Quality and quantity of social support in college students with ADHD symptomatology

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QUALITY AND QUANTITY OF SOCIAL SUPPORT IN COLLEGE STUDENTS WITH ADHD SYMPTOMATOLOGY

An Abstract of a Thesis

Submitted in Partial Fulfillment of the Requirements for the Degree

Master of Arts

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ABSTRACT

Social support is an important factor in both physical health and mental well-being. Both the quality and quantity of social support have been found to be a protective factor in some mental illnesses. Individuals with ADHD often have a hard time maintaining peer relationships because of the symptoms of the disorder. This may result in low social support quality and quantity, which may in turn affect social impairment, and symptoms of depression, anxiety, and stress. This study examines the relation between ADHD and social support in college students. Findings show that social impairment significantly predicts lower social support quality and quantity. Specifically, those with higher social impairment and but lower ADHD symptoms experience a reduced social support quality. This may be explained by the idea that students with increased ADHD may seek out a quality friend group as a coping mechanism. Additionally, findings suggest that ADHD and social support predict overall impairment. Specifically, those with decreased quantity of social support, especially those with greater ADHD symptoms, experience greater levels of overall impairment. These results suggest that college students with ADHD symptomatology who experience greater social impairment may experience a harder time cultivating and maintaining friendships. This also suggests that due to increased impairment, they may lack the quality friendships that could act as a protective factor against negative outcomes. Clinical implications include better appraisal of social support in clients with ADHD, and treatment approaches that address social impairment.

Key Words: ADHD, College, Social Support
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Entitled: Quality and Quantity of Social Support in College Students with ADHD Symptomatology

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CHAPTER ONE

INTRODUCTION

Quality and Quantity of Social Support in College Students with ADHD

Symptomatology

Social support is an important factor in both physical health and mental well-being (Cohen, 2004; Fu et al., 2018; Lakey & Cohen, 2000). Social support has been studied in the context of many specific psychological disorders, but it has yet to be fully examined in the context of adult Attention-Deficit/Hyperactivity Disorder (ADHD), despite the fact that social impairment in ADHD is a significant problem. This thesis examines social support as a protective factor in ADHD-related impairments and comorbidities in college students.

Attention-Deficit/Hyperactivity Disorder

ADHD is defined as a persistent pattern of inattention and/or hyperactivity-impulsivity that is developmentally inappropriate and interferes with functioning (American Psychiatric Association [APA], 2013). The symptoms of ADHD can manifest in three presentation types: predominantly inattentive, predominantly hyperactive, and combined presentation. ADHD occurs in approximately 5-9% of children, with boys twice as likely to be diagnosed. Males often show more symptoms of ADHD in childhood than females; however, females show equal if not more negative functional outcomes (Barkley, 2018; Willcutt, 2012). In the past ADHD was thought to be a disorder of childhood, but recent research shows that ADHD and its effects carry on
through the lifetime, affecting roughly 2.5-5% of adults (APA, 2013; Barkley et al., 2011).

ADHD is often accompanied by comorbid conditions; in fact, up to 80% of adults with ADHD have at least one other diagnosis (Barkley, 2018). While children with ADHD may experience higher rates of comorbid disruptive behavior disorders and learning disabilities, adults with ADHD are more likely to experience increased rates of comorbid mood and anxiety disorders (Kessler et al., 2006; Nigg & Barkley, 2014). Adults with ADHD experience problems with self-esteem and interpersonal relationships in addition to having difficulty managing their emotions which may result in these increased depressive and anxiety symptoms (Anastopoulos et al., 2018).

ADHD can be understood through the context of executive functioning (EF) theory. Executive function refers to a group of interrelated cognitive skills that are essential for daily life and are controlled by the prefrontal cortical and subcortical circuits (Antshel et al., 2014). The theory posits that behavioral inhibition and self-control/regulation are important components of executive functioning, and that these are essential functions for human social interaction (Antshel et al., 2014). Individuals with ADHD have difficulties with inhibition and self-control which leads to difficulties in other components of executive functioning skills such as being forgetful, disorganized, and lacking hindsight and foresight. These deficits can then lead to increased anxiety symptoms and further problems with motivation, self-regulation, and social interactions (Antshel et al., 2014; Barkley, 2018; Jarrett, 2016). As individuals with ADHD continue through adolescence and emerging adulthood, many of these executive functioning
deficits continue to be evident and cause increasing impairments throughout multiple life domains. Impairments include difficulties in memory function, planning, and time management. These impairments often result in making them late, seeming flakey or forgetful to peers, and causing increasing academic difficulties. They may also experience deficits in self-restraint and emotional self-regulation causing further negative impacts on social interactions and relationships (Barkley, 2018; Nigg & Barkley, 2014).

Emerging adulthood represents the developmental period from 18-25 years of age (Arnett, 2000; Meinzer et al., 2016), which is also the age range of traditional college students. Research has identified this time as an important developmental period filled with significant life changes and exploration, situated between adolescence and adulthood. Individuals who are considered emerging adults do not typically identify as adolescents (because they are not), but do not yet see themselves as adults. During emerging adulthood, many have not yet established a career, financial independence, permanent/stable residence, or gotten married. Thus, this is a time of exploration and opportunity, but also of risk-taking behaviors (Anastopoulos et al., 2018; Arnett, 2000). In adolescence there is a growing sense of independence that is seen in the gradual transition from relying on parental support to support from peers; this transition intensifies as these adolescents begin to enter adulthood and as some go on to college. While a majority of individuals with ADHD do not go on to college (Barkley, 2018), those who do continue to experience academic, social, and independence-related difficulties (Advokat et al., 2011).
College Students & ADHD

It is estimated that up to 8% of emerging adult college students have clinically significant levels of ADHD (DuPaul et al., 2009). This increased ADHD prevalence in the college population, over the 2-5% ADHD diagnoses in the adult population, may be related to the added executive function strain these students experience in terms of the expectations of sitting through long lectures, studying for hours, and writing lengthy papers. Due to these added strains and difficulties in college these individuals are more likely to be identified and diagnosed. As emerging adults with ADHD transition to college, many report relying on social support from their peers. These students often have a difficult time with this transition (Lefler et al., 2016). Some college students with ADHD even report that they come to rely on peers as a coping mechanism for success in college by asking their friends to remind them of due dates, help them study, and even making sure they get to class on time (Meaux et al., 2009). Thus, college may be a particularly difficult time for those with ADHD and may put additional stress on their social relationships.

College students with ADHD experience many challenges to their academic success; they earn lower grades and graduate at lower rates than their peers (Barkley et al., 2011; Frazier et al., 2007). Research shows that college students with ADHD have poor time management and organizational skills, fail to complete work on time, have poor reading and study skills, difficulty keeping to a schedule, and difficulty staying focused (DuPaul et al., 2009; Meaux et al., 2009). Additionally, college students with ADHD have difficulty focusing during lectures and concentrating on difficult tasks.
(Fleming & McMahon, 2012). College students with ADHD express problems with reading comprehension, with many reporting that they choose to stop reading for classes entirely (Lefler et al., 2016). A subset of these students face further challenges because they are unaware of resources and opportunities that are available for help (Meaux et al., 2009). Even when college students with ADHD do know about these available accommodations, they report needing more individualized accommodations, and that the current accommodations they are receiving are insufficient (Lefler et al., 2016).

In addition to these academic challenges, college students with ADHD show an increased risk for social impairment. Students with ADHD often interrupt others, talk excessively, have a hard time waiting their turn, and fail to listen to others and attend to social cues. In addition, lack of emotion regulation and difficulties identifying others emotions lead to students with ADHD having impaired relationships (Barkley, 2018). Often peers were less friendly to a child with ADHD and more likely to describe them as annoying (Barkley, 2018; Landau et al., 1998). This can lead to students with ADHD having weak relationships and increases the risk of being rejected by peers (Barkley, 2018; Kim et al., 2015). Moreover, they might be subject to stigma from their peers. For example, peers rate them as less desirable groupmates on class projects (Thompson & Lefler, 2016). As these individuals begin to look for romantic partners, they face similar challenges with their dating and marital relationships, often reporting poor quality relationships and having significantly higher divorce rates than unaffected peers (Barkley, 2018; Klein et al., 2012). In all, college students with ADHD not only face
academic challenges, but also experience significant social impairments. Therefore, it is important to understand the social support of college students with ADHD.

Social Support

Social Support is a measure of real or perceived help an individual feels they receive from friends, family, and social groups (Lara et al., 1998). The National Cancer Institute's Dictionary of Cancer Terms defines social support as “a network of family, friends, neighbors, and community members that is available in times of need to give psychological, physical, and financial help” (National Cancer Institute, n.d.). Research has confirmed that people with good social support adjust better to stress and recover more quickly from physical and mental health conditions (Cohen, 2004; Fu et al., 2018; Lakey & Cohen, 2000). The stress and coping perspective theory posits that through supportive actions of others along with the perceived availability of this support, social support can be a protective factor against stressful life events on health (Lakey & Cohen, 2000). Social support seems to have a wide range of benefits simultaneously, including increased resilience (Puckett et al., 2019), stress reduction (Herbell & Zauszniewski, 2019), and greater overall life satisfaction (Harasemiw et al., 2019).

One interesting distinction to make regarding social support is whether it is the quantity or quality of the support that makes a difference. The quantity of social support refers to the size of a support system. Quantity of social support can be examined in three ways: the overall number of people in an individual's social network, the number of regular social interactions, and the number of different social domains in which an individual is regularly active, such as family, friends, work, and church/temple (Cohen et
al., 1997). The quality of social support, on the other hand, is often defined as the perception of adequacy of support (Franks et al., 2004). Adequacy of support is having someone, or better yet several people, who are reliable and whom you could call on for support or assistance in a variety of situations. This emphasizes the nature and depth of the support rather than the sheer size.

Social Support in Physical Health

Research has long identified social support as a protective factor in physical health. The hallmark research study that identified social support in the context of health was that of Cohen, in which he and his colleagues determined that those with more diverse social networks were less susceptible to the common cold, and showed greater upper respiratory resilience (Cohen et al., 1997). Research also suggests that social support and connectedness act as protective factors against other negative health outcomes and stress (Cohen, 2004; Wiesmaierova et al., 2019). Indeed, Cohen found that social connectedness, or greater quality of social support, positively influences peoples’ eating and exercise habits, through social controls and peer pressure. He also found that connectedness and the perceived availability of social support can act as a buffer to stress, balance emotional tones, and result in greater care for oneself (Cohen, 2004).

Further, another study showed that patients with higher quality of social support had better outcomes after a cardiac event (Wiesmaierova et al., 2019). Specifically, patients with acute coronary syndrome were evaluated after a cardiac event, and results showed that those who reported more stressful life events also showed higher depressive symptoms and a cascade effect that led to decreased renal functioning. However, this
result was only observed in those who reported low social support, showing again that social support can act as a protective factor against accumulated stress (Wiesmaierova et al., 2019). Additionally, social support is a significant predictor of a patient's anxiety, as well as caregiver’s anxiety and depression, in gastric cancer patients (Jeong & An, 2017). In this study, cancer patients with lower quality of social support and lower income showed more anxiety, while caregivers of cancer patients experience increased depression and anxiety symptoms as a result of low perceived social support (Jeong & An, 2017). In a study of pregnant women, greater perceived quality of social support was related to lower perceived stress, lower pregnancy-specific stress, fewer depressive symptoms, and higher resourcefulness (Herbell & Zauszniewski, 2019). Taken together, these studies show that social support acts as an important protective factor for mental health problem symptoms in patients seeking help for physical needs. The effects of having increased social support are not limited to one domain (i.e., physical health) but may impact many aspects of a person’s life at one time. Although social support has most commonly been examined within the context of physical health, it has important implications for mental health as well.

Social Support in Mental Health

In particular, some research suggests that the different sources of social support may act as protective factors for individuals with mental health problems. In research with transgender individuals, for example, higher reported quantity of social support was related to lower anxiety and depression symptoms, and higher resiliency (Puckett et al., 2019). Social support from family was a better predictor for both anxiety and depression
symptoms than social support from friends or general community connectedness (Puckett et al., 2019). This might suggest that while each source of social support offers some level of protectiveness, that certain sources of support, such as family support, offer a greater degree of protection. While family support was a better predictor for transgender individuals, another study with nurses found that support from relatives or friends, along with additional support from coworkers and supervisors, were all related to better physical and mental health outcomes (Fu et al., 2018). Thus, for nurses, social support from both friends and family members seemed to show similar benefits, and support from family continues to be a key area of support. This shows that for some people, the source of social support may have differing impacts, but an overall increase in social support generally increases the benefits one may experience.

Moreover, farmers in the Midwest who reported higher perceived quality of social support showed fewer depressive symptoms (Bjornestad et al., 2019). Low perceived support from family and friends was the most significant risk factor for increased depression scores, suggesting that social support is an essential protective factor to the effects of depression. Similar results were found in aging adults. In these older adults, greater diversity and quantity of social networks was related to greater perceived quality of social support, and this greater perceived quality of social support was then related to fewer depressive symptoms and greater life satisfaction (Harasemiw et al., 2019). This represents a potential interaction between quantity and quality of social support, while also again demonstrating the protective factor of social support on specific mental health concerns.
One specific mental health condition that has been examined in the context of social support is post-traumatic stress disorder (PTSD). Individuals who experienced traumatic events, with low perceived social diversity and low perceived social availability, were the most likely to have experienced PTSD (Platt et al., 2014). Those who had high perceived social diversity, but low perceived social availability, had a lower chance of having experienced PTSD than those who had low perceived social diversity and high perceived social availability (Platt et al., 2014). This suggests that there may be a difference in benefits between the quantity and quality of social support in those with PTSD. Although these findings are specific to PTSD, this is an open research question for other mental health diagnoses.

Additionally, sex differences have also been found within social support. In adolescents who experienced bullying, a higher proportion of boys than girls reported that they had no one to talk to (Noret et al., 2019). However, overall boys report having larger social networks than girls (Helgeson, 2017). Research shows that girls report experiencing more intimate relationships, which includes feelings of affection, loyalty, and self-disclosure (Hussong, 2000). This suggests that girls may experience higher quality friendships than boys, but boys may have a higher quantity of friends. However, many reports show mixed results or inconclusive support for sex differences in the quantity and quality of social networks. More research on sex differences in social support specific to individual mental health disorders, including ADHD, is certainly warranted. Indeed, understanding sex differences in social support as well as in mental health disorders is important to be able to identify potentially at-risk populations, and to
develop appropriate interventions and treatment methods for these groups (Hartung & Lefler, 2019). Therefore, this is an area in need of further exploration.

College students with ADHD show an increased risk of experiencing weaker relationships with peers and having lower levels of social adjustment and social skills (Barkley, 2018; DuPaul et al., 2009). Students at risk for ADHD report lower social support and lower closeness to those in their social network, as well as difficulties forming meaningful relationships. Additionally, fewer people consider these individuals to be close friends (Barkley et al., 2011; Kim et al., 2015). This demonstrates that students with ADHD are more likely to be alienated by their peers or be viewed as outsiders. Additionally, students with ADHD report higher levels of rejection sensitivity, and show a higher tendency to overreact to social rejection (Layden et al., 2017). This perception of social rejection, the perceived social isolation and loneliness, and lack of close relationships can affect functional connectivity in the brain and result in decreased ability to engage the executive control process (Babinski et al., 2019). This decreased function in executive control may serve to exacerbate ADHD symptoms and executive dysfunction, therefore continuing to perpetuate a loop of increased symptoms and fewer close relationships. College students with ADHD struggle with social relationships, and as a result may suffer by having a lower quality and quantity of social support, which may in turn worsen their pre-existing ADHD symptoms. This is an important area for further research.
CHAPTER TWO

CURRENT STUDY

College students with ADHD already show difficulties with executive functioning skills which may be related to functional life impairments and comorbid levels of depression and anxiety. If students also lack the necessary social support, both in terms of quantity and quality, these difficulties may be exacerbated. To date there has been no research directly examining the effects of and comparison between quality versus quantity of social support for college students with ADHD. The present study can help us understand the nature of social support for college students with ADHD, and how this affects other ADHD-related problems. To that end, the hypotheses below relate to ADHD, the quality and quantity of social support, social impairment, and internalizing symptoms (i.e., depression, anxiety, stress).

Additionally, research suggests that it is important to examine sex differences among individuals with ADHD (Hartung & Lefler, 2019). However, there is insufficient evidence to support a specific hypothesis as to the sex differences that may be observed in this particular study; therefore, we conducted exploratory analyses by sex.

Hypotheses

The following hypotheses were developed based on previous research:

1. Social impairment will moderate the effect of ADHD symptoms on the quality of social support.
2. Social impairment will moderate the effect of ADHD symptoms on the quantity of social support.
3. The quality of social support will moderate the effect of ADHD symptoms on overall impairment, after controlling for anxiety, depression, and stress.

4. The quantity of social support will moderate the effect of ADHD symptoms on overall impairment, after controlling for anxiety, depression, and stress.

In addition to these formal hypotheses, exploratory analyses were run separately by ADHD symptom clusters (i.e., inattentive and hyperactive symptom clusters), increased levels of ADHD (i.e., only those who rated at least five symptoms of ADHD as occurring often or very often thus equaling enough symptoms to be diagnosed), and sex/gender (i.e., cisgender-heterosexual-females, cisgender-heterosexual-males, and sexual and gender minorities). Sexual and gender minorities (SGM) include anyone who identified as gay, lesbian, bisexual, transgender, or intersex. Sexual and gender minorities were grouped in this way because Minority Stress Theory suggests that students who are part of a sexual and gender minority groups experience greater psychological distress, than non-minority students (Hayes et al., 2011). It is therefore important to understand how the key variables in this study may be different for these individuals.
CHAPTER THREE

METHOD

Participants

Participants included in final analyses were 2,563 undergraduate college students, 98.2% of participants are between the ages of 18-25 ($M=19.26$, $SD=1.37$), 1.8% of participants are 26+. In terms of sex/gender, 62.4% were cis-hetero female; 21.6% were cis-hetero male, and 16.0% were sexual and gender minority. In terms of race, 67.3% were White, 7.3% were Asian or Pacific Islander, 5.8% were Black, 8.5% were Latinx/Hispanic, 1.7% were Middle Eastern, 0.3% were Native American/American Indian, and 7.1% were multi-racial. Students were from six universities in the Rocky Mountain, Midwest, Mid-Atlantic, Northeast, and Southeast regions of the United States. Participants were from two waves of a large, multi-site college ADHD study: wave 7 (Spring 2020) and wave 8 (Fall 2020).

Exclusion criteria included questionnaire completion times that are lower than the fastest time possible to complete the entire study, missing two or more attention checks within the larger study and having more than 80% missing data. Initially 3,268 participants were recruited for the study. A total of 705 participants were removed from the analyses; 575 of these participants were removed because they submitted the survey faster than it was possible to read the survey. An additional, 128 of these participants were removed for missing two or more attention checks, and 2 participants were removed for missing data. A final total of 2,563 participants data were used for final analyses. Participants with missing data on individual scales were dropped list-wise for that scale.
Procedures

Participants were recruited through SONA, a web-based participant pool management system, at each of the six universities as part of a larger study. Participants earned research participation credits for their psychology courses through this system. Students voluntarily chose to participate in the larger study and were directed to an online survey platform (i.e., Qualtrics) where they completed an online informed consent form before completing a number of questionnaires for the larger study. The order of the questionnaires was randomized. Only relevant measures from this larger study will be described herein.

An a-priori power analysis was conducted for a linear multiple regression with 3 predictors, using G*Power (Faul et al., 2007). Based on previous research (Fu et al., 2018; Herbell & Zauszniewski, 2019), an effect size of $f^2 = .02$, and $p = .05$, were used. It was recommended to have 863 participants; a total of 2,563 participants’ data were used for final analyses in this study so adequate power is assumed. This study was pre-registered, a pre-registration document can be found at https://osf.io/rkm2y/.

Measures

Demographics Form

Participants reported their age, biological sex, gender identity, race/ethnicity, and other demographic information on a demographics form created for the current study.

DSM-5 ADHD Symptoms (American Psychiatric Association, 2013)

A self-report checklist was created based on the exact wording of the 18 symptoms of ADHD in the Diagnostic and Statistical Manual of Mental Disorders, 5th
edition (APA, 2013). Participants answered items on the checklist such as “Fail to give close attention to details or make careless mistakes in schoolwork, at work, or during other activities (e.g., overlook or miss details or work is inaccurate)” on a 4-point Likert-type scale ranging from never/rarely (0), to very often (3). Symptoms were considered endorsed if the participant indicated an item happened often (2) or very often (3). The checklist shows excellent internal consistency reliability for inattention, α = .93 and good internal reliability for hyperactivity/impulsivity, α = .88 (Lefler et al., 2020) and α = .92 and α = .88, respectively for the current study.

**Depression Anxiety Stress Scale (Lovibond & Lovibond, 1995)**

The Depression Anxiety Stress Scale (DASS 21) is a 21 item self-report measure that assesses symptoms of depression, anxiety and stress (i.e., a broad indicator of internalizing symptoms). Participants rated if they were experiencing current impairment such as “I found it difficult to work up the initiative to do things” on a 4-point Likert-type scale ranging from did not apply to me at all (0) to applied to me very much or most of the time (3). In a previous study the DASS 21 shows good reliability across the subscales: Depression α=.94, Anxiety α=.87, and Stress α=.91 (Lovibond & Lovibond, 1995). In the current study subscales showed similar reliability: Depression α=.91, Anxiety α=.84, and Stress α=.86. Additionally, depression, anxiety, and stress will be referred to as “internalizing symptoms" throughout.

**Weiss Functional Impairment Rating Scale (Weiss, 2000)**

The Weiss Functional Impairment Rating Scale (WFIRS) is a 70 item self-report measure that measures impairment in 7 domains (school, family, work, life skills, self-
concept, social, and risk). Participants rated if they were experiencing current impairment on items such as “relying on others to do things for you” a 4-point Likert-type scale ranging from never/not at all (0) to often/very much (3). In past studies (Canu et al., 2020) the WFIRS has shown excellent overall internal reliability \( \alpha = .96 \), with the social subscale showing \( \alpha = .87 \). In the current study it has excellent overall internal reliability \( \alpha = .96 \), with the social subscale showing \( \alpha = .85 \).

**Interpersonal Support Evaluation List (Cohen et al., 1985)**

The Interpersonal Support Evaluation List (ISEL) is a 12-item measure of social support quality. Participants rated whether or not they believed their social community would be available in different situations like “If I were sick, I could easily find someone to help me with my daily chores” on a 4-point Likert-type scale ranging from definitely false (1) to definitely true (4). In past studies (Merz et al., 2014) the ISEL has shown good internal reliability \( \alpha = .86 \). In the present study the ISEL showed good internal reliability \( \alpha = .86 \).

**Social Network Index (Cohen et al., 1997)**

The Social Network Index (SNI) is a 12 to 23 item measure depending on how the participants answered the primary questions. For instance, if a person responded in the affirmative to a primary item such as “Are either of your parents living?” they proceeded to a secondary question, such as “Do you see or talk on the phone to either of your parents at least once every 2 weeks?” whereas if they responded in the negative, they did not see the secondary item. It is a measure of the size of a social support network, and question scales vary. One example question is “How many close friends do you have?
(meaning people that you feel at ease with, can talk to about private matters, and can call on for help).” The SNI has shown acceptable internal reliability $\alpha = .70$ in past studies (Platt et al., 2014), and low reliability $\alpha = .54$ in the current study. This low alpha value is understandable, however, given that a person may have disparate social support from various sources, and we do not necessarily expect social support from parents to relate in the same way to social support from friends across participants. Thus, we will maintain this measure despite the low internal consistency reliability because it is expected.

**Attention Checks**

Four attention checks were used within the larger multisite study. Attention checks include items like “A puppy refers to a… (cat, elephant, monkey, dog).” These items were used to ensure that participants were paying attention to the study rather than responding randomly.
CHAPTER FOUR
RESULTS

Data Preparation

After the data were collected, the dataset was reviewed and cleaned. IBM SPSS package 27.0.0.0 (IBM Corp., released 2020) and Andrew Hayes’ PROCESS macro (Hayes, 2017) were used to conduct analyses. Within PROCESS, moderation model 1 was used with the standard presets of, 95% confidence intervals, 5000 bootstrap samples, and no mean centering. Bootstrapping was used to address our non-normality problem. Prior to analysis, tests of assumptions were conducted. Scatterplots and Pearson’s correlations were conducted to assess the assumption of linearity. A visual inspection of the correlation matrix was conducted showing that measures were correlated appropriately and therefore linearity was assumed. Next, the assumption of multicollinearity was examined via tolerance and VIF values. All values were greater than .2 demonstrating no evidence of multicollinearity. The assumption of homoscedasticity was examined via a visual inspection of the residual scatter plots. Plots show that predicted values are similar across all levels of the residual values, thus there is equal variance. In examining the data for outliers, it was found that the Social Network Index had several. However, due to the fact that this is a measure of the quantity of social support we chose not to transform the data but instead to pull in the extreme outliers. The natural cutoff in the data was at a social network with 68 individuals, so we began pulling in the outliers and assigning them numbers in order starting at 69, and so on. Finally, the assumption of Normality was examined by looking at skewness, kurtosis, histograms, Q-
Q plots, and Kolmogorov-Simonov and Shapiro-Wilks tests. These tests showed that all of the variables deviated from normal. However, because we are interested in examining a clinical subset of the population, we expected this and chose to not adjust for normality as to be able to examine clinical symptoms (i.e., in clinical psychology the variables of interest are often not distributed normally).

A variable was created to group sexual and gender minorities together to be able to evaluate the exploratory analyses. This variable was created by distinguishing three groups: cisgender-heterosexual-females (i.e., straight, non-transgender women), cisgender-heterosexual-males (i.e., straight, non-transgender men), and sexual and gender minorities (SGM; anyone who identified as gay, lesbian, bisexual, transgender, intersex, etc.). Sexual and gender minorities were grouped in this way, despite the heterogeneity of the group, because it is important to understand how the key variables in this study may be different for these individuals, given the Minority Stress Theory. Also, this was done because there would not be enough power to include individual groups (i.e., gay men vs. transgender women) in any analyses. Therefore, this SGM group was created in an attempt to get an idea about what individuals in these groups may experience in terms of differences in social support.

All variables were computed into summary scores (i.e., sums), with the exception of the ADHD diagnosis variable used in exploratory analyses. This variable is comprised of only those who answered “often” or “very often” on at least 5 ADHD symptoms, thus exhibiting a diagnosable level of ADHD. Summary scores were used in an attempt to be able to better analyze the clinical population by not compressing scores into a mean but
rather allowing for more variability for each variable. The standard effect size for a small correlation is $r=.10$, medium correlation $r=.20$, and a large correlation $r=.30$ (Gignac & Szodorai, 2016). The standard effect size for a small, moderated regression is $R^2=.02$, medium $R^2=.13$, large $R^2=.25$ (Cohen, 1992).

The DASS was included as a covariate because the internalizing symptoms of depression, anxiety, and stress are often comorbid with ADHD and may account for a certain amount of impairment for individuals who experience both (Kessler et al., 2006). Therefore, it is important to differentiate the impairment related to internalizing symptoms from ADHD, and social support. In fact, in our study the DASS is highly correlated with impairment ($r=.577$) so statistically we controlled for internalizing symptoms (see below).

Data Analysis

Correlation Matrix

A Pearson’s correlation matrix was conducted (Table 1), and target variables were correlated in the following ways: quantity of social support and quality of social support had a medium positive correlation ($r=0.28$, $p<.001$). Quantity of social support had small negative correlations with internalizing symptoms ($r=-0.12$, $p<.001$), and overall impairment ($r=-0.19$, $p<.001$), and was not correlated with ADHD ($r=-0.03$, $p=.128$). Quality of social support had a significant, small negative correlation with ADHD ($r=-0.16$, $p<.001$), and a significant large correlation with internalizing symptoms ($r=-0.310$, $p<.001$), and overall impairment ($r=-0.30$, $p<.001$). ADHD had large, positive, correlations with internalizing symptoms ($r=0.57$, $p<.001$), and overall impairment ($r=$...
Finally, internalizing symptoms had a large, positive, correlation with overall impairment ($r = 0.58, p < .001$).

### Table 1
Descriptive Statistics and Intercorrelations

<table>
<thead>
<tr>
<th>Variable</th>
<th>SNI</th>
<th>ISEL</th>
<th>DSM</th>
<th>DASS</th>
<th>WFIRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISEL</td>
<td>.280**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DSM</td>
<td>-.030</td>
<td>-.164**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DASS</td>
<td>-.121**</td>
<td>-.310**</td>
<td>.572**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WFIRS</td>
<td>-.185**</td>
<td>-.297**</td>
<td>.608**</td>
<td>.577**</td>
<td>(.956)</td>
</tr>
<tr>
<td>$M$</td>
<td>19.28</td>
<td>38.26</td>
<td>30.39</td>
<td>36.10</td>
<td>104.44</td>
</tr>
<tr>
<td>$SD$</td>
<td>12.28</td>
<td>6.94</td>
<td>10.88</td>
<td>12.99</td>
<td>33.62</td>
</tr>
</tbody>
</table>

Note. $N = 2563$. Entries on the main diagonal are Cronbach’s alpha. SNI = Social Network Index; ISEL = Interpersonal Support Evaluation List; DSM = DSM-5 ADHD Symptoms List; DASS = Depression Anxiety Stress Scale; WFIRS = Weiss Functional Impairment Rating Scale. *$p < .05$, **$p < .001$.

### SGM analyses

Given the minority stress theory it is likely that participants who identify as a sexual and gender minority may experience more depression, anxiety, and stress symptoms, along with increased impairment. To examine this, a one-way between subjects’ ANOVA was conducted to compare DASS and WFIRS scores between cis-hetero-women, cis-hetero-men, and sexual and gender minorities members.

Results indicated that there is a significant difference in levels of depression, anxiety, and stress between the three groups, $F(2,2560) = 62.59, p < .001$. Bonferroni post
hoc comparisons indicated that individuals in the SGM group experience significantly higher levels of depression, anxiety, and stress ($M=41.83$, $SD=13.97$) than cis-hetero-females ($M=35.81$, $SD=12.72$), and cis-hetero-males ($M=32.67$, $SD=11.55$). Similarly, results indicated that there is a significant difference in levels of overall impairment between the three groups, $F(2,2382)=69.43$, $p<.001$. Bonferroni post hoc comparisons indicated that individuals in the SGM group experience significantly higher levels of overall impairment ($M=122.73$, $SD=37.70$) than cis-hetero-females ($M=101.48$, $SD=31.86$), and cis-hetero-males ($M=99.90$, $SD=31.18$).

Taken together these results indicate that the SGM group reports significantly higher levels of depression, anxiety, and stress, and overall impairment. Due to these findings, it is therefore important to conduct exploratory analyses examining the hypothesized effects within the SGM group.

**ADHD symptom analyses**

Frequencies for ADHD symptoms were conducted. Results indicate that 59% of participants endorsed 0-2 ADHD symptoms, 12.1% of participants showed subthreshold ADHD by endorsing 3-4 symptoms, and 28.8% of participants endorsed five or more symptoms which is within a diagnosable range.

**Hypothesis 1**

The first hypothesis predicted that social impairment would moderate the effect of ADHD symptoms on the quality of social support. A moderated regression was conducted using social impairment as a moderator between ADHD symptoms and social support quality, $F(3,2549)=163.11$, $p<.001$, $R^2=0.16$ (Table 2). This model accounted
for 16% of the variance in quality of social support. The interaction between ADHD and social impairment explained a significant increase in social support quality variance, $F(1, 2549)=11.79, p< .001, \Delta R^2= 0.04$. Thus, social impairment was a significant moderator of the relation between ADHD and social support quality, with a small effect size. This suggests that those who experience low levels of social impairment, regardless of their level of ADHD symptoms, experience high levels of quality of social support. However, those with decreased ADHD symptoms, especially those with greater social impairment, experience lower social support quality (Figure 1). Figure one represents the simple slopes for the moderation between social impairment, ADHD and quality of social support. Low impairment represents one standard deviation below the mean, with high impairment representing one standard deviation above the mean. Simple slopes are significant for both low and high social impairment ($p<.05$).

Within this moderated regression, the main effect of ADHD was a significant predictor of social support quality, $b= -0.07, t(2549)= -2.07, p< .05$, such that ADHD predicts lower social support quality. The main effect of social impairment was also a significant predictor of social support quality, $b= -0.95, t(2549)= -10.49, p< .001$, such that social impairment predicts lower social support quality.
Table 2
Social Impairment as a Moderator between ADHD and Quality of Social Support (Hyp. 1)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$\beta$</th>
<th>$p$</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHD*</td>
<td>-.071</td>
<td>.038</td>
<td>-.139,  -.004</td>
</tr>
<tr>
<td>Social Impairment**</td>
<td>-.946</td>
<td>&lt; .001</td>
<td>-1.122, -.769</td>
</tr>
<tr>
<td>ADHD x Social Impairment**</td>
<td>.008</td>
<td>&lt; .001</td>
<td>.003, .012</td>
</tr>
</tbody>
</table>

*p $\leq$ .05, **$p$ $\leq$ .001

Figure 1
Interaction between Social Impairment and ADHD on Quality of Social Support (Hyp. 1)

Hypothesis 2

The second hypothesis predicted that social impairment would moderate the effect of ADHD symptoms on the quantity of social support. A moderated regression was conducted using social impairment as a moderator between ADHD and social support.
quantity, $F(3, 2559)=30.89, p<.001, R^2=0.04$ (Table 3). This model accounted for 4% of the variance in quantity of social support. The interaction was not significant, showing no moderating effect, $F(1, 2559)=1.33, p=0.2480, \Delta R^2=0.0005$. Likewise, the main effect of ADHD was not a significant predictor of social support quantity, $b=0.02, t(2559)=0.37, p=0.710$. However, the main effect of social impairment was a significant predictor of social support quantity, $b=-0.77, t(2559)=-4.52, p<.001$, such that social impairment predicts lower social support quantity.

Table 3
Social Impairment as a Moderator between ADHD and Quantity of Social Support (Hyp. 2)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>β</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHD</td>
<td>.024</td>
<td>.715</td>
<td>-.104, .152</td>
</tr>
<tr>
<td>Social Impairment**</td>
<td>-0.772</td>
<td>&lt;.001</td>
<td>-1.107, -.438</td>
</tr>
<tr>
<td>ADHD x Social Impairment</td>
<td>.005</td>
<td>.248</td>
<td>-.004, .014</td>
</tr>
</tbody>
</table>

*p ≤ .05, **p ≤ .001

Hypothesis 3

The third hypothesis predicted that quality of social support would moderate the effect of ADHD symptoms on functional impairment, after controlling for internalizing symptoms. A moderated regression was conducted using social support quality as a moderator between ADHD and overall impairment, after controlling for internalizing, $F(4, 2373)=508.47, p<.001, R^2=0.46$ (Table 4). This model accounts for 46% of the variance in overall impairment. However, the interaction is not significant, showing no
moderating effect, $F(1, 2373)=1.57, p=0.2104, \Delta R^2=0.0004$. The main effect of ADHD, on the other hand, was a significant predictor of overall impairment, $b=1.28$, $t(2373)=22.21, p<.001$. Specifically, ADHD predicts increased overall impairment. The main effect of quality of social support was a significant predictor of impairment, $b=-0.66, t(2373)=-8.68, p<.001$, such that, social support quality predicts lower overall impairment.

Table 4
Social Support Quality as a Moderator between ADHD and Impairment (Hyp. 3)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$\beta$</th>
<th>$p$</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHD**</td>
<td>1.282</td>
<td>&lt;.001</td>
<td>1.169, 1.395</td>
</tr>
<tr>
<td>Social Support Quality**</td>
<td>-0.665</td>
<td>&lt;.001</td>
<td>-0.815, -0.515</td>
</tr>
<tr>
<td>ADHD x Social Support Quality</td>
<td>-0.008</td>
<td>.210</td>
<td>-0.020, 0.005</td>
</tr>
<tr>
<td>Internalizing†</td>
<td>.750</td>
<td>&lt;.001</td>
<td>.653, .848</td>
</tr>
</tbody>
</table>

* $p \leq .05$, ** $p \leq .001$, †=covariate

Hypothesis 4

The fourth hypothesis predicted that quantity of social support would moderate the effect of ADHD symptoms on functional impairment, after controlling for internalizing symptoms. A moderated regression was conducted using social support quantity as a moderator between ADHD and overall impairment, controlling for internalizing, $F(4, 2380)=515.31, p<.001, R^2=0.46$, with a large effect size (Table 5). This model accounted for 46% of the variance in overall impairment. There was a
moderating effect explained by the significant interaction of ADHD and social support quantity, $F(1, 2380)=12.86, p<.001, \Delta R^2= 0.003$. Thus, social support quantity was a significant moderator of the relation between ADHD and overall impairment. This suggests that for both levels of quantity of social support (i.e., high and low) those with increased ADHD symptoms experience more impairment. Overall, those with decreased quantity of social support, especially those with greater ADHD symptoms, experience greater levels of overall impairment (Figure 2). Figure two represents the simple slopes for the moderation between social support quantity, ADHD and overall impairment. Low social support quantity represents one standard deviation below the mean, with high quantity representing one standard deviation above the mean. Simple slopes are significant for both low and high social support quantity ($p<.001$).

In addition, the main effect of ADHD was a significant predictor of overall impairment, $b= 1.31, t(2380)=22.70, p< .001$. Specifically, ADHD predicts higher overall impairment. Finally, the main effect of social support quantity was a significant predictor of social support quantity, $b= -0.38, t(2380)= -8.85, p< .001$, such that social support quantity predicts lower overall impairment.
Table 5
Social Support Quantity as a Moderator between ADHD and Impairment (Hyp. 4)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>β</th>
<th>p</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHD**</td>
<td>1.306</td>
<td>&lt; .001</td>
<td>1.193, 1.419</td>
</tr>
<tr>
<td>Social Support Quantity**</td>
<td>-.376</td>
<td>&lt; .001</td>
<td>-.460, -.293</td>
</tr>
<tr>
<td>ADHD x Social Support Quantity**</td>
<td>-.014</td>
<td>&lt; .001</td>
<td>-.022, -.006</td>
</tr>
<tr>
<td>Internalizing†</td>
<td>.807</td>
<td>&lt;.001</td>
<td>.712, .901</td>
</tr>
</tbody>
</table>

*p ≤ .05, **p ≤ .001, †= covariate

Figure 2
Interaction between Quantity of Social Support and ADHD on Impairment (Hyp. 4)

Exploratory Analyses

First, exploratory analyses included running the models from hypotheses three and four and examining differences between sex/gender and sexual orientation (i.e., three groups; cis-hetero-female, cis-hetero-male, sexual and gender minorities [SGM] groups). There were 1,476 cis-hetero-females, 521 cis-hetero-males, and 366 SGM participants.
Second, the same models as noted above were examined for differences in ADHD symptom clusters (i.e., inattentive and hyperactive symptom clusters). This differs from the ADHD variable used in the original models because we are separating out individuals who experience inattention from those who experience hyperactivity/impulsivity, to examine differences between the two clusters of symptoms. These analyses were conducted using the full sample.

Third, moderations from hypotheses three and four were run using only diagnosable ADHD. This means analyzing data in the moderations from only those who reported enough symptoms to be diagnosed with ADHD, meaning they rated at least five symptoms of ADHD as occurring often or very often. This was done to examine differences between diagnosable levels of ADHD and subthreshold ADHD. The number of participants in this group is 480.

The model for Hypothesis 3, that quality of social support would moderate the effect of ADHD symptoms on functional impairment, after controlling for internalizing symptoms was run separately by the three sex/gender and sexual orientation groups (cis-hetero-female, cis-hetero-male, SGM). The overall model is significant for cis-hetero-men, cis-hetero-women, and sex and gender minorities.¹ The findings from the full sample hold for cis-hetero-females, in that the main effect of ADHD is significant \( (b = 1.66, t(1476)=5.65, p< .001) \), but the interaction is not significant. However, the results differ from the full sample such that the main effect of quality is not significant for cis-hetero-females. The findings from the full sample also hold for cis-hetero-males, in that

¹ Data are not included for exploratory analyses due to low power but is available upon request.
the main effect of ADHD is significant, but the interaction is not significant. However, the results also differ from the full sample such that the main effect of quality is not significant for cis-hetero-men, however this may be due to low power. There are not significant main effects or interactions for the SGM group, however, this may be due to the low power as well. These results suggest that for cis-hetero-individuals, as ADHD symptom counts increase, overall impairment increases.

The model for Hypothesis 4, that quantity of social support would moderate the effect of ADHD symptoms on functional impairment, after controlling for internalizing symptoms was run separately by the three sex/gender and sexual orientation groups (cis-hetero-female, cis-hetero-male, SGM) The overall model is significant for cis-hetero-men, cis-hetero-women, and sex and gender minorities. The main effect of ADHD was significant for all groups ($p<.001$). This result holds from the overall analysis. There is no significant main effect of quantity for cis-hetero-individuals, however, the main effect of quantity was significant for sexual and gender minorities ($p=.003$). This suggests that for sexual and gender minorities as the quantity of social support increases, impairment decreases. The interaction of ADHD and quantity was not significant for cis-hetero-men; however, it was significant for cis-hetero-women ($b=-0.02$, $t(1480)=-4.34$, $p<.001$), and sexual and gender minorities ($b=-0.02$, $t(367)=1.79$, $p=.05$). These results suggest that for cis-hetero-women and sexual and gender minorities, the interaction of ADHD and quantity of social support explained a significant increase in variance of overall impairment.
The model for Hypothesis 3, that quality of social support would moderate the effect of ADHD symptoms on functional impairment, after controlling for internalizing symptoms was run separately by inattention & hyperactive/impulsive ADHD symptom clusters. For both ADHD symptom clusters the overall model was significant (Inattention, $F(4, 2378)=317.36, p< .001, R^2= 0.35$; hyperactive/impulsive, $F(4, 2378)=317.45, p< .001, R^2= 0.35$). For both ADHD symptom clusters there was no main effect of ADHD symptom cluster, which differs from the overall findings. However, both clusters showed a main effect of quality, such that, as quality increases, impairment decreases, which does reflect overall findings. Similarly, neither symptom cluster showed a significant interaction on model three, between symptoms and quality of social support, which also supports overall findings.

The model for Hypothesis 4, that quantity of social support would moderate the effect of ADHD symptoms on functional impairment, after controlling for internalizing symptoms was run separately by inattention & hyperactive/impulsive ADHD symptom clusters. The overall model was significant for both (Inattention, $F(4, 2385)=318.24, p< .001, R^2= 0.35$; hyperactive/impulsive, $F(4, 2378)=318.14, p< .001, R^2= 0.35$). There was a main effect of ADHD symptoms, that indicated that as symptoms increase, impairment increases, for both ADHD symptom clusters as well. Additionally, there was a main effect of quantity for both clusters that, as quantity increases, impairment decreases. There was a significant interaction between hyperactive symptoms and quantity, that explained a significant increase in variance of overall impairment. This interaction was
not observed for inattention symptoms and quantity. These findings were similar to overall findings.

Finally, the models of hypothesis three and four were examined including only the 480 participants who endorsed elevated levels of ADHD (i.e., those who gave a rating of “often” or “very often” on at least 5 ADHD symptoms) Both of the overall models for hypothesis three and four were significant. However, the model for hypothesis three had no significant main effects or a significant interaction. The model for hypothesis four showed that the main effect of ADHD was significant, however, the main effect for quantity and the interaction were not significant. These analyses were vastly underpowered, so it is not surprising that significant results were not observed.
CHAPTER FIVE

DISCUSSION

The current study examined the effects of and comparison between quality versus quantity of social support for college students with ADHD. College students with ADHD show difficulties with executive functioning skills which may be related to life impairments. If students then also lack necessary social support quality and quantity, these problems may be exacerbated.

Primary Findings

Within the present study it was hypothesized that social impairment would moderate the effect of ADHD symptoms on the quality of social support. A moderating effect was found for the interaction between ADHD and social impairment on quality. The interaction explained a significant increase in variance of social support quality. This suggests that those who experience low levels of social impairment, regardless of their level of ADHD symptoms, experience high levels of quality of social support. However, those who experience high social impairment, experience lower overall quality of social support. Additionally, those who experience high impairment and lower ADHD symptoms experience less quality of social support than those who experience high social impairment and high ADHD. Overall, this suggests that those with decreased ADHD symptoms, especially those with greater social impairment, experience lower social support quality. This finding was unexpected, although it may be explained by a phenomenon in which students with high levels of ADHD have learned to develop a close group of friends on whom they rely substantially as a coping mechanism for
success. However, as the effect was small, it is possible that our large sample size contributed to this significant finding. It could also be that because the current study is merely a correlational design, and is not causational, that we do not know which variables come first in the interaction. Thus, the relation between ADHD, social impairment, and social support quality described in this hypothesis may be better explained in a different order.

Additionally, it was hypothesized that social impairment would moderate the effect of ADHD symptoms on the *quantity* of social support. There was no moderating effect found for interaction of social impairment and ADHD for quantity of social support. Additionally, there was no significant main effect of ADHD (i.e., ADHD was not a significant predictor of quantity). However, there was a significant main effect for social impairment. Results suggest that social impairment significantly predicts lower social support quantity. This is to be expected; if one reports social impairment, they likely also have fewer friends. However, the fact that ADHD was not a significant predictor was surprising. This might be because students with increased ADHD have been able to find diverse groups to be a part of on campus, and cultivated friendships through these shared interests, regardless of their symptomology. Similarly to hypothesis one, this correlational study cannot show causation between the variables in question. Null findings may also be explained by the idea that the variables are not related in the way we hypothesized. However, it may be that rather than social impairment moderating the relation between ADHD and social support quantity it may act as a mediator.
The third hypothesis predicted that the quality of social support would moderate the effect of ADHD symptoms on functional impairment. There was no moderating effect of quality of social support on ADHD predicting impairment. However, there was a significant main effect of ADHD, such that ADHD predicted greater overall impairment. In addition, there was a main effect of quality of social support, such that social support quality predicted lower overall impairment. These findings partially held for symptom clusters of ADHD (i.e., Inattentive and Hyperactive/Impulsive) and for cis-hetero-individuals. ADHD symptom clusters did not show main effects for ADHD, while cis-hetero-individuals did not show a main effect for quality. While SGM did not show any significant main effects or interaction, which may be due to low power. Therefore, this finding is partially generalizable for individuals with both types of ADHD symptoms, and for cis-hetero-individuals.

Finally, hypothesis four stated that the quantity of social support would moderate the effect of ADHD symptoms on functional impairment. There was a moderating effect explained by the interaction of ADHD and social support quantity on impairment. The interaction of ADHD and social support quantity explained a significant increase in variance of overall impairment. This suggests that for both levels of quantity of social support (i.e., high and low) those with increased ADHD symptoms experience more impairment. It is also important to note that even individuals with low ADHD symptoms still experience impairment and greater social support quality is related to lower impairment in these individuals as well. In sum, for those who have a low quantity of social support coupled with higher levels of ADHD experience increased levels of
impairment compared to those who experience a high quantity of social support and increased levels of ADHD. Overall, this suggests that those with decreased quantity of social support, especially those with greater ADHD symptoms, experience greater levels of overall impairment. These findings hold for cis-hetero-women, and sexual and gender minorities, but not for cis-hetero-men, which may be due to low power. However, it is important to note that even with low power these findings were significant for sexual and gender minorities, which suggests that they may be very sensitive to this interaction. Additionally, the findings hold when the analysis is run by ADHD symptom cluster. Therefore, these findings are generalizable for cis-hetero-women, sexual and gender minorities, and those with both inattentive, and hyperactive symptoms of ADHD presentation.

**Links to Previous Research**

Our findings reflect a similar observation from the work of Platt and colleagues (Platt et al., 2014) that examined the effects of perceived social support (quality), and social diversity (quantity) on PTSD. They found that a lack in quantity of social support regardless of the strength of quality of social support a person experienced was related to worse outcomes. The present research suggests a similar trend. Hypothesis three shows that the moderating effect of social support quality was not significant. However, hypothesis four shows that there is a moderating effect of quantity such that those who experience a low quantity of social support as well as elevated ADHD symptoms experience greater overall impairment. This shows that while quality and quantity may both offer some degree of protection against life impairment, in the context of a person
with elevated ADHD symptoms, that the lack of *quantity* of support is a much stronger predictor of overall impairment.

Results from the current study are similar to those found in previous research which has shown that students with ADHD may be more at risk to have poorer social interactions (Nigg & Barkley, 2014). Results from the current study support these past findings, indicating that those who experience higher levels of ADHD symptoms experience increased levels of social impairment. Additionally, past research has shown that students who have ADHD exhibit weaker social relationships (Barkley, 2018). The present study found similar results showing that students with increased levels of ADHD have lower quality and quantity of social support, suggesting that their social relationships may be lacking. Similarly, past research has shown that students with ADHD also experience higher social rejection than their peers (Kim et al., 2015). Our results may suggest that because those who experience higher levels of ADHD symptoms have lower quality and quantity of social support, they may be experiencing higher rates of social rejection.

Previous research on executive functioning theory posits that behavioral inhibition and self-control/regulation are important components of executive functioning, and that these are essential functions for human social interaction (Antshel et al., 2014). Students with ADHD show difficulties with inhibition and self-control which leads to difficulties in other components of executive functioning skills and can then lead to problems with motivation, self-regulation, and social interactions. Findings from the current study support these findings that students with ADHD show increased social
impairment. Current findings also build off of these previous findings, by showing that students who experience this increased level of social impairment then also experience a decrease in quality and quantity of social support.

Additionally, this supports the idea that there may be a negative feedback loop that students with ADHD experience. Students with ADHD report higher levels of rejection sensitivity and show a higher tendency to overreact to social rejection (Layden et al., 2017). This perception of perceived social isolation, loneliness, and lack of close relationships can affect functional connectivity in the brain and result in decreased ability to engage the executive control process (Babinski et al., 2019). This decreased function in executive control may then serve to exacerbate ADHD symptoms and executive dysfunction, therefore continuing to perpetuate a loop of increased symptoms and fewer close relationships. Our findings support this feedback loop, showing that college students with ADHD have increased levels of social impairment, and as a result suffer by having a lower quality and quantity of social support. This may in turn worsen their pre-existing ADHD symptoms.

Results from the present study support minority stress theory. Minority stress theory suggests that students who are part of sexual and gender minority groups experience greater psychological distress, than non-minority students (Hayes et al., 2011). Current results indicate that the general findings that lower quantity of social support is related to greater impairment generalizes to SGM. Similarly, results that those with decreased quantity of social support, especially those with greater ADHD symptoms, experience greater levels of overall impairment, are generalizable to SGM as
well. These findings were significant despite analyses being underpowered which suggests that these relations may be particularly strong from members of sexual and gender minorities.

Clinical Implications

These findings have important implications for people's lives. Indeed, previous research has shown that students with ADHD rely heavily on social support for success during the transition to college (Lefler et al., 2016). However, understanding that college students with ADHD experience a weaker quality of social support due to social impairments and experience greater overall impairment due to a lack of quantity of social support should inform how we address services for these students. This should inform how parents and high school counselors help these students prepare for the transition to college. Recommendations include giving support to students to find social organizations during the transition to higher education and participating in ADHD support groups and social skills training. Indeed, research has shown that developing close relationships upon arrival at college is essential for student’s adjustment (Azmitia et al., 2013). Counselors of these students should provide information about the transition to college, including the services available to the student once at college, and when possible, appropriate ways to reach out for help to professors and services.

Social skills training should focus on building the skills that we know students with ADHD struggle with. These skills these students often lack include talking in turn, not talking excessively, listening to others, attending to social cues, and identifying others’ emotions (Barkley, 2018). Therefore, by focusing on addressing these skills and
working to improve them, it may help these students be able to cultivate closer friendships. Previous research suggests that students with ADHD experience increased rejection sensitivity (Layden et al., 2017). Thus, it is important for students to be involved in some social skills training before being encouraged to make new friends and become involved in more social organizations. This will ensure that students are learning to manage their ADHD symptoms, and building the social skills necessary to cultivate and maintain quality friendships and will serve to decrease the risk of rejection.

Additionally, college support services and resources for these students should provide continued opportunities for ADHD support groups and help connect students to social organizations on campus. College services should also provide additional advising sessions to incoming students with ADHD, about college expectations, and self-advocacy on campus. This is particularly important as research has shown that college students with disabilities who are able to engage in self-advocacy have greater success in college and are more likely to graduate than students who are not able to self-advocate (Pfeifer et al., 2020). Therefore, by offering support in learning the skills necessary for self-advocacy can help students with ADHD get connected with the necessary support groups and accommodations they may need for success in college.

University counselors and therapists may consider providing Cognitive Behavioral Therapy (CBT) for adults, or college students with ADHD, to help them with strategies to manage their symptoms. In a recent review of CBT intervention studies, most interventions show fair to good quality of improvement for individuals with ADHD (Fullen et al., 2020). However, the current research shows that social support is an
important aspect of coping with and managing ADHD, so this should be added to the current CBT manuals. For example, one well known manual, *Cognitive-Behavioral Therapy for Adult ADHD* (Solanto, 2011) does not include a module on social relationships and social support. Future CBT manuals should consider adding a chapter about the importance of social support and focus on building the social skills that may be necessary to success for these individuals. Adding intervention and skills related to social skills and building social relationships may serve to make these CBT interventions more effective. For example, in a CBT manual of social skills training for adolescents with Autism, they used group settings to simulate social situations, and gave direct feedback in the moment (Laugeson et al., 2009). Also, in a social skills training program for adults with social anxiety, they used a hierarchy and behavioral rehearsal to build social skills and improve social performance (Beidel et al., 2014). These social skills programs could be adapted to fit within a CBT manual for college students, and adults with ADHD. In addition, the review of ADHD interventions shows that individuals who received psychological interventions plus the use of medication experienced the greatest improvement in management of ADHD symptoms (Fullen et al., 2020). Therefore, it is important for counselors and therapists to discuss the use of CBT combined with medication with their clients with ADHD.

**Limitations and Future Directions**

The findings introduced herein should be understood in context of the limitations of this study. The use of a large multi-site study, while helpful in many aspects, introduces some limitations to this study. For example, because each university has added
measures for various projects, the overall survey has gotten rather long; it takes approximately an hour to complete. This may be a long time to ask college students, particularly students with elevated ADHD symptoms, to focus and may affect the quality of data we receive. Indeed, 128 students had to be excluded from data analyses in the current study because of missed attention checks. Future studies of ADHD may benefit from being shorter.

Another limitation may be that by using college students as a sample of emerging adults, the results may not generalize to other emerging adults with ADHD who did not attend college. The transitional experiences, and accessibility of peers for support may be very different for emerging adults that did not attend college. It may also be true that the college population we examined were higher functioning than the general population, and thus our findings may be specific to a college population. Additionally, given that participants in the study were predominantly White (67.3%), cis-hetero females (62.4%), findings may not be generalizable beyond white, female college students. Future research should focus on examining these effects in non-college populations to further the knowledge base on how non-college adults may experience social support and impairment.

Additionally, as we are particularly interested in looking at the college population there is a limitation of not examining other areas of impairment that we know these students experience. In future research it may be important to consider other areas of impairment, specific to college students, that may be affected by social support. Looking at how social support is related to other specific outcomes such as grades, dropout rates,
study habits, and alcohol use, may help us fill in important gaps to further understand how college students with ADHD may be affected. In addition, previous research suggests that living situation, and proximity to parents, may be related to social closeness, social support, and college adjustment (Arnett, 2000). These factors were not considered in the present study but should be examined in future studies to understand how these factors may affect college students with ADHD.

It is also important to note that other comorbid conditions may affect the relation between ADHD, social support, social impairment, and overall impairment. The current study examined and controlled for the internalizing symptoms of depression, anxiety, and stress, because they are often comorbid with ADHD and may affect these relations. However, there are other comorbid conditions that individuals may experience such as substance use, trauma, autism, and learning disorders, that may also affect the relation between ADHD, social support, and impairment. Future research should consider examining how other comorbid conditions may affect college students with ADHD.

Next, considering the negative feedback loop that may exist between ADHD symptoms, social impairment, social support, and executive dysfunction, the present study only examined ADHD, social impairment, and social support. Future research should consider examining the relationship between social support and executive functioning, and their relationship on ADHD symptoms to complete the feedback loop.

Finally, the current study is only a correlational design. With a correlational study causality between the variables of interest cannot be determined. Future research may
consider using a longitudinal study to examine causality and the direction of the relations between the target variables.

**Final Conclusions**

The current study examined the effects of and comparison between quality versus quantity of social support for college students with ADHD. College students with ADHD show difficulties with executive functioning skills which may be related to life impairments. If students then also lack necessary social support quality and quantity, these problems may be exacerbated.

Overall, findings suggest that ADHD and social support predict overall impairment. Additionally, those with lower ADHD symptoms, especially those with greater social impairment, experience lower social support quality. Finally, those with decreased quantity of social support, especially those with greater ADHD symptoms, experience greater levels of overall impairment. Overall this shows that ADHD indeed has an impact on a person’s social support.
REFERENCES


APPENDIX A

MEASURES

Demographics Form

1. What is your biological sex (or sex assigned at birth)?
   - Male
   - Female
   - Intersex
   - Not listed (please specify)

2. What is your gender identity?
   - Male
   - Female
   - Transgender
   - Nonbinary/fluid queer/gender queer
   - Not sure (exploring my gender identity)
   - Not listed (please specify)

3. What is your sexual orientation?
   - Heterosexual
   - Gay or Lesbian
   - Bisexual
   - Queer
   - Pansexual
   - Asexual
   - Not sure (exploring my sexual orientation)
   - Not listed (please specify)

4. Please select your age.
5. What is your height in feet and inches?
6. What is your current weight in pounds?
7. Although the categories listed below may not represent your full identity or use the language you prefer, for the purpose of this survey, please indicate which group(s) below most accurately describes your racial identification.
   - Native American/American Indian/Alaska Native/Indigenous
   - Asian
   - Black
   - Latinx/Hispanic (Non-White)
   - Middle Eastern/North African (Non-White)
   - Pacific Islander/Native Hawaiian
   - White
   - Multiracial
   - Not listed (please specify)______________

8. USE SKIP LOGIC TO DISPLAY ONLY TO PEOPLE THAT CHOSE MULTIRACIAL ABOVE. Multiracial people can identify in various ways. For example,
some people identify with a specific racial heritage, and some identify as “multiracial.” Please describe the race with which you primarily identify. Please also describe any other races that are part of your identity.

9. Are there any other words you would use to describe your race, ethnicity, or culture?

10. Current residential status:
   · Living at home with one or more parents
   · Living on campus
   · Living off-campus (not with a parent)

11. Select the choice that you think best describes your hometown:
   · Urban
   · Suburban
   · Rural

12. What year are you currently in (select one):
   · First year
   · Second year
   · Third year
   · Fourth year
   · Fifth year or more

13. What is your college grade point average (GPA)?

14. What was your high school grade point average (GPA)?

15. If you took the ACT, choose the score from the dropbox below.

16. If you took the SAT, please include the Verbal plus Quantitative score in the blank.

17. Approximately when did you take the ACT? (MM/DD/YYYY)

18. Approximately when did you take the SAT? (MM/DD/YYYY)

19. Are you a competitive athlete (e.g., student athlete, weightlifter, runner, cyclist) OR do you hold a position that requires you to be physically fit or frequently engage in physical exercise (e.g., athletic trainer, yoga instructor, outdoor program trip leader)? If yes, please specify.

20. The university you attend:
   · Appalachian State University
   · University of Northern Iowa
   · University of Wyoming
   · University of South Carolina
   · University of Colorado Boulder

21. Are you a first generation college student?
   · Yes
   · No

22. Religious affiliation:
   · Christian (please enter denomination)______
   · Jewish
   · Interdenominational
   · Muslim
   · Hindu
   · Buddhist
23. What school is your major in?
   - Business
   - Education
   - Engineering and Computing
   - Nursing
   - College of Arts and Science (Humanities)
   - College of Arts and Science (Science)
   - Hospitality, Retail, and Sport Management
   - Mass Communications and Information Studies
   - Music
   - Public Health
   - Social Work
   - Undecided

24. What extra-curricular activities are you actively involved in (Check all that apply)
   - Varsity sports team
   - Club sports team
   - Social fraternity or sorority
   - Professional fraternity, sorority, or organization
   - Academic organization or honors society
   - Student government
   - Religious group (ex. youth group or bible study)
   - Service organization
   - Volunteering
   - Arts performance group
   - Other ________

25. Are you in the honors college?
   - Yes
   - No

26. Have you ever been diagnosed with ADHD?
   - Yes
   - No

27. Who diagnosed you with ADHD? (if indicated yes to question above)
   - Medical Doctor
   - Psychiatrist
   - Psychologist
   - Other ________

28. How old were you when you were diagnosed? (if indicated yes to question 27)

29. Do you think that you should be diagnosed with ADHD? (if indicated no to 27)

30. Annual family income:
   - Less than $23,000
   - $23,000-$50,000
   - $50,000-$99,000
31. Father’s highest education achieved:
   · Elementary or middle school
   · Some high school
   · High school diploma/GED
   · Some college
   · Associates degree
   · Bachelor’s degree
   · Some graduate school (Masters, PhD, JD, MD, etc.)
   · Graduate degree
   · Don’t know

32. Mother’s highest education achieved:
   · Elementary or middle school
   · Some high school
   · High school diploma/GED
   · Some college
   · Associates degree
   · Bachelor’s degree
   · Some graduate school (Masters, PhD, JD, MD, etc.)
   · Graduate degree
   · Don’t know

33. Think of this ladder as representing where people stand in our society. At the top of the ladder are the people whose social class (income level, occupation and education level) is the most ideal, accepted, and valued in our society. At the bottom of the ladder are the people whose social class is the least ideal, accepted and valued in our society. The higher up you are on this ladder, the closer you are to the people at the very top and the lower you are, the closer you are to the bottom. Where would you put yourself on the ladder? Please place an X on the rung where you think you stand.

   MOST IDEAL, VALUED, ACCEPTED SOCIAL CLASS
   
   
   
   
   
   
   LEAST IDEAL, VALUED, ACCEPTED SOCIAL CLASS
DSM-5 ADHD Symptoms (American Psychiatric Association, 2013)

The checklist is measured on a 4-point Likert-type scale ranging from never/rarely (0), to very often (3).

1. Fail to give close attention to details or make careless mistakes in schoolwork, at work, or during other activities (e.g., overlook or miss details or work is inaccurate)
2. Have difficulty sustaining attention in tasks or play activities (e.g., have difficulty remaining focused during lectures, conversations, or lengthy reading)
3. Do not seem to listen when spoken to directly (e.g., mind seems elsewhere, even in the absence of any obvious distraction)
4. Do not follow through on instructions and fail to finish schoolwork, chores, or duties in the workplace (e.g., start tasks but quickly lose focus and am easily sidetracked)
5. Have difficulty organizing tasks and activities (e.g., difficulty managing sequential tasks; difficulty keeping materials and belongings in order; messy, disorganized work; have poor time management; fail to meet deadlines)
6. Avoid, dislike, or am reluctant to engage in tasks that require sustained mental effort (e.g., schoolwork or homework; for older adolescents and adults, preparing reports, completing forms, reviewing lengthy papers)
7. Lose things necessary for tasks or activities (e.g., school materials, pencils, books, tools, wallets, keys, paperwork, eyeglasses, mobile telephones)
8. Am easily distracted by extraneous stimuli (for older adolescents and adults, may include unrelated thoughts)
9. Am forgetful in daily activities (e.g., doing chores, running errands; for older adolescents and adults, returning calls, paying bills, keeping appointments)
10. Fidget with or tap hands or feet or squirms in seat
11. Leave seat in situations when remaining seated is expected (e.g., leaves his or her place in the classroom, in the office or other workplace, or in other situations that require remaining in place)
12. Run about or climb in situations where it is inappropriate (Note: In adolescents or adults, may be limited to feeling restless.)
13. Unable to play or engage in leisure activities quietly
14. Am often “on the go,” acting as if “driven by a motor” (e.g., is unable to be or uncomfortable being still for extended time, as in restaurants, meetings; may be experienced by others as being restless or difficult to keep up with)
15. Talk excessively
16. Blurt out an answer before a question has been completed (e.g., completes people’s sentences; cannot wait for turn in conversation)
17. Have difficulty waiting for my turn (e.g., while waiting in line)
18. Interrupt or intrude on others (e.g., butts into conversations, games, or activities; may start using other people’s things without asking or receiving permission; for adolescents and adults, may intrude into or take over what others are doing)
Depression Anxiety Stress Scale (Lovibond & Lovibond, 1995)

The items are measured on a 4-point Likert-type scale ranging from did not apply to me at all (0) to applied to me very much or most of the time (3). Symptoms are reported based on the past week.

1. I found it hard to wind down.
2. I was aware of dryness of my mouth.
3. I couldn't seem to experience any positive feeling at all.
4. I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion).
5. I found it difficult to work up the initiative to do things. 6. I tended to over-react to situations.
7. I experienced trembling (e.g., in the hands).
8. I felt that I was using a lot of nervous energy.
9. I was worried about situations in which I might panic and make a fool of myself.
10. I felt that I had nothing to look forward to. 11. I found myself getting agitated.
12. I found it difficult to relax.
13. I felt down-hearted and blue.
14. I was intolerant of anything that kept me from getting on with. 15. I felt I was close to panic.
16. I was unable to become enthusiastic about anything.
17. I felt I wasn't worth much as a person.
18. I felt that I was rather touchy.
19. I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat).
20. I felt scared without any good reason.
21. I felt that life was meaningless.

Weiss Functional Impairment Rating Scale (Weiss, 2000)

Participants rate if they are experiencing current impairment on a 4-point Likert-type scale ranging from never/not at all (0) to often/very much (3).

A. Family
1. having problems with family
2. having problems with spouse/partner
3. relying on others to do things for you
4. causing fighting in the family
5. making it hard for the family to have fun together
6. problems taking care of the family
7. problems balancing your needs against those of your family
8. problems losing control with family
B. Work
1. problems performing required duties
2. problems with getting your work done efficiently
3. problems with your supervisor
4. problems keeping a job
5. getting fired from work
6. problems working in a team
7. problems with your attendance
8. problems being late
9. problems taking on new tasks
10. problems working to your potential
11. poor performance evaluations
C. School
1. problems taking notes
2. problems completing assignments
3. problems getting your work done efficiently
4. problems with teachers
5. problems with school administrators
6. problems meeting minimum requirements to stay in school
7. problems with attendance
8. problems being late
9. problems taking on new tasks
10. problems working to your potential
11. problems with inconsistent grades
D. Life Skills
1. excessive or inappropriate use of internet, video games or TV
2. problems keeping an acceptable appearance
3. problems getting ready to leave the house
4. problems getting to bed
5. problems with nutrition
6. problems with sex
7. problems with sleeping
8. getting hurt or injured
9. avoiding exercise
10. problems keeping regular appointments with doctor/dentist
11. problems keeping up with household chores
12. problems managing money
E. Self-Concept
1. feeling bad about yourself
2. feeling frustrated with yourself
3. feeling discouraged
4. not feeling happy with your life
5. feeling incompetent
F. Social
1. getting into arguments
2. trouble cooperating
3. trouble getting along with other people
4. problems having fun with other people
5. problem participating in hobbies
6. problems making friends
7. problems keeping friends
8. saying inappropriate things
9. complaints from neighbors

G. Risk
1. aggressive driving
2. doing other things while driving
3. road rage
4. breaking or damaging things
5. doing things that are illegal
6. being involved with the police
7. smoking cigarettes
8. smoking marijuana
9. drinking alcohol
10. taking "street" drugs
11. sex without protection (birth control, condom)
12. sexually inappropriate behavior
13. being physically aggressive
14. being verbally aggressive

Interpersonal Support Evaluation List (Cohen et al., 1985)

The items are measured on a 4-point Likert-type scale ranging from definitely false (1) to definitely true (4).

1. If I wanted to go on a trip for a day (for example, to the country or mountains), I would have a hard time finding someone to go with me.
2. I feel that there is no one I can share my most private worries and fears with.
3. If I were sick, I could easily find someone to help me with my daily chores.
4. There is someone I can turn to for advice about handling problems with my family.
5. If I decided one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me.
6. When I need suggestions on how to deal with a personal problem, I know someone I can turn to.
7. I don’t often get invited to do things with others.
8. If I had to go out of town for a few weeks, it would be difficult to find someone who would look after my house or apartment (plants, pets, garden, etc.)
9. If I wanted to have lunch with someone, I could easily find someone to join me.
10. If I was stranded 10 miles from home, there is someone I could call who could come and get me.
11. If a family crisis arose, it would be difficult to find someone who could give me good advice about how to handle it.
12. If I needed some help in moving to a new house or apartment, I would have a hard time finding someone to help me.

Social Network Index (Cohen et al., 1997)

1. Which of the following best describes your marital status?
   (1) currently married & living together, or living with someone in marital-like relationship
   (2) never married & never lived with someone in a marital-like relationship
   (3) separated
   (4) divorced or formerly lived with someone in a marital-like relationship
   (5) widowed
2. How many children do you have? (If you don't have any children, check '0' and skip to question 3.)
   ____0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more
   2a. How many of your children do you see or talk to on the phone at least once every 2 weeks?
   ____0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more
3. Are either of your parents living? (If neither is living, check '0' and skip to question 4.)
   (0) neither
   (1) mother only
   (2) father only
   (3) both
   3a. Do you see or talk on the phone to either of your parents at least once every 2 weeks?
   (0) neither
   (1) mother only
   (2) father only
   (3) both
4. Are either of your in-laws (or partner's parents) living? (If you have none, check the appropriate space and skip to question 5.)
   (0) neither
   (1) mother only
   (2) father only
   (3) both
   (4) not applicable
   4a. Do you see or talk on the phone to either of your partner's parents at least once every 2 weeks?
   (0) neither
   (1) mother only
   (2) father only
   (3) both
5. How many other relatives (other than your spouse, parents & children) do you feel close to? (If '0', check that space and skip to question 6.)
   ____0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more
   5a. How many of these relatives do you see or talk to on the phone at least once every 2 weeks?
   ____0 ____1 ____2 ____3 ____4 ____5 ____6 ____7 or more
6. How many close friends do you have? (meaning people that you feel at ease with, can talk to about private matters, and can call on for help)
6a. How many of these friends do you see or talk to at least once every 2 weeks?

6. Do you belong to a church, temple, or other religious group? (If not, check 'no' and skip to question 8.)

7a. How many members of your church or religious group do you talk to at least once every 2 weeks? (This includes at group meetings and services.)

8. Do you attend any classes (school, university, technical training, or adult education) on a regular basis? (If not, check 'no' and skip to question 9.)

8a. How many fellow students or teachers do you talk to at least once every 2 weeks? (This includes at class meetings.)

9. Are you currently employed either full or part-time? (If not, check 'no' and skip to question 9.)

9a. How many people do you supervise?

9b. How many people at work (other than those you supervise) do you talk to at least once every 2 weeks?

10. How many of your neighbors do you visit or talk to at least once every 2 weeks?

11. Are you currently involved in regular volunteer work? (If not, check 'no' and skip to question 11.)

11a. How many people involved in this volunteer work do you talk to about volunteering-related issues at least once every 2 weeks?

12. Do you belong to any groups in which you talk to one or more members of the group about group-related issues at least once every 2 weeks? Examples include social clubs, recreational groups, trade unions, commercial groups, professional organizations, groups
concerned with children like the PTA or Boy Scouts, groups concerned with community service, etc. (If you don't belong to any such groups, check 'no' and skip the section below.)

_____ no  _____ yes

Attention Checks

1. A puppy refers to a…
   ___cat, ___elephant, ___monkey, ___dog

2. A kitten refers to a...
   ___cat, ___dog, ___monkey, ___elephant

3. An apple is a type of…
   ___meat, ___vegetable, ___fruit, ___dairy

4. A carrot is a type of…
   ___fruit, ___vegetable, ___meat, ___dairy