EXPLORING THE IMPACT OF ADVERSE CHILDHOOD EXPERIENCES ON RESILIENCE, SCHOOL ENGAGEMENT, AND SUCCESS IN ADOLESCENTS WITH CO-OCCURING AUTISM SPECTRUM DISORDER AND ATTENTION DEFICIT HYPERACTIVE DISORDER

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There remains a dearth of literature that explains with no ambiguity, the complex relationships that exist between adverse childhood experiences (ACEs) and resilience, as well as school engagement and school in individuals with a co-occurring diagnosis of autism spectrum disorder (ASD) and attention deficit hyperactive disorder (ADHD). This study seeks to fill this missing gap in the literature. These research questions were answered using a retrospective cross-sectional study design of national secondary data from the National Survey of Children's Health (NSCH). The findings revealed that the more ACEs an individual had, the less they were likely to engage and succeed in school. A similar finding was obtained for resilience as individuals with more ACEs showed less resilience. However, counterintuitively to the hypothesis of the project, having both ASD and ADHD does not necessarily make these outcomes worse compared to having a singular diagnosis of either ASD or ADHD. The significance of this study is that it informs rehabilitation counselors as well as educators on the need for early identification of individuals with ASD and ADHD with a background of ACEs and commence interventions early enough to ensure they are more resilient and obtain improved success in school-related activities as well outside school activities and eventually improved quality of life.

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TABLE OF CONTENTS

Page

LIST OF TABLES AND FIGURES

Page

Tables

Figures

CHAPTER 1

INTRODUCTION

In the last few decades, there has been a growth in the number of individuals diagnosed with neurodevelopmental conditions. The population of individuals diagnosed with autism spectrum disorder (ASD) has increased from 1 in 150 in the year 2000 to 1 in 54 in 2016 (Centers for Disease Control and Prevention; CDC, 2020). According to CDC (2020), the population of children with attention deficit hyperactive disorder (ADHD) in 2016 was estimated to be 6.1 million. Both ASD and ADHD affect predominantly more males than females. According to the surveillance summaries from CDC (2020), ASD is diagnosed in males 4 times more than in females. Both conditions are reported in all racial, ethnic, and socioeconomic groups.

A lot of studies in recent years have focused on a better understanding of neurodevelopmental conditions such as ASD and ADHD (Ramtekkar, 2017). A recent report from the CDC indicates that some children diagnosed with ADHD have also been diagnosed with other conditions such as ASD, behavior or conduct problem, or a mental or emotional disorder (2021). There is a growing population of individuals with a diagnosis of ASD and ADHD, as well as those with the co-existing diagnosis of ASD and ADHD (CDC, 2020). The literature is flooded with research studies that seek to properly understand the presentations and the various associations of ASD and ADHD (Volkmar & Reichow, 2013). Part of the changes that have occurred in the past few years was the recognition of ADHD as a co-occurring condition with ASD (Leitner, 2014; Ramtekkar, 2017). This was applied clinically after the publication of the most recent *Diagnostic Statistical Manual-5* (*DSM-5*).

1.1 Characteristics of Individuals with ASD and ADHD

According to the *DSM-5*, on the one hand, ASD can be briefly described as a "social communication disorder that is characterized by persistent deficits in social communication and social interaction across multiple contexts…" (American Psychiatric Association, 2013). ASD is also characterized in the literature by persistent deficits in social interaction and communication, in addition to restricted, repetitive patterns of behavior and activities (Adolph et al., 2006; Carter et al., 2005; Ramtekkar, 2017). ADHD, on the other hand, is characterized by a persistent pattern of inattention and/or hyperactivity-impulsivity (CDC, n.d). From the definition, ADHD is predominantly characterized by deficits in attention, organization, and activity levels.

A growing body of scholarship has suggested a strong relationship between ASD and ADHD diagnoses (Leitner, 2014; Ramtekkar, 2017). More than 60% of individuals with a diagnosis of ADHD manifest symptoms of ASD while as high as 30% - 50% of individuals diagnosed with ASD also display symptoms of ADHD (Davis & Kollins, 2012; Leitner, 2014). According to Leitner (2014), the management of ADHD symptomatology has been reported to help reduce the symptomatology of ASD as well (Children and Adults Living with ADHD; CHADD, 2020). These studies highlighted have continuously demonstrated a robust connection between ASD and ADHD. However, to date, there is a dearth of literature that have considered ASD and ADHD as co-occurring conditions (David & Kollins, 2012; Leitner, 2014).

There is growing evidence that indicates that exposure to adverse childhood experiences (ACEs) can affect neurodevelopment, often negatively impacting the physical and mental health, school success, as well as the overall quality of life of individuals with such experiences (Garner et al., 2015; Shonkoff & Garner, 2012). Individuals with ASD have poorer quality of life outcomes compared with individuals without disabilities (Orsmond et al., 2013). According to

Orsmond et al. (2013), individuals with ASD have higher rates of unemployment, lower rates of school success and restricted opportunities to engage or participate in events within their immediate environment such as the school and community at large. Adolescents with ASD have also been noted to have increased incidence and prevalence rates of social and emotional behavioral disorders such as anxiety, depression (Chandrasekhar & Sikich, 2015; Magiati et al., 2014), behavior and conduct disorder (CDC, 2020).

Individuals exposed to ACEs have been noted to underperform in school (Crouch et al., 2019), and this academic impairment is more evident in those with a co-occurring mental and behavioral disorders such as ASD and ADHD (Bethell et al., 2016). The percentage of children with ADHD and a co-existing mental or socio-emotional behavioral disorder is high, about 64% (CDC, 2020). Parents of children with ASD have a slightly increased rate of separation or divorce (Hartley et al., 2010). This can be attributed to the relationship strain partners suffer post-diagnosis of the child, often stemming from the challenges of caregiving. The social instability that can result from parental separation or divorce, can significantly affect functioning in a child. Some children with ASD, because of the nature of their diagnosis can exhibit repetitive routine behaviors that can be negatively impacted by sudden changes in household stability (Ahlers et al., 2017). Significant marital strain can also be seen in families with children with ADHD as well (Kousgaard et al., 2018).

As many as 32% of adolescents with ADHD drop out of school, compared to 15% of neurotypically developed individuals (Breslau et al., 2011). Individuals with ADHD are more likely to be unemployed and to be laid off from work, compared to their neurotypically developed counterparts (Kuriyan et al., 2013). Evidence in the literature to suggest a negative relationship between ACEs and school engagement and success in the general population exists

(Crouch et al., 2019; Evans et al., 2020) but there exists a gap in the literature that examines similar outcome in individuals with ASD and ADHD. This unexplored connection suggests a need to investigate resilience amongst individuals who have been exposed to at least one adverse childhood experience.

The broader impact or consequences of longstanding mental health concerns of individuals are partly due to problems that stem from their childhood, most of which are preventable (CDC, 2020). Exposure to a parent with mental illness is one of the ACEs considered in previous studies and this has been said to negatively impact the well-being of their children (Felliti et al., 1998). On an individual level, ACEs can have a direct adverse impact on not just the physical health but also the mental health of an individual as well (Rutten et al., 2013). Even though ACEs occurs at an early stage of an individual's life, these events have the potential to cause long-lasting effects that can significantly impact an individual's level of functioning (Felitti et al., 1998). These complications manifest both physically, emotionally, and mentally. As children mature into adolescents, physical health conditions can arise from risky health behavior and harmful choices resulting from exposure to ACEs. These can all culminate in chronic medical conditions that can affect any system in the body, examples being heart diseases and stroke (CDC, 2020). The adverse health complications arising from ACEs are the reality for both the general population as well as individuals with ADHD and ASD (Kanne & Mazurek, 2011; Watchel & Shorter, 2013).

Exposure to parental substance use disorder is another factor of ACEs, often promoting poor life outcomes for children generally, and even more so children with ASD and ADHD (Butwicka et al., 2017). Parental substance use can even further compound mental health issues when present. Other than reduced academic engagement and success stemming from neglect

from the addicted parent(s), there could also be a resultant substance misuse in the children. According to a study carried out by Ottosen et al. (2016), children with ASD and ADHD have an increased risk of cannabis use. The risk is about 2.6-fold increase in individuals with ADHD (Ottosen et al., 2016).

Despite the overwhelming evidence in the literature, ASD and ADHD were only acknowledged as co-occurring disorders in DSM-5 a few years ago (Leitner, 2014 & Ramtekkar, 2017). Less favorable life outcomes and other research findings highlighted, as well as the recent changes in the DSM-5 strongly suggest a need to view the manifestations of the two diagnoses from the same lens. A diagnosis of ASD as a diagnosis of its own presents with significant functional limitations, in combination with a co-occurring disorder like ADHD-with its own accompanying limitations-further impacts functional development and less successful life outcomes (Bethell et al., 2016).

Recent findings have shown that individuals with ASD have a reduced quality of life, more than individuals without disabilities and this is seen academically, in their school dropout and unemployment rates, as well as in other health indices (Rigles, 2017). As previously highlighted, this issue of adaptability and functioning is made worse with a co-existing disorder like ADHD. In addition to experiencing a poorer quality of life because of the functional limitations with social interaction and engagement, existing literature has shown that some individuals living with ASD have unmet emotional needs as well, which can further impact interpersonal interactions and may lead to loneliness and isolation.

The human mind is the center of intelligence and planning of activities, and when proper care is not taken, every other aspect of an individual's life is affected (McDaid et al., 2008). These other aspects of life such as social identity and career development, determine the well-

being of an individual and the quality-of-life outcomes. In essence, at the individual level, directly or indirectly, these events affect the development of resilience, individual's level of activities and participation within the school environment, and thus the quality-of-life outcomes such as educational outcomes, employment outcomes, and community engagement and integration.

1.2 Statement of the Problem

In recent years, more than ever, there have been far too many incidences such as increasing unemployment and crime rate, that call for more attention to be paid to the overall success of young people, more so, in individuals with pre-existing cognitive impairment (Markowitz, 2011). Often, these incidences are sporadic and random, and as such not preventable, but other times, there is almost a discernable pattern in which the root cause of the problem can be identified and properly managed. Individuals with ADHD, given the unique characteristics they possess, are often socially isolated and are frequently bullied and maltreated by their peers and other people in their environment including their schools (Barkley et al., 1990; Pelham et al., 1985). Individuals with ASD also experience bullying from their peers (Earnshaw et al., 2018; Maino et al., 2016). This maltreatment and other forms of traumatic situations that they deal with on a day-to-day- basis, partly contribute to their ACEs. Children, more so, adolescents with ASD/ADHD with a background of ACEs are even more likely to have less successful life outcomes given their predisposition to numerous mental illnesses that arise from impaired adaptive functioning (Hellstrom, 2019; Mehtar & Mukaddes, 2011; Taylor & Gotham, 2016)

These complications that arise due to their exposure to ACEs can be social or health related. As highlighted previously, some of these complications include low academic

performances, school dropout, unstable employment, financial instability, mental illness (e.g., depression, anxiety disorder), and chronic health conditions (obesity, hypertension). Because of the numerous associated complications of ACEs, it can be very costly to affected individuals, their families, and the community (CDC). According to CDC, the total costs associated with child maltreatment is estimated to be about $124 billion; $83.5 billion due to productivity loss, $25 billion due to health care needs, $4.6 billion special education needs, $4.4 billion in child welfare and $3.9 billion from criminal justice-related issues. Undoubtedly, some of these ACEs can be prevented if adequate measures are taken and necessary interventions are implemented (Brennan et al., 2020), however, until required steps are taken, individuals will continue to stand the risk of being exposed to these adverse events. This then presents a need to investigate and find possible protective factors for adolescents who have been exposed and for those subsets not yet exposed but could benefit from the findings of the present research project focused on identifying at-risk groups and highlighting those protective factors, that may limit the impact of adverse events in the future. There exist too many factors in an individual's life that can act either as a protective or risk factor to their health and living. This paper explores child resilience alongside academic success, exploring the factors that contribute mostly to the general outcome of adolescents with ASD/ADHD.

Considering that this population is predisposed to numerous adverse events and mental illnesses, there is a need to investigate the relationships (if any), between ACEs, resilience, school engagement, and success. While this population of individuals with ASD/ADHD is unique and not representative of the general population, it is important to investigate the potential effect of ACEs on their life outcomes as well as for individuals without neurodevelopmental disabilities. A body of scholarly work has demonstrated there to be a

correlation between ACEs and resilience and school engagement and success, especially in the general population, but there remain unanswered questions about the relationship between ACEs, resilience, and participation in adolescents who are diagnosed with ASD/ADHD.

As highlighted earlier, there are protective factors that have been found among individuals without neurodevelopmental disabilities. However, there is little or no research to show that these same factors can be operationalized in adolescents with ASD/ADHD to improve their development of resilience and as such improve their academic outcomes in life and prevent adverse chronic health conditions in the future. When an individual is engaged within their school community and home communities, they are better able to develop some form of resilience that will improve their overall quality of life. It is well established in the literature that individuals who develop resilience against their previous adverse experiences function better in schools (Bethell et al., 2014), at home, and the society at large (van Leeuwen et al., 2012). Given that individuals without neurocognitive disabilities with high resilience participate actively and have improved quality of life outcomes and lower rates of mental health diagnoses (Beliis et al., 2018), it would be worth exploring if this holds true for adolescents with ASD/ADHD.

1.3 Adolescents with ASD/ADHD

The adolescent period is a vital stage in human development (Feldman et al., 1990). Family structure as well as quality of the relationships within the family are key to the growth and development of a child (Lee & McLanahan, 2015). Parents or family members of children with ASD can often act as protective factors during pre-adolescent development, and research has shown how this social network might protect them at this stage of development (Weiss, 2011). However, they eventually grow past this pre-adolescent phase where they gradually become less dependent on their parents and caregivers. This is true for individuals without

neurocognitive disabilities and for individuals on the autism spectrum especially for those with higher cognitive skills and a higher level of adaptive functioning. It is evident in literature that social support amongst other factors is protective of the possible complications of ACEs (Von Cheong, 2017). High social support has been linked to an increased potential of developing resilience and improved life outcomes for individuals with ASD (Ruiz-Robledillo et al., 2014)

The adolescent group is also very important to explore because exposure to ACEs can have high prevalence during this period of development (CDC, 2020). This is the period where children begin to freely associate with friends and peers from school and within the community. According to the CDC (2020), some children are at greater risk of developing ACEs compared to their counterparts. Adolescents with a diagnosis of ASD alone are at a greater risk of being exposed to at least one of the various traumatic events (Fuld, 2018) associated with ACEs and life outcomes are further negatively impacted by the presence of another coexisting disorder like ADHD (Salerno & Kooij, 2019; Young et al., 2020). This can further compact the issue of social isolation and exclusion. As earlier highlighted, the social characteristics of individuals on the autism spectrum are such that they are often mocked, stigmatized, and excluded from social activities within the school environment and the community at large. This level of stigmatization and bullying is seen commonly amongst adolescents (Sterzing et al., 2012).

1.4 Purpose of the Study

The United States seems to have a growing population of adolescents and those diagnosed with ASD/ADHD have seemingly increased. Just over the past few years, there has been an increase in individuals diagnosed with ASD from 1 in 150 to 1 in 54 (CDC, 2020). While the relationship between exposure to ACEs and development of chronic health conditions tends to result in less favorable life outcomes for individuals with ASD/ADHD, there remains a

percentage of individuals who experience an improved health-related quality of life and positive outcomes both at work and school (Poole et al., 2017).

According to the WHO resilience report (2017), the phenomenon where individuals are still able to function adequately despite a background of traumatic events has been termed "resilience." While resilience has been understood as an individual's inability to bend but not break and bounce back, this is far from the true definition of resilience. Resilience can be simply defined as "the process of adapting well in the face of adversity, trauma, tragedy, threats or even significant sources of stress" (American Physiological Association, 2014). Resilience has been researched in individuals without neurocognitive disabilities and it is critical to examine whether resilience can be operationalized for adolescents with ASD/ADHD, as it is operationalized in adolescents without neurocognitive disabilities. As earlier highlighted, children diagnosed with ASD/ADHD are more likely to come from families with high relationship strain, separation, and divorce rates, unlike their counterparts with no neurocognitive disabilities. This complexity in their family background, as well as other factors documented in the literature, makes it critical for this topic to be researched.

Studies have itemized some protective factors that buffer against the possible short-term and long-term complications of ACEs (Bethell et al., 2014; Rigles, 2017). Positive psychological factors have been identified in the past to help curb the effects of ACEs. According to Benard (1993), a resilient individual has mainly four attributes, namely problem-solving skills, social competence, autonomy, and a sense of purpose and future. The ability of these individuals to be resilient has been attributed to protective factors or resources within their environment (Rutter, 2006). As previously highlighted, it is a well-established in the literature that individuals with a diagnosis of ASD have varying levels of social impairment and may find it more challenging to

establish social interactions amongst peers (Cavanaugh & Rademacher, 2014). However, it would be interesting to understand how these protective factors within and around them can help promote their level of resilience and participation within the school environment, thus serving as a protective mechanism and facilitating better life outcomes in their academics, health status, and life in general.

Several scholarly articles have findings on the relationship between ACEs, resilience, and the mental health of affected individuals (Bethell et al., 2016; Rigles, 2017). Rigles (2017) specifically examined the relationship between ACEs, resilience, and health in individuals with ASD. However, no study has yet shown the connections between ACEs, resilience and school engagement, and quality of life in individuals with a dual diagnosis of ASD and ADHD. To date, no study has explored or examined the possible impact of ACEs and how the positive protective factors can promote resilience and school engagement, and success amongst these individuals. Thus, the essence of this study is to provide counselors, educators, and policymakers with a greater comprehension of how variables like resilience and school participation interact with each other, to improve the quality-of-life outcomes in individuals with a co-occuring diagnosis of ASD/ADHD. As previously highlighted, increased understanding of the relationships can be valuable for decisions that are related to funding allocation and service provision of both environmental structures (health and social), youth resilience building, and empowerment programs, that will promote the development of essential characteristics to improve quality of life outcomes amongst the population of interest. The possible influence the findings will have on the importance of timely social and health interventions for the ASD/ADHD population.

Over the years, researchers have emphasized understanding family resilience in families with children living with ASD (Schneider et al., 2019). This may be attributed to increased levels

of difficulty associated with obtaining adequate information from individuals with ASD, given the communication and language difficulties often experienced by individuals on the autism spectrum (Vicker, 2009). This can result in an increased reliance on parents and other family remember and caregivers to gain their perceptions of the child's well-being. Another factor could be the increased level of stress associated with caring for a child with a disability (Firth & Dryer, 2013; Mallory et al., 2019; Plumb, 2011). It is pertinent to consider the mental health of caregivers of individuals with ASD (Catalano et al., 2018). As much as this is a critical area to examine, it is also imperative to examine this topic of resilience from another vantage point, which is from the individual's perspective. Exploring protective factors like stable and safe relationship and living in a safe neighborhood, helps to improve life outcomes. An examination of school achievement, level of competence/confidence, self-esteem, and level of community integration are explored in subsequent chapters.

1.5 Research Questions

This proposed study seeks to explore the possible relationships between ACEs, child resilience, and school engagement and success, in adolescents with a co-occurring diagnosis of ASD and ADHD. This study seeks to answer the following questions:

1. Is there a significant difference between adolescent participants with a diagnosis of ASD or ADHD when compared to individuals with a co-occurring diagnosis of ASD/ADHD as it relates to their exposure to ACEs? (Using ACEs grouping of ACEs < 4 and ACEs > 4 to demonstrate severity)
2. Does ACEs predict school engagement and success and does this relationship vary among adolescents screened for both ASD/ADHD and ASD or ADHD?
3. Does ACEs predict resilience and does this relationship vary among adolescents screened for both ASD/ADHD and ASD or ADHD?

CHAPTER 2

LITERATURE REVIEW

This chapter presents the literature that is pertinent in discussing resilience in individuals with autism spectrum disorder co-occuring with attention deficit hyperactive disorder (ASD/ADHD) who are exposed to adverse childhood experiences (ACEs). The historical background of the key concepts is outlined. Essential theories that help explain the relationship between ACEs and resilience are highlighted. The resilience model provide a theoretical grounding to understand the possible interactions between child resilience and school success in adolescents with neurocognitive disabilities. This model explains the relationships between the major concepts of this study which are ACEs, resilience, and school engagement and success in the population of interest. Succinct discussions on existing knowledge regarding the development of resilience in children with a diagnosis of ASD/ADHD are provided while highlighting the dearth of literature that focuses on the development of individual resilience and its impact on school success and overall participation in life activities. High resilience has been linked to improved participation and quality of life outcomes (Butler & Ciarrochi, 2007; Wardlaw et al., 2015). The present study explores the possible relationships between participation and success in life outcomes after exposure to ACEs in ASD/ADHD. This work fills a specific gap in the literature as it pertains to developing individual resilience.

For decades, studies have focused on studying ACEs and their short-term and long-term consequences in both individuals without neurocognitive disabilities (Hughes et al., 2017) and individuals with neurocognitive disabilities (Fuld, 2018). At some point in life, most individuals will face traumatic events that can directly or indirectly impact their mental health and quality of life tremendously. Children tend to experience these traumatic events more, often leading to an

increased rate of developing long-term complications later in life (Felitti et al., 1998). The impact of traumatic events can result in the development of mental health conditions like anxiety, depression, post-traumatic stress disorder, and substance use disorders (Anda et al., 2010; Felitti et al., 1998). Childhood traumatic events also impact the physical health of those who experience it. The literature documents the consequences on physical health, and they include the development of chronic medical illnesses such as hypertension, diabetes mellitus, migraines (Anda et al., 2010; Finkelhor, 2018).

When poorly managed, these traumatic events can have negative effects on the quality of life of individuals who experience them. For school-aged children, there is a tendency of affected individuals to underperform in school as well at work and in the community at large (Kiesel et al., 2016). The fact that the consequences of ACEs are not just limited to the individual but the community as well, is also a cause for concern (CDC, 2020). According to the CDC, these effects can also be economical (CDC, 2020). Individuals with ASD and ADHD are not spared from the consequences of ACEs itemized above, especially the ACEs of parental separation or divorce, parental substance use, and parental mental illness. If anything, these individuals are more predisposed to both increased rates of experiencing ACEs (Schneider et al., 2019) as well as increased rates of developing lifelong consequences (Brown et al., 2017; Morris et al., 2020). There is a growing body of literature that discusses the complications of ACEs in ASD and ADHD as individual diagnoses (Brown et al., 2017; Fuld, 2018; Morris et al., 2020), however, the literature that examines child resilience in both ASD and ADHD remains scant. It remains critical to explore what lifelong issues ACEs predisposes the adolescents to and interventions to abate those and improve educational outcomes, among other life outcomes.

2.1 Autism Spectrum Disorder (ASD)

ASD is a communication and behavior disorder that is prevalent in the world especially in the United States and its incidence and prevalence rates continue to increase (Lee & Gardner, 2010). As stated earlier, the population of ASD has dramatically increased from I in 150 in the year 2000 to 1 in 54 in 2016 (CDC, 2020). The scope of understanding of ASD has evolved over the years (Doernberg & Hollander, 2016) and so has the "etiology" and the criteria for diagnosis. In the past century, when ASD was first coined, ASD was thought to be caused by the poor attachment of children to their mothers (Cohmer, 2014), which has since been further explored and unfounded (Phelps & Fogler, 2018). Children with a diagnosis of ASD present with features which impact social interactions, speech development, and neurotypical behavioral development (APA, 2013).

ASD is a communication and behavioral disorder, however, it is not without some associated clinical associations and co-morbidities. Individuals with this diagnosis are also not exempted from the typical health conditions that affect other children without neurodevelopmental disabilities. Considering the social deficits and difficulty establishing social connections that is commonly associated with the diagnosis, this may affect their ability to cope with the effects of ACEs. Even without exposure to ACEs, ASD is associated with an increased rate of depression and less favorable social, academic, and health outcomes (Bethell et al., 2016; Kohane et al., 2012; Rigles, 2016). This study utilizes a nationally representative sample to identify any relationship between ACEs and resilience in the population of interest compared to a population with an isolated diagnosis of ASD or ADHD or adolescents without a neurodevelopmental disability.

In addition to challenges with social communication and non-verbal communication

behaviors, ASD is characterized with repetitive patterns in their behaviors and routines (APA, 2013). This difficulty they experience with changing their interests and routines can be significantly affected by the social instability caused by parental separation or divorce (Ahlers et al., 2017). According to Ahlers et al., anxiety and social isolation are commonly associated with ASD, and this is often magnified with ACEs such as parental separation or divorce. Kousgaard et al. (2018) documented significant marital strain in families with children with emotional and behavioral disorders like ASD as well as ADHD.

2.2 Attention-Deficit Hyperactive Disorder (ADHD)

As ASD has evolved over the years, similar shifts have occurred for ADHD, a neurodevelopmental disorder that is characterized by inattention (attention-deficit) and hyperactivity, with male children being predominantly diagnosed more than female children (Skogli, 2013). According to Barkley and Peters (2012), the diagnosis was first described by Melchoir Adam Weikard in the year 1775. The diagnostic criteria and nomenclature have also evolved, just like ASD. The labels used in the past were hyperkinetic reactions of childhood, attention deficit disorder. It was with the introduction of *DSM-III*, that the term ADHD was adopted (APA, 1987). In *DSM-IV*, ADHD was grouped into three types namely the ADHD-predominantly hyperactive-impulsive type, ADHD- inattentive type, and ADHD-combined type which is a class for individuals who manifested both hyperactive-impulse symptoms and inattentive symptoms (Martel, 2012). The evolution of this neurodevelopmental condition continued into the current manual which is the *DSM-5*, the most recent update to the manual (APA, 2013). Changes were made to the nomenclature used in describing the different types of ADHD, the age of onset was also modified to before age 12, and other changes in the presentation of the condition which was not clarified in previous manuals.

ADHD is associated with diminished quality of life outcomes such as reduced rates of academic success (Fried et al., 2016; Matoune et al., 2011), reduced employment (Adamou et al., 2013; Hills et al., 2015), and other health conditions. The hyperactive-impulsive symptoms seen in individuals with ADHD has been reported to correlate with their increased school dropout rate as well as increased occupational impairment (Fredriksen et al., 2014). According to APA (2013), individuals with a diagnosis of ADHD have an increased rate of being diagnosed with another mental health condition, compared to the general population. The mental health conditions that have been associated with ADHD include anxiety, depression, obsessive-compulsive disorders, and opposition defiant disorder (Sheppard et al., 2010).

2.3 Autism Spectrum Disorder and Attention-Deficit Hyperactive Disorder

While autism spectrum disorder is a diagnosis that commonly presents with significant challenges with social skills and communication development(Cavanaugh & Rademacher, 2014), Attention-deficit hyperactive disorder, according to the name has two major components. These two components are namely hyperactivity and impaired attention level (Cavanaugh & Rademacher, 2014). Just as the operational definitions and the general understanding have evolved over the years and keeps evolving, so also are the diagnostic criteria. Over the years, there have been some controversies in the criteria of making a diagnosis of attention deficit hyperactive disorder and autism spectrum disorder.

A few years ago, when the *DSM-IV* was used, ADHD was regarded as a disorder occurring in isolation from ASD. This has, however, changed since the use of *DSM-5* as ADHD can now be diagnosed in the context of ASD given the overlapping features of both disorders, ADHD-inattentive type being more common than ADHD-Combined type in individuals with ASD (Antshel et al., 2014). Whether ADHD is diagnosed in isolation or within the context of

ASD, this diagnosis has been associated with an increased propensity of having less successful life outcomes and developing a mental health condition in the future (George & Stokes, 2018). Jang et al. (2013) also suggest that those with a dual diagnosis have a reduced level of functioning and as such are more predisposed to other psychological disorders. Over the past few years, there has been an acknowledgment of the co-occurrence of ASD and ADHD but not a lot is known about how one diagnosis significantly affects the impairments associated with the other.

A handful of studies have investigated other related areas. Goldin et al (2013) did a comparison of tantrum behavior profiles in children diagnosed with ASD and ADHD while van Dongen et al. (2015) recorded the effects of this dual diagnosis on reward anticipation. Other studies focused on the structural brain abnormalities and their findings illustrated that ASD and ADHD share similar brain abnormalities, structurally and functionally (Rommelse et al., 2011), not to mention that the two conditions also have 50-72% overlap of contributing genetic factors (van Steijn et al., 2012).

Additional research has demonstrated the need to further study these two populations as co-occurring disorders. Gargaro et al. (2014) stated in their clinical study, that children with co-occurring ASD and ADHD experience an increased rate of emotional and behavioral problems compared to those with a single diagnosis. Another study that examined the quality of life in these individuals found that individuals with ASD and clinically significant ADHD were more likely to have less successful life outcomes compared to others with ASD or ADHD in isolation (Sikora et al., 2012). If individuals with co-occurring ASD and ADHD have a reduced quality of life and are more predisposed to less successful life outcomes when compared to individuals with no neurodevelopmental disability, this is an indication to study the subject of child resilience in

those with ASD and ADHD, especially given their background exposure to ACEs. Child resilience is such an important protective factor that can reduce their chances of developing other mental health challenges, thus increasing their chances of developing other mental health challenges improved functioning, participation, and success in school and other communities.

Just as ACEs have been rigorously studied over time, the concept of resilience has also been studied by researchers. This is no surprise given the need to circumvent the effects of these negative traumatic experiences, to alleviate or alienate some of the attended complications of ACEs. Resilience is not in any way inherent, rather it is a process (Masten, 2011). The American Psychological Association (APA) defines resilience as the ability of an individual to adapt well in the face of adversity, trauma, tragedy, threats, or even significant sources of stress (APA, 2014). The discussion of ACEs and resilience in this project is inadequate and incomplete without factoring in the interaction of the positive protective and negative risk factors that interact to determine one's ability to develop resilience especially in the population of interest in this study.

This is where the resilience model is key, as the model captures the intricate connections between the positive protective factors and the negative risk factors and helps to determine an individual's quality-of-life outcomes (Afifi & MacMillan, 2011; Martinez-Torteya, 2009). It suffices to state that resilience is not a binary concept, but the concept of resilience can be examined on a continuum as it is not a static variable. The environment plays an important role in determining how an individual develops resilience over time (Stokols et al., 2013). Ability to develop stable relationships cannot be overemphasized, being a strong protective factor.

This project is important, as it will help to investigate the relationships between exposure to ACEs, resilience, and school engagement and success. In the event these relationships are

established and properly understood, then the factors that promote the development of resilience in the population of study can also be explained. This presents opportunities to develop strength-based models that will emphasize the bolstering of strengths in adolescents with a co-occurring diagnosis of ASD and ADHD. A paradigm shift from just understanding the complications of ACEs in individuals to researching methods that promote resilience, especially individual resilience is essential. This is very crucial at this time, given the increasing separation and divorce rates, substance use disorders, amongst other forms of traumatic events that adolescents are exposed to. Besides, the need for a study of resilience in children, especially with respect to their health (mental and physical) has been pointed out (Rigles, 2017). For this current study, this is done with individuals who have a co-occurring diagnosis of ASD and ADHD and this study is thus critical and timely as it is needed to help fill this gap of knowledge in existing resilience literature.

There is a need to briefly consider the mental health of this population. As stated earlier, the ability of an individual to excel in life depends greatly on their mental health functioning (Hasson & Butler, 2020). The mental health of the parents is just as crucial as the mental health of their children since they affect one another. The ability of an adolescent to actively engage and succeed in school depends on their level of resilience and mental health status (Venta et al., 2019). Research shows that children with ASD or ADHD are predisposed to developing an emotional or affective disorder as adults, and the percentage for both affected populations could be as high as 35-50% (Kooji, 2012). This tendency to develop an emotional disorder like depression even extends into the aging population with a similar diagnosis (Michielsen et al., 2012). According to Nylander et al. (2013), affective disorders were commonly seen in individuals with ADHD, while psychoses were common amongst individuals with ASD. Most of

these adults with ADHD and ASD may have experienced some form of adverse childhood events, and a pre-existing history of ACEs contributes more to their risk of having a mental health condition given the primary diagnosis (Fuld, 2018). Also, having a parent with a mental health diagnosis stemming from whatever cause contributes significantly to the children's well-being.

2.4 Historical Background of Resilience

Human development is constantly being put in jeopardy because of events and adversities that surround people in any given environment and at any given point in time. As earlier highlighted, these events have both short-term and long-term consequences in the life of individuals. These consequences can trickle down to families and society at large. A multitude of children are constantly being affected by traumatic events both within and outside of their homes. United Nation Children's Emergency Fund (UNICEF, 2012) reported that millions of children are displaced every year because of conflicts and disasters. Millions of children are also being abused and neglected regularly, thus prompting the need to investigate factors that can help children develop resilience to escape the negative consequences that could arise from these exposures. These consequences include poor academic performances, less social engagement, substance use disorders.

To adequately understand the necessity of studying resilience in children, there is a need to briefly describe the historic events that propelled researchers to venture into resilience studies in children. Post-World War II (WW II), just like the field of rehabilitation was constituted to help returning veterans reintegrate into society, there was also a rapid shift of focus to find out about the welfare of children who were exposed to war. According to Masten (2014), many of these children were assessed by clinicians and were found to have varying levels of

psychological dysfunction. Studies were carried out to assess the mental health of children exposed to WW II, and some factors were identified to be more associated with the developmental of mental health problems in the group studied. As more researchers developed an interest and delved into this area of research, they found that children exposed to wars and traumatic events had varied outcomes and according to Cicchetti (2013), this led to even more studies to determine why some children fared better than other children despite being exposed to same events. Today, children continue to experience traumatic events in their lives, and as such, resilience in children should be studied, more so in those with a highly stigmatized medical condition like ASD/ADHD.

The word resilience is of Latin origin and derived from the word "resilire," which means "to rebound." Resilience is a term that has gained so much attention amongst researchers and scholars. It is a term that has been used to promote research in at-risk groups, considering exposure to adversities (Martinez-Torteya et al., 2009). There are different schools of thought on what exactly resilience is. While some literature has described it as a personal characteristic (Ahern et al., 2008), in some other literature, it is described as not static, but a process that can be influenced by the environment and as such is an interaction between personal and environmental factors (Cox et al., 2010). For a few others, resilience is an outcome that results despite adversities (Masten, 2001). Ungar (2008, p.225) provided a more robust definition of resilience and described resilience as ."..the capacity of individuals to navigate their way to health-sustaining resources, including opportunities to experience feelings of well-being, and a condition of the individual family, community and culture to provide these health resources and experiences in culturally meaningful ways."

2.5 Types of Resilience

As stated earlier, the term resilience has been studied in some detail over the decades and some types of resilience have been described by researchers based on their empirical findings. It is important to highlight these different types of resilience, so one can further appreciate the need to study individual resilience in adolescents with co-occurring diagnoses of ASD and ADHD, which is the scope of this study. Some of the types of resilience that are briefly described include family resilience, community resilience as well as child (individual) resilience. One cannot overemphasize the fact that resilience is not an inborn quality. In agreement with existing literature and as earlier highlighted, Egeland et al. (2009) clearly described resilience to be a process rather than just an inherent ability. Egeland et al. (2009) went further to state that resilience develops over a period and is often because of person-environment interactions, thus the need to explore the factors that may promote its development amongst adolescents. Since the concept of resilience has been studied by researchers, attempts have been made to better understand the concept and aid researchers in simplifying and narrowing the focus of their studies.

Part of the attempt to properly understand the phenomenon of resilience led to the categorization of resilience. Resilience has been classified into different categories in the literature and these categories include Individual resilience, Family resilience, Community resilience, and even resilience-based policies. Cross-cultural perspectives on resilience and Deployment resilience have also been described. According to Rak and Patterson (1996), "resiliency in children is the capacity of those who are exposed to identifiable risk factors to overcome those risks and avoid negative outcomes such as delinquency and behavioral problems, psychological maladjustment, academic difficulties, and physical complications."

2.5.1 Family Resilience.

McCubbin & McCubbin (1996) described Family resilience

> as the positive behavioral patterns and functional competence individuals and the family unit demonstrate under stressful or adverse circumstances, which determine the family's ability to recover by maintaining its integrity as a unit while insuring, and where necessary restoring, the well-being of family members and the family unit as a whole. (p. 5)

2.5.2 Individual Resilience

Individual resilience is "the capacity for successful adaptation, positive functioning, or competence … despite high-risk status, chronic stress, or following prolonged or severe trauma (Egeland et al., 1993). According to Kaplan et al. (1996, p. 158), resilience is primarily defined in terms of the "presence of protective factors (personal, social, familial, and institutional safety nets)" which enable individuals to resist life stress. To determine an individual's resilience level, this can be measured by determining the ratio between the presence of protective factors and the presence of hazardous circumstances (VanBreda, 2001).

Resilience in adolescents is a critical topic to investigate and a lot of scholarship currently exists that explored resilience in adults. While some research focused on exploring the development of resilience in adults with respect to the development of chronic illnesses like diabetes mellitus, hypertension (Filetti et al., 1998; Young et al., 2020), others have focused specifically on the development of mental health conditions (Hoover & Kaufman, 2018). All these studies have been carried out in neurotypical individuals, thus creating a need to delve into resilience in adolescence, more so, those with a dual diagnosis of ASD/ADHD, given the nature of their diagnoses and social interactions.

Families play a crucial role in the lives of children with special needs such as adolescents with ASD/ADHD. Due to the increasing (emotional, financial) needs of families with children

with ASD compared to families with children with no disabilities, family resilience is a crucial aspect of resilience to be considered. With respect to family resilience, Kahana et al. (2015) investigated family resilience among families with an individual with a diagnosis of ASD, and their findings revealed that resilient families were able to cope better with the adverse impact of quality-of-life stressors.

2.5.3 Community Resilience

Other than family resilience, community resilience is another concept that has been highlighted in the literature (Ye et al., 2020). While this is a vital concept and as such an important study to embark on, there is limited study on community resilience and ASD. However, this is beyond the scope of this paper. While all these aspects of resilience are important and should be studied, there is a need to adjust the focus of research from caregivers and the community to the individuals with the diagnosis and find out possible factors that helped or can help them develop resilience even at the adolescent level of development.

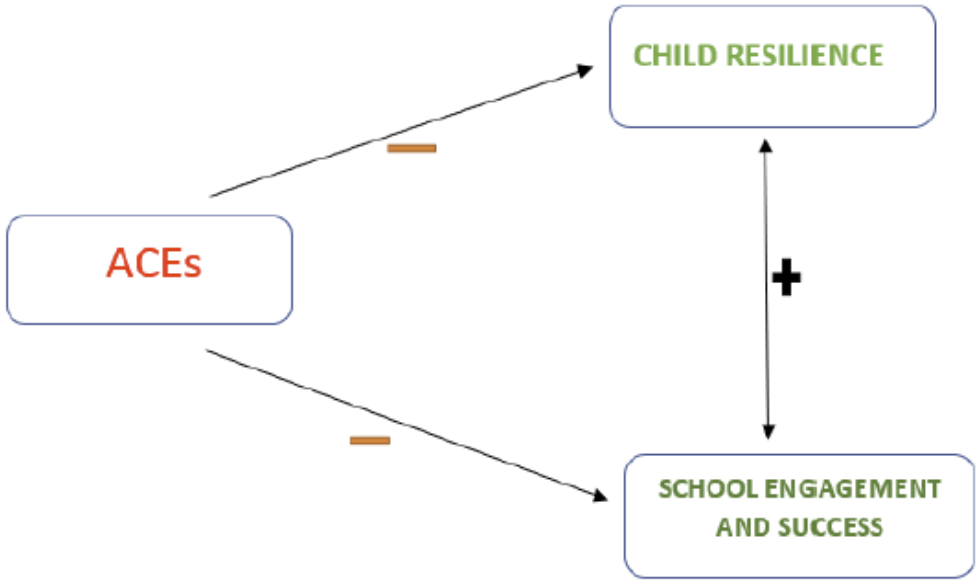
2.6 Positive Protective factors and Negative Risk Factors and Resilience

The primary goal of this study is to attempt to identify the factors that play a role in the development of resilience in adolescents with a co-occurring diagnosis of ASD and ADHD, which has never been done. The overarching aim is to bridge the existing gap in knowledge about ASD and ADHD and resilience and ACEs. Resilience is not a binary concept that can either be absent or present, however, it is a continuum (Masten, 2011). Individuals can be said to have high or low resilience (Poole, 2017; Sege & Browne, 2017) and can affect the quality of life and outcomes such as engagement and performances in school as illustrated in Figure 2.1. The resilience of any individual also varies depending on the context being examined, whether it is resilience at home, in the school environment, or within the community. While greater resilience

is associated with greater chances of positive mental health outcomes as well as improved quality of life outcomes (Ross et al., 2020), lesser resilience in any individual is associated with reduced quality of life outcomes and the accompanying mental health conditions such as anxiety, depression, PTSD (Schnarrs et al., 2020).

Figure 2.1

Relationships between ACEs, Resilience, and School Engagement and Success



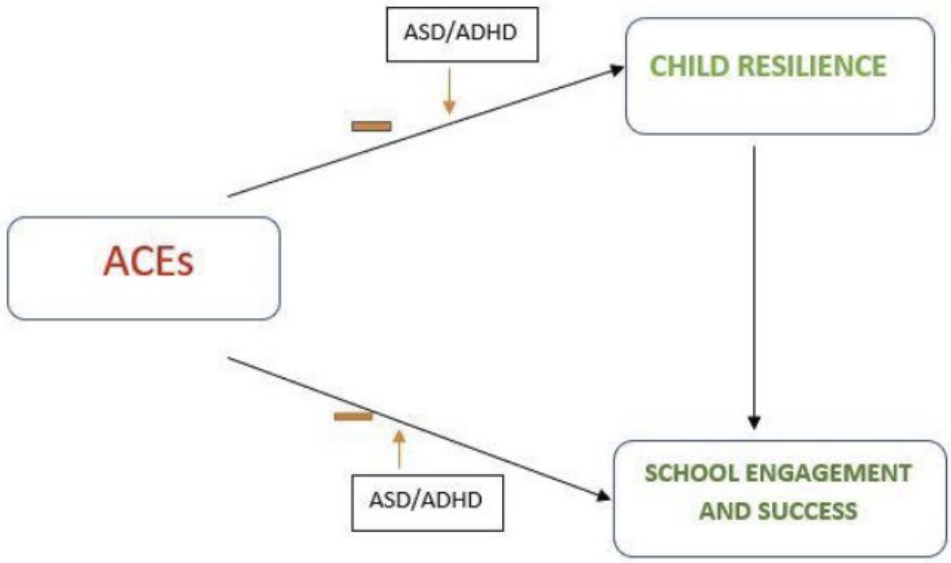
Note. Figure depicting the hypothesis of the current study.

In this study, individual resilience is examined using the concept of resilience that has been adapted by other researchers in the recent past. The concept of child resilience has been investigated in the past and some frameworks have been adapted to effectively measure child resilience. One of such frameworks is the Health Outcomes from Positive Experiences (HOPE) framework and this includes concepts that buttress positive protective factors as well as activities and community participation. The HOPE framework concepts, which exemplify the positive protective factors, studied in the data set have been previously used and validated (Bethell et al., 2019; Sege & Browne, 2017). The concepts include emotional competencies, safe and stable

neighborhoods, opportunities for social engagement in school and at home, and having nurturing relationships.

Figure 2.2

Possible Impact of Co-Occurring ASD/ADHD on Study Outcomes



Note. Figure illustrating the impact of ASD/ADHD diagnosis on study outcomes.

Negative risk factors that can affect resilience, school engagement and success, and other quality-of-life outcomes include negative social interactions, genetics, economic hardship, parental separation or divorce, parental death, household incarceration, witnessing household violence, witnessing neighborhood violence, household substance use, household mental illnesses (Bethell et al., 2016; Crouch et al., 2019; Filetti et al., 1998) and these are considered in detail in this study. Conversely, positive protective factors that can preserve an adolescent against developing already highlighted complications include opportunities for social engagement within their school and home environment, having nurturing relationships, living in a safe neighborhood, and lastly, learning emotional competencies as well as the individual's level of activities and community participation. According to Barrett (2020), emotional and

behavioral disorders as well as other mental illnesses impact adolescents and youths, thus presenting a need to study and explore these positive protective factors that can enhance the development of resilience in already stigmatized populations.

2.7 Resilience and Mental Health

When individuals continuously go through stressful conditions, especially over a prolonged period, there is neurobiochemical feedback, which results in a release of stress hormones in the body (Marinova & Maercker, 2015). These hormones, in the long term, have been implicated in developing mental health conditions, namely anxiety, depression, post-traumatic stress disorder (Marinova & Maercker, 2015). Developing resilience may alleviate the impact of adversities that individuals encounter in their daily dealings, especially in their childhood (Bellis et al., 2018). Resilience thus serves as a protective factor for mental health disorders, and the reverse is also true, and these changes can persist well into old age. Michielsen et al. (2013) reported depressive symptoms in older adults with ADHD. It is only logical to imagine that with an increased number of ACEs in an individual with a dual diagnosis of ASD/ADHD, comes a greater risk factor for a mental health disorder and thus the need to develop resilience.

2.8 Adverse Childhood Experiences (ACEs)

According to the CDC (2020), adverse childhood events or adverse childhood experiences (ACEs) are traumatic events that occur in an individual's life during an age of 0-17 years. Millions of children are constantly being neglected (Cicchetti, 2013). These ACEs can be physical, psychological, emotional, or sexual traumatic events, including abuse and neglect, household dysfunction (Felitti et al., 1998). Similarly, to having a diagnosis of ASD or ADHD or any other cognitive impairment, ACEs have been linked to the development of chronic mental

and physical health conditions, even substance use disorders (CDC, 2020). Significant literature has documented an inverse relationship between ACEs and resilience, as ACEs increases, resilience decreases, and this is the case for the general population (Rigles, 2016).

There are studies that have demonstrated an inverse relationship between resilience and ACEs in the ASD population (Rigles, 2017). According to Rigles (2017), in a study involving a population with an isolated diagnosis of ASD, it was found that individuals with ASD were more likely to experience more ACEs, but resilience is not associated with ACEs. It remains undetermined if this inverse relationship can be applied to adolescents with a co-occurring diagnosis of ASD and ADHD. For this project, the ACE count is applied, and the severity of the ACEs is examined using well-known categories, where 4 has been used as a cut point. The first category is individuals with less than 4 ACEs and the second category is individuals with 4 or more ACEs (Kerker et al., 2015; McKelvey et al., 2017). This well used ACEs category is used to address some research questions while the ACE count is implemented in addressing other questions.

2.9 Adverse Childhood Experiences and Quality of Life Outcomes

These ACEs have a negative impact on the overall well-being and quality of life of individuals, affecting academic success, employment, and marital outcomes, and another cascade of events. Studies have shown a high positive correlation between the number of ACEs and the possible negative outcomes on well-being (Felitti & Anda, 2010). Essentially, ACEs has a dose-response relationship with many other health conditions and other life outcomes (Chang et al., 2019)

2.10 School Engagement and Success

For any individual to function effectively, there is a role of active participation in their

community (Liberman, 2012). A known benefit of participation in one's immediate community is the establishment of social networks, which help in building one's social capital and support system (Alaimo et al., 2010). For the adolescent population, these relationships are important both within the school environment and home environment or any other environment that they operate in (Fox et al., 2010; Vella et al., 2013). Engagement within the school environment is critical since an adolescent spends most of their time at school. According to Tarvernor et al. (2012), to adequately measure an adolescent's quality of life outcome, their activity, emotional wellbeing, as well as physical wellbeing, must be taken into consideration.

Adolescent enrolled in primary or secondary education, spends an average of about 40% of their time in a day at school interacting with their school environment (Harding et al., 2015). This time is spent engaging with teachers, students as well as other educators and non-academic staff within the school environment. For some students, some portion of this time is dedicated to participation in extracurricular activities, such as sports, clubs, organizations within the school environment (Stearns & Glennie, 2010). School engagement has been directly linked to improved academic success among adolescent students (Farb & Matjasko, 2012; Seow & Pan, 2014). This level of active engagement while in the school environment is typical of adolescents without neurodevelopmental disabilities but research shows that children with ADHD or ASD do not participate as much as other students without neurodevelopmental disabilities (Kasari et al., 2011). Ingram et al. (2007) stated that individuals with ASD are more likely to be socially isolated in class and on the school playground.

Adolescents with a single diagnosis of ASD and ADHD are more predisposed to early school less successful performances (Kern et al., 2007). For those diagnosed with ADHD, the symptom of inattentiveness is directly linked to their poor academic performances (Zendarski et

al., 2017). This is further worsened by exposure to ACEs, stemming from an unstable family environment. Some adolescents with ADHD have a poor attachment to their parents, and this robs them of the positive protective factors that they need to be more resilient and excel in their academics (Mautone et al., 2011). The relationship strains those individuals with ADHD experience with their parents, teachers, and peers further set the stage for even more reduced performances in school when compared to individuals without neurodevelopmental disabilities Rushton et al., 2020).

Adolescents with a background of ACEs have been noted to have poor performance in school, even in the absence of any neurodevelopmental disability (Blodgett & Lanigan, 2018; Crouch et al., 2019) or any other form of prior mental health condition. It is noted in the literature that adolescents that demonstrate high resilience tend to engage and perform well in school activities (Motti-Stefanidi & Masten, 2013). However, the reverse is the case for adolescents with low resilience (Abolghasemi & Varaniyab, 2010). According to Bethell (2019), resilience acts as a mitigating factor between ACEs and school engagement, and school success. The literature to prove similar phenomenon in adolescents with a co-occurring diagnosis of ASD and ADHD is however lacking, thus the need to carry out a study like this current study to discover if resilience also serves as a mitigating factor between exposure to ACEs and school performance as well as engagement and to what extent.

2.11 Theoretical Model

In this section of the literature review, the major resilience theories are described and theories guiding the current research and understanding of the relationship between ACEs and resilience in adolescence are explained. Over the years, several theories have been used by researchers to explore and comprehend the relationship that exists between ACEs and resilience

in the general population, and they include the socio-ecological model (Masten, 2018), Attachment theory (Kinniburgh, 2017), life stress paradigm (Rigles, 2017). The ability for individuals to develop resilience is an interaction of multiple systems (Masten, 2014).

The socio-ecological theory emphasizes the fact that an individual's ability to develop resilience and adapt to traumatic situations is greatly influenced by systems around them such as connections to family and other relationships in the community as well as public policies (Henderson et al., 2016; Chen et al., 2012). According to Luthar et al. (2015), protective factors are available not only at the individual level but at the family and community levels. Even though the socioecological theory has been used in the literature to provide an understanding of ACEs and life outcomes, in this current study however, the theoretical concept is rooted in resilience theory.

2.12 Resilience Theory

In the field of rehabilitation and other related therapeutic professions, there is a focus on individual empowerment, and this can be built or rebuilt through positive psychology. This means that an individual can rise above life experiences such as ACEs and live an improved quality of life despite the adverse experiences. The importance of positive protective factors such as strong interpersonal relationships cannot be stressed enough. The resilience theory is vital to also examine as it tells the relationship between the positive predictive factors and the negative risk factors (ACEs in this study). The resilience theory helps to provide a holistic view of the interaction between ACEs and school engagement and success and overall quality of life outcomes of any individual.

Resilience theory was first postulated to explain the relationship between traumatic events and how these unpleasant life events impact individuals who experience them (van Breda,

2018). Antonvsky (1979) sought to find out why people who are exposed to the same stress end up being impacted differently, with one group adversely affected and the other not succumbing to their negative experiences. This culminated in the generation of the resilience theory in 1979. Resilience is beyond the ability to cope but also includes "the ability to cope within and across systems and processes (Crandall et al., 2019; Masten & Cicchetti, 2016). From 1979 till this moment, a lot of researchers have utilized this theory and conducted research that seeks to understand so many social and health issues. Examples of such studies include mental health outcomes secondary to adverse experiences (Crandall et al., 2019; Garmezy, 1971; Werner et al., 1967).

Although the concept of resilience implies interactions of different systems such as the individual, family, neighborhoods, and schools (Crandall et al., 2019), for this study, emphasis is on the individual component of resilience which is less studied. Resiliency theory is best suitable for this study because it provides a strengths-based focus to the issues of childhood traumatic events and this helps inform interventions targeted at this stage of development (Zimmerman, 2013). Zimmerman identifies some positive factors to include individual, social, and contextual factors, and these positive protective factors help to mitigate the effects of negative experiences. In this study, resilience is hypothesized to be a mitigating factor of mental health and school engagement or performances of adolescents with co-occurring ASD and ADHD, who have experienced ACEs. The outlined models above explain the relationships between ACEs and resilience. However, the attachment theory and resilience theory are both suitable in explaining the theoretical underpinnings of this current study.

2.13 Attachment, School Environment, Resilience and School Success

Attachment is the close emotional bond an individual develops while Autonomy is

shifting the power to the learner. Achievement is completing increasingly complex tasks, and a relationship of reciprocity is referred to as Altruism (Brendtro, 2019). As earlier highlighted, when an individual can establish great developmental relationships, then they can be more resilient and excel in life even given their history and exposure to traumatic events such as the ACEs in children. When individuals do not develop these essential elements and thus resilience, there is a tendency to have an individual who rather than thriving in life, will end up with reactive coping strategies and immature defense mechanisms, which could culminate into psychological and physical dysfunctions (Wang et al., 2020). This tends to result ultimately in poor life outcomes and chronic health conditions (Laczkovics et al., 2018; Wang et al., 2020).

Environmental factors can either impede or facilitate an individual's development of resilience more so in adolescents. Environmental factors such as social support can play a crucial role in the life of adolescence and determine if the individual can succeed in the present daily activities and has the potential to predict the quality-of-life outcomes in the individual given a background of ACEs. This concept can be applied in both individuals without neurodevelopmental disabilities as well as individuals with neurodevelopmental disabilities. The environments that are pertinent to the development of resilience in any adolescent include the family environment and school environment. When a child has adequate parental support, they tend to perform better in their life endeavors, whatever this might be. A study that investigated students' academic achievement revealed that perceived parental support correlated highly and strongly to students' performances (Ahmed et al., 2010). Another study explored the school environment and found that students with perceived peer and teacher support, performed remarkably well in their academic performances (Wentzel et al., 2012). These supports highlighted and other factors are necessary for the development of resilience in any individual,

more so in adolescents.

2.14 Role of Interventions in Improving Resilience and Educational Outcomes

The importance of interventions in improving life outcomes in individuals with emotional and behavioral outcomes cannot be over emphasized. The literature has examples of noteworthy interventions that have been used in enhancing outcomes of the population of focus in this study. Pfiffner et al. (2013) conducted a study where collaborative school-home behavioral intervention was implemented for ADHD. The intervention focused on classroom behaviors, social and independence skills and a pre- and post-survey were collected and there were significant improvements noted in the academic achievements, student engagement, amongst other life skills measured.

There also exists effective interventions for children with ASD and these are often targeted at different outcomes. While some interventions were effective, some interventions were said to yield below than expected outcomes. Mackay et al. (2017) conducted a study to help improve resilience and prevent depressive symptoms for young children with ASD. While the report gathered at the end of the study showed a significant improvement in parent reports of adolescent coping self-efficacy, six months post intervention, no improvement was noted on the depressive symptoms or mental health of study participants (Mackay, 2017). This calls for a need to engage in continuous data gathering which could pave way for a deeper understanding of the study population and ways to serve them better and enhance quality-of-life.

CHAPTER 3

METHODOLOGY

This study is a quantitative analysis that examines the relationships between adverse childhood experiences (ACEs) and resilience, school engagement, and success in adolescents with a co-occurring diagnosis of autism spectrum disorder and attention deficit hyperactive disorder (ASD/ADHD). To conduct this study, the research shows the relationships (if any) that exist between ACEs, and resilience, and school engagement and success by answering the research questions guiding this project. These questions are itemized below. The sampling procedure, participants as well as the methodological strategies, and study design are also detailed in this section.

3.1 Study Design

This is a quantitative study with a retrospective cross-sectional research design. A cross-sectional survey makes an inference about a population of interest at one point in time (Lavrakas, 2018). The objective of this study is to delineate the relationships between ACEs, resilience, school engagement, and success at a single point in time. Whether ADHD is diagnosed alone or together with ASD, there is an increased tendency to not perform well in school and a propensity of developing a mental health condition in this population (George & Stokes, 2018), thus the need to study this relationship at this time. Publicly available secondary data from the U.S Department of Health and Human Services, Health Resources and Services Administration (HRSA), Maternal and Child Health Bureau (MCHB) is utilized. The Maternal and Child Health Bureau annually collects health data indices from children across the states. The study was approved by the University of North Texas Institutional Review Board as exempt.

3.2 Participants

The data utilized in this study is called the National Survey of Children's Health (NSCH) and were collected using a two-phase multimode collection design. According to the CDC (2020), all addresses received an invitation letter with instructions for web participation. Participants who did not respond the first time were mailed a follow-up letter after some time. By using a multimode design, this entailed administering survey questionnaires to randomly selected households. The questionnaires could be administered online or in paper format and they were presented in two languages namely English and Spanish. A total of 52,229 surveys were completed by families and this was between 2017 and January 2018.

The two-phased multimode data collection process involved first, screening of the household to assess if they met the age eligibility, which was child or children ages 0-17 in the household. If that criterion was met, then only one child was randomly selected and the participant was directed to fill age-specific topical questions (Ghandour et al., 2018). The age-specific topical questionnaire can be filled online or in paper format, depending on the preference of the participant. The estimated average length of the survey was about 35 mins. The respondent was someone who knew about the child's health and health care needs (CDC, 2020). There was a good response in the year 2017/2018, with an online response rate of 77.9% and 22.1% for the paper instrument (NSCH codebook, 2018).

Given the nature of one of the research questions, all participants within the desired age range (12-17 years) were used for this study and this was the only inclusion criteria for the current study. This reduced the sample from 52,229 to 24,496 participants. The participants for the larger study were asked questions about the child's diagnosis of ASD and ADHD. According to the NSCH codebook, the adult participants (parents/guardians) were asked whether parents

were ever told by a health care provider that the child has attention deficit disorder/attention deficit hyperactivity disorder (ADD/ADHD); and, if the response to the previous question is "Yes," whether the child currently has the condition. Respondents were grouped according to whether they currently have ADD/ADHD. For the diagnosis of ASD, similar questions were asked, whether parents were ever told by a health care provider that the child has autism or another autism spectrum disorder; and, if the response to the previous question is "Yes," whether the child currently has the condition. Respondents were grouped according to whether they currently have autism.

Since some of the research questions specifically target the ASD/ADHD population, all those who answered "YES" to both having a diagnosis of ASD and ADHD are used to run some of the analysis.

3.3 Measures

Previously validated psychometric scales were utilized to measure the variables in the NSCH data (Ghandour et al., 2018). As stated in the NSCH codebook for 2017 data, the questionnaire topics covered demographics, health insurance coverage, health, and functional status, health care access and utilization, early childhood issues (0-5 years), middle childhood and adolescence issues (6-17 years), neighborhood and community characteristics, parent health status and family and family functioning. Altogether, two questionnaires were utilized, and the questions were designed by the team of researchers which included the Maternal and Child Health Bureau directors, survey design specialists, children's health researchers, family organizations representatives.

Two questionnaires were utilized in the larger survey, and they are namely (1) a household screener questionnaire and (2) an age-based topical questionnaire; T1 for ages 0-5

years, T2 for ages 6-11 years and T3 for ages 12-17 years (Karpur et al., 2019). However, for this study, which is streamlined to just adolescents, the collated data using the NSCH-T3 survey questions was utilized. The predictor variable for this study is ACEs while the latent outcome variable is resilience and school engagement and success.

The questionnaire used for the larger survey had 11 sections. Some of the sections are more relevant to the current study than other sections and the relevant ones are discussed in detail. The first and second sections had questions that were focused on the child's physical, emotional, and mental health. Questions in this section include in general, "how would you describe this child's health (the one named above)?" This was answered in a Likert scale form, from poor to excellent. Another question was "Has a doctor or other health care provider ever told you that this child has any other mental health condition?" And it was to be answered "YES" or "NO."

The third section of the questionnaire had questions on health care services while the fourth section had questions on the adult participants' experience with the child's health care providers. The child's health insurance coverage was the focus of the fifth section and some of the questions were "During the past 12 months, was this child ever covered by any kind of health insurance or health coverage plan? The sixth section was on providing for the child's health.

The emphasis of the seventh section was on the child's schooling and level of activities. There were seven items under this section, and they are as follows: "During the past 12 months, about how many days did this child miss school because of illness or injury? Include days missed from any formal homeschooling?" Participants answered using a Likert scale from "No missed school days" to "This child was not enrolled in school." During the past 12 months, how many times has this child's school contacted you or another adult in your household about any

problems he or she is having with school? And the options were “None,” “1,” and “2 or more times”; Since starting kindergarten, has this child repeated any grades? “Yes” or “No.”

Other questions in the seventh section were “During the past 12 months, how often did you attend events or activities that this child participated in?” The options ranged from “always” to “never”; During the past 12 months, did this child participate in (a) sports team or did he or she take sports lessons after school or on weekends, (b) any clubs or organizations after school or on weekends, (c) any other organized activities or lessons, such as music, dance, language, or other arts, (d) any type of community service or volunteer work at school, place of worship, or in the community, (e) any paid work, including regular jobs as well as babysitting, cutting grass, or other occasional work?

The questions on participation and activity continue as follows; “During the past week, on how many days did this child exercise, play a sport, or participate in physical activity for at least 60 minutes?” Compared to other children his or her age, how much difficulty does this child have making or keeping friends? “A little difficulty, A lot of difficulty” compared to other children his or her age, how much difficulty does this child have making or keeping friends? Options were “no difficulty,” “a little difficulty,” “a lot of difficulty.”

Section 8 was about the adult participant and the child, and the questions centered on the demands the participant has experienced taking care of the child such as “During the past 12 months, was there someone that you could turn to for day-to-day emotional support with parenting or raising children?” “How well do you think you are handling the day-to-day demands of raising children?” Other questions were related to the child’s well-being.

The ninth section has questions about the family and household and there were about thirteen items. Items 1and 6 focused on family cohesion, exploring activities done together as a

family. “During the past week, on how many days did all the family members who live in the household eat a meal together? Options were in days “0.” “1-3,” “4-6,” “every day.” Item 6 was “When your family faces problems, how often are you likely to do each of the following: (a) Talk together about what to do, (b) work together to solve our problems, (c) Know we have strengths to draw on, (d) stay hopeful even in difficult times? The options were “all of the times, most of the time, some of the time, none of the time.” Items 2 and 3 were about smoking within the household. Items 4 and 5 were about the use of insecticides and the presence of mold or mildew on surfaces in the home.

Items 7, 8, and 9 focused on the family’s financial capabilities such as being able to provide food and housing. Items 10, 11, and 12 focused on neighborhood safety and community cohesion and the questions were as follows; (a) sidewalks or walking paths? (b) a park or playground? (c) a recreation center, community center, or boys’ and girls’ club? (d) a library or bookmobile? (e) litter or garbage on the street or sidewalk? (f) poorly kept or rundown housing? (g) vandalism such as broken windows or graffiti?

Item 11 was “To what extent do you agree with these statements about your neighborhood or community;(a) people in this neighborhood help each other out, (b) we watch out for each other’s children in this neighborhood, (c) this child is safe in our neighborhood, (d) when we encounter difficulties, we know where to go for help in our community, (e) this child is safe at school and the answer options given were “definitely agree,” “somewhat agree,” “somewhat disagree,” “definitely disagree.” Item 12 was “Other than you or other adults in your home, is there at least one other adult in this child’s school, neighborhood, or community who knows this child well and who he or she can rely on for advice or guidance?” Yes or No.

The last item on this section centered on ACEs and participants were given the option to

not answer questions on this section, because it may result in the recollection of painful past events in the child's life. "To the best of your knowledge, has this child ever experienced any of the following; (a) parent or guardian divorced or separated, (b) parent or guardian died, (c) parent or guardian served time in jail, (d) saw or heard parents or adults slap, hit, kick, punch one another in the home, (e) was a victim of violence or witnessed violence in his or her neighborhood, (f) lived with anyone who was mentally ill, suicidal, or severely depressed, (g) lived with anyone who had a problem with alcohol or drugs, (h) treated or judged unfairly because of his or her race or ethnic group? The participants were to give a "YES" or "NO" answer to each question.

The last section had questions on the caregivers and household information such as their sex, source, and level of income, level of education.

1. Is there a significant difference between adolescent participants with a diagnosis of ASD or ADHD when compared to individuals with a co-occurring diagnosis of ASD and ADHD as it relates to their exposure to ACEs? (Using ACEs grouping of ACEs < 4 and ACEs > 4)
2. Does ACE predict school engagement and success and does this relationship vary among adolescents screened for both ASD/ADHD and ASD or ADHD?
3. Does ACE predict resilience and does this relationship vary among adolescents screened for both ASD/ADHD and ASD or ADHD?

3.4 Demographic Variables

A demographic questionnaire was also administered to the participants. They were asked to give information on the following: age, sex, race/ethnicity, origin, presence, or absence of diagnoses of ASD, ADHD. The diagnoses were binary and so coded as 0 = No, 1= Yes. A new variable was created for those with ASD/ADHD, coded as 2. The race/ethnicity variable was coded as 1= "Hispanic," 2= "White non-hispanic," 3= "Black non-hispanic," 4= "All others." , sex was coded as 0 = "male," 1 = "female," age was a continuous variable ranging from age 12

to 17, and parent's level of education was coded as 1 = "less than high school," 2 = "high school graduate," and 3 = "more than high school." Sociodemographic data such as age, gender, Depression or Anxiety in the child participant, household income, Adult's physical and mental health status, parental educational status serve as control variables.

3.5 Dependent Variables

The latent outcome variable is resilience and school engagement and success. Resilience was measured for children ages 6–17, however, for this study, only the adolescents (12-17) were included in the analysis. To ascertain resilience, questions were developed internally by an NSCH Expert Panel (2011/2012 CSHCN 2013). The concept of resilience is meant to capture dimensions of physical, mental, and emotional health, as well as empathy and caring (Rigles, 2017). The child resilience is examined using concepts that have been utilized and validated in the past by researchers of resilience who also used the NSCH data set (Rigles, 2017, Elmore et al., 2020). The Health Outcomes from Positive Experiences (HOPE) framework used in older studies (Bethell et al., 2019 & Sege & Browne, 2017) include concepts like learning emotional competencies, opportunities for social engagement, having nurturing relationships, and developing in a safe and stable environment. Specific questions in the data to measure "child resilience" include: (1) child stays calm and in control when faced with a challenge, (2) child finishes and follows through with plans, (3) child shows curiosity and interest in learning new things. These questions were measured on a similar Likert scale and participants responded using one of the following: "Always," "usually," "sometimes," "never." A new variable, Child resilience was computed by summing up the three items above. In this study the reliability analysis resilience was .74[10] respectively.

School engagement and success is measured by assessing whether the child (1) cares

about doing well in school, and (2) completes all required homework, during the previous month (Data Resource Center for Child and Adolescent Health, 2013). Lastly, (3) since starting kindergarten, has this child repeated any grades? The first two items, measured in a Likert scale, were used to assess School engagement. A new outcome variable, school engagement was computed by summing items (1) and (2) above and a reliability analysis was conducted and the Cronbach's α for School engagement was .80[10]. The question on repeating a class (Item 3) was used as a categorical variable to measure School Success.

This concept of school engagement and success has been used and validated and the NSCH was also utilized in literature (Bethell et al., 2014)

3.6 Independent Variables

The independent variable of interest is the child's adverse childhood experiences. Some ACEs questions included in the survey questions are (1) How often has it been hard to get by on your family's income—hard to cover basics like food or housing, (2) Child lived with a parent who got divorced/separated after he/she was born, (3) Child lived with parent who die, (4) Child lived with parent who served time in jail after he/she was born, (5) Child saw parents hit, kick, slap, punch or beat each other up, (6) Child was a victim of violence or witnessed violence in his/her neighborhood, (7) Child lived with anyone who was mentally ill or suicidal, or severely depressed for more than a couple weeks, (8) Child lived with anyone who had a problem with alcohol, (9) Child was ever treated or judged unfairly because of his/her race or ethnic group. The hypothesized moderating effect of ASD/ADHD on the association between ACEs and resilience. The other ACE variables were binary coded as 0 = "no," and 1 = "yes."

The ACEs examined in the data set were economic hardship, parental separation or divorce, parental death, household incarceration, witnessing household violence, witnessing

neighborhood violence, household substance use, household mental illness. To adequately explore the impact of ACEs on the study outcomes, the ACEs are studied individually and collectively. For this project, the ACE count is utilized, and severity is determined using already established categories in the literature, where 4 is used as a cut point. The first category is individuals with less than 4 ACEs and the second category is individuals with 4 or more ACEs (Kerker et al., 2015; McKelvey et al., 2017). The ACE count as well as the ACE grouping is utilized in addressing the research questions. The reliability index analysis was conducted for ACE questionnaire and the Cronbach's $\alpha = .70$)[10]. The NHSC- ACEs questionnaire has also been validated by previous researchers (Bethell et al., 2017).

While there is a growing body of literature regarding resilience as it related to an ASD (Jang et al., 2013), there is a dearth of investigations of the impact of ACES on the development of resilience and the combined impact on community participation among adolescents with the co-existing diagnoses of ASD and ADHD. It would be interesting to find if any type of ACEs impacts these study outcomes more than others. This study fills the existing gap in the literature by utilizing a nationally representative sample and examining specifically child resilience for adolescence aged 12-17 and exploring the relationships between exposure to ACEs and resilience factors in co-existing ASD and ADHD population. Since there is no existing study to ascertain this, this study hypothesizes that adolescents with exposure to ACEs with no positive protective factors or experiences will have low resilience. This will be associated with an elevated likelihood to be diagnosed with a mental health condition in the future and vice versa.

3.7 Data Analysis

3.7.1 Missing Data Analysis

Considering that there are cases of missing data in this data set, there are analyses to help

manage these missing cases. This is to prevent spurious conclusions that can result from undue biases post-data analysis. Missing data are usually classified as missing at random (MAR) missing completely at random (MCAR) or missing not at random (MNAR). For this project and analysis, the MCARs test is used.

3.7.2 Preliminary Data Analysis

Other than managing missing cases, there is a need to ensure that the data to be used meets some appropriate statistics to effectively run the proposed test in any study. Commonly, outliers tend to exist in the data set, and it is always ideal to manage them (Asparouhov & Muthén, 2010). The data was examined to ensure it is normally distributed and to do this, skewness and kurtosis of the data was studied. Very importantly, the data was inspected for homogeneity of variance (O'brien, 1979). Should there be a violation of any of these, appropriate post-hoc tests were conducted. The G-power software was utilized in this preliminary analysis as this helped to ascertain the appropriate sample size for the main analysis. Parameters used in this preliminary analysis included the *t*-tests, statistical means which show the difference between any two-independent means. The two-tailed, effect size (d = .20, small), $\alpha = 0.05$, $\beta = .80$, the sample size required for the study is a minimum of 400 participants.

3.7.3 Primary Data Analysis

The data was cleaned, and as earlier highlighted, missing data were identified and managed adequately. IBM SPSS version 27 was used for the data analyses. A descriptive analysis was conducted and this highlighted the demography of participants such as child age, gender, race/ethnicity, as well as their educational level of the parents. Other demographic information includes the respondent's relationship with the child, family income level, and these demographic factors were all treated as confounders. Also, to be highlighted in the descriptive

analysis is the types of adverse childhood events experienced by the selected participants. According to Pampel (2020), regression analysis is considered suitable in this study because there are binary dependent and continuous independent variables in the dataset. Therefore, the binary logistic regression was conducted to analyze the relationship between the dependent variables and independent variables. Also, important to consider is the effect size and this tells the variance accounted for in the outcome variable and also the extent of the differences that exist between groups compared (Coe, 2002).

A basic Pearson correlation was computed to ensure strong correlations between the predictor and outcome variables, which are ACEs, school engagement and success, and resilience. According to Ratner (2009), variables will be considered to have a strong correlation if the Pearson correlation is 0.7 or greater. As used by most studies in the social and behavioral sciences, the *p*-value was set at .05 for the relevant statistical analysis. A simple chi-square test was conducted to tell the difference between ASD, ADHD, and ASD/ADHD given the categorical variable, cumulative exposure to ACEs.

3.7.4 Statistical Assumptions

To effectively address the research questions, chi-square analysis, linear regression, and binary logistic regression were done, and some statistical assumptions were met prior to the analyses. According to McHugh (2013), to conduct a chi-square analysis, the variables of interest must be categorical variables. It was also stated that the variables should be two or more categorical independent groups. In this dataset, ACEs group of less than 4 and those of greater than 4 were both independent groups and categorical in nature. The expected counts should also be 10 or greater and in the event, the expected counts are less than the desired number, but found to be more than 5, Yates correction is to be utilized. McHugh further stated that in the event, the

expected counts are less than 5, a Fisher exact test is to be applied. These rules stated for a chi-square analysis was adhered to in the running of this chi-square test. Before the regression analyses were conducted, a correlation analyses were carried out to rule out multi-collinearity of variables in this study.

CHAPTER 4

RESULTS

The purpose of this research was to determine the difference among adolescent participants with (a) a diagnosis of autism spectrum disorder (ASD), (b) a diagnosis of attention deficit hyperactive disorder (ADHD), and (c) a co-occurring diagnosis of ASD and ADHD (ASD/ADHD), as it relates to their exposure to adverse childhood experiences (ACEs) (using two groups namely ACEs < 4 & ACEs > 4), and to investigate if ACEs predict school engagement and success and how that relationship varies between adolescents screened for both ASD, ADHD (individual diagnoses) and ASD/ADHD (co-morbid diagnoses); and lastly to explore if ACEs also predicts resilience and how this relationship also varies between adolescents screened for both ASD, ADHD and ASD/ADHD. In this study, various statistical analyses were applied to answer the relevant research questions. Simple descriptive analyses were computed along with correlational, regression analyses to determine the variance as well as the effect size of the variables in the study.

4.1 Descriptive Analyses

Table 4.1 presents descriptive data on the sample and mean scores on continuous variables used in this study.

Table 4.1

Descriptive Statistics for Dependent Continuous Variables (N = *24,496)*

Variable	M	SD	Skewness	Kurtosis
Child resilience	10.12	1.77	-.98	.86
School Engagement	7.01	1.32	-1.30	1.02

4.2 Preliminary Analyses

Data was cleaned and the eight ACE questions were recoded into dichotomous variables. Participants with ASD, ADHD, ASD/ADHD were also recoded into binary variables. For those who answered yes to a diagnosis of ASD, it was coded as "1," while those who answered "no" to this question were coded as "0." The Little's MCAR test was used to diagnose the nature of the missing data and the Little's MCAR test chi square was not statistically significant as $p > .105$. According to Carter (2006), when the test is not statistically significant, this means the missing data were only at random and can be managed by listwise deletion. Missing cases were managed by listwise deletion since the cases were only missing at random. Listwise deletion is an acceptable method of managing randomly missing cases (Carter, 2006). Table 4.2 reviews the ACE items included in the analysis.

Table 4.2

ACE Questions in the 2017/2018 National Survey of Children's Health

Adverse Childhood Experiences
1. Parent or guardian divorced or separated
2. Parent or guardian died
3. Parent or guardian served time in jail
4. Saw or heard parents or adults slap, hit, kick, punch one another in the home
5. Victim/witness of neighborhood violence
6. Lived with anyone who was mentally ill, suicidal, or severely depressed
7. Lived with anyone who had a problem with alcohol or drug
8. Treated or judged unfairly because of his/her race or ethnic group

The predictor variable in this study is ACEs and that was used in the grouping of the participants, to answer Research Question 1, which essentially seeks to find if there is a difference across the three groups, namely those with ASD, ADHD and a co-occurring diagnosis of ASD/ADHD. Table 4.3 details the demographic characteristics of the study population, with *N*

= 24,496. The study sample included only adolescents who are between ages 12-17. There was an almost equal distribution in the gender of participants in this study, even across the diagnoses. White non-Hispanics accounted for greater than 70% of the each of the population studied (ASD, ADHD, and ASD/ADHD). Ninety-one point six percent of study participants with a diagnosis of ASD had another chronic health condition, while those with ADHD and ASD/ADHD who had other chronic conditions were 28.3% and 80.3% respectively. Over 50% of the children lived in a household with a guardian who had a college degree or higher.

Table 4.3

Characteristics of Participants (N = *24,496)*

Characteristics		ASD	ADHD	ASD/ ADHD
Characteristics of Child				
Gender	Males	48.0	51.9	48.2
	Females	52.0	48.1	51.8
Race/ethnicity	Hispanics	10.7	11.1	9.6
	White non-Hispanics	72.1	70.1	73.6
	Black non-Hispanics	6.3	6.8	7.2
	All others	11.0	12.0	9.6
Other chronic health conditions	None present	2.7	48.5	4.8
	1 Health condition	5.6	23.2	14.9
	>1 Health condition	91.6	28.3	80.3
Characteristics of Respondent				
Family Structure	Two parents, married	64.5	70.4	63.6
	Two parents, not married	6.2	5.6	6.4
	Single parent	23.5	19.9	23.5
	Grandparent household	4.8	3.0	4.8
	Other family type	1.1	1.2	1.8
Highest Level of Education	Less than high school	1.7	2.8	2.2
	High school or GED	14.1	14.3	15.4

(table continues)

Characteristics		ASD	ADHD	ASD/ ADHD
	Some college or Tech sch	28.2	24.0	28.2
	College degree or higher	56.0	59.0	54.3
Poverty or income level	0-99% FPL	14.6	11.5	13.5
	100-199% FPL	19.8	15.2	17.2
	200-399% FPL	31.1	29.7	29.2
	400% FPL or greater	34.5	43.6	40.1
Gender of Primary Caregivers				
Adult 1	Male	62.9	61.5	64.0
	Female	37.1	38.5	36.0
Adult 2	Male	26.8	32.4	26.6
	Female	73.2	67.6	73.4

Note. All expressed in percentages.

It is also important to take note of the number of ACEs participants are exposed to, to determine severity. The ACE grouping of 4 or < and > 4 was utilized in providing an answer to research question.

Table 4.4

Types and Number of ACEs Participants are exposed to

ACE Exposure		ASD	ADHD	ASD/ ADHD
Number of ACEs	zero	56.9	57.3	30.6
	< 4	40.5	40.4	55.9
	> 4	2.6	2.3	13.6
Types of ACEs	Racial/ethnic discrimination	6.2	5.0	6.2
	Parental death	6.8	4.8	7.5
	Parental separation/divorce	**38.6**	**30.4**	**40.7**
	Parental substance use disorder	**15.3**	**12.3**	**19.6**
	Exposure to domestic violence	10.3	6.6	11.4
	Exposure to neighborhood violence	7.4	5.5	10.2
	Parent served a jail term	9.4	8.0	14.2
	Parent with mental illness	**23.3**	**11.4**	**20.8**

Table 4.5

Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
ASD	-																		
ADHD	-																		
ASD/ADHD	.907**																		
Child Resilience	-.294**	-.326**																	
School Engagement	-.331**	-.346**	.624**																
Class repeat (SchSuccess)	.164**	.170**	-.151**	-.158**															
ACE score	.158**	.149**	-.203**	-.216**	.132**														
ACE grouping	.107**	.100**	-.138**	-.141**	.104**	.741**													
ACEdivorce	.100**	.097**	-.141**	-.160**	.084**	.668**	.330**												
ACEjail	.108**	.092**	-.121**	-.127**	.12**	.6311**	.554**	.317**											
ACEneighviol	.097**	.086**	-.105**	-.125**	.084**	.532**	.488**	.196**	.259**										
ACEdrug	.094**	.082**	-.142**	-.141**	.076**	.689**	.531**	.306**	.409**	.272**									
ACEdeath	.055**	.053**	-.063**	-.067**	.074**	.323**	.216**	.088**	.150**	-.088**	.130**								
ACEmhealth	.127**	.135**	-.146**	-.144**	.059**	.594**	.443**	.230**	.220**	.244**	.367**-	.108**							
ACEdomviol	.087**	.083**	-.119**	-.118**	.077**	.623**	.603**	.291**	.378**	.352**	.373**	.091**	.275**						
ACEdiscrim	.026**	.025**	-.042**	-.053**	.028**	.321**	.213**	.086**	.094**	.166**	.088**	.037**	.115**	.105**					
Family structure	.074**	.071**	-.129**	-.137**	.103**	.489**	.287**	.536**	.318**	.176**	.255**	.285**	.156**	-.238**	.084**				
Poverty level	-.036**	-.046**	.118**	.105**	-.123**	-.230**	-.144**	-.215**	-.198**	-.114**	-.093**	-.107**	-.085**	-.131**	-.055**	-.323**			
Highest level of education	-.028**	-.023**	.136**	.113**	-.114**	-.167**	-.101**	-.157**	-.175**	-.089**	-.082**	-.102**	-.025**	-.090**	-.008	-.274**	.440**		
Race/ethnicity	-.001	.001	.017	.007	.002	.066**	.049**	.018**	.046**	.046**	.005**	.032**	.014**	.044**	.145**	.058**	-.016**	.039**	
National Outcome of CSHCN	-.422**	-.452**	.261**	.243**	-.118**	-.174**	-.113**	-.087**	-.092**	-.107**	-.113**	-.048**	-.182**	-.089**	-.056**	-.069**	.037**	-.009	-.007

**Correlation is significant at the .01 level (2 tailed). *Correlation is significant at the .05 level (2 tailed).

4.3 Research Question 1

Is there a difference among adolescent participants with (a) a diagnosis of ASD (b) a diagnosis of ADHD, and (c) a co-occurring diagnosis of ASD and ADHD, as it relates to their experience with ACEs (using two groups namely ACEs < 4 & ACEs > 4)?

To effectively address this research question above, a chi-square test of independence was used to ascertain if truly there is a difference in the way ACEs is experienced among the populations of interest. For this research question, the ACEs grouping was done to show the possible effect of having a certain number of ACEs. Just as previously done in some studies in the past (Crouch et al., 2019; Campbell, 2020), two groups were used namely those who had 4 or < ACEs and those who had experienced > 4 ACEs. Prior to running the chi-square test, the three diagnostic criteria of choice in the study, ASD, ADHD, and a co-occurring diagnosis of ASD/ADHD were all classified using the ACE groupings previously described.

For participants with ADHD, their expected count differed greatly from the count in the ACEs grouping used for the study, chi-square $\chi 2$ (1, N = 20786) = 238.950, $p < .001$. This shows that the ACE grouping for individuals with ADHD were statistically significant. For those with ASD, their expected count differed greatly from the count in the ACEs grouping used for the study, $\chi 2(1, N = 20924) = 19.059$, $p < .001$. This was however not the case for participants with a co-occurring ASD/ADHD, $\chi 2(1, N = 3361) = .083$, $p > .05$. The total and expected counts are shown in Table 4.6. The chi-square result shows that there is a relationship between the ACEs groupings and the diagnoses.

Table 4.6

Results of the Chi-Square Analysis

			ASD		ADHD		ASD/ADHD	
			No	Yes	No	Yes	No	Yes
ACE Grouping	<4 ACEs	Count	19053	684	16954	2651	2635	350
		Expected Count	19025.8	711.2	16772.6	2832.4	2633.3	351.7
		% within grouping	96.5	3.5	86.5	13.5	87.8	11.7
	>4 ACEs	Count	1117	70	829	352	330	46
		Expected Count	1144.2	42.8	1010.4	170.6	331.7	44.3
		% within grouping	94.1	5.9	70.2	29.8	87.8	12.2
Total	Count		20170	754	17783	3003	2965	396
	Expected Count		20170	754	17783.0	3003.0	2965.0	396.0

4.4 Research Question 2

Does ACE predict school engagement and does this relationship vary among adolescents screened for both ASD/ADHD and ASD or ADHD? (b) Does ACEs predict school success and does this relationship vary among adolescents screened for both ASD/ADHD and ASD or ADHD?

Linear regression was used to address the first part of the question on school engagement, while a logistic regression was used for the second part of the question on school success, given that the outcome is a categorical variable. For Research Question 2a, a binary logistic regression was used and according to Harrell (2015), some assumptions stated were met to run a binary logistic regression. Firstly, the outcome variable, *school success* is a binary variable. It was measured with class repeat and this was coded "0" for "No" and "1" for "Yes." Secondly, the independent variables in this analysis were independent of one another. Also, using the diagnostic collinearity, multi-co-linearity of the variables of choice was not detected. According to Harrell (2015), binary logistic regression should be applied only to massive sample sizes and this sample met this criterion as well. Table 4.7 shows the coefficients (standardized and unstandardized) for ASD, ADHD, and ASD/ADHD, respectively.

Table 4.7

Coefficients for Model 1 (Dependent Variable = School Engagement)

	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
ASD					
(Constant)	**7.229**	.011		685.719	.000
ACE score	-.210	.007	-.208	-31.111	.000
ASD	**-1.186**	.047	-.167	-25.051	**.000**

(table continues)

	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
ADHD					
(Constant)	**7.318**	.010		700.112	.000
ACE score	-.170	.007	-.169	-25.758	.000
ADHD	**-1.141**	.025	-.305	-46.579	**.000**
ASD/ADHD					
(Constant)	**7.331**	.010		703.488	.000
ACE score	-.170	.007	-.169	-25.966	.000
ASD/ADHD	**-.983**	.020	-.322	-49.553	**.000**

Table 4.7 shows that there is a negative relationship between ACE scores and School Engagement and the same also applies to ASD, ADHD, and ASD/ADHD, although ASD/ADHD was a better predictor of School Engagement. In the series of linear regression conducted, using the beta weights, a co-occurring diagnosis of ASD/ADHD had the highest beta weight of .32, compared to ASD .17 and ADHD .31. However, using the unstandardized structure coefficients, ASD was a better predictor of school engagement compared to ADHD, ASD/ADHD.

The model predicting the regression of ACE Scores against School Engagement for participants with ASD/ADHD was statistically significant, with $p < .001$. The structural coefficient of ASD/ADHD variable was -.98 while that of ACE score was -.17. The beta weight of ASD/ADHD was -.32 while that of ACE score was -.17 and both variables were statistically significant. The regression result was also statistically significant, $F(20, 20622) = 1798.198$, $p < .001$, with $R^2 = .15$ and the adjusted $R^2 = .15$ (see Table 4.8). This further confirms that the model provides a good fit for the data. In this model, ASD/ADHD accounts for 15% of School Engagement among participants. ASD/ADHD explained the most variance in School Engagement. The model for ADHD and ASD explained 13% and 7% variance, respectively.

Table 4.8

Model 1 Summaries for ASD, ADHD, ASD/ADHD

	R	R^2	Adj R^2	Std. Error	R^2 Change	F Change	df1	df2	Sig. F Change
ASD/ ADHD	.385	.148	.148	1.21369	.148	1798.198	2	20622	.000
ADHD	.372	.138	.138	1.22039	.138	1103.972	3	20617	.000
ASD	.273	.075	.074	1.26518	.075	836.360	2	20754	.000

For Research Question 2b, a binary logistic regression was used to ascertain the relationship between ACE score and School Success in participants with ASD, ADHD, ASD/ADHD. The model predicted the overall percentage to repeat a class, having the predictor, ACEs score, to be about 93.7%. When ACEs Count was included alone in the model, the step 1 model shown in Table 4.9, the logistic regression had a $p < .05$, and this indicated a good fitness of the model to the data. Although the pseudo R^2, Nagelkerke was .036.

Table 4.9

Classification Table

		Class repeat		Predicted Percentage Correct
		No	Repeat	
Step 1: Observed Class repeat	No	19077	20	99.9
	Repeat	1272	3	.2
Overall Percentage				93.7

When the diagnosis of co-occurring ASD/ADHD was included in the variable, the omnibus test for the model was still statistically significant indicating a good fitness of model. The Nagelkerke R^2, however now increased to .080, explaining 8% of the variance in School Success. When ASD/ADHD was analyzed with ACE scores and the ACE grouping, the model

showed that participants with ASD/ADHD are almost three times more likely to repeat a class and this exponential B value was statistically significant, $p < .05$. While the cumulative ACE score was statistically significant, ACE grouping was not.

In this logistic analysis, some control variables were used, and they include family structure, poverty level of the household, highest level of education of the reported adults, race, and the national outcome measure of percentage of children with special health care needs. When these control variables were added to the model, the model remained statistically significant. All of the control variables individually were also statistically significant except the race of the participants. Results from the omnibus tests of model coefficients showed that the model including predictor variables is a significant improvement from the one that did not include any predictor variables (X^2=892.449, *df*=7, *p*=0.00).

Table 4.10

Variables in the Equation for ASD/ADHD (Step 1)

	B	S.E.	Wald	df	Sig.	Exp(B)
ACE score	.142	.033	18.446	1	.000	1.153
ASD/ADHD	.804	.057	195.818	1	.000	**2.233**
Family structure	.064	.032	4.120	1	.042	1.066
Poverty level of this household based on DHHS guidelines - Imputed	-.252	.031	64.395	1	.000	.777
Highest level of education among reported adults	-.300	.037	66.798	1	.000	.741
Race/ethnicity categories	-.004	.022	.038	1	.845	.996
National Outcome Measure 17.1: Percent of children with special health care needs (CSHCN)	-.395	.071	31.227	1	.000	.674
Constant	-.872	.196	19.761	1	.000	.418

a. Variable(s) entered on step 1: ACE score, ASD/ADHD, Family structure, Poverty level of this household based on DHHS guidelines - Imputed, Highest level of education among reported adults, Race/ethnicity categories, National Outcome Measure 17.1: Percent of children with special health care needs (CSHCN).

When ADHD was regressed against School Success, the analysis showed that participants with ADHD were also almost 3 times likely not to succeed in a class, which was measured by repeating a class. Control variables like family structure, poverty level, and the highest level of education among reported adults played a statistically significant role in this result; with family structure playing more role than the other control variables. In terms of ACEs, only the cumulative ACE score was statistically significant, showing that the more a participant was exposed to ACEs, the more they are likely not to succeed in school. Results from the omnibus tests of model coefficients showed that the model including predictor variables is a significant improvement from the one that does not include any predictor variables where (X^2=885.064, *df*=8, *p*=0.00).

Table 4.11

Variables in the Equation for ADHD

	B	S.E.	Wald	df	Sig.	Exp(B)
ACE score	.134	.033	16.331	1	.000	1.143
ADHD	.994	.073	184.920	1	.000	2.702
Family structure	.066	.032	4.380	1	.036	1.068
Poverty level of this household based on DHHS guidelines - Imputed	-.263	.031	70.333	1	.000	.769
Highest level of education among reported adults	-.291	.037	62.793	1	.000	.748
Race/ethnicity categories	-.004	.022	.033	1	.855	.996
National Outcome Measure 17.1: Percent of children with special health care needs (CSHCN)	-.431	.069	38.527	1	.000	.650
Constant	-.807	.195	17.208	1	.000	.446

a. Variable(s) entered on step 1: ACE score, ADHD, Family structure, Poverty level of this household based on DHHS guidelines - Imputed, Highest level of education among reported adults, Race/ethnicity categories, National Outcome Measure 17.1: Percent of children with special health care needs (CSHCN).

The logistic regression of ASD against school success yielded a statistically significant result (X^2=747.670, *df*=7, *p*=0.00). According to the regression result, participants with a diagnosis of ASD were .5 times as likely not to succeed in school, given their cumulative exposure to ACEs. Again, all the control variables used for the regression analysis in this population were statistically significant except race. The model summary of ASD, ADHD, ASD/ADHD, explained 10% variance each of the School Success in participants with ACEs.

Table 4.12

Model Summary of the Logistic Regression of ACEs Score and School Success (Step 1)

Subsample	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
ASD	8869.032	.036	.096
ADHD	8649.502	.043	.114
ASD/ADHD	8642.584	.043	.115

4.5 Research Question 3

Does ACE score predict resilience and does this relationship vary by ACEs among adolescents screened for co-occurring ASD/ADHD, ASD, and ADHD?

To answer this, a linear regression analysis was used and assumptions of homogeneity of variance was met. A simple linear regression was calculated to predict child resilience based on ACE Score of participants with co-occurring ASD/ADHD and the regression equation was statistically significant $F(2, 20739) = 1571.673$, $p < .001$., with an R^2 of 13%.

Here, ASD, ADHD, ASD/ADHD all significantly predicted Child resilience. There is a negative relationship between the predictor, ACEs and Child resilience in the three subsample sets. As a participants' membership in each group increases, Child resilience decreases, also given their exposure to more ACEs.

Table 4.13

Coefficients for Model 1 (Dependent Variable = Child Resilience)

	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
ADHD					
(Constant)	10.500	.014		739.026	.000
ACE score	-.218	.009	-.161	-24.252	.000
ADHD	-1.356	.033	-.270	-40.719	.000
ASD					
(Constant)	10.407	.014		738.406	.000
ACE score	-.263	.009	-.194	-29.227	.000
ASD	-1.813	ASD.063	-.191	-28.718	.000
ASD/ADHD					
(Constant)	10.526	.014		746.757	.000
ACE score	-.214	.009	-.158	-24.126	.000
ASD/ADHD	-1.245	.027	-.304	-46.445	.000

CHAPTER 5

DISCUSSION

In this chapter, the focus is to discuss the results from the regression analyses as well as state the research limitations and possible implications of the research findings. Using the resilience theory, an attempt was made to examine the relationship between a background of ACEs and resilience, also exploring how that may affect an adolescents' school engagement and success. The bigger goal here in mind is however targeted at the overall quality of life of individuals. This stems from the knowledge that individuals with a diagnosis of ASD or ADHD are more predisposed to being diagnosed with a mental health condition later in life, as well as other less favorable quality of life outcomes.

There is a need to explore the possible connections that exist between ACEs and these constructs; resilience, health, school success and overall quality of life of individuals with co-occurring diagnosis of ASD and ADHD. Rigles (2017) pointed out the need to study these connections especially in individuals that have co-occurring ASD and ADHD. This need has become even more imperative since the modification in the diagnostic criteria of these conditions in the DSM-5. The findings will guide development of models and interventions that aim to promote resilience and overall quality of life in these individuals. As discussed extensively in the literature review, building stable and safe relationships within one's environment is one of the many protective factors that can promote development of resilience in individuals exposed to ACEs.

In the NSCH data, care givers were asked if the child had experienced any of the following ACEs and the ACEs that were asked include the following; parent or guardian divorced or separated, parent or guardian died, parent or guardian served time in jail, saw or

heard parents or adults slap, hit, kick, punch one another in the home, victim/witness of neighborhood violence, lived with anyone who was mentally ill, suicidal, or severely depressed, lived with anyone who had a problem with alcohol or drug, treated or judged unfairly because of his/her race or ethnic group.

5.1 School Engagement

ACE score, which is the cumulative ACEs experienced by participants was used as a predictor for school engagement. In the model, where ASD and ADHD were treated as a co-occurring disorder, experience of divorce accounted for the most variance in the model and this was statistically significant. The study by Kasehagen et al. (2017) showed that divorce and separation was one of the most prevalent ACEs experienced by participants in their study. The participants were said to improve in school engagement, only after some measure of resilience was exhibited. The model that identified the diagnosis of ASD and ADHD as two separate entities. The linear regression results however showed that victim/witness of neighborhood violence significantly predicted the level of school engagement of adolescents in school. Haerens et al. (2009) in their study, also emphasized the importance of neighborhood characteristics in predicting engagement among adolescents.

In addition to experiencing divorce/separation, the other major ACE was exposure to a parent with a problem of alcohol or drug, followed closely by having anyone within the household with a mental illness diagnosis and lastly, ACE of witnessing of neighborhood violence. However, in those with a co-occurring diagnosis of ASD and ADHD, this was not statistically significant. For those with ASD and ADHD, a negative relationship between ACEs and school engagement was found. This means that the more the participant experienced ACEs, the less likely they were engaged in school.

Caregiver relationship and interaction does not only affect development of child resilience, but also determines the level of a child's engagement and success in school, given their exposure to ACEs (Panter- Brick & Leckman, 2013). Just as parental level of education influenced development of resilience in participants of the current study, the level of education of caregivers also played a significant role in determining the level of school engagement of participants. Caregivers with some college or lower level of education were found to be negatively associated with school engagement of the adolescent participant. This finding is consistent with the literature in that parents with higher degree qualifications tend to inspire their children or wards better, in terms of career aspirations and this is also directly related to their level of school success (Khampirat, 2020).

It is the intention of every rehabilitation counselor to see their clients excel in any given field of their client's choice. This then makes it necessary for rehabilitation counselors to have an adequate understanding of any co-morbidities that might present a challenge to achieving set out goals with their clients. Another significant finding from the results is that adolescents with one or more chronic health conditions were less likely to engage in school. Children who had no chronic health conditions such as asthma, diabetes mellitus, were more likely to engage effectively at school and succeed, unlike individuals who have presence of one or more health conditions. For a child with chronic health conditions or disabilities, it is likely they might experience more difficulty engaging effectively at school with either their peers or teachers. This has both short-term and long-term implications. The short-term implication is often a diminishing of their level of engagement, while on the long run, if they continue to maintain a low level of engagement, this may result to failure in school and eventually school dropout.

Furthermore, beyond presence or absence of chronic physical health conditions, presence

of a mental health condition like depression in the child participant was significantly associated with less school engagement. According to the literature, the mental health status of a child negatively impacts educational outcomes such as school engagement and success (Becker et al., 2014). Becker et al. (2014) found there to be a significant improvement in the educational outcomes when mental health outcomes of study participants were improved. The current study results also strongly suggest the mental health of the primary caregiver to be a strong determinant of the child participants' school engagement. This finding is consistent with results of similar studies on the relationship between mental health of the primary caregiver and school engagement and success of their wards. Porche et al. (2016) identified poor caregiver mental health to be an additional risk factor in determining the educational outcomes of students. Other risk factors identified include living in an unsafe neighborhood and family economic hardship.

Even though, all these control variables accounted for higher variance in the outcome, school engagement and school success, participants with a diagnosis of ASD or ADHD had more variance accounted for (21%), compared to participants with co-occurring diagnosis of ASD and ADHD (13%).

5.2 School Success

A child's success in school is determined by many factors and many items in the NSCH dataset have been used to measure the school success of students. In this study, class repeat was the parameter tested for. The results from the analyses suggest that participants with the diagnosis of ADHD were more likely to repeat a class compared to those with ASD. This is in line with results from previous studies. For example, a longitudinal study done among high school students with ADHD showed that they were more likely than other students to experience significant academic impairment (Kent et al, 2011). Repeating a class is not the only way to

measure success in school, even though that is one measure that is commonly used by educators and parents to assess a child's school performance. It must also be highlighted here that repeating a class was only used as a proxy to measure school success.

The result of the logistic regression revealed that individuals with ADHD are more likely to not succeed in school and repeating a class was the measure used to assess school success. ADHD as popularly documented in literature (Coghill & Seth, 2011) has a component of hyperactivity as well as inattention. The inattentiveness is often demonstrated in the classroom, and this could explain the reason why the adolescents with ADHD were more likely to repeat a class than those with ASD.

Resilience in individuals have also been linked with their ability to succeed in their education and life in general. Parental level of education is vital to the school success of an adolescent because it is the level of education that will determine the level of support the parent is able to provide for the adolescent (Khampirat, 2020). Parental level of education also indirectly determines their socioeconomic status, and this affects other provisions that a parent or caregiver can make towards the educational success of their children, although this may not always be the case.

The regression analysis showed that the adolescents with ADHD were more likely to repeat a class compared to those with ASD and a co-occurring diagnosis of ASD and ADHD. This finding is understandable for those with the diagnosis of ADHD given their inattention, however, it was expected that the risk would increase in those with a co-occurring disorder but that was not the finding, at least in this current study sample. Race/ethnicity did not play any significant role in determining the adolescents who were more likely to succeed in school. Some control variables used in the model that played a significant role in this finding was parental

education, household income. The analysis also revealed that the ACEs grouping did not effectively show the effect of ACEs on school success as much as the cumulative ACEs score.

5.3 Resilience

To measure resilience on this study, three items from the survey were used and they include child's ability to stay calm and in control, the ability of the child to finish and follow through with plans, and lastly, that the child shows curiosity and interest in learning new things. In participants with a co-occurring diagnosis of ASD and ADHD, the regression results showed that all the ACEs that were tested were negatively associated with child resilience, although they were not statistically significant. However, in those with ASD or ADHD, exposure to a parent with a problem of alcohol or drug and experiencing divorce are the two statistically significant ACEs in this dataset, with a $p < .05$

According to the NSCH data, some factors were found to be associated with child resilience and the factor that contributed most to child resilience was the mental health status of the parents. Adolescents who were more resilient than other participants had parents who did not have any chronic mental health condition. This finding is consistent with the literature. Children who are born to parents with a mental health condition have more difficulty coping when presented with life challenges (Pölkki, Ervast, & Marika Huupponen, 2013).

An interesting finding in this current study was that adolescents who showed high resilience had an adult child in their life that they could seek advice from, unlike those who did not have such relationships. This further buttresses the importance of building safe and stable relationships. In addition to one's immediate parents, adolescents in the study who had high resilience were also found to have their grandparents as the primary respondents.

Having the presence of another trusted adult within the household can serve as a positive protective factor. The result of the linear regression of ACEs and child resilience, also points to the fact that beyond close bonds with one's parents (mother), and grandparents, having an adult in one's life who can give their opinion in issues related to the adolescent also positively predicts child resilience. One of the strong positive predictors of child resilience was presence of an adult in the life of the participant, who can give advice on personal issues when need be. This highlights the importance of social ties and social support in building family resilience and individual resilience as well. According to Janicki-Deverts and Cohen (2011), the social ties that an individual has, plays a significant role in determining how well they develop resilience towards life adverse events.

Other than social ties and relationships, the level of education was another control variable in the model. Caregivers with some college or lower form of education were negatively associated with resilience. In addition to the level of education of parents, presence of a mental health condition such as anxiety or depression, were negatively associated with child resilience. When an individual has a mental health condition, this further reduces their threshold to develop any form of resilience towards ACEs. Other than emotional security, which is built through relationships, skilled parent management as well as discipline towards a child are associated with parent's level of education (Khampirat, 2020). These attributes determine an individual's resilience.

In this exploratory study, even though the cumulative ACEs that participants were exposed to, predicted their resilience, given the negative relationship between resilience and ACE score, this relationship was not evident in participants with a diagnosis of ASD and ADHD.

On the contrary, the data used showed there to be positive relationship between ASD, ADHD, and resilience.

5.4 Implications of Research Findings

5.4.1 Research

This study draws attention to the unique needs and experiences of adolescents with co-occurring ASD and ADHD population. The population presents with unique features that are largely unexplored in the literature, specific reference to their quality of life. It thus presents a need for interested researchers to find out more about the population of focus especially as it pertains to life outcomes and quality of life in general. Research findings will provide guidance to professionals that serve them in different capacities. There is also a need to continue to research further moderating and mediating factors in resilience development as well as educational outcomes highlighted in this study. Most importantly, key protective factors must be noted to guide innovation and implementation of interventions in the future.

5.4.2 Rehabilitation Professionals

A need for timely social and health interventions for the ASD/ADHD population cannot be overemphasized. One of the implications of the findings in this study is the need to initiate interventions targeted at resilience in a timely manner. It is not enough to have policies or programs that build resilience, there is also a need to initiate these interventions early on in life, especially at the stage when the brain is still rapidly growing, rather than wait till when the child must have developed maladaptive ways of coping with life stress. The current study was done among adolescents and these maladaptive paths were already evident in some of the participants, thus echoing the need to initiate early child interventions. Interventions should be targeted

towards improving coping skills, and self-efficacy as these will promote resilience and improve educational outcomes.

Even though the outcome variables researched in this study were not all statistically significant, using the p-value as a standard, there is still a need for rehabilitation professionals to better comprehend how variables like ACEs, resilience, and school engagement and success interact with one other. The aim being to improve the quality-of-life outcomes, special reference to education and employment outcomes in individuals with co-occurring diagnosis of ASD/ADHD. Understanding the need to provide additional accommodation for instance, when necessary, could be advocated for especially for the adolescents who will soon transition into college where they are left to self-advocate.

5.4.3 Educators

Outside of the home, students within the age group reviewed, spend a great deal of their time at school and st such, interact with teachers and other educators on a frequent basis. This makes it possible for trained or well experienced educators to pin-point behaviors that are unexpected in students. If educators are well informed on the issues that may affect school engagement and success of their students with a diagnosis of co-occurring ASD and ADHD, then they are better equipped to support them through their education. The duty to identify adolescents with exposure to ACEs should not be left to health and rehabilitation professionals alone. There is an ardent need for educators to have versatile knowledge on these ACEs and thus collaborate with local mental health providers within school district to provide mental health and other needed assessments to students who might need it.

Training educators on interventions that can be embedded in teaching practices and classroom routines, makes it possible for students to be exposed to these interventions on a more

frequent basis, which better aligns with the benefit of routine and consistency for this population. As much as possible, these interventions should be individualized as there is a need to consider every student's co-existing sociodemographic factors to better provide the much-needed help. There is potential for the general school population to benefit from these early interventions as well. Training educators helps to improve their overall attitude towards students with emotional and behavioral disorders such as ADHD and/or ASD could directly or indirectly impact the student outcomes positively.

Provision of accommodations should not be left to only the rehabilitation counselors. Educators should be able to know necessary accommodations needed and advocate for students when necessary. The duty to educate as well as advocate for these students, when necessary, cannot be overemphasized. Providing them with multiple accommodations and enhancing problem solving skills can help improve their participation, engagement, and overall success in school. When these skills are sustained, they can eventually be translated into future careers and life in general, improving life outcomes.

5.4.4 Policy Makers

Population-based research studies are often time consuming and requires a lot of funds which are usually available to researchers. With the earlier stated need for researchers to focus on the new diagnostic criteria and explore different life outcomes of individuals who may be diagnosed with these conditions. This decision should therefore guide policy makers around budgeting so as to promote research studies on a large scale that would provide further guidance on measures and interventions that target enhanced school engagement and success. These studies should also aim to guide the government on making policies related to ACE prevention, with focus on the population of study.

5.5 Study Strengths, Limitations and Suggestions for Future Research

There are only a handful of projects that have studied population with co-occurring ASD and ADHD since the DSM-5 diagnostic criteria modifications for these conditions. This current study is the only research project that has explored how ACEs impact individual resilience, school engagement, school outcome in adolescents with co-occurring ASD and ADHD. Even though the continuous variables used all had a significant Cronbach alpha levels as stated earlier in the methodology, a more standardized instrument could have been more adequate in measuring the variables of interest.

The age of onset of ADHD has been moved up to 12 years and this further strengthens the findings of this research as only individuals within the desired age bracket was included in the study. Given the apparent lack of studies related to this new diagnostic criterion, it can be said that this current study was innovative and provided some enlightening for researchers and the public of the possible similarities and differences that may exist as far as the study variables are concerned in the said population.

Racial discrimination was measured as a form of ACEs in the study and there is a need for future researchers to continue to incorporate this component of ACEs into questionnaires as it is not a common practice. The study had a large sample size and a good response rate and this validates the findings to a good extent.

On the measurement tool still, the ACEs questions only asked if individuals experienced an event or not. It did not however consider the cultural underpinning of those events. The sample did involve a combination of participants from multiple race and ethnicity, and it would have been better to account for these cultural differences in their responses, other than just providing a yes or no answer to the experience(s).

The primary respondents in the study were the parents or other adult caregivers and this could present a form of bias. There may be parent/caregiver responder bias as it relates to ACES questions, especially substance use disorder. There were also other form of ACEs that were not asked for in the questionnaire such as forms of emotional abuse, sexual abuse, physical abuse. Future studies should better operationalize this variable as these events can be experienced differently.

For the purpose of generalizability, the research findings from this study cannot be generalized. The findings only allude to a relationship that exists between the predictor variable, ACEs and outcome variables, school success, school engagement and resilience. It does not confer any causal relationship in any sense. Also note-worthy is the fact that the variables used in the study was limited to a certain time frame. A longitudinal study that follows up the participants over time would have been more ideal to infer causality. The study population also had predominantly participants who from one racial category (White non-Hispanics), that means the results of this study even though valid, may not be applicable to other racial categories.

Diagnoses were a limitation (ASD and ADHD) as this was self-report from parent. This has major implications for findings as there were likely very many in the sample that were not properly diagnosed which will conflate findings.

Based on the above stated limitations, a recommendation to use longitudinal data to further explore other positive protective factors would allow for educators and rehabilitation professionals to better come up with programs and interventions that will improve resilience in individuals diagnosed with ASD and ADHD or even other conduct or emotional disorders that may affect development of resilience.

5.6 Summary and Conclusion

This research was exploratory in nature and has essentially highlighted the importance of investigating adolescents with ASD, ADHD, and co-occurring ASD and ADHD. From the results emphasized and the discussion, it is evident of the need to conduct more research to better understand and find out more about this relatively new diagnostic criterion of ASD and ADHD in the DSM-5 as this would enable all appropriate service providers to serve them better. When their essential life needs are met, then they are more likely to thrive and excel, with a resultant improvement in their overall quality of life. The knowledge of the factors that hinder and promote resilience, school engagement, and school success can inform development of necessary interventions that focus on this study population. Without a doubt, the general adolescent population will also benefit immensely from such projects.

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