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SOCIOECONOMIC STATUS, ETHNICITY, ADHD SYMPTOMOLOGY: A STUDY
INVESTIGATING THE CONDITIONS THAT PREDICT TREATMENT PATTERNS FOR
CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER

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ABSTRACT

Objective: To explore what conditions affect the likelihood of children receiving treatment for ADHD. The purpose of this study is to investigate under which conditions a child is less likely to receive treatment, including medication or psychological services, for their ADHD. **Methods:** A sample of 347 children, all screened for this study as ADHD positive, were administered a battery of neurophysiological tests within the laboratory. Parents were required to complete questionnaires concerning their child's thoughts, feelings, and behaviors, as well as a treatment and developmental history form concerning the child participant and immediate family members. **Results:** Findings demonstrated that white children were significantly more likely than non-white children to have previously received either medication or psychological treatment, despite similar levels of ADHD symptomology. Children who had previously received medication had significantly higher levels of ADHD symptomology and parent ratings of ADHD symptoms than children who had not previously received medication. **Conclusion:** Overall, this study enhances the understanding of the conditions that predict access to medication and psychological services for children suffering with ADHD.

TABLE OF CONTENTS

Acknowledgements.....	iii
INTRODUCTION	1
METHODS	19
RESULTS	26
DISCUSSION.....	30
Appendix A.....	38
References.....	45
ACADEMIC VITA.....	50

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INTRODUCTION

Attention-Deficit/Hyperactivity Disorder

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that is diagnosed during childhood and characterized by inappropriate levels of distractibility and inattention. It is the most frequently diagnosed childhood neurological disorder (Comings et al., 2005). The Diagnostic and Statistical Manual of Mental Disorder Fifth Edition, DSM-V, specifies that symptoms are required be present for a minimum of six months and must have emerged before the age of twelve. Symptoms are expected to have observable manifestations in which the child is adversely impacted in multiple domains of life, including social relationships and academic performance (*American Psychiatric Association, 2013*) (Mattox & Harder, 2007).

In order for an ADHD diagnosis to be determined, a child must exhibit at least 6 symptoms of ADHD (Bakor & Anderson, 2014). There are three different presentations of symptoms: predominately inattentive, predominately hyperactive and combined. A predominantly inattentive presentation is characterized by difficulty sustaining attention and disorganization. This presentation of symptoms is documented to appear more frequently in females and is associated with the co-occurrence of internalizing disorders, such as anxiety disorders and mood disorders (Sagvolden, Johansen, Aase, & Russell, 2005). Heightened levels of physical activity and impulsivity characterize children who display a predominantly hyperactive presentation of symptoms. This presentation of symptoms occurs more commonly in boys and is correlated with the co-morbidity of externalizing disorders (Sagvolden et al., 2005). Externalizing disorders encompass disorders characterized by disruptive behavior, such as Oppositional Defiant Disorder and Conduct Disorder. The combined presentation of ADHD

symptoms is marked by a propensity to demonstrate behaviors of both a hyperactive and inattentive presentation (Sagvolden et al., 2005).

The true etiology of ADHD remains unknown. Research has indicated a strong biological link in the occurrence of ADHD. Although twin studies illustrate that the disorder is highly heritable, studies examining monozygotic twins have demonstrated that ADHD is not 100% heritable (Mercugliano, 1999). High heritability illustrates the significant genetic influence on the presence of the disorder. Bakor and Anderson (2014) estimated the heritability of ADHD to be 76%. Identical twins were found to have a concordance rate of at least 65%, whereas fraternal twins demonstrated a rate typically below 40% (Comings et al., 2005). These results demonstrate that identical twins are more likely to be afflicted with ADHD than fraternal twins, thus indicating the existence of a genetic component in the occurrence of this neurobiological disorder.

The biological expression of ADHD is classified as polygenic; researchers have concluded that numerous genes, as opposed to one single gene, contribute to the appearance of this disorder (Comings et al., 2005). Scientific efforts have been unsuccessful in identifying specific predictor genes. Efforts are being made to identify and examine the mutations of specific genetic sequences in order to understand subsequent effects on Dopamine and Norepinephrine (Schmidt & Petermann, 2009). Dopamine and Norepinephrine are two neurotransmitters associated with the presentation of ADHD (Bakor & Anderson, 2014). Many ADHD pharmaceutical treatments target these specific neurotransmitters.

Researchers theorize that genes or genomic sequences predispose an individual to a disorder or condition and the presence of certain environmental factors provoke the onset of

symptoms. In a preventative effort, recent studies have focused on identifying and examining specific gene-environment interactions. The determination of environmental factors is valuable in decreasing a child's risk of being afflicted with ADHD. There is strong evidence to support that exposure to toxicants, such as smoking and alcohol, during pregnancy and low birth rate are contributing factors to ADHD (Bokor & Anderson, 2014; Getahun et al., 2013). Although studies have demonstrated these correlations, further research is required in order to determine the magnitude to which these risk factors impact the appearance of ADHD.

ADHD is prevalent throughout the world. An estimated 5.7% of the global population of school-aged children have been diagnosed with ADHD. (Greenhill, Posner, Vaughan, & Kratochvil, 2008). Global statistical prevalence rates vary slightly depending on the nation and its diagnostic standards. Within the United States, it is estimated that 3% to 7.5% of school-aged children are affected with the neurodevelopmental disorder (Comings et al., 2005). There is a very limited scope of research that has attended to the pervasiveness of ADHD within the population of preschool aged children. Epidemiologic studies found that anywhere from 2% to 6% of preschoolers met the DSM criteria for ADHD (Greenhill et al., 2008). Much controversy has ignited over whether children of this age group are too young to be diagnosed, largely because many characteristics culturally expected of preschool aged children could clinically be identified as a predominantly hyperactive symptom.

One common misconception concerning attention deficit hyperactivity disorder is the belief that individuals are only afflicted during childhood. Symptoms of this disorder persist throughout adolescence and carry on into adulthood. The manifestation of ADHD typically deviates with age, making it more difficult to detect in adults. As an individual matures they

develop an increased sense of awareness of their behaviors and the subsequent consequences. Adults commonly exercise greater self-regulation which directly affects the presentation of hyperactive symptoms, such as fidgeting and difficulty remaining in ones seat.

As one ages, a shift occurs regarding the presentation of symptoms that have the greatest effects on daily functioning. During childhood, hyperactive symptoms cause the greatest impairment, though this trend dissipates into adulthood. Individuals with predominantly inattentive symptoms were identified as experiencing the greatest degree of impairment, as compared to predominately hyperactive symptoms (Braham et al., 2008). Numerous studies conducted have produced a variation of results illustrating the true degree to which symptoms persist overtime. Results of a meta-analysis studying a population of 25-year olds suggested an estimated diagnostic retention of 15% into adulthood. Upwards of another 65% of individuals were found to continue displaying symptoms, though they did not meet the diagnostic criteria outlined by the DSM (Braham et al., 2008). This decrease in diagnostic retention may be a direct result of the development of coping mechanisms overtime in an effort to manage ADHD symptoms. It is likely that many individuals no longer met the strict 6 symptoms requirement outlined by the DSM-IV at the time.

The statistical prevalence rates of ADHD present disparities in gender and culture. Proportionately more males are affected with the disorder than females (Schmitz, 2003). Boys are two times more likely than girls to be diagnosed with attention deficit hyperactivity disorder; while the ratio of adult males to females is approximately 1.6:1. By adulthood there are no longer significant gender disparities in the prevalence of ADHD (Comings et al., 2005; *American Psychiatric Association*, 2013). It can be theorized that a portion of the gender disparities seen in

childhood are due to the fact that girls are more likely to present inattentive symptoms, rather than hyperactive symptoms. As a result, girls may be evaluated and diagnosed less often. As previously noted, as individuals with ADHD mature into adulthood, they are most likely to have a predominately inattentive presentation. The disappearance of gender disparities into adulthood could also be a result of the combination of acquiring adaptive mechanisms and an increased difficulty in identifying inattentive symptoms. In addition to age and gender, culture also is an important element to take into account when investigating demographic differences of ADHD prevalence rates.

Culture appears to be a mitigating factor when considering the differences in the rates of clinical diagnoses. In the United States, African Americans and Latinos are relatively less likely to be diagnosed with ADHD compared to Caucasians (Stevens, Harman, & Kelleher, 2005). Behaviors outlined by the DSM-V as culturally deviant may be interpreted differently based upon the cultural backgrounds of the child and the informants, parents and teachers completing the behavior assessment forms. The variation of norms between cultures is an important factor to consider when establishing a diagnosis. Each ethnicity has a set of expectations, which are widely understood and practiced within that group. There can be a great difference in culturally accepted behaviors between minority and non-minority groups. For example, some minority groups have more unconstrained standards for how active a child should be; this variation in standards should be considered when evaluating a child for a possible ADHD diagnosis.

Children meeting the DSM criteria of ADHD have significantly increased rates of co-morbidity. In fact, individuals with at least one behavioral disorder are 2 to 4 times more likely to develop another behavioral disorder (Comings et al., 2005). Oppositional defiant disorder

(ODD), which is characterized by a lack of control of oneself, behaviors, and emotions, is commonly identified in children with ADHD (*American Psychiatric Association, 2013*). It is estimated that ODD is present in 40% to 60% of childhood ADHD cases. The high rates of comorbidity are suspected to be a result of shared risk factor genes between the two disorders (Comings et al., 2005). There is also a significant co-occurrence of Conduct disorders (CD) and ADHD; both disorders share an impairment of executive functioning within the brain. The comorbidity of CD and ADHD are correlated with the development of antisocial personality disorder in adulthood (Kieling, Goncalves, Tannock, & Castellanos, 2008). Epidemiologic and clinical evidence supports that CD and/or ODD occur with ADHD in about 30% to 50% percent of the cases (Kieling et al., 2008).

Patterns of co-occurrence of ADHD and other disorders are also demonstrated with internalizing disorders. Though not pervasive, a moderate correlation has been found between ADHD diagnosis and the existence of major depression disorder, bipolar affective disorder and anxiety disorders. One study found major depression disorder to be present in 15% of the population of ADHD afflicted individuals (Greenhill et al., 2008). Within that same population, 10.4% of individuals were reported to have bipolar affective disorder (Greenhill et al., 2008). Anxiety disorders are speculated to have an even greater pervasiveness. It is estimated that anxiety disorders co-occur with ADHD in about 25% of the cases (Sagvolden et al., 2005). Research has found that there is a higher prevalence of depression and anxiety among females as compared to males diagnosed with ADHD (Mattox & Harder, 2007). The increased appearance of mood disorders may be the result of developed negative internal feelings associated with ones ADHD symptoms. There is also evidence of higher rates of substance abuse with individuals

diagnosed with ADHD (Schmidt & Petermann, 2009). Symptoms and their duration must be examined closely in order to accurately diagnose the existence of multiple mental health disorders. Accurate diagnoses are critical to the deliverance of appropriate treatment.

ADHD Treatment Options

The variance of ADHD symptom presentation requires a range of treatment methods. Typically treatment consists of various approaches, including: medical intervention, behavioral therapy, and educational accommodation (Pellow, Solomon, & Barnard, 2011). Due to the biological nature of this disorder, researchers and clinicians typically choose pharmacology as the initial response to ADHD (Ryan et al., 2011). Medication is intended to assuage symptoms, improve the individual's functioning in all domains of their life, and promote the effectiveness of non-pharmacological interventions being employed (Ryan et al., 2011).

In 2006, an estimated 56% of a population of 4.5 million children, between the ages of 3-17, were reported to be using pharmaceuticals to manage their ADHD symptoms (Ryan, Katsiyannis, & Hughes, 2011). The overall increase of ADHD diagnoses has prompted the concern of whether the disorder is currently being over diagnosed or is now more clearly understood and recognized. As medication usage increases with the number of ADHD diagnoses made, it is important to ensure children are not being overmedicated. Given the current body of research, it would be beneficial for future studies to examine the association between ADHD medication usage and the severity of ADHD symptoms. If medication usage is found to be significantly associated with more severe ADHD symptoms, then it would support the notion that clinicians are appropriately prescribing medication. This data could provide further insight into the complex relationship between ADHD symptoms and pharmacological treatment.

There are three classes of medication used to address symptoms: stimulants, non-stimulants, and antidepressants (Pellow et al., 2011). Stimulant medications, such as Adderall and Ritalin, are the most commonly used pharmaceuticals and typically a clinician's first choice for treating ADHD symptoms. Stimulants have been found to provide the quickest response, on average within minutes, and generate the most effective outcomes (Bokor & Anderson, 2014). It is estimated that 75-80% of children treated with stimulants have significantly positive responses to the medication (Ryan et al., 2011). Stimulants function by influencing the central nervous system to enhance energy and alertness; they are offered in both short and long-acting classes, varying in the peak of response and length of duration (Bokor & Anderson, 2014; & Ryan et al., 2011).

Pharmaceuticals can have serious side effects. A child is monitored closely, especially, during the first month of use of any medications (Ryan et al., 2011). Common side effects of stimulants include appetite loss, mood swings, increased heart rate, tics and anxiety. Infrequent long-term reactions include: cardiovascular effects and growth suppression (Pellow et al., 2011). Presentation and severity of side effects impact whether an individual will receive alternative medication. Up to 30% of people treated with stimulant drugs have either no response to the medication or experience side effects that negatively impact their daily functioning.

Antidepressants are the next commonly prescribed class of drugs that are used to manage ADHD symptoms if stimulants are found to not be the best choice. In comparison to stimulant medication, antidepressants have a longer length of duration and take significantly longer to take effect, as lengthy as a few weeks (Ryan et al., 2011). This class of medication functions by increasing dopamine and norepinephrine levels in the brain (Pellow et al., 2011). Antidepressants

may be especially beneficial for individuals affected with both ADHD and a mood disorder, such as major depression or bi-polar disorder (Bokor & Anderson, 2014); as it corrects the irregular activity and levels of neurotransmitters that are linked to both attention deficit hyperactivity disorder and mood disorders.

Atomoxetine, a stimulant medication used to treat ADHD symptoms, is the least commonly prescribed pharmacological treatment. For individuals with a co-morbid tic disorder, non-stimulants may be favored over stimulant medication as they are less likely to increase the appearance of tics (Bokor & Anderson, 2014). As a result, it may be a superior alternative to other medications if the individual has a preexisting diagnosis of a tic disorder. This class of pharmaceuticals function by inhibiting the reuptake of norepinephrine. Though found to improve ADHD symptoms, Atomoxetine is not as effective as stimulants and antidepressants (Pellow et al., 2011). Overall the usage of medication enhances the benefits of other administered treatment methods.

Studies have found psychosocial therapy in combination with pharmacological treatment, allows for efficacy with lower dosages of medication (Antshel & Olszewski, 2014). Psychotherapy is intended to improve or correct maladaptive attitudes, behaviors, and emotions that have formed due to previous experiences. The emphasis on the development of concrete skills provides the individual with specific strategies and solutions to solving everyday problems that arise. The most common psychosocial intervention includes: behavioral parent training (BPT), teacher training of contingency management techniques, and parent-child training in problem solving and communication strategies (Antshel & Olszewski, 2014). There is strong

empirical evidence that BPT has significantly positive effects in younger children (Greenhill et al., 2008).

Another commonly used behavioral alternative to treating children with ADHD is Cognitive Behavioral Therapy (CBT). CBT is a method that addresses behaviors and thoughts that cause impairments in the daily functioning of individuals. The therapy focuses on specific behaviors and strategies that would enable individuals' to adjust their automatic thoughts. CBT is extremely beneficial for adolescents, who can generalize the techniques learned to real life scenarios and develop a concrete understanding of their disorder (Antshel & Olszewski, 2014).

Socioeconomic Status, Mental health, and Treatment Access

Over the past decade, there has been increased emphasis placed on the examination of societal factors that influence an individual's access and utilization of health care and treatment. Socioeconomic status (SES) has been thoroughly researched as a reliable variable in assessing social inequalities in the context of health care (Reiss, 2013). SES is a socio-demographic characteristic that indexes both one's economic and social standing within society.

There are inherent complexities when attempting to study socioeconomic status and its impact on an individual's life. The difficulty of examining this social construct arises from the variety of ways SES can be defined and operationalized. A range of factors can be used to establish a participant's SES, including: family income, parental education, and parental occupation (Reiss, 2013; McLaughlin et al., 2011). There is considerable variance between previously conducted studies regarding the indicators chosen to represent SES. Family size and housing type are additional factors that have also been used in assessing an individual's socio-economic standing (Russell, Ford, Rosenberg, & Kelly, 2015). The frequently used indicators-

parental income, education, and occupation- have been linked to specific associations with childhood quality of health, insurance coverage, and access to medical treatment.

Parental education was identified as a predictive measure of a child's health insurance status. Children whose parents reported a low level of education, 0-11 years, were more likely to be uninsured (Lu et al., 2004). Parental education was also correlated with the prevalence of mental health disorders and accessed treatment for these disorders. Lower parental education was predictive of an increased presence of hyperactivity/inattention and conduct difficulties, as well as of an increase in the persistence of these behavioral disorders (Bøe et al., 2012; McLaughlin et al., 2011). Conversely, high parental education was associated with greater access to treatment for mental health issues in children (Reiss, 2013). The income of a family has also been found to correlate to the presence of both internalizing and externalizing difficulties (Bøe et al., 2012; McLaughlin et al, 2011). Of the three commonly used indicators of SES, parental occupation has been found to have the least significant impact on a child's mental health (Reiss, 2013). However, the variance in measuring SES complicates the process of comparing literature because there are likely differences in results based upon the indicators used. The diversity of determinants included in measuring SES could account for deviations in the results and prevalence rates reported by different studies exploring childhood health.

In the context of health care, those from a low social and economic position are at an extreme disadvantage. Children from a low socioeconomic background have less accessibility to medical treatment and increased severity levels when afflicted with an illness (Reiss, 2013; Bradley & Corwyn, 2002). Together, a lack of health insurance and a propensity toward risky health behaviors are estimated to account for 10-16% of variance in an individual's health along

socioeconomic lines (Lu, Samuels, & Wilson, 2004; Stevens et al., 2005). These two factors likely have significantly enduring effects.

Low SES during childhood has long-lasting direct and indirect impacts on ones overall health status throughout life, affecting both the resources available and daily living functions (McLaughlin et al., 2011). Low childhood SES has also been found to be significantly correlated with ones mental health during adulthood (McLaughlin et al., 2011). Following a literature review, Reiss (2013) concluded that mental illness affects children from disadvantaged socioeconomic backgrounds as high as two to three times more than their counterparts.

The persistence of mental illness in the context of low SES varies based upon the disorder classification. Studies have found that socioeconomic standing has a stronger correlation to externalizing disorders than to internalizing disorders (Bøe et al., 2012; Reiss, 2013). Maternal education has been identified as the greatest prediction of the presence of externalizing disorders, such as ADHD, compared to the other indicators of SES (Bøe et al., 2012). Huaqing & Kaiser (2003) reported that approximately 30% of their sample of preschoolers from socioeconomically disadvantaged backgrounds demonstrated behavior problems. Where as in the general population, there was only a 3% to 6% prevalence rate of behavioral issues (Huaqing & Kaiser, 2003). The study supports the theorized association between one's socioeconomic status and the existence of externalizing disorders, which are characterized by disruptive behaviors.

ADHD has been extensively researched in order to understand externalizing mental health disorders in the context of SES. The results of one study examining ADHD exposed a significant link between ADHD diagnoses and indicators of socioeconomic disadvantage, such as: poverty, household income, maternal education, housing tenure, and index of SES, within a

UK population (Russell et al., 2014). ADHD prevalence rates were found to be higher among children from a low socioeconomic background (Russell et al., 2014).

Previous research associating lower SES with lack of health insurance and poorer mental health status supports a probable correlation between insurance status and an ADHD diagnosis. A study conducted on 1061 children found that those lacking health insurance were less likely to be diagnosed with ADHD, despite previous evidence demonstrating that children who lack health insurance have higher rates of behavioral disruptive disorders (Stevens et al., 2005). Even though children from economic disadvantage are more likely to have behavior problems, if they lack insurance they are unlikely to be diagnosed; therefore, they are ultimately unlikely to receive treatment. Thus, the low diagnosis rate of ADHD found in the study could be a direct result of the inability to access mental health resources only available to those with insurance.

Subsequent research has illustrated that once diagnosed, children who were uninsured were the less likely to receive stimulant medication and psychotherapy than those children with insurance (Stevens et al., 2005). There were also discrepancies in services accessed based upon the type of insurance. Children who were covered by public insurance were also less likely to receive the necessary medication as compared to children with private insurance. These findings illustrate the importance of researching and understanding the factors that influence a child's access to health care, pharmacological treatment, and psychological intervention.

Ethnicity, Mental Health, and Treatment Access

There is great complexity in understanding the interactions of social constructs, such as socioeconomic status and ethnicity. When controlling for ethnicity within a population, SES is also indirectly controlled because of the disparity within socioeconomically disadvantaged

groups along ethnic lines. Ethnicity is a concept referring to a group of people characterized by similar attitudes and cultural practices, shared ways of thinking (Sigrid & Norton, 2004). These cultural practices influence daily behaviors and perceptions of others' behaviors (Harvey, Fischer, Weieneth, Hurwitz, & Sayer, 2013); thus illustrating its importance when assessing health, treatment access, and the ultimate utilization of available resources. In addition to culture and SES, other factors contribute to the ethnic divergences in mental health care; including discrimination, insurance status, conceptions of health professionals and treatment, and communication and delivery style (Sentell, Shumway, & Snowden, 2007).

Relatively little research has been devoted to examining populations with ADHD who are diverse in socioeconomic standing or ethnicity. In order to administer evaluations in the context of cultural competency and subsequently deliver appropriate treatment, it is important for clinicians to understand the complex interaction between these social constructs and hyperactivity and inattention difficulties (Mattox & Harder, 2007). Getahun et al. (2013) conducted a long-term study that examined children with ADHD in the context of race; five categories were used to distinguish ethnicity: Asian/Pacific Islanders, Hispanic, White, Black, and other. The results demonstrated that white children were most likely to be diagnosed with ADHD. Black children were the second most frequently diagnosed group, followed by Hispanics and Asian/Pacific Islanders (Getahun et al., 2013). Studying the prevalence of diagnoses over a nine-year period, blacks had the greatest relative increase in the number of ADHD diagnoses; however at the peak of prevalence, blacks were still less likely to be diagnosed than whites (Getahun et al., 2013). Slightly inconsistent with Getahun et al.'s (2013) results, Mattox and Harder (2007) and Schmitz (2003) found African Americans to have the highest reported rates of

hyperactive behaviors. These findings indicate that although African Americans may be reported to have elevated levels of hyperactivity, they are not more likely to be diagnosed with ADHD. Further research distinguished that elevated levels of hyperactivity was not a characteristic of all ethnic minorities. In fact, African American children had levels greater than all other groups: white, chicano, and Asian American children (Mattox & Harder, 2007).

This discrepancy of lower ADHD diagnoses in black children and higher presence of hyperactive behaviors, may be in relation to a number of different factors: including culture, teacher/parent reporting bias, and disparities in access to mental health care professionals. It's theorized a child's home environment is the basis for the development of hyperactive behaviors (Schmitz, 2003). As a result, ethnicity and culture are likely strong influences on the endorsement of hyperactive symptoms.

In order to meet criteria for an ADHD diagnosis, parents and teachers must endorse similar levels of hyperactivity and inattention in the child. One study found large inconsistencies between parent/teacher observational reports. Asian and Hispanic children were evaluated by teachers as demonstrating lower levels of ADHD behaviors, as compared to Caucasian and African American children (Epstein et al., 2005). Teacher reports described African American students as having significantly higher levels of hyperactivity and inattention than parent ratings of ADHD symptoms (Harvey et al., 2013). Researchers have developed two main hypotheses in explanation of discrepancies in informant ratings along ethnic lines. The first hypothesis speculates that inconsistencies in reported behaviors arise from cultural differences, subsequently influencing ones perception (Harvey et al., 2013). In support of this theory, research has found

that when informants are of the same ethnicity there is no longer an apparent association between ethnicity and behavior report inconsistencies (Harvey et al., 2013).

The alternative theoretical model proposes that children demonstrate different behaviors depending on the setting, thus explaining why observations from home and school settings do not match (Harvey et al., 2013). Nonetheless, these discrepancies may contribute to the lower prevalence rates of ADHD among African American, Asian, and Hispanic children. Without matching parent/teacher reports, an official diagnosis cannot be made and the child will not receive the appropriate mental health treatment. Further research is necessary to determine if ethnic minorities truly have higher rates of discrepancies between parent and teacher reports of ADHD symptoms. If found, it must be decided whether these discrepancies are a result of ethnic differences between the informant and the child, variations in the behavioral norms at home versus in the classroom, or a combination of both of these explanations.

Across all ethnicities, children in need of mental health evaluations typically do not receive any mental health related care within a year (Kataoka, Zhang, & Wells, 2002). Results from a study conducted by Kataoka, Zhang, and Wells (2002) found a significant link between membership of an ethnic minority group and lower utilization of mental health services. Children with an Asian/Pacific Islander background were found to be the least likely to engage in or continue treatment (Getahun et al., 2013). African American and Latino children have significantly lower rates of access to mental health services and subsequent utilization, when compared to Caucasian children (Kataoka et al., 2002). In reference to stimulant medication, white children were more likely to receive a stimulant prescription than black children, while no differences were found between white children compared to Hispanic children (Stevens et al.,

2005). These results indicate significant deviations in treatment within specific ethnic minority groups. Further research is necessary to indicate whether these results express a heightened unmet need among racial minorities or truly lower prevalence rates.

One critical perspective of racial minorities that has received limited attention is the function of the minority identity as a protective measure. Perhaps a membership to a ethnic minority inherently provides individuals a buffer against what typically would be considered unfavorable influences. Schmitz (2003) explains that persistently living in low socio-economic conditions is theorized to adversely affect parents' mental health, thus negatively affecting the amount of warmth and support given to their children. When examined in the context of ethnicity, this theory was more strongly displayed with European Americans as compared to African Americans and Hispanics (Schmitz, 2003). African American parents were also found to value expressivity, thus endorsing high activity levels within their children (Harvey et al., 2013). Though these behaviors may meet the criteria for symptoms of hyperactivity, which are associated with an ADHD mental health diagnosis, the prevalence of ADHD remains significantly lower in African American children compared to Caucasian children. This may indicate a difference in threshold for the groups and support the position of an inherent protective measure within the minority identity.

In summary, understanding the complexity between children's mental health diagnoses, accesses to treatment, and social variables, such as ethnicity and SES, is essential for providing culturally competent care that is available to all children in need. ADHD is a neurobiological disorder that can cause significant impairment in all domains of life. Therefore understanding the conditions in which the likeliness of treatment, psychological intervention or medication, are

affected is extremely important. There are few studies available that specifically examined access to mental health medications, specifically ADHD medication, in the context of an individual's severity of ADHD, SES, and ethnicity. Ultimately, further research is necessary in providing clarity to whether there truly is an under diagnosis of ADHD among children from an ethnic background or there is a decrease in prevalence due to inherent protective measures. The goal of this study is understand the circumstances in which access to medication and psychological interventions are affected for a population of children afflicted with ADHD.

Hypothesis 1: I hypothesize that those who have and have not received treatment prior to entering the study will differ by socioeconomic status, as defined by mother and father education level, and total household income. Specifically, children who have never received treatment will have mothers and fathers with lower education levels and lower total household income.

Hypothesis 2: Children who are ethnic minorities will be less likely to have previously received treatment, which will not be due to greater severity of ADHD symptomology among white children vs. non-white children.

Hypothesis 3: Children who have previously received treatment will have higher levels of ADHD symptomology than those who have not previously received treatment.

METHODS

Participants

Participants between the ages of 8-12 years old with and without a history of attention deficits were recruited to be a part of this study. The children were recruited from State College, Pennsylvania, Harrisburg, Pennsylvania, as well as surrounding regions. For the purposes of this research the population includes 347 participants, all of whom were defined as ADHD. The sample is comprised of 225 males and 122 females. The ethnic composition for the population of participants includes: 71.5% Caucasian/White Non-Hispanic, 4% Caucasian/White Hispanic, 8.1% African American/Black Non-Hispanic, 1.4% African American/Black Hispanic, 1.2% Other Hispanic, 1.4% Asian, and 7.2% mixed.

Screening/Data Collection and Procedure

Eligibility was determined through a three phase screening process. The first phase consisted of parents completing a brief phone screening in order to conduct a preliminary evaluation of the child. During the interview, rudimentary information concerning the child's demographics, basic health history, and medication usage was collected. Children were determined to be ineligible if they had been previously diagnosed with a pervasive developmental disorder, such as Autism Spectrum Disorder, a profound sensorimotor deficit, a neurological disorder, and/or an intellectual disorder, such as any children with a full scale IQ below 80. Children were also deemed ineligible if a sibling had previously participated in the study. All parents who reported their child as actively using medication were advised that all medication usage must cease 24-48 hours prior to any scheduled laboratory visit. This protocol

ensured that all ADHD symptoms and subsequent cognitive effects could be accurately assessed, unaffected by stimulants or any other form of pharmaceuticals.

In the second phase of this study, one parent and one schoolteacher were asked to complete a set of questionnaires assessing the child's thoughts, feelings, and behaviors. The questionnaires were a compilation of multiple assessment scales, including: the Behavioral Assessment Scale for Children-Second Edition (BASC-2), the Conner's Rating Scale-Revised (CRS-R), the ADHD Rating Scale-IV, and the Social Skills Rating System (SSRS).

The BASC-2 contains parent-specific and teacher-specific forms intended to assess observable adaptive and maladaptive behaviors (Reynolds & Kamphaus, 2004). The parent form includes 150 items and the teacher form consists of 139 items. The forms are composed of items that are measured using a 4-point likert scale with response options, "never," "sometimes," "often," and "almost always" (Reynolds & Kamphaus, 2004).

The CRS-R is a revised version of an assessment of problem disorders (Conners, 2000). Parents also complete a long-form composed of 80 items and teachers complete a short-form composed of 28 items (Conners, 2000). All items are based upon a 4-point likert scale consisting of, "not true at all," "just a little true," "pretty much true," and "very much true." The ADHD Rating Scale-IV is a tool used to evaluate children's behavior based upon the DSM-IV symptom criterion for diagnosing ADHD (DuPaul, Power, Anastopoulos & Reid, 1998). The scale is composed of 18 items measured using a 4-point likert scale, nine of the items evaluate hyperactive symptoms and the other nine items assess symptoms of inattention (DuPaul, et. al, 1998). Response options include "never," "sometimes," "often," and "very often."

The Social Skills Rating System (SSRS) assesses children's social skills based upon on a 3-point likert scale, ranging from "never" to "very often" (Gresham & Elliot, 1990). Both parents and teachers are required to complete the SSRS. Teachers complete one additional form, the Teacher Peer Relations Scale, assessing peer relationships within the classroom setting.

Based upon responses from teachers and parents on the scales outlined above, participants were either assigned to the ADHD group or the control group. In order for a child to be identified as ADHD, the parent and teacher must have collectively endorsed at least three symptoms of hyperactivity/inattention on the ADHD Rating Scale. A symptom was considered endorsed if the parent or teacher indicated "often" or "very often." Based upon parent and teacher responses to at least one of the following: the BASC, CRS-R, or ADHD RS, it was required the child be above the 85th percentile for hyperactive and inattentive subscales. In order for a child to be screened as a control, no more than two symptoms of hyperactivity or inattention could have been endorsed collectively by the parent or teacher on the ADHD Rating Scale. Controls also needed to be below the 80th percentile on the BASC, CRS-R, and ADHD RS. Participants were screened out during this phase if a parent and/or teacher's endorsements of ADHD symptoms did not meet the above guidelines.

The third phase of the study consisted of two, three-hour laboratory visits on campus at Pennsylvania State University. Laboratory visits consisted of a battery of neurophysiological tests that were administered to the participating child. These assessments included computer-generated tasks, as well as tasks from the Wechsler Intelligence Scale for Children - fourth edition (WISC-IV), Wechsler Individual Achievement Test- third edition (WIAT-III), and the Wide Range Assessment of Memory and Learning – second edition (WRMAL-II). Participating

children also completed the Multidimensional Anxiety Scale for Children (MASC) and the Children's Depression Inventory (CDI), questionnaires assessing indexes of anxiety and depression (Kovacs, 2003; March, 1997). In order for control participants to be scheduled for the second laboratory visit, their Full-Scale IQ had to be assessed as greater than 80 and below 110.

During laboratory visits, parents were required to complete the Diagnostic Interview Schedule for Children Version IV (DISC-IV), an array of questions concerning their child's thoughts, feelings, and behaviors (Shaffer, Fisher, Lucas, Dulcan & Schwab-Stone, 2000). The DISC-IV was subsequently used to diagnose psychiatric disorders, including ADHD (Shaffer et al., 2000). Responses to the DISC-IV were used to establish a final ADHD status. Parents also completed the Behavior Rating Inventory of Executive Function (BRIEF), developmental and treatment history forms, and the Parent SSRS. The parent completing these questionnaires and interviews were required to be the same parent that completed the scales during phase two of the study.

Socio-economic Status

Based upon former research, socio-economic status was measured in terms of three variables: mother's education level, father's education level, and household income. All three variables representing socio-economic status were analyzed separately. This demographic information was collected through the developmental history form, a form used to collect demographic and developmental information on the child participant as well as immediate family members. The child's primary caretaker is instructed to circle the one response that best fits the child.

Table A illustrates the questions and response options used to assess both mother and father's education level. For the purposes of this study, the response options were grouped into three educational categories. Response options 1 through 3 were grouped together as high school graduate or below. Response options 4 and 5 were classified as at least some college or a college graduate. Response option 6 was the third education level category, any individual that had completed advanced graduate studies. Data for mother's education was missing for 16 of 347 participants. Data for father's education was missing for 73 of the 347 participants.

Table B illustrates the question and response options used to assess income. Reports of household income were based upon the past calendar year. Due to a fair distribution across income amounts within the given population, the categorization of income levels was left as the original response options. Income data was missing for 21 of 347 participants.

Ethnicity

The ethnic identities of the children who participated in this study were established based upon the primary caretaker's response on the developmental history form. The caretaker was instructed to circle the one response that best fit the child. Table C reflects the question and given response options used to assess the child's ethnicity. For the purposes of this research study and due to population size constraints, participants were categorized as either white or non-white. White included any participant that was identified as Caucasian/White non-Hispanic. The non-white group included all other answer options, excluding Don't Know.

Of the entire population of 347 participants, 248 were identified as white and 82 were identified as non-white. There was no data on the ethnic identity of 17 participants.

Previously Received Treatment

Previously received treatment was defined as: receiving psychological services and/or medication prior to entering the study. Data concerning psychological services and medication was collected in the treatment history form. Table D and Table E represent the specific items on the treatment history forms. Psychological interventions were subsequently categorized into twelve types of treatment including: behavior modification, individual therapy/counseling, family therapy/counseling, group therapy/counseling, social skills group, Therapeutic Support Services (TSS), family based mental health, intensive case management, special diet, occupational therapy, speech therapy, and Title 1 Program.

Three different variables were composed based upon this data: received psychological medication, received a psychological intervention, and received any type of treatment in the past. Depending on the hypothesis and analysis, medication and psychological services were either assessed together (previously received treatment defined as receiving medication or psychological intervention) or medication and psychological services were examined separately. In the latter case, previously received treatment was represented through two different variables.

Within the sample of 347 participants, 55.3% of children had received treatment prior to entering the study. 40.1% of participants had previously received medication and 29.1% of the population had received at least one kind of psychological intervention.

Parent/Teacher Averages of ADHD Ratings and Levels of ADHD Symptomology

Teacher Conner's hyperactivity T-score was averaged with the teacher Conner's inattention T-score to create a teacher composite for ADHD. The same steps were also taken to

construct an average T-score for Parent Conner's symptom indexes of ADHD. These two T-scores represent parent and teacher averages of ADHD ratings for each participant.

The two resulting average T-scores were then averaged together to create a global parent and teacher composite. Parent Conner's T-scores were missing for 88 of the 347 participants.

RESULTS

Test of Hypothesis 1

The three variables used to represent socioeconomic status: mother's education level, father's education level, and household income, were all significantly correlated with each other. Mother's education level was positively correlated with father's education level, ($r = .414, p < .01$) and household income, ($r = .402, p < .01$). Household income was positively correlated with father's education level, ($r = .417, p < .01$). The Pearson correlation values of hypothesis 1 can be found in Table 1.

Children who had received treatment, medication or psychological services, compared to those who had not received treatment did not differ significantly by their mother's education level, $F(1, 329) F = .170, p = .681, \eta^2 = .001$, father's education level, $F(1, 272) F = .880, p = .349, \eta^2 = .003$, or household income, $F(1, 325) F = .200, p = .655, \eta^2 = .001$. The mean level of education for mothers whose children had received treatment was 2.07; while the mean for the non-treatment group was 2.05. Mean results from both groups illustrate that on average mothers completed at least some college or were college graduates. The mean level of education for fathers was 1.96 for the treatment group and 1.88 for the non-treatment group. Although the mean was slightly greater in the treatment group, the mean level of education for both groups were located within the range of high school graduate or below. The treatment group's mean total household income was 6.91, ranging upwards between \$51,000 to \$60,000; while the mean household income for the non-treatment group was 7.08, ranging between \$61,000 to \$70,000. The results did not change significantly when treatment methods were analyzed separately, as

medication and psychological services. Group means and standard deviations of mother's education level, father's education level, and household income can be seen in Table 2.

Test of Hypothesis 2

Table 3 illustrates the cross tabulation of previously received treatment, including medication or psychological services, with participants' ethnicity. Children who had previously received treatment (i.e. either medication or psychological services), were significantly more likely to be white than non-white ($X^2=4.206$, $p=.040$). When treatment methods were analyzed separately, children who had only previously received medication were slightly more likely to be white rather than non-white, but the difference was not significant ($X^2=1.57$, $p=.210$). See Table 3. There was no significant relationship between previously received psychological services and a child's ethnicity ($X^2=.263$, $p=.608$). See Table 3.

It is possible that white children may have received treatment more frequently than non-white children if as a group their level of ADHD symptomology was higher. Therefore, measures of ADHD symptomology and participants' ethnic identity were submitted to a one-way ANOVA. Examining only participants who had previously received treatment, there was no significant difference between the level of ADHD symptomology in white children (mean=64.35, SD=7.38) compared to non-white children (mean=67.11, SD=7.47), $F(1, 130)$ $F=2.560$, $p=.112$, $\eta^2=.019$.

Test of Hypothesis 3

Measures of previous treatments and ADHD symptomology were submitted to a one-way ANOVA. Children who previously received medication (i.e. only medication or both psychological services and medication) had significantly higher levels of parent and teacher

global ADHD symptomology (mean=65.75, SD=7.59) than children who had received no medication (i.e. no treatment at all or only psychological services) (mean=62.96, SD=7.33), $F(1, 249) F=8.215, p=.005, \eta^2=.032$.

The level of ADHD symptomology for those children who had only received psychological services and those that had received no treatment at all also did not differ significantly, $F(1,157) F=.013, p=.911, \eta^2=.000$. There was no significant difference among children who had received only medication and the population of children who had received both medication and psychological services, $F(1, 90) F=.001, p=.982, \eta^2=.000$. Group means and standard deviations of previous kinds of treatment and ADHD symptomology can be found in Table 4.

Since parent and teacher ratings of behavior have low inter-rater reliability, analyses were rerun with the parent and teacher reports of behavior separate. Children who had previously received medication (i.e. only medication or both psychological services and medication) had significantly higher *parent* ratings of hyperactive and inattentive symptoms than children who had not received medication (i.e. no treatment at all or only psychological services), $F(1,249) F=16.06, p<.001, \eta^2=.061$. There were no significant group differences between the children who had previously received medication and the children who received no medication on *teacher* ratings of hyperactive and inattentive symptoms, $F(1, 337) F=.306, P=.580, \eta^2= .001$.

Children who had previously received only psychological services did not differ significantly on *parent* ratings of hyperactive and inattentive symptoms compared to children who had not received no treatment at all, $F(1, 157) F=.234, P=.630, \eta^2= .001$. Furthermore, no significant differences were found between children who had only received psychological

services and those children who had received no treatment at all on *teacher* ratings of hyperactive and inattention symptoms, $F(1, 198) = .093, p = .761, \eta^2 = .000$. Group means and standard deviations of previously received treatment and informant ratings of ADHD symptoms can be found in Table 4.

DISCUSSION

Summary

The purpose of this study was to understand the conditions in which access to medication and psychological services are affected for a population of children suffering with ADHD. The likelihood of previous treatment was investigated in the contexts of a child's socioeconomic status, ethnicity, and level of ADHD symptomology. The three variables used to measure socioeconomic status: mother's education, father's education, and household income, were all positively correlated with each other. No significant results were found establishing a relationship between previously received treatment and a child's socioeconomic status.

Noteworthy relationships emerged when investigating previous treatment, ethnicity, and ADHD symptomology. White children were significantly more likely than non-white children to have previously received either medication or psychological treatment. Of the participants who had previously received treatment, white children and non-white children did not differ in their levels of ADHD symptomology.

Children who had previously received medication had significantly higher levels of ADHD symptomology than children who had not received medication. However, the severity of ADHD symptomology did not differ between those children who had only received psychological services and those who had received no treatment at all. There were also no significant differences in the level of ADHD symptomology among children who had received only medication compared to those who had received both medication and psychological services.

However, children who had previously received medication had significantly higher parent ratings of ADHD symptomology than children who had not previously received

medication. Teacher reports were not significantly linked with previous medication usage.

Neither parent nor teacher ratings were significantly related to previously received psychological services.

Hypothesis 1

This study expected to find that children who had not previously received treatment would have mothers and fathers with low education levels and total household income. Previous research has documented the relationship between a child's socioeconomic status and access to health care services, specifically linking a high parental education with an enhanced access to services, including resources for mental health issues (Lu et al., 2004; Reiss, 2013). Results from Lu et al.'s (2004) study demonstrated that both low education levels and income were associated with a lack of health insurance, perhaps partially contributing to the documented pattern of poorer ADHD health care among children who lack insurance: including a decreased likelihood of receiving a diagnosis and stimulant medication (Steven et al., 2005). These findings illustrate a direct and indirect association between an individual's socioeconomic status, subsequent insurance status, and consequential lack of psychological services and medication for ADHD symptoms; thus supporting the hypothesis proposed above.

Pearson correlation values demonstrated a positive relationship between the three variables used to measure socioeconomic status: mother's income, father's income, and total household income. These significant correlations attest to the internal validity of the study and supports the use of these variables to operationalize socioeconomic status in future studies.

Analyses surprisingly revealed no relationship between previous treatment and a child's

socioeconomic status. These results diverge from the findings within current literature highlighting the indirect effect of a low SES on a child's access to health care.

Hypothesis 2

It was predicted that white children were significantly more likely to have previously received medication or psychological services than non-white children. Literature has consistently documented lower prevalence rates of ADHD among ethnic minorities, as well as lower rates of access to mental health treatment than their white counterparts (Ethan et al., 2013; Kataoka et al., 2002). It is possible that the lower prevalence rates of ADHD reported in ethnic minority groups are a consequence of this decreased access to treatment and subsequent lack of clinical diagnoses. Disparities in the likelihood of receiving ADHD medication are dependent on the specific minority group. African American children were found to be significantly less likely to receive stimulant medication than Caucasian children; though no significant differences were found between Hispanic and Caucasian children (Stevens et al., 2005). There is a considerable lack of data addressing whether there is an unmet need in certain ethnic groups or if ethnic minorities have truly lower prevalence rates of ADHD.

Findings from this study illustrated that white children were indeed more likely to receive treatment than non-white children. Assessing treatment methods separately as medication and psychological services, yielded no change in results. Subsequent analyses illustrated there was no difference between the ADHD severity of white children and non-white children who had previously received treatment. These results depict an apparent disproportion in the pattern of previous treatment despite the comparable severity of ADHD between the two groups. The

findings from this study support previous studies demonstrating disparities within mental health service usage along ethnic lines (Katoka et al., 2013).

Two theories support the significant disparity in treatment along ethnic lines that cannot be explained by the children's level of ADHD symptomology. The first explanation proposes that there truly is an unmet need of treatment among minority children, implying that ethnic minority children are not accessing the necessary medication or psychological services to treat their symptoms of inattention or hyperactivity. Alternatively, these results may illustrate that treatment methods are being overly encouraged among white children, whether by parents, teachers, or clinicians. This theory accounts for the disproportionately elevated rates of treatment among white children, despite the fact that the level of ADHD symptomology did not differ significantly when comparing white children and non-white children.

Hypothesis 3

This study intended to address a lack of current literature concerning patterns of treatment methods and a child's degree of ADHD symptomology. With an approximated 56% of children diagnosed with ADHD using stimulant medication in 2003, it is important to understand the current trends of medication and psychological service usage in the context of ADHD severity (Fulton et al., 2009). The results demonstrated that children who previously received medication, whether only medications or both medication and psychological services, had significantly higher levels of ADHD symptomology than children who had received only psychological services or no treatment at all. Further analyses conducted on the separate parent and teacher reports of ADHD symptomology revealed that parent ratings of behavior were significantly associated with previous medication usage. No significant links were found

between previous medication usage and teacher reports of behavior or parent and teacher reports and previous psychological services.

These findings have significant implications on ADHD treatment method trends. The lack of a significant relationship between previous psychological services and ADHD symptomology implies that psychological services are utilized as an initial response to address mild ADHD symptomology. As for medication, the significant results suggest ADHD medication is used when children exhibit severe ADHD symptomology.

Alternative explanations for the findings concerning psychological services and ADHD symptomology may be attributed to the general nature of the category psychological treatment. This method of treatment encompasses a wide array of therapies, ranging from family therapy to speech therapy. As a result, it cannot be deduced that the services the youth received were addressing ADHD symptomology. In fact, psychological services may have been utilized in order to address alternative issues, such as family problems or a speech disorder. It is also important to highlight the high rates of comorbidity in children afflicted with ADHD and the implications on psychological treatment. Consequently, the interventions could have been a strategy to address symptoms of multiple disorders. If so, psychological services would likely be significantly linked to ADHD symptomology with the symptoms of the co-morbid disorder(s); thus previous psychological services would not solely be predictive of ADHD symptomology.

The established relationship between previous medication and parent ratings of ADHD symptomology is valuable in understanding the conditions associated with receiving treatment. The results imply that ADHD symptoms are raising a greater alarm among parents than with teachers. Since previous medication used was linked with higher parent ratings of ADHD

symptoms and greater levels of overall ADHD symptomology, one may conclude that parents are more likely to be motivated to medicate their children due to the severity of ADHD because it is so disruptive within the home setting.

LIMITATIONS

Certain characteristics of this study limit the generalizability of the data and results. The first limitation is the sample size of various ethnic groups, including: African Americans, Asians, and Hispanics. Due to these population constraints, all ethnic minorities were analyzed together as one group. Results from hypothesis 1 and 2 may have illustrated different patterns depending on the specific ethnic minority group. It is possible that other trends were masked as a result of analyzing the populations together as non-white. With the largest minority group of participants being African American (N=28), trends specific to this group may have veiled the medication usage and psychological service patterns of Hispanic (N=5), Asian (N=5) and/or Caucasian/White Hispanic participants (N=14). As previous literature report findings of severe discrepancies between African American and Caucasian children's pattern of medication use, which are not consistent with patterns among Latino children (Graves & Serpell, 2013; Stevens et al., 2005).

Although findings demonstrated that ethnicity was predictive of whether a child previously received treatment, no significant results were found when medication and psychological services were measured as separate treatment methods. Poor sample size may have also been a limitation that influenced these findings. When treatment was measured as medication, there were only 29 participants who were identified as an ethnic minority and had received medication. Similarly for psychological services, only 23 participants were ethnic

minorities and had received psychological services. It is likely that given a larger sample size of minorities in both treatment conditions (medication and psychological services), results would support the existing finding that white children are significantly more likely to have previously received treatment (i.e. medication or psychological services) than non-white children.

FUTURE RESEARCH

In addressing the limitations mentioned, the study should be replicated with the adequate population sizes of ethnic minorities in confirmation of the results and speculations of existing alternative patterns. Furthermore, additional research is necessary to investigate the lack of significant data in support of the current body of literature concerning the relationship between an individual's socioeconomic status and subsequent access to health services. Despite the overwhelming studies specifically illustrating the implication of parental education level on health care treatment access, it may be beneficial to evaluate how the different levels of education were categorized (Graves & Respell, 2013; Reiss, 2013). Regardless, hypothesis 1 should be replicated in order to determine the source of discrepancy between the results and current literature. It would be interesting for future studies to investigate if disparities exist between children of differing socioeconomic status and the extent of their treatment history. Perhaps children with a history of consistent treatment regimens are more likely to be from a higher socioeconomic status.

Further investigation is also central to understanding the source of discrepancy between white and non-white children on previously received treatment. As outlined above, there are two primary theories to explain the results: an unmet need within minority children or perhaps an over treatment of Caucasian children. A study proposed to examine the true explanation for the

data demonstrating that white children are significantly more likely to receive treatment than their non-white counterparts would provide significant insight into a segment of research that has yet to be assessed.

CONCLUSION

Overall, this study enhances the understanding of the conditions that influence access to medication and psychological services for children suffering with ADHD. The study addresses a lack of research on social variables, such as socioeconomic status and ethnicity, as well as ADHD symptomology in the context of treatment. Most importantly, the findings have significant implications on the disparities in access to treatment that exist within different populations. The results and subsequent research can increase awareness among professionals working with children with disparities in treatment methods and aid in alleviating those inequities.

Appendix A

Tables

Table 1. Pearson Correlations of Socioeconomic Status Variables

Measure	Mother's Education	Father's Education	Household Income
1. Mother's Education	1	.414**	.402**
2. Father's Education		1	.417**
3. Household Income			1

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table 2. Means and Standard Deviations for No Treatment and Treatment Groups of: Mother's Education Level, Father's Education Level, and Household Income

Measure	No Treatment (n=146)		Treatment (n=185)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Mother's Ed	2.05	.59	2.08	.62
Father's Ed	1.88	.69	1.96	.72
Household Income	7.08	3.20	6.91	3.31

Table 3. Cross Tabulations of Previous Kinds of Treatment with Participants' Ethnicity

	<i>Meds Yes</i>	<i>Meds No</i>	<i>Total</i>	<i>Psych services Yes</i>	<i>Psych services No</i>	<i>Total</i>	<i>Any txt Yes</i>	<i>Any txt No</i>	<i>Total</i>
<i>White</i>	108	139	247	77	171	248	150	98	248
<i>Non- white</i>	29	52	81	23	59	82	39	43	82
<i>Total</i>	137	191	328	100	230	330	189	141	330

Table 4. Means and Standard Deviations of Previous Kinds of Treatment and Informant Ratings of ADHD Symptoms from Conner's T Scores

Measures	Parent & Teacher		Parent		Teacher	
	Composite		Ratings		Ratings	
	M	SD	M	SD	M	SD
Medication (Only Meds or both Meds & Psych Services)	65.75	7.59	71.41	9.47	59.53	8.81
No Medication (No treatment or only Psych Services)	62.96	7.33	66.28	9.94	60.04	8.01
No treatment at all	62.92	7.46	66.05	10.21	60.15	8.03
Only Psych Services	63.07	7.07	66.91	9.24	59.75	8.03
Only Medication	65.76	7.53				
Both Psych Services & Medication	65.72	7.89				

Table A: Education Level Questionnaire Item and Response Options

Mother's or mother figure's education:	Father's or father figure's education:
1. Eighth grade or less	
2. Some high school	
3. High school graduate or GED	
4. Some College or post-high school	
5. College Graduate	
6. Advanced graduate or professional degree	

Table B: Income Questionnaire Item and Response Options

Total household income (from all sources) for the past year:
1. Less than \$10,000
2. \$10,000 to \$20,000
3. \$21,000 to \$30,000
4. \$31,000 to \$40,000
5. \$41,000 to \$50,000
6. \$51,000 to \$60,000
7. \$61,000 to \$70,000
8. \$71,000 to \$80,000
9. \$81,000 to \$90,000
10. \$91,000 to \$100,000
11. \$101,000 to \$150,000
12. More than \$150,000

Table C: Ethnicity Questionnaire Item and Response Options

Child's racial/ethnic background:
1. Caucasian/White non-Hispanic
2. Caucasian/White Hispanic
3. African American/Black non-Hispanic
4. African American/Black Hispanic
5. Other Hispanic
6. Asian
7. Native American/American Indian
8. Other (please specify):
9. Mixed
10. Don't know

Table D: Previous Medication Questionnaire Item

<p>If the child has ever taken prescription medication for psychological, emotional, or behavioral problems including problems including problems with attention and/or hyperactivity? (for example, Ritalin, Bendezedrine, Cylert, Zoloft, Prozac, Mellaril, Tofranil, Thorazine), please provide the following information:</p>							
Medication	Date started	Still using?		If not, date ended	Dosage		
		Yes	No		am	noon	pm
1.		Y	N				
2.		Y	N				
3.		Y	N				

Table E: Previous Psychological Interventions Questionnaire Item

<p>If the child has ever received any other interventions (for example, behavior modification; individual, family, or group psychotherapy, or counseling; special diet) please provide the following information:</p>						
Intervention	Date started	Still using?		If not, date ended	How often?	Type of Professional
		Yes or no				
1.		Y	N			
2.		Y	N			
3.		Y	N			

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ACADEMIC VITA

Alexis M. Collins

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EDUCATION

The Pennsylvania State University, Schreyer Honors College; Paterno Fellow **University Park, PA**
Bachelor of Arts, Psychology May 2015
Biology Minor
Dean's List: Fall 2011-Fall 2013; Fall 2014;

HONORS/AWARDS

Schreyer Honors College Fall 2013
Hugh and Lynn J. Arnelle Scholarship Fall 2013 – Spring 2015
Schreyer Ambassador Travel Grant Spring 2014

CLINICAL EXPERIENCE

Child Attention and Learning Lab **University Park, PA**
Research Assistant January 2013-Present

- Worked with clinical psychologist, Cynthia Hung-Pollock on her federally funded NIMH research examining attention and learning difficulties in children with attention deficit hyperactive disorder (ADHD)
- Began composing senior honors thesis analyzing the treatment of ADHD in the context of SES and ethnicity
- Encoded and input data for working memory subsets
- Assisted with construction design of novel working-memory span task using Photoshop

Rockland Psychiatric Hospital **Orangeburg, NY**
Intern Summer 2013 & 2014

- Shadowed many clinical positions: including MD, Nurse Practitioner, Psychologist, Nurse & Psychiatrist
- Observed in-patient therapy sessions, both group and one-on-one and psychiatric intake routines for in-patient care
- Co-facilitated an art therapy group for individuals in out-patient
- Observed daily interdisciplinary meetings for medical personnel working with the in-patient units

Residenza Anziani e Centro Diurno Arzaga **Milano, It**
Intern January 2014-May 2014

- Shadowed social psychologist, Dalia Segrè, during client sessions and worked with her to design multisensory environments in common areas in order to improve symptoms of dementia patients at a long-term care elderly facility
- Observed the administration of the Mini Mental State Examination (MMSE) & Geriatric Depression Scale (GDS)

VOLUNTEER EXPERIENCE

COLAGE (Children of Lesbians and Gays Everywhere) **Provincetown, MA & New York, NY**
Facilitator/Former Board Member/Housing Coordinator Summer 2010-Present

- Board Member (Finance Committee): Advised Executive Director on financial issues such as expense reduction, staff employment, and operation costs for the national organization and created monthly budget sheets, using Microsoft Excel
- Developed age appropriate workshops for youth examining topics such as: bullying, school, family & social justice issues
- Organized room assignments for all volunteer staff and was the liaison for all housing related issues during week long event

Penn State IFC/PanHellenic Dance Marathon (THON) **State College, PA**
Hospitality Committee Member THON 2012, 2013, & 2015
Special Events Committee Member THON 2014

- Assisted in the planning and execution of food service THON weekend and fundraising events through the year

Big Brother Big Sisters **State College, PA**
Big Sister/ Volunteer Fall 2012- Fall 2013

- Developed a one to one relationship through weekly visits, involving tutoring and outings, with a youth by offering dependability and encouragement in the development of interpersonal skills with others and self- confidence

WORK EXPERIENCE

Uno Pizzeria and Grill **Central Valley, NY**
Hostess Summer 2014

Kipling **Central Valley, NY**
Sales Associate Summer 2014

Michael Kors **Central Valley, NY**
Sales Associate May 2012-January 2014

Dunkin Donuts **State College, PA**