

[Exp(B)=1.314, 95% CI (1.017, 1.697)] for reporting a comorbid condition based on

some college education compared to having a college degree. The results are reported

with the constant in Table 10.

Table 10

Logistic Regression for Parental Education and ASD Comorbidity

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1ª	Education			5.383	3	.146			
	Less than high school	-.241	.359	.450	1	.502	.786	.389	1.588
	High school or GED	.017	.162	.011	1	.915	1.017	.740	1.398
	Some college	.273	.130	4.373	1	.037	1.314	1.017	1.697
	Constant	.975	.074	171.790	1	.000	2.651		

a. Variable(s) entered on step 1: Highest level of education among reported adults.

Parental Employment and ASD Comorbidities

RQ2: Is there a relationship between household employment status and the

prevalence of a comorbid condition (depression, anxiety, behavioral) among children

with autism?

H_0: There is no relationship between household employment status and the

prevalence of a comorbid condition (depression, anxiety, behavioral issues)

among children with autism.

H_a: There is a relationship between household employment status and the

prevalence of a comorbid condition (depression, anxiety, behavioral issues)

among children with autism.

A simple logistic regression analysis was performed to evaluate whether a

relationship existed between parental employment and the prevalence of a comorbid

condition among children with ASD and was found to be non-significant. The

unstandardized Beta weight for the predictor variable was B=.293, S.E.=.168,

Wald=3.053, p=.081. The results are reported with the constant in Table 11.

Table 11

Logistic Regression for Employment and ASD Comorbidity

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Employment	.293	.168	3.053	1	.081	1.340	.965	1.861
Constant	1.014	.060	283.393	1	.000	2.755		

a. Variable(s) entered on step 1: Children who live in households where one of the adult primary caregiver employed at least 50 out of the past 52 weeks.

Heath Insurance Coverage

RQ3: Is there a relationship between health insurance coverage for mental health services and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism?

H_0: There is no relationship between health insurance coverage for mental health services and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism.

H_a: There is a relationship between health insurance coverage for mental health services and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism.

A simple logistic regression analysis was performed to evaluate whether a relationship existed between health insurance coverage for mental health services and the prevalence of a comorbid condition among children with ASD. Using always having mental health insurance coverage as the reference standard, the unstandardized Beta weight for the predictor variable usually having health insurance were B=.257, S.E.=.175, Wald=2.151, p=.142. The unstandardized Beta weight for the predictor variable sometimes having mental health insurance coverage were B=.493, S.E.=.211, Wald=5.468, p=.019. The estimated unadjusted odds ratio indicates a significantly higher odds of approximately 64% [Exp(B)=1.638, 95% CI (1.083, 2.476)] for reporting a comorbid condition based on sometimes having health coverage compared to always having health coverage. The unstandardized Beta weight for the predictor variable never

has coverage for mental health insurance were B=-.214, S.E.=.272, Wald=.614, p=.433.

These results are reported with the constant in Table 12.

Table 12

Logistic Regression for Health Insurance and ASD Comorbidity

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1ª	Health insurance			8.183	3	.042			
	Usually	.257	.175	2.151	1	.142	1.293	.917	1.824
	Sometimes	.493	.211	5.468	1	.019	1.638	1.083	2.476
	Never	-.214	.272	.614	1	.433	.808	.474	1.378
	Constant	1.359	.107	161.534	1	.000	3.891		

a. Variable(s) entered on step 1: Health Insurance - Cover Mental Behavioral Needs.

Multiple Logistic Regression

A multiple logistic regression analysis was performed to evaluate whether the independent variable of parental education, parental employment, and health insurance coverage for mental health services could predict the reporting of a comorbid condition in children with ASD when adjusting for gender. For this analysis, the significance values were set at p<0.05, and confidence intervals were set at 95% for the upper and lower limits. Nagelkerke R^2 Square was used to calculate any variations.

Parental Education and ASD Comorbidities

RQ1: Is there a relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender?

H_0: There is no relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

H_a: There is a relationship between household education level and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

Multiple logistic regression was performed to evaluate whether parental education level, while controlling for gender, predicted comorbid conditions in children with ASD from the NSCH survey. The outcome of interest was the reporting of comorbidities in children with ASD. Parental education level and gender were the potential predictor variables. The Hosmer-Lemeshow goodness-of-fit was not significant (p=.171), indicating that the model is correctly specified. The -2-log likelihood=1928.914 and the Nagelkerke R Square =.007. The model depicted in Table 11 resulted in the independent variable gender demonstrating non-significance (p=.092). Using a college degree or higher as the reference standard, the unstandardized Beta for less than high school was B=-.287, S.E. .361, Wald=.633, p=.426. The unstandardized Beta for high school or GED were B=.004, S.E.=.163, Wald=.001, p=.979. The unstandardized Beta for some college education was B=.268, S.E.=.131, Wald=4.207, p=.040. The estimated odds ratio

indicates a significantly higher odds of 31% [Exp(B)=1.307, 95% CI 1.012, 1.689)] for reporting a comorbid condition based on some college compared to having a college degree or higher when controlling for gender (Female gender was the reference category). The results are reported in Table 13.

Table 13

Multiple Logistic Regression for Education and ASD Comorbidity Controlling for Gender

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	Education			5.514	3	.138			
	Less than high school	-.287	.361	.633	1	.426	.751	.370	1.522
	High school or GED	.004	.163	.001	1	.979	1.004	.730	1.381
	Some college	.268	.131	4.207	1	.040	1.307	1.012	1.689
	Male gender	-.241	.143	2.836	1	.092	.786	.593	1.040
	Constant	1.173	.140	69.785	1	.000	3.233		

a. Variable(s) entered on step 1: Highest level of education among reported adults, Sex of the child.

Parental Employment and ASD Comorbidities

RQ2: Is there a relationship between household employment status and the prevalence of a comorbid condition (depression, anxiety, behavioral) among children with autism when accounting for gender?

H_0: There is no relationship between household employment status and the

prevalence of a comorbid condition (depression, anxiety, behavioral issues)

among children with autism when accounting for gender.

H_a: There is a relationship between household employment status and the

prevalence of a comorbid condition (depression, anxiety, behavioral issues)

among children with autism when accounting for gender.

Multiple logistic regression was performed to evaluate whether parental

employment while controlling for gender predicted comorbid conditions in children with

ASD from the NSCH survey. The outcome of interest was the reporting of comorbidities

in children with ASD. Parental employment and gender were the potential predictor

variables. The Hosmer-Lemeshow goodness-of-fit was not significant (p=.884),

indicating the model is correctly specified. The -2-log likelihood=1886.739 and the

Nagelkerke R Square=.005. The model resulted in the independent variable gender

demonstrating non-significance (p=.107). The unstandardized Beta weight for the

predictor variable was B=.282, S.E.=.168, Wald=2.824, p=.093. The results are reported

in Table 14.

Table 14

Multiple Logistic Regression for Employment and ASD Comorbidity Controlling for Gender

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	Employment	.282	.168	2.824	1	.093	1.326	.954	1.842
	Male gender	-.234	.145	2.603	1	.107	.791	.595	1.052

Constant	1.204	.134	81.157	1	.000	3.333

a. Variable(s) entered on step 1: Children who live in households where one of the adult primary caregiver employed at least 50 out of the past 52 weeks, Sex of the child.

Health Insurance Coverage and ASD Comorbidities

RQ3: Is there a relationship between health insurance coverage for mental health services and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender?

H_0: There is no relationship between health insurance coverage for mental health services and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

H_a: There is a relationship between health insurance coverage for mental health services and the prevalence of a comorbid condition (depression, anxiety, behavioral issues) among children with autism when accounting for gender.

Multiple logistic regression was performed to evaluate whether health insurance coverage for mental health services while controlling for gender predicted comorbid conditions in children with ASD from the NSCH survey. The outcome of interest was the reporting of comorbidities in children with ASD. Health insurance coverage and gender were potential predictor variables. The Hosmer-Lemeshow goodness-of-fit was not significant (p=.964), indicating the model is correctly specified. The -2-log likelihood =1179.366 and the Nagelkerke R Square=.014. The model resulted in the independent variable gender demonstrating non-significance (p=.114). Controlling for gender, the

predictor variable of health insurance coverage in this multiple logistic regression

contributed to the model. Using always having mental health insurance coverage as the

reference standard, the unstandardized Beta weight for the predictor variable usually

having health insurance were B=.258, S.E.=.176, Wald=2.154, p=.142. The

unstandardized Beta weight for the predictor variable sometimes having mental health

insurance coverage were B=.498, S.E.=.211, Wald=5.570, p=.018. The estimated

unadjusted odds ratio indicates a significantly higher odds of approximately 65%

[Exp(B)=1.646, 95% CI (1.088, 2.489)] for reporting a comorbid condition based on

usually having health insurance compared to always having health insurance coverage

when controlling for gender. The unstandardized Beta weight for the predictor variable

never has coverage for mental health insurance were B=-.210, S.E.=.273, Wald=.595,

p=.441. These results are reported in Table 15.

Table 15

Multiple Logistic Regression for Health Insurance Coverage and ASD Comorbidity
Controlling for Gender

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	Health insurance			8.247	3	.041			
	Usually	.258	.176	2.154	1	.142	1.294	.917	1.825
	Sometimes	.498	.211	5.570	1	.018	1.646	1.088	2.489
	Never	-.210	.273	.595	1	.441	.810	.475	1.383
	Male gender	-.307	.194	2.502	1	.114	.736	.503	1.076
	Constant	1.606	.192	70.042	1	.000	4.983		

a. Variable(s) entered on step 1: Health Insurance - Cover Mental Behavioral Needs, Sex of the child.

Summary

This study evaluated whether the independent variables of parental education, parental employment, and health insurance coverage for mental health services are associated with the parental reporting of comorbidities in children with ASD from the NSCH survey. The adjusted odds ratio demonstrated a positive relationship between the independent variable of parental education and the dependent variable of comorbid conditions in children with ASD. As a result, the alternate hypothesis stating that there is a relationship between parental education and the parental reporting of comorbid conditions in children with ASD when adjusting for gender is supported. Parental employment did not demonstrate a statistically significant relationship with the parental reporting of comorbid conditions in children with ASD. For the variable parental education, the null hypothesis stating that there is no relationship between parental employment and comorbid conditions in children with ASD is supported. The adjusted odds ratio demonstrated a positive relationship between the independent variable of health insurance coverage for mental health services and the dependent variable of comorbid conditions in children with ASD. Thus, the alternative hypothesis stating that there is a relationship between health insurance coverage for mental health services and the parental reporting of comorbid conditions in children with ASD when accounting for gender is supported.

The findings from this analysis demonstrated that parental education and health insurance coverage for mental health services have a significant relationship with the

parental reporting of comorbid conditions in children with ASD. Due to the differences in diagnosis between boys and girls, gender was considered as a confounding variable. Gender was not identified in this study to be significantly associated with the reporting of comorbid conditions. Overall, this study's findings identified an association between parental education and health insurance coverage for mental health services and comorbid conditions in children with ASD.

Chapter 5 will interpret the findings of this analysis and assess potential implications for social change. Additionally, I will discuss the conclusions of this study and how they may inform future research projects.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The concept of autism was first described in the literature as early as the 1900s to describe a subset of schizophrenic patients (Evans, 2013). It was not until the 1980s that "infantile autism" was added to the Diagnostic and Statistical Manual of Mental Disorders. Today, the term has evolved to be known as ASD, which is more representative of the condition. The parent-reported prevalence of US children with ASD is estimated at 1 in 40 and has been steadily increasing in recent years (Kogan et al., 2018). Improvements in diagnostic methods, parental awareness, and an increase in patient advocacy groups have been cited as reasons for an increase in ASD cases worldwide. The exact cause of ASD is unknown. Environmental or genetic factors have been postulated to play a role in the etiology of ASD (Rylaarsdam & Guemez-Gamboa, 2019). There is no cure for ASD; treatment for ASD may include counseling, medication, or specialized education (Elder et al., 2017). Exacerbating the public health concern of ASD are the associated comorbid conditions associated with ASD, including depression, anxiety, and behavioral issues (Greenlee et al., 2020). These comorbid conditions can impact individuals with ASD throughout their lifetime, impacting their ability to complete their education or maintain employment. Socioeconomic factors such as parental employment and parental education can influence a timely diagnosis and appropriate treatment for ASD (Durkin et al., 2017). A lack of or inadequate health insurance coverage is an additional factor affecting the quality of care for children with ASD (Kogan et al., 2008). A gap in the literature that exists is an evaluation of the role

that SES factors such as parental employment, household education, and health insurance coverage for mental health issues have on the reporting of comorbid conditions in children with ASD.

The purpose of this quantitative, nonexperimental study was to evaluate whether there was an association between SES and the reporting of comorbid conditions in children with ASD. Parental employment and household education have been identified as components of SES (Yang et al., 2020). Health insurance coverage is an essential component to receiving optimal healthcare and reducing health inequities (Washington, 2001). SES is one of many factors that can lead to disparities in care in the general population (Fiscella & Williams, 2004). Family SES can significantly impact the quality of care, treatment, and diagnosis for children with ASD (Delobel-Ayoub et al., 2015; Durkin et al., 2017; Thomas et al., 2012; Yang et al., 2020; Yu et al., 2020). Children with ASD are significantly impacted by comorbid conditions such as anxiety, depression, and behavioral issues (DeFilippis, 2018; Hill et al., 2014; Uljarevic et al., 2016). According to Simonoff (2008), 70% of ASD children are impacted with one comorbid condition, and 41% are affected by two or more comorbid conditions. It is not clear in the literature whether there is an association between SES and the reporting of comorbid conditions in children with ASD. Understanding whether an association exists can lead to the development of strategies to address potential disparities in care and improve the quality of life for children with ASD. This study evaluated whether associations existed between SES factors and the reporting of comorbid conditions in children with ASD.

This analysis was conducted using data from the NSCH survey conducted in 2018 & 2019 (CAHMI, 2020). A total of 59,963 surveys were conducted during this period, providing the data needed to evaluate for a relationship between SES factors and the reporting of comorbid conditions in children with ASD. This study demonstrated that parental education had a significant role in the reporting of comorbid conditions in children with ASD. When a parent or a guardian of a child with ASD had some college education, there was a significantly higher odds of the child reporting a comorbid condition compared to children with ASD who resided in a household where the parent or guardian had a college degree or higher. Health insurance coverage for mental health services also proved to be significantly associated with the reporting of comorbid conditions in children with ASD. There were significantly higher odds of reporting a comorbid condition in children that reporting sometimes having health insurance coverage for mental health services compared to those who always had health insurance coverage for mental health services. The parent or guardian's employment status did not significantly impact the reporting of a comorbid condition in children with ASD.

Interpretation of the Findings

Based on the estimated parent-reported prevalence of US children with ASD of 1 in 40 (Kogan et al., 2018) and the number of surveys conducted in the 2018-2019 combined NSCH of 59,963 (CAHMI, 2020), it is estimated that the sample size will be approximately 1,500 children with ASD in the NSCH survey. As provided in Table 7, the ASD population from the NSCH survey was 1,692 (2.7%), aligning with the US population's estimates.

Based on the descriptive statistics provided in Table 7, 74.1% of children with ASD were affected by one or more comorbid conditions. According to the literature, children with ASD are often impacted with comorbid conditions such as anxiety, depression, and behavioral issues (Sanchack & Thomas, 2016). These mental health-related conditions can have significant consequences for individuals with ASD, such as suicidality (Hirvikoski et al., 2016; Raja et al., 2011). Although there may be many comorbid conditions impacting children with ASD, the definition of comorbid conditions in this study was limited to anxiety, depression, and behavioral issues.

Not all SES factors in this study demonstrated an association with comorbid conditions. The multiple logistic regression analysis performed for the variable parental employment did not indicate an association with the reporting of comorbid conditions in children with ASD when adjusting for gender. The multiple logistic regression analysis demonstrated that the parent or guardian's education level was significantly associated with the reporting of comorbid conditions in children with ASD when adjusting for gender. If the parent or guardian had some college education, the odds of the child with ASD having a comorbidity was 31% higher (p=0.040) when compared to children whose parents had a college education or higher. The multiple logistic regression analysis performed for the variable health insurance coverage for mental health benefits demonstrated an association with the reporting of comorbid conditions in children with ASD when adjusting for gender. In individuals whose health insurance sometimes covered mental health benefits, the odds of the child with ASD having a comorbid

condition were 64% higher (p=0.018) when compared with individuals that always had health insurance coverage for mental health benefits.

The results of this study suggest that when children with ASD live in households with lower parental education level and inconsistent health insurance coverage for mental health benefits, there is an increased risk of the parental reporting of a comorbid condition. EST served as the guiding theory for this study. According to Bronfenbrenner (1977), a child's environment and their interactions within the various systems that comprise the theory may impact their behavior and development. The SES of a household has been demonstrated in this study to increase the risk of developing a comorbid condition such as anxiety, depression, or behavioral issues. Parental educational attainment, a component of the microsystem, can significantly impact the probability of a comorbid condition in children with ASD. Additionally, health insurance coverage for mental health benefits, a component of the macrosystem, was demonstrated to be associated with comorbid conditions in children with ASD.

Limitations of the Study

There are several limitations to this study that need to be considered when interpreting its findings. By utilizing a secondary data set, the NSCH survey, there may be bias related to the diagnosis of ASD and subsequent comorbid conditions. It cannot be determined if the child still has the various comorbid conditions analyzed, which would impact the internal validity of the results. Additionally, the cross-sectional study design cannot determine causation. This study assessed for associations between SES factors and comorbid conditions in children with ASD. It cannot be ascertained whether these SES

factors cause these comorbidities. The NSCH survey is a self-reported survey conducted with a child's parent or guardian. Self-reported data may decrease the external validity due to recall bias or responder bias (Tripepi et al., 2010). Recall bias may result from an individual not remembering a given diagnosis, and the responder bias may be due to the respondent answering the question the way they believe the researcher wants them to rather than providing factual information. Parents who cannot recall a diagnosis may lead to an underrepresentation of the samples evaluated in this study.

Generalizability impacts the external validity of this study (Andrade, 2018). Despite this study being conducted in all 50 states, including the District of Columbia, the reported study results may not be generalizable to all populations. The NSCH was primarily conducted via the web, which may have biased the sample toward higher-income households that could afford internet service.

Recommendations

Additional research will be required to verify the findings from this study regarding the role that SES factors have on the reporting of comorbid conditions in children with ASD. Despite parental education and health insurance coverage demonstrating an association with the reporting of comorbidities, future research should examine additional risk factors that may be involved, including the child's age and race. Although employment did not demonstrate an association with the reporting of comorbid conditions, future research is warranted to confirm this finding considering the majority of individuals within the NSCH sample studied were employed.

The current study focused on the comorbid conditions of anxiety, depression, and behavioral issues in children with ASD. Additional research is needed to evaluate relationships between other comorbid conditions that impact children with ASD, such as ADHD, sleep disorders, or bipolar disorder. Due to this study's cross-sectional design, it was not possible to determine causality between SES factors and the reporting of comorbidities. Future research will be required to evaluate causality.

As a result of this analysis, policymakers and public health professionals can have a significant role in addressing disparities in the reporting of comorbid conditions that impact children with ASD. Policymakers may seek to implement changes to health insurance plans to ensure that mental health benefits are provided for children with ASD and other neurodevelopmental disorders. Public health professionals may seek to implement educational programs for healthcare providers informing them about ASD and its associated comorbid conditions. School officials may implement programs to identify children with anxiety, depression, or behavioral issues that need to be referred for further evaluation. Programs and strategies should be focused in socioeconomically challenged communities.

Implications

These study results address a significant gap identified in the literature regarding the relationship between SES factors and the reporting of comorbidities in children with ASD. Children with ASD that are impacted by comorbid conditions are at-risk for suicidal ideation, bullying, poor school performance, and social isolation (Hirvikoski et al., 2016; Rigles, 2017a; Rydzewska et al., 2019; Salazar et al., 2015). SES has been

identified to lead to inequality in diagnosis and subsequent care for children with ASD resulting from limited access to health care services or lack of knowledge of the condition (Delobel-Ayoub et al., 2015; Durkin et al., 2017; Hong & Singh, 2019; Maenner et al., 2020). As a result of this study's findings demonstrating an association between SES factors and comorbid conditions in children with ASD, public health resources can be directed toward developing programs for children with ASD from disadvantaged communities. The reallocation of resources and subsequent development of social programs can lead to positive social change for these communities by decreasing the number of children impacted with comorbid conditions. Addressing comorbidities may reduce the psychosocial issues that affect children with ASD.

The economic burden of ASD in the United States is estimated in the billions (Leigh & Du, 2015). The additional healthcare and non-healthcare-related costs of caring for a child with ASD is $17,081 per year above caring for a child without ASD (Lavelle et al., 2014). Adding to the economic burden is the fact that ASD children carry their condition into adulthood. Eighty percent of adults with ASD are either underemployed or unemployed (Rogge & Janssen, 2019). By addressing the risks for comorbid conditions in ASD children, it may be possible to significantly reduce the financial burden to those impacted by ASD, including the public health system.

Caregiver stress associated with caring for a child with ASD has been identified as a significant problem for families (DesChamps et al., 2020; Dovgan & Mazurek, 2019). Stress can lead to health implications for other members of the household and can lead to financial strain. Addressing the SES factors that lead to comorbid conditions and

increase caregiver stress may lead to a reduction in health disparities and improve the quality of life for children with ASD and their families.

Conclusion

Based on data from the 2018-2019 NSCH survey, SES factors of parental education and health insurance coverage were statistically significantly associated with the reporting of comorbid conditions in children with ASD. Anxiety, depression, and behavioral issues are commonly found in children with ASD and were used in this analysis. Parental employment was not found to be associated with the reporting of comorbid conditions in children with ASD.

SES factors have been reported to impact the timing of ASD diagnosis and the subsequent care (Durkin et al., 2010; Hong & Singh, 2019; Pickard & Ingersoll, 2016). This analysis adds to the existing body of literature regarding the health inequities of children that reside in low SES. These results are aligned with the EST, further indicating that a child's environment has a significant role in their health. Public health interventions are needed to address health disparities that exist in communities of low SES.

Further research is warranted to examine additional risk factors that may exist in the development of comorbid conditions in children with ASD. Examining the role of age, race, and ethnicity may be informative in reducing health inequities. Developing resources to address health disparities and reduce the impact of comorbid conditions may lead to positive social change in disadvantaged communities.

References

Adams, D., Clark, M., & Simpson, K. (2020). The relationship between child anxiety and

    the quality of life of children, and parents of children, on the autism spectrum.

    Journal of Autism and Developmental Disorders, *50*(5), 1756–1769.

    https://doi.org/10.1007/s10803-019-03932-2

Aggarwal, S., & Angus, B. (2015). Misdiagnosis versus missed diagnosis: Diagnosing

    autism spectrum disorder in adolescents. *Australasian Psychiatry: Bulletin of*

    Royal Australian and New Zealand College of Psychiatrists, *23*(2), 120–123.

    https://doi.org/10.1177/1039856214568214

Ahmedani, B. K., & Hock, R. M. (2012). Health care access and treatment for children

    with co-morbid autism and psychiatric conditions. *Social Psychiatry and*

    Psychiatric Epidemiology, *47*(11), 1807–1814. https://doi.org/10.1007/s00127-

    012-0482-0

Algood, C. L., Harris, C., & Hong, J. S. (2013). Parenting success and challenges for

    families of children with disabilities: An ecological systems analysis. *Journal of*

    Human Behavior in the Social Environment, *23*(2), 126–136.

    https://doi.org/10.1080/10911359.2012.747408

Algood, C. L., Hong, J. S., Gourdine, R. M., & Williams, A. B. (2011). Maltreatment of

    children with developmental disabilities: An ecological systems analysis.

    Children and Youth Services Review, *33*(7), 1142–1148.

    https://doi.org/10.1016/j.childyouth.2011.02.003

Althubaiti, A. (2016). Information bias in health research: Definition, pitfalls, and adjustment methods. *Journal of Multidisciplinary Healthcare*, *9*, 211–217. https://doi.org/10.2147/JMDH.S104807

Andrade, C. (2018). Internal, external, and ecological validity in research design, conduct, and evaluation. *Indian Journal of Psychological Medicine*, *40*(5), 498–499. https://doi.org/10.4103/IJPSYM.IJPSYM_334_18

Anixt, J. S., Murray, D. S., Coury, D. L., Kuhlthau, K. A., Eskra, D., Seide, J., Kelly, A., Hess, A., Lipkin, P. H., Law, J. K., Fedele, A., & Lannon, C. (2020). Improving behavior challenges and quality of life in the autism learning health network. *Pediatrics*, *145*(Suppl 1), S20–S29. https://doi.org/10.1542/peds.2019-1895E

Assari, S., & Caldwell, C. H. (2018). High risk of depression in high-Income African American boys. *Journal of Racial and Ethnic Health Disparities*, *5*(4), 808–819. https://doi.org/10.1007/s40615-017-0426-1

Assari, S., Caldwell, C. H., & Bazargan, M. (2019). Association between parental educational attainment and youth outcomes and role of race/ethnicity. *JAMA Network Open*, *2*(11), e1916018. https://doi.org/10.1001/jamanetworkopen.2019.16018

Bölte, S., Duketis, E., Poustka, F., & Holtmann, M. (2011). Sex differences in cognitive domains and their clinical correlates in higher-functioning autism spectrum disorders. *Autism: The International Journal of Research and Practice*, *15*(4), 497–511. https://doi.org/10.1177/1362361310391116

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, *32*(7), 513–531. https://doi.org/10.1037/0003-066X.32.7.513

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology*, *22*(6), 723–742. https://doi.org/10.1037/0012-1649.22.6.723

Bronfenbrenner, U., & Ceci, S. J. (1994). Nature-nuture reconceptualized in developmental perspective: A bioecological model. *Psychological Review*, *101*(4), 568–586. https://doi.org/10.1037/0033-295X.101.4.568

Brookman-Frazee, L., Stadnick, N., Chlebowski, C., Baker-Ericzén, M., & Ganger, W. (2018). Characterizing psychiatric comorbidity in children with autism spectrum disorder receiving publicly funded mental health services. *Autism*, *22*(8), 938–952. https://doi.org/10.1177/1362361317712650

CAHMI. (2019). *The 2018 National Survey of Children's Health Fast Facts.* https://mchb.hrsa.gov/data/national-surveys/data-user

CAHMI. (2020). *2018-2019 National Survey of Children's Health*. https://www.childhealthdata.org/docs/default-source/nsch-docs/2018-2019-nsch-fast-facts_cahmi_edited_10-2-20.pdf?sfvrsn=4a7b5f17_2

Cakir, J., Frye, R. E., & Walker, S. J. (2020). The lifetime social cost of autism: 1990–2029. *Research in Autism Spectrum Disorders*, *72*, 101502. https://doi.org/10.1016/j.rasd.2019.101502

Callander, E. J., & Lindsay, D. B. (2018). The impact of childhood autism spectrum disorder on parent's labour force participation: Can parents be expected to be able to re-join the labour force? *Autism*, *22*(5), 542–548. https://doi.org/10.1177/1362361316688331

Caporino, N. E., Read, K. L., Shiffrin, N., Settipani, C., Kendall, P. C., Compton, S. N., Sherrill, J., Piacentini, J., Walkup, J., Ginsburg, G., Keeton, C., Birmaher, B., Sakolsky, D., Gosch, E., & Albano, A. M. (2017). Sleep-related problems and the effects of anxiety treatment in children and adolescents. *Journal of Clinical Child & Adolescent Psychology*, *46*(5), 675–685. https://doi.org/10.1080/15374416.2015.1063429

Carr, T., Shih, W., Lawton, K., Lord, C., King, B., & Kasari, C. (2016). The relationship between treatment attendance, adherence, and outcome in a caregiver-mediated intervention for low-resourced families of young children with autism spectrum disorder. *Autism: The International Journal of Research and Practice*, *20*(6), 643–652. https://doi.org/10.1177/1362361315598634

Carrilero, N., Dalmau-Bueno, A., & García-Altés, A. (2020). Comorbidity patterns and socioeconomic inequalities in children under 15 with medical complexity: A population-based study. *BMC Pediatrics*, *20*(1), 358. https://doi.org/10.1186/s12887-020-02253-z

Casanova, M. F., Frye, R. E., Gillberg, C., & Casanova, E. L. (2020). Editorial: Comorbidity and autism spectrum disorder. *Frontiers in Psychiatry*, *11*, 617395. https://doi.org/10.3389/fpsyt.2020.617395

Chandler, S., Howlin, P., Simonoff, E., O'Sullivan, T., Tseng, E., Kennedy, J., Charman, T., & Baird, G. (2016). Emotional and behavioural problems in young children with autism spectrum disorder. *Developmental Medicine & Child Neurology*, *58*(2), 202–208. https://doi.org/10.1111/dmcn.12830

Chandrasekhar, T., & Sikich, L. (2015). Challenges in the diagnosis and treatment of depression in autism spectrum disorders across the lifespan. *Dialogues in Clinical Neuroscience*, *17*(2), 219–227.

Chang, Y.-C., & Locke, J. (2016). A systematic review of peer-mediated interventions for children with autism spectrum disorder. *Research in Autism Spectrum Disorders*, *27*, 1–10. https://doi.org/10.1016/j.rasd.2016.03.010

Cheng, H. G., & Phillips, M. R. (2014). Secondary analysis of existing data: Opportunities and implementation. *Shanghai Archives of Psychiatry*, *26*(6), 371–375. https://doi.org/10.11919/j.issn.1002-0829.214171

Christensen, D. L., Maenner, M. J., Bilder, D., Constantino, J. N., Daniels, J., Durkin, M. S., Fitzgerald, R. T., Kurzius-Spencer, M., Pettygrove, S. D., Robinson, C., Shenouda, J., White, T., Zahorodny, W., Pazol, K., & Dietz, P. (2019). Prevalence and characteristics of autism spectrum disorder among children aged 4 years—Early autism and developmental disabilities monitoring network, seven sites, United States, 2010, 2012, and 2014. *Morbidity and Mortality Weekly Report. Surveillance Summaries (Washington, D.C.: 2002)*, *68*(2), 1–19. https://doi.org/10.15585/mmwr.ss6802a1

Cidav, Z., Marcus, S. C., & Mandell, D. S. (2012). Implications of childhood autism for parental employment and earnings. *Pediatrics*, *129*(4), 617–623. https://doi.org/10.1542/peds.2011-2700

Constantino, J. N., Abbacchi, A. M., Saulnier, C., Klaiman, C., Mandell, D. S., Zhang, Y., Hawks, Z., Bates, J., Klin, A., Shattuck, P., Molholm, S., Fitzgerald, R., Roux, A., Lowe, J. K., & Geschwind, D. H. (2020). Timing of the diagnosis of autism in African American children. *Pediatrics*, *146*(3), e20193629. https://doi.org/10.1542/peds.2019-3629

Cuvo, A. J., & Vallelunga, L. R. (2007). A transactional systems model of autism services. *The Behavior Analyst*, *30*(2), 161–180. https://doi.org/10.1007/BF03392153

DeFilippis, M. (2018). Depression in children and adolescents with autism spectrum disorder. *Children (Basel, Switzerland)*, *5*(9). https://doi.org/10.3390/children5090112

Delobel-Ayoub, M., Ehlinger, V., Klapouszczak, D., Maffre, T., Raynaud, J.-P., Delpierre, C., & Arnaud, C. (2015). Socioeconomic disparities and prevalence of autism spectrum disorders and intellectual disability. *PLOS ONE*, *10*(11), e0141964. https://doi.org/10.1371/journal.pone.0141964

DesChamps, T. D., Ibañez, L. V., Edmunds, S. R., Dick, C. C., & Stone, W. L. (2020). Parenting stress in caregivers of young children with ASD concerns prior to a formal diagnosis. *Autism Research: Official Journal of the International Society for Autism Research*, *13*(1), 82–92. https://doi.org/10.1002/aur.2213

Dey, P., & Bach, P. B. (2019). The 6 Functions of Health Insurance. *JAMA*, *321*(13), 1242. https://doi.org/10.1001/jama.2019.2320

Dooley, E., & Kunik, M. E. (2017). Depression and Anxiety Across the Age Spectrum. In A. Sharafkhaneh, A. M. Yohannes, N. A. Hanania, & M. E. Kunik (Eds.), *Depression and Anxiety in Patients with Chronic Respiratory Diseases* (pp. 11–31). Springer New York. https://doi.org/10.1007/978-1-4939-7009-4_2

Dovgan, K., & Mazurek, M. O. (2019). Impact of multiple co-occurring emotional and behavioural conditions on children with autism and their families. *Journal of Applied Research in Intellectual Disabilities*, *32*(4), 967–980. https://doi.org/10.1111/jar.12590

Durkin, M. S., Maenner, M. J., Baio, J., Christensen, D., Daniels, J., Fitzgerald, R., Imm, P., Lee, L.-C., Schieve, L. A., Van Naarden Braun, K., Wingate, M. S., & Yeargin-Allsopp, M. (2017). Autism spectrum disorder among US children (2002-2010): Socioeconomic, racial, and ethnic disparities. *American Journal of Public Health*, *107*(11), 1818–1826. https://doi.org/10.2105/AJPH.2017.304032

Durkin, M. S., Maenner, M. J., Meaney, F. J., Levy, S. E., DiGuiseppi, C., Nicholas, J. S., Kirby, R. S., Pinto-Martin, J. A., & Schieve, L. A. (2010). Socioeconomic inequality in the prevalence of autism spectrum disorder: Evidence from a U.S. cross-sectional study. *PLOS ONE*, *5*(7), e11551. https://doi.org/10.1371/journal.pone.0011551

Eamon, M. K. (2001). The effects of poverty on childrens socioemotional development: An ecological systems analysis. *Social Work*, *46*(3), 256–266. https://doi.org/10.1093/sw/46.3.256

Eilenberg, J. S., Paff, M., Harrison, A. J., & Long, K. A. (2019). Disparities based on race, ethnicity, and socioeconomic status over the transition to adulthood among adolescents and young adults on the autism spectrum: A systematic review. *Current Psychiatry Reports*, *21*(5), 32. https://doi.org/10.1007/s11920-019-1016-1

Eisenmann, J. C., Gentile, D. A., Welk, G. J., Callahan, R., Strickland, S., Walsh, M., & Walsh, D. A. (2008). SWITCH: Rationale, design, and implementation of a community, school, and family-based intervention to modify behaviors related to childhood obesity. *BMC Public Health*, *8*(1), 223. https://doi.org/10.1186/1471-2458-8-223

Elder, J. H., Kreider, C. M., Brasher, S. N., & Ansell, M. (2017). Clinical impact of early diagnosis of autism on the prognosis and parent-child relationships. *Psychology Research and Behavior Management*, *10*, 283–292. https://doi.org/10.2147/PRBM.S117499

Emerson, N. D., Morrell, H. E. R., & Neece, C. (2016). Predictors of age of diagnosis for children with autism spectrum disorder: The role of a consistent source of medical care, race, and condition severity. *Journal of Autism and Developmental Disorders*, *46*(1), 127–138. https://doi.org/10.1007/s10803-015-2555-x

Eriksson, M., Ghazinour, M., & Hammarström, A. (2018). Different uses of

    Bronfenbrenner's ecological theory in public mental health research: What is their

    value for guiding public mental health policy and practice? *Social Theory &*

    Health, *16*(4), 414–433. https://doi.org/10.1057/s41285-018-0065-6

Evans, B. (2013). How autism became autism: The radical transformation of a central

    concept of child development in Britain. *History of the Human Sciences*, *26*(3), 3–

    31. https://doi.org/10.1177/0952695113484320

Fiscella, K., & Williams, D. R. (2004). Health disparities based on socioeconomic

    inequities: Implications for urban health care. *Academic Medicine: Journal of the*

    Association of American Medical Colleges, *79*(12), 1139–1147.

    https://doi.org/10.1097/00001888-200412000-00004

Flores, G., Lin, H., Walker, C., Lee, M., Currie, J. M., Allgeyer, R., Portillo, A., Henry,

    M., Fierro, M., & Massey, K. (2017). The health and healthcare impact of

    providing insurance coverage to uninsured children: A prospective observational

    study. *BMC Public Health*, *17*(1), 553. https://doi.org/10.1186/s12889-017-4363-

    z

Fountain, C., King, M. D., & Bearman, P. S. (2011). Age of diagnosis for autism:

    Individual and community factors across 10 birth cohorts. *Journal of*

    Epidemiology & Community Health, *65*(6), 503–510.

    https://doi.org/10.1136/jech.2009.104588

Fusar-Poli, L., Brondino, N., Politi, P., & Aguglia, E. (2020). Missed diagnoses and

    misdiagnoses of adults with autism spectrum disorder. *European Archives of*

Psychiatry and Clinical Neuroscience. https://doi.org/10.1007/s00406-020-01189-w

Georgiades, S., Szatmari, P., Duku, E., Zwaigenbaum, L., Bryson, S., Roberts, W., Fombonne, E., Mirenda, P., Smith, I., Vaillancourt, T., Volden, J., Waddell, C., Thompson, A., & Pathways in ASD Study Team. (2011). Phenotypic overlap between core diagnostic features and emotional/behavioral problems in preschool children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *41*(10), 1321–1329. https://doi.org/10.1007/s10803-010-1158-9

Ghandour, R. M., Sherman, L. J., Vladutiu, C. J., Ali, M. M., Lynch, S. E., Bitsko, R. H., & Blumberg, S. J. (2019). Prevalence and treatment of depression, anxiety, and conduct problems in US children. *The Journal of Pediatrics*, *206*, 256-267.e3. https://doi.org/10.1016/j.jpeds.2018.09.021

Gipson, T. T., Lance, E. I., Albury, R. A., Gentner, M. B., & Leppert, M. L. (2014). Disparities in identification of comorbid diagnoses in children with ADHD: *Clinical Pediatrics*. https://doi.org/10.1177/0009922814553434

Glanz, K., Rimer, B. K., & Viswanath, K. (Eds.). (2015). *Health behavior: Theory, research, and practice* (5. edition). Jossey-Bass.

Glod, M., Creswell, C., Waite, P., Jamieson, R., McConachie, H., Don South, M., & Rodgers, J. (2017). Comparisons of the Ffctor structure and measurement invariance of the spence children's anxiety scale-parent version in children with autism spectrum disorder and typically developing anxious children. *Journal of*

Autism and Developmental Disorders, *47*(12), 3834–3846.

https://doi.org/10.1007/s10803-017-3118-0

Gockley, J., Willsey, A. J., Dong, S., Dougherty, J. D., Constantino, J. N., & Sanders, S.
J. (2015). The female protective effect in autism spectrum disorder is not
mediated by a single genetic locus. *Molecular Autism*, *6*, 25.
https://doi.org/10.1186/s13229-015-0014-3

Greenlee, J. L., Winter, M. A., & Johnson, M. (2020). Depression symptoms in
adolescents with autism spectrum disorder: A contextual approach to mental
health comorbidities. *Journal of Adolescence*, *85*, 120–125.
https://doi.org/10.1016/j.adolescence.2020.10.005

Guthrie, W., Swineford, L. B., Nottke, C., & Wetherby, A. M. (2013). Early diagnosis of
autism spectrum disorder: Stability and change in clinical diagnosis and symptom
presentation. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*,
54(5), 582–590. https://doi.org/10.1111/jcpp.12008

Harrop, C., Gulsrud, A., & Kasari, C. (2015). Does gender moderate core deficits in
ASD? An investigation into restricted and repetitive behaviors in girls and boys
with ASD. *Journal of Autism and Developmental Disorders*, *45*(11), 3644–3655.
https://doi.org/10.1007/s10803-015-2511-9

Hartley, S. L., Sikora, D. M., & McCoy, R. (2008). Prevalence and risk factors of
maladaptive behaviour in young children with Autistic Disorder. *Journal of
Intellectual Disability Research: JIDR*, *52*(10), 819–829.
https://doi.org/10.1111/j.1365-2788.2008.01065.x

He, P., Guo, C., Wang, Z., Chen, G., Li, N., & Zheng, X. (2018). Socioeconomic status and childhood autism: A population-based study in China. *Psychiatry Research*, *259*, 27–31. https://doi.org/10.1016/j.psychres.2017.08.046

Hedley, D., Uljarević, M., Foley, K.-R., Richdale, A., & Trollor, J. (2018). Risk and protective factors underlying depression and suicidal ideation in Autism Spectrum Disorder. *Depression and Anxiety*, *35*(7), 648–657. https://doi.org/10.1002/da.22759

Hidalgo, N. J., McINTYRE, L. L., & McWHIRTER, E. H. (2015). Sociodemographic differences in parental satisfaction with an autism spectrum disorder diagnosis. *Journal of Intellectual & Developmental Disability*, *40*(2), 147–155. https://doi.org/10.3109/13668250.2014.994171

Hill, A. P., Zuckerman, K. E., Hagen, A. D., Kriz, D. J., Duvall, S. W., van Santen, J., Nigg, J., Fair, D., & Fombonne, E. (2014). Aggressive behavior problems in children with autism spectrum disorders: Prevalence and correlates in a large clinical sample. *Research in Autism Spectrum Disorders*, *8*(9), 1121–1133. https://doi.org/10.1016/j.rasd.2014.05.006

Hirvikoski, T., Mittendorfer-Rutz, E., Boman, M., Larsson, H., Lichtenstein, P., & Bölte, S. (2016). Premature mortality in autism spectrum disorder. *The British Journal of Psychiatry: The Journal of Mental Science*, *208*(3), 232–238. https://doi.org/10.1192/bjp.bp.114.160192

Hong, A., & Singh, J. S. (2019). Contextualizing the Social and Structural Constraints of Accessing autism services among single black female caregivers in Atlanta,

Georgia. *International Journal of Child Health and Human Development*, *12*(4), 365.

Hrdlicka, M., Vacova, M., Oslejskova, H., Gondzova, V., Vadlejchova, I., Kocourkova, J., Koutek, J., & Dudova, I. (2016). Age at diagnosis of autism spectrum disorders: Is there an association with socioeconomic status and family self-education about autism? *Neuropsychiatric Disease and Treatment*, *12*, 1639–1644. https://doi.org/10.2147/NDT.S107239

Hudson, C. C., Hall, L., & Harkness, K. L. (2019). Prevalence of depressive disorders in individuals with autism spectrum disorder: A Meta-Analysis. *Journal of Abnormal Child Psychology*, *47*(1), 165–175. https://doi.org/10.1007/s10802-018-0402-1

Jacquemont, S., Coe, B. P., Hersch, M., Duyzend, M. H., Krumm, N., Bergmann, S., Beckmann, J. S., Rosenfeld, J. A., & Eichler, E. E. (2014). A higher mutational burden in females supports a "female protective model" in neurodevelopmental disorders. *American Journal of Human Genetics*, *94*(3), 415–425. https://doi.org/10.1016/j.ajhg.2014.02.001

Jang, J., & Matson, J. L. (2015). Autism severity as a predictor of comorbid conditions. *Journal of Developmental and Physical Disabilities*, *27*(3), 405–415. https://doi.org/10.1007/s10882-015-9421-9

Kapp, S. K. (2018). Social support, well-being, and quality of life among individuals on the autism spectrum. *Pediatrics*, *141*(Suppl 4), S362–S368. https://doi.org/10.1542/peds.2016-4300N

Karimi, P., Kamali, E., Mousavi, S. M., & Karahmadi, M. (2017). Environmental factors influencing the risk of autism. *Journal of Research in Medical Sciences: The Official Journal of Isfahan University of Medical Sciences*, *22*, 27. https://doi.org/10.4103/1735-1995.200272

Karpur, A., Lello, A., Frazier, T., Dixon, P. J., & Shih, A. J. (2019). Health disparities among children with autism spectrum disorders: Analysis of the National Survey of Children's Health 2016. *Journal of Autism and Developmental Disorders*, *49*(4), 1652–1664. https://doi.org/10.1007/s10803-018-3862-9

Keen, D., Adams, D., Simpson, K., den Houting, J., & Roberts, J. (2019). Anxiety-related symptomatology in young children on the autism spectrum. *Autism*, *23*(2), 350–358. https://doi.org/10.1177/1362361317734692

Kelly, B., Williams, S., Collins, S., Mushtaq, F., Mon-Williams, M., Wright, B., Mason, D., & Wright, J. (2019). The association between socioeconomic status and autism diagnosis in the United Kingdom for children aged 5-8 years of age: Findings from the Born in Bradford cohort. *Autism: The International Journal of Research and Practice*, *23*(1), 131–140. https://doi.org/10.1177/1362361317733182

Kerns, Connor M., Kendall, P. C., Zickgraf, H., Franklin, M. E., Miller, J., & Herrington, J. (2015). Not to be overshadowed or overlooked: Functional impairments associated with comorbid anxiety disorders in youth with ASD. *Behavior Therapy*, *46*(1), 29–39. https://doi.org/10.1016/j.beth.2014.03.005

Kerns, Connor Morrow, Newschaffer, C. J., Berkowitz, S., & Lee, B. K. (2017). Brief

   report: Examining the association of autism and adverse childhood experiences in

   the National Survey of Children's Health: The important role of income and co-

   occurring mental health conditions. *Journal of Autism and Developmental*

   Disorders, *47*(7), 2275–2281. https://doi.org/10.1007/s10803-017-3111-7

Kesmodel, U. S. (2018). Cross-sectional studies—What are they good for? *Acta*

   Obstetricia et Gynecologica Scandinavica, *97*(4), 388–393.

   https://doi.org/10.1111/aogs.13331

Kogan, M. D., Strickland, B. B., Blumberg, S. J., Singh, G. K., Perrin, J. M., & van

   Dyck, P. C. (2008). A national profile of the health care experiences and family

   impact of autism spectrum disorder among children in the United States, 2005-

   2006. *Pediatrics*, *122*(6), e1149-1158. https://doi.org/10.1542/peds.2008-1057

Kogan, M. D., Vladutiu, C. J., Schieve, L. A., Ghandour, R. M., Blumberg, S. J.,

   Zablotsky, B., Perrin, J. M., Shattuck, P., Kuhlthau, K. A., Harwood, R. L., & Lu,

   M. C. (2018). The prevalence of parent-reported autism spectrum disorder among

   US children. *Pediatrics*, *142*(6). https://doi.org/10.1542/peds.2017-4161

Kristjansdottir, G., Hallström, I. K., & Vilhjalmsson, R. (2020). Sociodemographic and

   health status predictors of parental role strain: A general population study.

   Scandinavian Journal of Public Health, *48*(5), 519–526.

   https://doi.org/10.1177/1403494819846361

Kryzak, L. A., Cengher, M., Feeley, K. M., Fienup, D. M., & Jones, E. A. (2015). A

   community support program for children with autism and their typically

developing siblings: Initial investigation. *Journal of Intellectual Disabilities: JOID*, *19*(2), 159–177. https://doi.org/10.1177/1744629514564450

Kuhlthau, K. A., McDonnell, E., Coury, D. L., Payakachat, N., & Macklin, E. (2018). Associations of quality of life with health-related characteristics among children with autism. *Autism*, *22*(7), 804–813. https://doi.org/10.1177/1362361317704420

Kuhn, J., Ford, K., & Dawalt, L. S. (2018). Brief report: Mapping systems of support and psychological well-being of mothers of adolescents with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *48*(3), 940–946. https://doi.org/10.1007/s10803-017-3381-0

Lado, J. J., & Lipman, T. H. (2016). Racial and ethnic disparities in the incidence, treatment, and outcomes of youth with type 1 diabetes. *Endocrinology and Metabolism Clinics of North America*, *45*(2), 453–461. https://doi.org/10.1016/j.ecl.2016.01.002

Larsson, H. J., Eaton, W. W., Madsen, K. M., Vestergaard, M., Olesen, A. V., Agerbo, E., Schendel, D., Thorsen, P., & Mortensen, P. B. (2005). Risk factors for autism: Perinatal factors, parental psychiatric history, and socioeconomic status. *American Journal of Epidemiology*, *161*(10), 916–925; discussion 926-928. https://doi.org/10.1093/aje/kwi123

Lavelle, T. A., Weinstein, M. C., Newhouse, J. P., Munir, K., Kuhlthau, K. A., & Prosser, L. A. (2014). Economic burden of childhood autism spectrum disorders. *Pediatrics*. https://doi.org/10.1542/peds.2013-0763

Lehti, V., Hinkka-Yli-Salomäki, S., Cheslack-Postava, K., Gissler, M., Brown, A. S., & Sourander, A. (2015). Maternal socio-economic status based on occupation and autism spectrum disorders: A national case-control study. *Nordic Journal of Psychiatry*, *69*(7), 523–530. https://doi.org/10.3109/08039488.2015.1011692

Leigh, J. P., & Du, J. (2015). Brief report: Forecasting the economic burden of autism in 2015 and 2025 in the United States. *Journal of Autism and Developmental Disorders*, *45*(12), 4135–4139. https://doi.org/10.1007/s10803-015-2521-7

Levy, S. E., Giarelli, E., Lee, L.-C., Schieve, L. A., Kirby, R. S., Cunniff, C., Nicholas, J., Reaven, J., & Rice, C. E. (2010). Autism spectrum disorder and co-occurring developmental, psychiatric, and medical conditions among children in multiple populations of the United States. *Journal of Developmental and Behavioral Pediatrics: JDBP*, *31*(4), 267–275. https://doi.org/10.1097/DBP.0b013e3181d5d03b

Lombardi, C. M., & Coley, R. L. (2017). Early maternal employment and children's academic and behavioral skills in Australia and the United Kingdom. *Child Development*, *88*(1), 263–281. https://doi.org/10.1111/cdev.12588

Maenner, M. J., Shaw, K. A., Baio, J., EdS1, Washington, A., Patrick, M., DiRienzo, M., Christensen, D. L., Wiggins, L. D., Pettygrove, S., Andrews, J. G., Lopez, M., Hudson, A., Baroud, T., Schwenk, Y., White, T., Rosenberg, C. R., Lee, L.-C., Harrington, R. A., … Dietz, P. M. (2020). Prevalence of autism spectrum disorder among children aged 8 years—Autism and developmental disabilities monitoring network, 11 Sites, United States, 2016. *Morbidity and Mortality Weekly Report.*

Surveillance Summaries (Washington, D.C.: 2002), *69*(4), 1–12.

https://doi.org/10.15585/mmwr.ss6904a1

Magiati, I., Ong, C., Lim, X. Y., Tan, J. W.-L., Ong, A. Y. L., Patrycia, F., Fung, D. S. S., Sung, M., Poon, K. K., & Howlin, P. (2016). Anxiety symptoms in young people with autism spectrum disorder attending special schools: Associations with gender, adaptive functioning and autism symptomatology. *Autism*, *20*(3), 306–320. https://doi.org/10.1177/1362361315577519

Mahrer, N. E., Montaño, Z., & Gold, J. I. (2012). Relations between anxiety sensitivity, somatization, and health-related quality of life in children with chronic pain. *Journal of Pediatric Psychology*, *37*(7), 808–816. https://doi.org/10.1093/jpepsy/jss054

Malhotra, P., Gella, V., Guru Murthy, G. S., Varma, N., & Varma, S. (2016). High incidence of aplastic anemia is linked with lower socioeconomic status of Indian population. *Journal of Public Health (Oxford, England)*, *38*(2), 223–228. https://doi.org/10.1093/pubmed/fdv027

Mandy, W., Chilvers, R., Chowdhury, U., Salter, G., Seigal, A., & Skuse, D. (2012). Sex differences in autism spectrum disorder: Evidence from a large sample of children and adolescents. *Journal of Autism and Developmental Disorders*, *42*(7), 1304–1313. https://doi.org/10.1007/s10803-011-1356-0

Mandy, W., & Lai, M.-C. (2016). Annual Research Review: The role of the environment in the developmental psychopathology of autism spectrum condition. *Journal of*

Child Psychology and Psychiatry, and Allied Disciplines, *57*(3), 271–292.

https://doi.org/10.1111/jcpp.12501

McDonnell, T., & Doyle, O. (2019). Maternal employment and childcare during infancy

and childhood overweight. *Social Science & Medicine*, *243*, 112639.

https://doi.org/10.1016/j.socscimed.2019.112639

Merikangas, K. R., He, J.-P., Burstein, M., Swanson, S. A., Avenevoli, S., Cui, L.,

Benjet, C., Georgiades, K., & Swendsen, J. (2010). Lifetime prevalence of mental

disorders in U.S. adolescents: Results from the National Comorbidity Survey

Replication--Adolescent Supplement (NCS-A). *Journal of the American Academy*

of Child and Adolescent Psychiatry, *49*(10), 980–989.

https://doi.org/10.1016/j.jaac.2010.05.017

Miot, S., Akbaraly, T., Michelon, C., Couderc, S., Crepiat, S., Loubersac, J., Picot, M.-

C., Pernon, É., Gonnier, V., Jeandel, C., Blain, H., & Baghdadli, A. (2019).

Comorbidity burden in adults with autism spectrum disorders and intellectual

disabilities—A report from the EFAAR (frailty assessment in ageing adults with

autism spectrum and intellectual disabilities) study. *Frontiers in Psychiatry*, *10*,

617. https://doi.org/10.3389/fpsyt.2019.00617

Mörk, E., Sjögren, A., & Svaleryd, H. (2014). Parental unemployment and child health.

CESifo Economic Studies, *60*(2), 366–401. https://doi.org/10.1093/cesifo/ifu016

Munkhaugen, E. K., Torske, T., Gjevik, E., Nærland, T., Pripp, A. H., & Diseth, T. H.

(2019). Individual characteristics of students with autism spectrum disorders and

school refusal behavior. *Autism*, *23*(2), 413–423.

https://doi.org/10.1177/1362361317748619

Nguyen, C. T., Krakowiak, P., Hansen, R., Hertz-Picciotto, I., & Angkustsiri, K. (2016). Sociodemographic disparities in intervention service utilization in families of children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *46*(12), 3729–3738. https://doi.org/10.1007/s10803-016-2913-3

Nolan, R., Walker, T., Hanson, J. L., & Friedman, S. (2016). Developmental behavioral pediatrician support of the medical home for children with autism spectrum disorders. *Journal of Developmental and Behavioral Pediatrics: JDBP*, *37*(9), 687–693. https://doi.org/10.1097/DBP.0000000000000348

Ogundele, M. O. (2018). Behavioural and emotional disorders in childhood: A brief overview for paediatricians. *World Journal of Clinical Pediatrics*, *7*(1), 9–26. https://doi.org/10.5409/wjcp.v7.i1.9

Parish, S. L., Thomas, K. C., Williams, C. S., & Crossman, M. K. (2015). Autism and families' financial burden: The association with health insurance coverage. *American Journal on Intellectual and Developmental Disabilities*, *120*(2), 166–175. https://doi.org/10.1352/1944-7558-120.2.166

Park, H. R., Lee, J. M., Moon, H. E., Lee, D. S., Kim, B.-N., Kim, J., Kim, D. G., & Paek, S. H. (2016). A short review on the current understanding of autism spectrum disorders. *Experimental Neurobiology*, *25*(1), 1–13. https://doi.org/10.5607/en.2016.25.1.1

Pickard, K. E., & Ingersoll, B. R. (2016). Quality versus quantity: The role of socioeconomic status on parent-reported service knowledge, service use, unmet service needs, and barriers to service use. *Autism: The International Journal of Research and Practice*, *20*(1), 106–115. https://doi.org/10.1177/1362361315569745

Pourhoseingholi, M. A., Vahedi, M., & Rahimzadeh, M. (2013). Sample size calculation in medical studies. *Gastroenterology and Hepatology from Bed to Bench*, *6*(1), 14–17.

Rai, D., Culpin, I., Heuvelman, H., Magnusson, C. M. K., Carpenter, P., Jones, H. J., Emond, A. M., Zammit, S., Golding, J., & Pearson, R. M. (2018). Association of autistic traits with depression from childhood to age 18 years. *JAMA Psychiatry*, *75*(8), 835–843. https://doi.org/10.1001/jamapsychiatry.2018.1323

Raja, M., Azzoni, A., & Frustaci, A. (2011). Autism spectrum disorders and suicidality. *Clinical Practice and Epidemiology in Mental Health: CP & EMH*, *7*, 97–105. https://doi.org/10.2174/1745017901107010097

Ranganathan, P., Pramesh, C. S., & Aggarwal, R. (2017). Common pitfalls in statistical analysis: Logistic regression. *Perspectives in Clinical Research*, *8*(3), 148–151. https://doi.org/10.4103/picr.PICR_87_17

Reinhardt Pedersen, C., Madsen, M., & Köhler, L. (2005). Does financial strain explain the association between children's morbidity and parental non-employment? *Journal of Epidemiology and Community Health*, *59*(4), 316–321. https://doi.org/10.1136/jech.2003.013839

Rigles, B. (2017a). The relationship between adverse childhood events, resiliency and health among children with autism. *Journal of Autism and Developmental Disorders*, *47*(1), 187–202. https://doi.org/10.1007/s10803-016-2905-3

Rigles, B. (2017b). The relationship between adverse childhood events, resiliency and health among children with autism. *Journal of Autism and Developmental Disorders*, *47*(1), 187–202. https://doi.org/10.1007/s10803-016-2905-3

Robinson, E. B., Lichtenstein, P., Anckarsäter, H., Happé, F., & Ronald, A. (2013). Examining and interpreting the female protective effect against autistic behavior. *Proceedings of the National Academy of Sciences of the United States of America*, *110*(13), 5258–5262. https://doi.org/10.1073/pnas.1211070110

Rogge, N., & Janssen, J. (2019). The economic costs of autism spectrum disorder: A literature review. *Journal of Autism and Developmental Disorders*, *49*(7), 2873–2900. https://doi.org/10.1007/s10803-019-04014-z

Romero, M., Aguilar, J. M., Del-Rey-Mejías, Á., Mayoral, F., Rapado, M., Peciña, M., Barbancho, M. Á., Ruiz-Veguilla, M., & Lara, J. P. (2016). Psychiatric comorbidities in autism spectrum disorder: A comparative study between DSM-IV-TR and DSM-5 diagnosis. *International Journal of Clinical and Health Psychology*, *16*(3), 266–275. https://doi.org/10.1016/j.ijchp.2016.03.001

Rosa, E. M., & Tudge, J. (2013). Urie Bronfenbrenner's theory of human development: Its evolution from ecology to bioecology: The evolution of Urie Bronfenbrenner's Theory. *Journal of Family Theory & Review*, *5*(4), 243–258. https://doi.org/10.1111/jftr.12022

Rosa, M., Puig, O., Lázaro, L., & Calvo, R. (2016). Socioeconomic status and intelligence quotient as predictors of psychiatric disorders in children and adolescents with high-functioning autism spectrum disorder and in their siblings. *Autism*, *20*(8), 963–972. https://doi.org/10.1177/1362361315617881

Rosenman, R., Tennekoon, V., & Hill, L. G. (2011). Measuring bias in self-reported data. *International Journal of Behavioural & Healthcare Research*, *2*(4), 320–332. https://doi.org/10.1504/IJBHR.2011.043414

Rydzewska, E., Hughes-McCormack, L. A., Gillberg, C., Henderson, A., MacIntyre, C., Rintoul, J., & Cooper, S.-A. (2019). Prevalence of sensory impairments, physical and intellectual disabilities, and mental health in children and young people with self/proxy-reported autism: Observational study of a whole country population. *Autism*, *23*(5), 1201–1209. https://doi.org/10.1177/1362361318791279

Rylaarsdam, L., & Guemez-Gamboa, A. (2019). Genetic causes and modifiers of autism spectrum disorder. *Frontiers in Cellular Neuroscience*, *13*, 385. https://doi.org/10.3389/fncel.2019.00385

Salazar, F., Baird, G., Chandler, S., Tseng, E., O'sullivan, T., Howlin, P., Pickles, A., & Simonoff, E. (2015). Co-occurring psychiatric disorders in preschool and elementary school-aged children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *45*(8), 2283–2294. https://doi.org/10.1007/s10803-015-2361-5

Sanchack, K. E., & Thomas, C. A. (2016). Autism spectrum disorder: Primary care principles. *American Family Physician*, *94*(12), 972–979.

Schieve, L. A., Gonzalez, V., Boulet, S. L., Visser, S. N., Rice, C. E., Braun, K. V. N., & Boyle, C. A. (2012). Concurrent medical conditions and health care use and needs among children with learning and behavioral developmental disabilities, National Health Interview Survey, 2006–2010. *Research in Developmental Disabilities*, *33*(2), 467–476. https://doi.org/10.1016/j.ridd.2011.10.008

Segers, M., & Rawana, J. (2014). What do we know about suicidality in autism spectrum disorders? A systematic review. *Autism Research: Official Journal of the International Society for Autism Research*, *7*(4), 507–521. https://doi.org/10.1002/aur.1375

Setia, M. S. (2016). Methodology Series Module 3: Cross-sectional Studies. *Indian Journal of Dermatology*, *61*(3), 261–264. https://doi.org/10.4103/0019-5154.182410

Shafiei, S., Yazdani, S., Jadidfard, M.-P., & Zafarmand, A. H. (2019). Measurement components of socioeconomic status in health-related studies in Iran. *BMC Research Notes*, *12*(1), 70. https://doi.org/10.1186/s13104-019-4101-y

Sharabi, A., & Marom-Golan, D. (2018). Social support, education levels, and parents' involvement: A comparison between mothers and fathers of young children with autism spectrum disorder. *Topics in Early Childhood Special Education*, *38*(1), 54–64. https://doi.org/10.1177/0271121418762511

Simonoff, E., Pickles, A., Charman, T., Chandler, S., Loucas, T., & Baird, G. (2008). Psychiatric disorders in children with autism spectrum disorders: Prevalence, comorbidity, and associated factors in a population-derived sample. *Journal of the*

American Academy of Child and Adolescent Psychiatry, *47*(8), 921–929.

https://doi.org/10.1097/CHI.0b013e318179964f

Sleskova, M., Tuinstra, J., Madarasova Geckova, A., van Dijk, J. P., Salonna, F.,

Groothoff, J. W., & Reijneveld, S. A. (2006). Influence of parental employment

status on Dutch and Slovak adolescents' health. *BMC Public Health*, *6*(1), 250.

https://doi.org/10.1186/1471-2458-6-250

Smith, K. A., Gehricke, J.-G., Iadarola, S., Wolfe, A., & Kuhlthau, K. A. (2020).

Disparities in service use among children with autism: A systematic review.

Pediatrics, *145*(Suppl 1), S35–S46. https://doi.org/10.1542/peds.2019-1895G

Smith, L. E., Greenberg, J. S., & Seltzer, M. M. (2012). Social support and well-being at

mid-life among mothers of adolescents and adults with autism spectrum disorders.

Journal of Autism and Developmental Disorders, *42*(9), 1818–1826.

https://doi.org/10.1007/s10803-011-1420-9

Soke, G. N., Maenner, M. J., Christensen, D., Kurzius-Spencer, M., & Schieve, L. A.

(2018). Prevalence of co-occurring medical and behavioral conditions/symptoms

among 4- and 8-year-old children with autism spectrum disorder in selected areas

of the United States in 2010. *Journal of Autism and Developmental Disorders*,

48(8), 2663–2676. https://doi.org/10.1007/s10803-018-3521-1

Solomon, M., Miller, M., Taylor, S. L., Hinshaw, S. P., & Carter, C. S. (2012). Autism

symptoms and internalizing psychopathology in girls and boys with autism

spectrum disorders. *Journal of Autism and Developmental Disorders*, *42*(1), 48–

59. https://doi.org/10.1007/s10803-011-1215-z

Spain, D., Sin, J., Linder, K. B., McMahon, J., & Happé, F. (2018). Social anxiety in autism spectrum disorder: A systematic review. *Research in Autism Spectrum Disorders*, *52*, 51–68. https://doi.org/10.1016/j.rasd.2018.04.007

Sperandei, S. (2014). Understanding logistic regression analysis. *Biochemia Medica*, *24*(1), 12–18. https://doi.org/10.11613/BM.2014.003

Steckler, A., & McLeroy, K. R. (2008). The importance of external validity. *American Journal of Public Health*, *98*(1), 9–10. https://doi.org/10.2105/AJPH.2007.126847

Stoltzfus, J. C. (2011). Logistic regression: A brief primer. *Academic Emergency Medicine: Official Journal of the Society for Academic Emergency Medicine*, *18*(10), 1099–1104. https://doi.org/10.1111/j.1553-2712.2011.01185.x

Storch, E. A., Larson, M. J., Ehrenreich-May, J., Arnold, E. B., Jones, A. M., Renno, P., Fujii, C., Lewin, A. B., Mutch, P. J., Murphy, T. K., & Wood, J. J. (2012). Peer victimization in youth with autism spectrum disorders and co-occurring anxiety: Relations with psychopathology and loneliness. *Journal of Developmental and Physical Disabilities*, *24*(6), 575–590. https://doi.org/10.1007/s10882-012-9290-4

Szatmari, P., Jones, M. B., Zwaigenbaum, L., & MacLean, J. E. (1998). Genetics of autism: Overview and new directions. *Journal of Autism and Developmental Disorders*, *28*(5), 351–368. https://doi.org/10.1023/a:1026096203946

Szumilas, M. (2010). Explaining odds ratios. *Journal of the Canadian Academy of Child and Adolescent Psychiatry = Journal De l'Academie Canadienne De Psychiatrie De L'enfant Et De L'adolescent*, *19*(3), 227–229.

Thomas, P., Zahorodny, W., Peng, B., Kim, S., Jani, N., Halperin, W., & Brimacombe, M. (2012). The association of autism diagnosis with socioeconomic status. *Autism: The International Journal of Research and Practice*, *16*(2), 201–213. https://doi.org/10.1177/1362361311413397

Tripepi, G., Jager, K. J., Dekker, F. W., & Zoccali, C. (2010). Selection bias and information bias in clinical research. *Nephron. Clinical Practice*, *115*(2), c94-99. https://doi.org/10.1159/000312871

Turygin, N. C., Matson, J. L., MacMillan, K., & Konst, M. (2013). The relationship between challenging behavior and symptoms of depression in intellectually disabled adults with and without autism spectrum disorders. *Journal of Developmental and Physical Disabilities*, *25*(4), 475–484. https://doi.org/10.1007/s10882-012-9321-1

Uljarević, M., Hedley, D., Rose-Foley, K., Magiati, I., Cai, R. Y., Dissanayake, C., Richdale, A., & Trollor, J. (2020). Anxiety and depression from adolescence to old age in autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *50*(9), 3155–3165. https://doi.org/10.1007/s10803-019-04084-z

Uljarevic, M., Nuske, H., & Vivanti, G. (2016). Anxiety in autism spectrum disorder. In *Psychiatric symptoms and comorbidities in autism spectrum disorder* (pp. 21–38). Springer International Publishing. https://doi.org/10.1007/978-3-319-29695-1_2

United States Census Bureau. (2020). *2019 National Survey of Children's Health Methodology Report*. https://www2.census.gov/programs-surveys/nsch/technical-documentation/methodology/2019-NSCH-Methodology-Report.pdf

Valderas, J. M., Starfield, B., Sibbald, B., Salisbury, C., & Roland, M. (2009). Defining

comorbidity: Implications for understanding health and health services. *Annals of

Family Medicine*, *7*(4), 357–363. https://doi.org/10.1370/afm.983

van Steensel, F. J. A., Bögels, S. M., & Perrin, S. (2011). Anxiety disorders in children

and adolescents with autistic spectrum disorders: A meta-analysis. *Clinical Child

and Family Psychology Review*, *14*(3), 302–317. https://doi.org/10.1007/s10567-

011-0097-0

Van Wijngaarden-Cremers, P. J. M., van Eeten, E., Groen, W. B., Van Deurzen, P. A.,

Oosterling, I. J., & Van der Gaag, R. J. (2014). Gender and age differences in the

core triad of impairments in autism spectrum disorders: A systematic review and

meta-analysis. *Journal of Autism and Developmental Disorders*, *44*(3), 627–635.

https://doi.org/10.1007/s10803-013-1913-9

Vasa, R. A., & Mazurek, M. O. (2015). An update on anxiety in youth with autism

spectrum disorders. *Current Opinion in Psychiatry*, *28*(2), 83–90.

https://doi.org/10.1097/YCO.0000000000000133

Vohra, R., Madhavan, S., & Sambamoorthi, U. (2017). Comorbidity prevalence,

healthcare utilization, and expenditures of Medicaid enrolled adults with autism

spectrum disorders. *Autism: The International Journal of Research and Practice*,

21(8), 995–1009. https://doi.org/10.1177/1362361316665222

Washington, D. L. (2001). Charting the path from lack of insurance to poor health

outcomes. *The Western Journal of Medicine*, *175*(1), 23.

https://doi.org/10.1136/ewjm.175.1.23

Weiss, J. A., Robinson, S., Fung, S., Tint, A., Chalmers, P., & Lunsky, Y. (2013). Family

hardiness, social support, and self-efficacy in mothers of individuals with Autism

Spectrum Disorders. *Research in Autism Spectrum Disorders*, *7*(11), 1310–1317.

https://doi.org/10.1016/j.rasd.2013.07.016

Werling, D. M., & Geschwind, D. H. (2013). Sex differences in autism spectrum

disorders. *Current Opinion in Neurology*, *26*(2), 146–153.

https://doi.org/10.1097/WCO.0b013e32835ee548

Wright, B. M., & Benigno, J. P. (2019). Autism spectrum disorder and sibling

relationships: Exploring implications for intervention using a family systems

framework. *American Journal of Speech-Language Pathology*, *28*(2), 759–767.

https://doi.org/10.1044/2018_AJSLP-18-0088

Yang, Y. C., Schorpp, K., Boen, C., Johnson, M., & Harris, K. M. (2020).

Socioeconomic status and biological risks for health and illness across the life

course. *The Journals of Gerontology: Series B*, *75*(3), 613–624.

https://doi.org/10.1093/geronb/gby108

Young, S., Hollingdale, J., Absoud, M., Bolton, P., Branney, P., Colley, W., Craze, E.,

Dave, M., Deeley, Q., Farrag, E., Gudjonsson, G., Hill, P., Liang, H.-L., Murphy,

C., Mackintosh, P., Murin, M., O'Regan, F., Ougrin, D., Rios, P., … Woodhouse,

E. (2020). Guidance for identification and treatment of individuals with attention

deficit/hyperactivity disorder and autism spectrum disorder based upon expert

consensus. *BMC Medicine*, *18*(1), 146. https://doi.org/10.1186/s12916-020-

01585-y

Yu, T., Lien, Y.-J., Liang, F.-W., & Kuo, P.-L. (2020). Parental socioeconomic status and autism spectrum disorder in offspring: A population-based cohort study in Taiwan. *American Journal of Epidemiology*. https://doi.org/10.1093/aje/kwaa241

Zablotsky, B., Black, L. I., Maenner, M. J., Schieve, L. A., & Blumberg, S. J. (2015). Estimated prevalence of autism and other developmental disabilities following questionnaire changes in the 2014 National Health Interview Survey. *National Health Statistics Reports*, *87*, 1–20.

Zablotsky, B., Kalb, L. G., Freedman, B., Vasa, R., & Stuart, E. A. (2014). Health care experiences and perceived financial impact among families of children with an autism spectrum disorder. *Psychiatric Services (Washington, D.C.)*, *65*(3), 395–398. https://doi.org/10.1176/appi.ps.201200552

Zuckerman, K., Lindly, O. J., & Chavez, A. E. (2017). Timeliness of autism spectrum disorder diagnosis and use of services among U.S. elementary school-aged children. *Psychiatric Services (Washington, D.C.)*, *68*(1), 33–40. https://doi.org/10.1176/appi.ps.201500549

Zuvekas, S. H., Grosse, S. D., Lavelle, T. A., Maenner, M. J., Dietz, P., & Ji, X. (2020). Healthcare costs of pediatric autism spectrum Disorder in the United States, 2003-2015. *Journal of Autism and Developmental Disorders*. https://doi.org/10.1007/s10803-020-04704-z