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The Influence of ADHD Symptoms and Social Functioning on Anxiety and Depression Symptoms in College Students

Danielle Willis

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THE INFLUENCE OF ADHD SYMPTOMS AND SOCIAL
FUNCTIONING ON ANXIETY AND DEPRESSION SYMPTOMS IN
COLLEGE STUDENTS

by

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DEDICATION

I dedicate this milestone to my grandmother, Janet Bemkey, who has always been so much more than a grandmother to me. Throughout my entire life, you have guided me with the patience of a saint and the kindness of an angel. Thank you so much for your unconditional love, unwavering support, and always appreciated encouragement. Words cannot express how truly grateful I am to have you in my life. I literally could not have done this without you. I love you, Nanny.

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ABSTRACT

Previous research has shown that Attention-Deficit/Hyperactivity Disorder (ADHD) is associated with impaired social functioning in children and adolescents. ADHD and poor social functioning have been shown to be separately associated with increased anxiety and depression symptoms as well. However, little research has examined these associations among college students. College is a transitional period of increased stress and exposure to new social situations for all students, but may be even more challenging for those with ADHD, who are already at risk for increased internalizing problems and impairment in social functioning. The current study aimed to examine the influence of ADHD symptoms and social functioning on anxiety and depression symptoms in traditional-aged college students attending a four-year university. Web-based surveys were completed by college students who self-reported on their ADHD symptoms, social functioning, and anxiety and depression symptoms. Additionally, a close friend of each participant also completed the ADHD and social functioning measures regarding the participant. Hypothesis 1, which predicted that ADHD symptoms would be significantly associated with social functioning, was not supported. Hypothesis 2, which predicted that increased ADHD symptoms would be associated with increased internalizing symptoms, was supported. Hypothesis 3 examined whether social functioning moderated the relation between continuous ADHD symptoms and internalizing symptoms (i.e., anxiety and depression symptoms, measured separately); hypothesis 3 was not supported for anxiety symptoms, however was

supported for participant-reported social functioning moderating the relation between ADHD symptoms and depression symptoms. The current study filled a gap in and addressed limitations of previous research and highlights the importance of targeting internalizing symptoms in interventions for college students who are experiencing ADHD symptoms.

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CHAPTER 1

INTRODUCTION

ADHD Overview and Prevalence

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder that is characterized by symptoms of inattention, hyperactivity, and/or impulsivity, affecting approximately 5% of children (American Psychiatric Association [APA], 2013). Although ADHD was once considered a childhood disorder, the APA now reports that ADHD occurs in approximately 2.5% of adults (2013); some studies have shown that up to 5% of the general adult population has ADHD (Barkley, Murphy, & Fischer, 2008). Other studies have shown that, regardless of official diagnosis, significant ADHD symptoms persist into adulthood for many of those with a childhood ADHD diagnosis. In a longitudinal study of children with ADHD, Weiss and Hechtman (1993) found that about 66.7% of their original sample reported having trouble with at least one or more disabling core symptoms (i.e., restlessness, impulsivity, inattention) as young adults, and 34% of these adults reported at least moderate to severe levels of inattention, hyperactivity, and impulsivity symptoms (Barkley et al., 2008).

College Students with ADHD

An adult population with ADHD that merits concern is college students. The current study utilizes a population of traditional-aged college students attending four-year colleges and universities. From this point forward, the term college student and

undergraduate refer to traditional-aged college students attending four-year colleges and universities. The developmental transition from high school to college can often lead to difficulties in adjustment for beginning college students, as college often is a transition to decreased external structure (Fleming & McMahon, 2012); however, for college students with ADHD, this same developmental challenge is intensified due to their vulnerability to a deficit in self-regulation (Fleming & McMahon, 2012) and the fact that most, if not all, external supports have been taken away (Meaux, Green, & Broussard, 2009; Anastopolous & King, 2015). Young adults with ADHD are attending college now more than ever, in part due to increased special education services for students with disabilities mandated by the government (Wolf, 2001). One of the first studies to examine the prevalence of ADHD symptoms in a general sample of college students found that 7-8% of the sample ($N=770$) self-reported significant ADHD symptoms (i.e., 1.5 standard deviations above the mean; Weyandt, Linterman, & Rice, 1995). Based on prevalence rates from previous research (APA, 2013; Barkley et al., 2008; Weyandt et al., 1995), if a large university campus was comprised of 40,000 college students, approximately 1,000 to 2,000 students would have a diagnosis of ADHD (i.e., 2.5 to 5%) and approximately 2,800 to 3,200 students would report a significant number of ADHD symptoms (i.e., 7 to 8%). ADHD clearly affects a large number of students on college campuses. Research on this topic is necessary and important so that those with ADHD and related concerns can be identified properly; proper identification of symptoms and related impairment will hopefully lead to these students accessing effective treatments.

Anxiety and Depression in College Students

Regardless of ADHD symptomology, “emerging adulthood” is a time that often consists of many challenges. Young adulthood often involves changes and exploration of possible life directions in love, future career, and worldviews (Arnett, 2000). Young adults who go to college face a huge transition in their lives, with more exposure to social situations and opportunities for substance use (Kahler, Read, Wood, & Palfai, 2003). This transition to college can be exciting, but also stressful; general samples of college students in recent decades are reporting increasingly more stress compared to students in the 1960s (Sax, 1997). In a national study of over 30,000 college students surveyed, 38.7% of students reported more than average stress and 8.7% reported tremendous stress in the last 12 months (American College Health Association [ACHA], 2011).

This increased stress may play a role in the prevalence of anxiety and depression in college students. In the same national sample of college students, the prevalence of being diagnosed or treated for anxiety or depression in the last 12 months was 9.2% and 8.3%, respectively, and 5.2% of students were diagnosed and/or treated for both anxiety and depression (ACHA, 2011). Although many college students were diagnosed or treated for anxiety and depression, an even greater number of students reported experiencing symptoms of anxiety and/or depression at any time in the last 12 months; 46.4% of students felt overwhelming anxiety and 28.4% felt so depressed that it was difficult to function. Given these statistics, it is important to identify students who may be most at risk for anxiety and depression during college.

ADHD and Internalizing Symptoms

High rates of anxiety and depression are clearly a concern for college students in general, but students with ADHD may be at an even greater risk of experiencing internalizing symptoms. Multiple studies have found ADHD to be associated with anxiety and depression symptoms for individuals from childhood through adulthood. Studies have found that ADHD in children is significantly associated with increased internalizing symptoms (Blackman, Ostrander, & Herman, 2005; Faraone, Biederman, Weber, & Russell, 1998). The prevalence rates for comorbid anxiety and depression disorders for children with ADHD are much higher compared to the general population (Angold & Costello, 1993; Angold, Costello, & Erklani, 1999; Costello, Egger, & Angold, 2004; Last, Hersen, Kazdin, Finkelstein, & Strauss, 1987; Pliszka, Carlson, & Swanson, 1999; Tannock, 2000). The association between ADHD and internalizing symptoms also extends past childhood into adolescence and adulthood. Lee and Hinshaw (2006) conducted a longitudinal study with girls and found that, at a five-year follow-up in adolescence, adolescent internalizing problems were predicted by childhood hyperactivity-impulsivity symptoms; this suggests that girls with ADHD symptoms, particularly those with hyperactivity-impulsivity, are at a greater risk for internalizing problems in adolescence. In a large national survey of 18- to 44-year-olds ($N = 3,199$), it was found that 12-month rates of mood disorders were 38.3% for adults with ADHD versus only 11.1% for adults without ADHD, and rates of anxiety disorders were 47.1% for adults with ADHD versus only 19.5% for adults without ADHD (Kessler et al., 2006).

The association between ADHD and internalizing symptoms has also been examined specifically within the college student population. Alexander and Harrison

(2013) found that higher ADHD symptoms were associated with higher levels of depression, anxiety, and stress in first-year psychology students. However, because this sample only included first-year students within one major, it is unclear if these results extend to the more general college student population and older college students. In a small sample of 43 undergraduates who all met diagnostic criteria for ADHD, it was found that 40% met criteria for a comorbid mood disorder and 33% met criteria for an anxiety disorder (based on DSM-IV criteria; Anastopolous & King, 2015). Although limited by a small sample size, this study by Anastopolous and King (2015) shows that college students with ADHD could be impacted by high rates of comorbidity for internalizing disorders, and these rates are comparable to, if not greater than, prevalence rates of internalizing disorders in children and adolescents with ADHD (i.e., approximately 25% of youth with ADHD have an anxiety disorder and approximately 12% to 50% have major depressive disorder; Tannock, 2000; Angold & Costello, 1993; Angold, Costello, & Erklani, 1999). Thus, there is a need for additional research examining these factors in the college student population.

In another study examining first-year college students, Rabiner, Anastopoulos, Costello, Hoyle, and Swartzwelder (2008) found that students with a self-reported ADHD diagnosis reported more depressive symptoms than those without an ADHD diagnosis; this finding was explained by more inattentive symptoms (but not hyperactive-impulsive symptoms) in students with ADHD. Unfortunately, the researchers did not collect data on anxiety, did not measure continuous ADHD symptoms, and did not sample students other than first-semester freshmen; thus, the results are limited to depression alone, self-reported (and possibly inaccurate) ADHD diagnostic status, and only students who were

in their initial transition to college. The researchers also measured social dissatisfaction and, surprisingly, found it did not differ among prior, current, or no ADHD diagnosis groups; however, the social dissatisfaction measure only included four general items (e.g., “I feel lonely”), did not examine social skills and prosocial behaviors, socio-emotional factors, or other important aspects of social functioning, and did not examine social dissatisfaction in relation to depression symptoms.

In a study that examined only anxiety (i.e., did not assess depression), it was found that college students who met criteria for an ADHD diagnosis based on self-reported ADHD symptoms reported significantly more anxiety symptoms than those who self-reported having no previous and no current ADHD diagnosis (Prevatt, Dehili, Taylor, & Marshall, 2015). Freshmen reported significantly more anxiety than upper-classmen, but anxiety levels did not differ between ADHD inattention and hyperactivity/impulsivity subtypes. These results suggest that college students with ADHD are at an increased risk of experiencing anxiety symptoms.

In contrast with the aforementioned research, Nelson and Gregg (2012) conducted a study comparing college students with and without an ADHD diagnosis, and found no differences on self-reported anxiety and depression symptoms between these groups. However, ADHD status was determined by a clinical evaluation, which was based on criteria from the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; DSM-IV-TR; APA, 2000) and a clinician’s judgment; self-reported and continuous ADHD symptoms were not measured, so associations between internalizing symptoms and subthreshold ADHD symptoms may have been overlooked. This study is therefore limited by its methodology of only using a single rater and categorical, clinician-

determined ADHD diagnoses, and the researchers also acknowledged other limitations of their study were small sample size and limited statistical power. Despite this study's contrasting results, the majority of the previous studies have found that ADHD is associated with increased internalizing symptoms throughout childhood, adolescence, and young adulthood, and specifically in college students. However, due to some limitations in previous research, a more thorough investigation of the relation between ADHD symptoms and anxiety and depression symptoms in college students is needed.

Negative Affect. The research and literature on possible theoretical models explaining the relation between ADHD and internalizing symptoms is extremely limited. However, one theory that could possibly explain the link between ADHD and internalizing symptoms is that both have a common factor of negative affect or negative affectivity (sometimes called "Negative Emotionality"). Negative affect (NA) is a temperamental quality described as the degree to which individuals feel upset, and encompasses various aversive affective states, such as being afraid, sad, angry, upset, scornful, disgusted, and worried (Clark and Watson, 1991). Clark and Watson (1991) put forth the tripartite model of anxiety and depression, which theorizes that anxiety and depression both share a common factor of NA but are differentiated in that high physiological arousal is specific to anxiety and low positive affect is specific to depression. Negative affect has been found to be significantly associated with increased anxiety and depression in children and adolescents aged 6 to 18 years (Chorpita, 2002), as well as in adults aged 18 to 64 years (Brown, Chorpita, & Barlow, 1998).

Negative affect has also been reported in individuals with symptoms of ADHD. Loney, Lima, and Butler (2006) found that NA was positively correlated with

hyperactivity/impulsivity, anxiety, and depression, as well as conduct problems in 11- to 19-year-olds. Fogleman, Walerius, Rosen, and Leaberry (2016) noted that, “In instances of distress, negative affect may differentially impact children with and without ADHD in that children with ADHD may be less likely to inhibit and regulate negative emotions leading to emotionally-driven negative affect expression,” and that this negative affect expression is “aversive to peers” (p. 2). Okado, Mueller, and Nakamura (2016) compared youth with ADHD-only and youth with ADHD and one or more comorbid disorder; although they found that ADHD-only youth did not have significantly higher NA compared to a community sample or ADHD youth with comorbidities, they did find that youth with ADHD and a comorbid disorder had significantly higher levels of NA. Additionally, youth with ADHD and one or more comorbid internalizing diagnoses had significantly higher NA than ADHD youth with comorbid externalizing disorders. This suggests that individuals with ADHD and a comorbid internalizing disorder may have the highest levels of NA.

Additional Shared Features. In addition to having increased negative affect in common, ADHD, anxiety, and depression also have shared diagnostic criteria; all share psychomotor agitation/disturbance (e.g., restlessness) and difficulty concentrating or thinking (APA, 2013; Biederman, Faraone, Mick, Moore, & Lelon, 1996). It has been found that the association between ADHD and internalizing symptoms is not simply due to these overlapping diagnostic criteria. Milberger, Biederman, Faraone, Murphy, and Tsuang (1995) found that even when methods of adjustment for overlapping symptoms of ADHD and depression were used, children with ADHD still had increased rates of depression, and this finding was replicated by Biederman, Faraone, Mick, and Lelon

(1995). In a study that examined children, adolescents, and adults, Murphy and Tsuang (1995) used two different techniques to account for overlapping symptoms between ADHD and internalizing disorders; they found that even after overlapping symptoms were subtracted/accounted for, the majority of individuals who had diagnoses of ADHD and a comorbid psychiatric disorder maintained their diagnosis of ADHD. Specifically, when overlapping symptoms of ADHD were subtracted, on average 75% of individuals maintained their generalized anxiety disorder diagnosis and 79% maintained their MDD diagnosis. These findings suggest that the link between ADHD and internalizing symptoms is not simply due to overlapping diagnostic criteria, and neither ADHD nor comorbid internalizing disorders are merely an artifact of the other's overlapping symptoms (Murphy & Tsuang, 1995; Biederman et al., 1996). Despite sharing common symptoms and being associated with one another, ADHD and internalizing symptoms each exist independently and should be further explored to gain a better understanding of their association.

ADHD and Social Functioning

Multiple studies have documented the relation between impaired social functioning and ADHD. While impairment in social functioning is not necessarily specific to ADHD alone and is included as a potential criterion for most of the psychological disorders in the 5th edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; APA, 2013), the causes of social impairment may differ between disorders; for example, impaired social functioning in individuals with social anxiety disorder may be due to avoidance of all social situations and intense fear of negative evaluation by others, while for individuals with major depressive disorder

(MDD), the impairments in social functioning may stem from reduced interest in social activity, dysfunctional empathic responding in social interactions, and/or a reduced capacity to generate effective solutions for interpersonal problems (APA, 2013; Kupferberg, Bicks, & Hasler, 2016). For adults with ADHD, impaired social functioning may result from ADHD neuropsychiatric deficits such as poor attention and organizational skills; social functioning difficulties for adults with ADHD may be manifested as poor listening skills, poor follow-through on commitments, problems with friendships, and difficulty with intimate relationships (Safren, Sprich, Chulvick, and Otto, 2004). While social functioning difficulties are not unique to ADHD, individuals with ADHD experience impairments in the social domain that warrant concern.

Children and adolescents with ADHD often struggle with poor social and communication skills (DuPaul, et al., 2004; Klimkeit, Graham, Lee, Morling, Russo, & Tonge, 2006). In addition to social skills deficits, various aspects of social functioning with peers are a challenge for youth with ADHD, including peer rejection, problems and increased negative features associated with peer relationships, lack of friendships, limitations in their activities with friends (if they do have any), and/or inability to maintain friendships (Wehmeier, Schacht, & Barkley, 2010; Blachman & Hinshaw, 2002). Youth with ADHD have fewer dyadic friends and are rated lower on social preference, less well liked, and more often in the rejected social status category compared to non-ADHD peers (Hoza, et al., 2005). Since those with ADHD are less likely to have mutual friendships, they miss out on the potential buffer against internalizing symptoms that a high quality friendship has been shown to provide (Rubin, Dwyer, Booth-LaForce,

Kim, Burgess, & Rose-Krasnor, 2004). As can be seen, poor social functioning can cause both direct and indirect negative effects for individuals with ADHD.

Although less research has examined the relation between social functioning and ADHD beyond childhood and adolescence, there are some studies that have examined this relation in the college student population. One study found that a hypothetical peer who was presented as having a known ADHD diagnosis was described with more negative adjectives than positive ones by college student participants (Chew, Jensen, & Rosen, 2009). College students have also reported that they would be less likely to befriend a hypothetical ADHD-diagnosed peer compared to a peer with a medical problem, less likely to want to work on a group project with this peer, and less likely to get to know this individual better (Canu, Newman, Morrow, & Pope, 2008). These studies show there is a stigma associated with ADHD among college students, which may be damaging to the social relationships and functioning of those with ADHD.

In addition to the stigma associated with ADHD, college students with ADHD may also display lower levels of social skills and more negative social behaviors, which then also lead to poorer social functioning. Shaw-Zirt, Popali-Lehane, Chaplin, and Bergman (2005) found that 21 ADHD-diagnosed college students reported significantly lower levels of social skills overall, and poorer social adjustment, compared to 20 non-ADHD college students. Specifically, female students with ADHD reported engaging in significantly more negative social behaviors than non-ADHD females, and also reported that their ADHD symptoms created difficulties for them in their social relationships. A possible cause for poorer social adjustment among students with ADHD could be explained by the results of a study by Kern, Rasmussen, Byrd, and Wittschen (1999);

when compared to a control group, college students who had been previously diagnosed and treated for ADHD reported having a greater tendency for confrontation and aggression under stressful situations, being more independent, and being less likely to be positively or negatively influenced by constructive feedback from others. These traits may negatively impact social interactions with peers for those with ADHD.

McKee (2014) also found that college students with more ADHD symptoms had decreased social skills and increased negative features in friendships. In this study of 68 undergraduates (of all class years except for freshmen), individuals in the high self-reported ADHD symptomology group reported being significantly less competent in providing advice and emotional support to friends and reported having more difficulty in managing interpersonal conflicts in comparison to students in the low symptomology group. Struggling in conflict management and in providing emotional support to friends may have a large influence on the social relationships of those with ADHD, especially considering the high levels of stress that often accompany college and the increased exposure to and dependence on peers (instead of parents) for guidance and support. Through self- and peer-reported measures of quality of friendship, McKee (2014) also found that those with high ADHD symptomology had friendships with somewhat dominant peers and their relationships were higher in antagonism compared to low ADHD symptomology students. Friends of high ADHD symptomology participants reported that they provided slightly more nurturance than they received from the participants. Additionally, friends who had more inattention symptoms reported seeking less support from high ADHD symptomology participants and also reported more difficulty engaging in behaviors associated with high-quality friendships.

While McKee (2014) found that friends of students with more ADHD symptoms reported receiving less nurturance from those students, Wilmshurst, Peele, and Wilmshurst (2011) found that ADHD-diagnosed college students rated their friends' support significantly lower compared to those with no ADHD diagnosis. It seems that both students with ADHD and their friends report receiving less nurturance and support in their friendships. Through interviews about college adjustment with students with ADHD, Meaux, Green, and Broussard (2009) found that many students reported looking for sources of support for their ADHD symptoms and transition to college; they specifically discussed transitioning from having their parents as main sources of support to having their peers be their primary support in college, and peer relationships were identified as a particularly helpful coping factor for these students with ADHD. Thus, it seems having less support from friends in college could impair students' coping ability.

Although multiple studies have found associations between ADHD and impaired social functioning in college students, Rabiner and colleagues (2008) did not find significant differences in satisfaction with social relationships between first-semester college students who self-reported ADHD symptoms and those who did not. However, these findings were limited since the social dissatisfaction measure the researchers used included only four general items. It is also possible that social dissatisfaction and impairment increase as students age (i.e., they may experience more negative social interactions over time), and consequently the association between social functioning and ADHD should be examined in a college student sample representing all four class years.

ADHD, Social Functioning, and Internalizing Symptoms

Impairments in social functioning are common for individuals with ADHD, and these social difficulties may exacerbate the existing link between ADHD and internalizing symptoms, leading to even greater levels of anxiety and depression symptoms. Limited research exists on the associations among ADHD symptoms, social functioning, and internalizing symptoms, especially for the college student population. A web-based survey conducted by Blasé and colleagues (2009) found that college students with a self-reported ADHD diagnosis reported more depressive symptoms and social concerns, as well as more emotional instability, academic concerns, and substance use. Although this study did examine ADHD, depression, and social concerns, the researchers did not examine the potential interactions among these constructs, and also did not use continuous, current symptoms of ADHD.

Several studies have examined the associations among ADHD, social functioning, and internalizing symptoms in childhood and adolescence. One study conducted with 142 Hispanic 14- to 19-year-olds found that there was a significant association between ADHD symptoms and impaired social functioning at high levels of depression, but not low levels of depression (Becker et al., 2013). However, this study was limited by its lack of generalizability to a more diverse population, and it was conducted with adolescents, not college students. Additionally, ADHD symptoms and social problems were only measured by one rater's report (i.e., teacher). In a study by Karustis, Power, Rescorla, Eiraldi, and Gallagher (2000), it was found that for 7- to 12-year-old children diagnosed with ADHD, social functioning was correlated significantly with anxiety and depression. Specifically, it was found that both parent-reported and child-reported anxiety were

positively correlated with parent-reported social problems; parent-reported depression (but not child-reported depression) was significantly associated with parent-reported social problems. Although this study included self-reported internalizing symptoms, social problems were not self-reported and were only obtained from the parent and teacher. Another study which also examined only ADHD-diagnosed youth (aged 10 to 14 years) found that a comorbid depression diagnosis, but not a comorbid anxiety diagnosis, was significantly associated with lower parent-reported social functioning; anhedonia and social anxiety symptoms were associated with lower youth-reported social skills, and lower youth- and parent-reported social acceptance (Becker, Langberg, Evans, Girio-Herrera, & Vaughn, 2014). However, neither Karustis and colleagues (2000) nor Becker and colleagues (2014) included a comparison group without ADHD, so it is unknown if undiagnosed youth would have the same associations or not. While these studies did examine associations among ADHD, social functioning, and internalizing symptoms, they were not conducted with college student populations.

One study by Blackman, Ostrander, and Herman (2005) examined a community sample of 6- to 11-year-olds and made comparisons among non-ADHD youth, ADHD youth without a depressive disorder, and ADHD youth with a comorbid depressive disorder (i.e., major depressive disorder or dysthymic disorder). They found that “children with ADHD and depression were particularly impaired in their social competence” compared to ADHD children without depression, noting that “social deficits may play a critical role in the relationship between ADHD and depression” (Blackman, Ostrander, & Herman, 2005, p. 204). The results found by Blackman and colleagues (2005) show that increased depression symptoms in youth with ADHD may have been in

part due to impaired social functioning. It seems that ADHD and internalizing symptoms have an existing association with each other, possibly due to a common factor of increased negative affect, but then this existing link between ADHD and internalizing symptoms could be exacerbated by deficits in social functioning.

Safren, Sprich, Chulvick, and Otto (2004) proposed a cognitive-behavioral model of impairment in adults with ADHD. They posit that the core and associated neuropsychiatric deficits that are characteristic of ADHD (i.e., difficulties related to attention, inhibition, self-regulation, and impulsivity) often result in a history of failure, underachievement, and relationship problems. Chronic failure and underachievement engender dysfunctional cognitive responses (e.g., “I can’t do it,” “I’m going to fail again”) which then in turn increase negative affect and mood disturbances (e.g., depression, anxiety, guilt, anger). Increased negative affect then makes it even more difficult for individuals with ADHD to manage distractibility, procrastination, and avoidance, and to enact adaptive compensatory strategies, which then further increases functional impairment. Increased functional impairment then adds to the existing history of failure and underachievement and the cycle continues. It seems that difficulties in social functioning and with social relationships may be one more factor that contributes to a history of failure and underachievement in individuals with ADHD. Increased difficulties with social functioning could then, in turn, exacerbate the existing link between ADHD and internalizing symptoms, leading to even more anxiety and depression symptoms in those with ADHD and impairment in social functioning.

While impaired social functioning may exacerbate the link between ADHD and internalizing issues, better social functioning (e.g., having friends and high quality

friendships) is associated with decreased internalizing symptoms and may serve as a buffer against anxiety and depression. Having a friend may actually serve as a protective factor for those youth who are at risk of having peer problems (Rubin, Fredstrom, & Bowker, 2008). In a one-year longitudinal study of fourth and fifth graders, Hodges, Boivin, Vitaro, and Bukowski (1999) found that peer victimization predicted increased internalizing and externalizing symptoms, but only for children who did not have a mutual best friend; this highlights the importance of friendships and suggests that having a best friend may prevent negative consequences, such as anxiety and depression. Rubin and colleagues (2004) found that better friendship quality predicted decreased internalizing problems, and predicted increased social competence and global self-worth in fifth graders. For girls specifically, high friendship quality predicted lower peer victimization and rejection, and also functioned as a buffer for the effect of low maternal support on the girls' internalizing problems. Future research is needed to determine whether having friends and high friendship quality serves as a protective factor in regard to internalizing symptoms beyond childhood, and specifically in college students. It would seem that for college students with ADHD, having social competence and high quality friendships could potentially serve as a buffer and weaken the link between ADHD and internalizing symptoms.

Limitations of Previous Studies

Many of the studies previously mentioned have limitations that the proposed study addresses. Specifically, multiple studies examined a limited sample. For instance, some studies that used a college student sample only looked at first year or first semester college students (e.g., Alexander & Harrison, 2013; Rabiner et al., 2008), or excluded

first year students (e.g., McKee, 2014). Some studies examining college students had very small sample sizes, and consequently may have lacked sufficient power to detect some important effects (e.g., McKee, 2014; Shaw-Zirt, et al., 2005). One study examined only females (e.g., Lee & Hinshaw, 2006), so it is not known whether these results extend to both genders. Multiple studies only examined one ethnicity (e.g., Becker, et al., 2013; Gudjonsson, et al., 2009), so the results may lack generalizability to a more diverse, general population. Additionally, some studies only examined the impact of ADHD diagnosis, rather than continuous ADHD symptoms; subthreshold ADHD symptoms have been associated with social impairment and comorbid symptoms such as anxiety and depression, so examining ADHD only as a dichotomous variable may neglect to take into account impairments that can result from subthreshold ADHD symptoms (Rielly, 2006; Malmberg, Edbom, Wargelius, & Larsson, 2011).

In addition to using limited samples, most studies did not include multiple raters (e.g., self- and peer-rated symptoms), and would have benefitted from using measures collected from multiple perspectives. The current study aimed to address these limitations (i.e., the use of limited samples and a single rater) in previous literature. Although the relations among ADHD symptoms, social functioning, and internalizing symptoms seem obvious, very few studies have examined these constructs simultaneously in the college population. Consequently, information about the relations among these variables is limited. Further research needs to be conducted in order to gain a better understanding of how they may interact and impact the lives of individuals who may be struggling with these issues.

The Current Study

Currently, research examining the associations among ADHD symptoms, social functioning, and anxiety and depression symptoms in college students, using multiple raters, is limited. The current study aimed to address this gap in research by examining the moderating effect of social functioning on the association between ADHD symptoms and internalizing symptoms in college students. This was accomplished by administering (in a web-based format) self-reported and close friend-reported measures on ADHD symptoms and aspects of social functioning, and self-reported symptoms of anxiety and depression.

The current study examined ADHD symptoms measured as a continuous variable, as opposed to a dichotomous variable of ADHD diagnosis, since subthreshold symptoms of ADHD are associated with numerous negative consequences, such as adverse educational outcomes (Bussing, Mason, Bell, Porter, & Garvan, 2010), and impaired social functioning. Children with subthreshold inattention symptoms have more difficulties in social domains of functioning (e.g., lower levels of positive friendship qualities) than comparison peers (Rielly, 2006). Subthreshold ADHD symptoms have also been associated with other comorbid psychological symptoms (e.g., depression, anxiety, mania, trauma), smoking, and alcohol consumption in adolescence (Malmberg, Edbom, Wargelius, & Larsson, 2011). Research has also found that ADHD is best measured on a continuum of symptom severity (i.e., a dimensional model) as opposed to using categorical diagnoses (i.e., dichotomous model; Marcus & Barry, 2011). Using subthreshold ADHD symptoms rather than discrete ADHD diagnoses may allow for a clearer picture of the levels of impairment associated with varying degrees of ADHD

symptom severity. Additionally, examining subthreshold symptoms may allow for the detection of negative social functioning and internalizing symptoms patterns for those with subthreshold ADHD symptoms that may have otherwise been missed if discrete categorical diagnoses were used. The current study also utilized combined participant self-reported and friend-reported symptoms via the “or” algorithm, which dictates that a symptom is present if at least one rater (i.e., participant or friend) endorsed a symptom as present (Martel, Nigg, & Schimmack, 2017). This combined rater approach is the most common approach utilized in research in the field (Martel et al., 2017; Pelham, Gnagy, Greenslade, & Milich, 1992). The ADHD symptom reports were combined such that the highest rating between the participant self-report and friend report was taken for each item, and the same symptom was not counted twice if it appeared on both participant and friend reports of the rating scale. The combined rater approach for ADHD symptoms has been widely used since incorporating reports from informants appears to offer more valid ratings of ADHD symptoms for adults and maximizes the diagnostic information that is available from the multiple informants (Sibley et al., 2012a, Sibley et al., 2012b).

Ratings of a close friend were collected for several reasons. First, close friends frequently observe participants’ ADHD-related behaviors and social functioning, especially during college. These close friends are likely to be knowledgeable about participants’ ADHD symptoms and social functioning, and can provide additional information that will be useful in understanding the nature of social relationships of individuals with ADHD. Second, close friend ratings can be examined to determine whether having friends rate ADHD and social functioning can better predict anxiety and depression symptoms in those with ADHD. Third, examining correlations between raters

can provide further evidence for the validity of each rater's reports (Barkley, Murphy, & Fischer, 2006). Lastly, any discrepancies between participants' and friends' reports may also reveal level of insight and/or differences in perspectives, particularly whether individuals with ADHD have insight into how their friends may feel about their relationship with them (Buhrmester, Furman, Wittenberg, & Reis, 1988).

The current study examined the following hypotheses regarding a traditional undergraduate student population (i.e., a normative sample) at a four-year university:

- (1) What is the association between ADHD symptoms and social functioning?
- (2) What is the association between ADHD symptoms and internalizing symptoms, with anxiety and depression examined separately?
- (3) Does social functioning moderate the relation between ADHD symptoms and internalizing symptoms, with anxiety and depression examined separately?

For research questions involving social functioning, there were separate analyses for participant self-report and close friend report, with hypotheses remaining the same for both raters. Self- and friend-reported ADHD symptoms were combined to create one overall score of ADHD that was used in analyses. Internalizing symptoms were only self-reported. It was hypothesized that: (1) there would be a negative association between ADHD symptoms and social functioning, such that increased ADHD symptoms would be associated with lower (i.e., poorer) social functioning, (2) there would be positive associations between ADHD symptoms and internalizing symptoms, (3) social functioning would have a moderating effect on the relation between ADHD symptoms and internalizing symptoms, with anxiety and depression examined separately; specifically, it was hypothesized that those with poorer social functioning and higher

ADHD symptoms would exhibit the greatest internalizing symptoms. Exploratory analyses compared the average ADHD and social functioning measures ratings between participants' self-reports and friends' reports to determine if reports differed significantly.

Anxiety and depression were examined separately in the current study, since there may be differential effects for these internalizing symptoms. By exploring anxiety and depression as distinct dimensions, greater understanding is obtained and specificity is increased. Previously mentioned studies (Becker et al., 2013; Becker et al., 2014; Karustis et al., 2000) have found clear associations between ADHD, impaired social functioning, and internalizing problems, but the findings were mixed regarding anxiety and depression. Karustis and colleagues (2000) reported that using a broad-band construct of internalizing symptoms helped explain general trends, but that depression or anxiety each explained a unique portion of the variance in multiple instances, in addition to the contribution of the broad-band internalizing symptoms construct. Additionally, Lonigan, Carey, and Finch (1994) found that, although anxiety and depression seem to share a negative affectivity component, anxiety and depression also have distinguishing features that can be measured and seem to be separate constructs. As can be seen, examining the anxiety and depression domains separately will provide further specificity and a more thorough understanding of the complex relations between these domains, ADHD, and impaired social functioning.

The current study examined multiple domains of social functioning, including more observable aspects of interpersonal competence as well as underlying emotional functioning as it relates to social functioning, since it is possible that people can be competent in some domains while struggle with others (Buhrmester, Furman, Wittenberg,

& Reis, 1988). The more concrete, observable aspects of social skills were examined since social skills deficits have been associated with ADHD and can cause impairment in social functioning. Additionally, the more emotional, higher-order aspects of social functioning, such as empathy, were examined since emotional functioning and empathy play a key role in regulating social behavior by increasing displayed prosocial behaviors and inhibiting antisocial behaviors towards others (Bramham, Morris, Hornak, Bullock, & Polkey, 2009).

CHAPTER 2

METHOD

Participants

Participants were traditional aged college students at the University of South Carolina (USC), a four-year university in Columbia, South Carolina. Participants had to be at least 18 years old to participate, so that parental consent was not necessary for the students to participate. Efforts were made to include approximately equal numbers of freshmen, sophomores, juniors, and seniors so that all college class years were represented (i.e., to examine potential effects of age and class year on internalizing symptoms). Since the current study's targeted population was traditional undergraduates from a four-year university, two participants (aged 39 and 40 years) were excluded (see Table 2.1 for details of survey completion data).

Close friend raters. Each participant was asked to provide the name, email address, and phone number of up to three current close friends (i.e., friends to whom they feel the closest at the time of the survey), to increase the chances of having a friend respond; the participants were asked to list their friends in rank order of closeness, so that the first friend (i.e., with whom participants feel the closest) was contacted first. If after approximately two weeks the first friend did not complete the survey or respond, then the second friend was contacted to complete the survey. The third friend was contacted if the second friend did not respond for approximately two weeks after receiving the invitation

to complete the survey. The close friend was defined as “a friend/peer with whom you feel you have the closest relationship and who knows you best.” It was explained that this close friend could be of the same or opposite sex, but should be a person with whom the participant has a platonic relationship; it was explained that the close friend could not be a family member and could not be someone with whom the participant has a romantic and/or sexual relationship. The close friends provided information on the behaviors of the participants, and the close friends were told that this confidential information would never be shared with participants. The close friends did not have to be USC students, since many students may have close friends from high school or other places outside of USC. Close friends who completed the study could not also be a participant in the study, and were excluded (see Table 2.1 for details of survey completion data).

Recruitment. Participants were recruited through various means at the University of South Carolina. Per the USC Institutional Review Board (IRB), recruitment flyers/advertisements stated that the purpose of the study was “to learn more about the social behaviors of college students and whether these behaviors are related to certain factors, such as emotions, attention, or other concerns.” The psychology department’s research database, which compiles active research studies for which USC students can complete for extra credit for their classes, was one strategy utilized for recruiting participants. The researcher and her undergraduate research assistant made contact with professors in various departments (e.g., not only psychology, but also business, biology, engineering, history, art, literature, health sciences, etc.). Research staff obtained permission to speak in their classrooms to tell the students about the study and/or had professors disseminate the researcher’s contact and survey information via email to their

students. The research staff also asked professors if participants could receive extra credit for completing the survey if possible. The researcher also posted recruitment flyers around the USC campus (e.g., Student Counseling Center, Thomas Cooper Library, dormitories, campus ministry buildings, academic buildings). Additionally, the researcher posted flyers in off-campus businesses that are close to campus and places where USC students usually frequent (e.g., Chick-Fil-A, Jimmy John's, Starbucks, Insomnia Cookies), after receiving permission from the establishments to do so.

Consent and compensation. All participants and close friends read online consent forms that were approved by the USC Institutional Review Board (IRB), and consented to participating before completing their respective surveys. Participants also gave consent for the researcher to contact the close friends whom they specified, if they chose to provide close friends' contact information. When possible, participants received extra credit in their classes at the discretion of their professors. If participants were able to receive extra credit for their class, their name and email were stored in a password-protected Excel file and their name was sent to their professor showing that they completed a research survey. Participants and close friends who completed the survey were each entered into a raffle to win one of five \$25 Amazon gift cards. Participants who completed the survey and also had a close friend complete the survey were entered into a raffle for the grand prize of a \$100 Amazon gift card. Each individual could only win one prize.

Procedure

All survey data was collected via REDCap, a web-based research survey software system. This allowed participants to complete the measures online in any location and at a time that was convenient for them. It was explained to both participants and their close friends that all participation was voluntary, and that discontinuation of the study would not affect their grades or any services they may or may not be receiving at USC; informed consent was obtained.

Participants first completed questions to determine eligibility (i.e., if they were a current USC undergraduate student and if they were 18 years or older), followed by the demographic information measure. Next, participants completed measures on current ADHD symptoms, social functioning, and anxiety and depression symptoms. After completing measures, participants were asked to give consent for the researcher to contact three close friends of theirs, whom the participant specified in an order to whom they felt closest. If a participant gave consent to contact his or her close friends, he or she provided the names, email addresses, and/or phone numbers for them. If a participant did not consent to have the researcher contact his or her close friends, then the participant was thanked for participating, and was only entered in the raffle for the \$25 Amazon gift cards (but not the grand prize raffle).

Once the close friends' contact information and consent to contact them was obtained, the closest friend (i.e., friend listed first) was sent an invitation to participate in the study via email with a goal of within two weeks of the participant completing his or her own survey; however, due to research staff schedules and demands, some close

friends were emailed survey links outside of this specified time frame. The general purpose of the study and the fact that it was voluntary were explained, as well as compensation and the fact that the participant needs the friend's participation to be entered in the raffle for the grand prize. Informed consent was obtained before the close friends completed the online surveys. As described above, the second closest friend specified by the participant was contacted if after approximately two weeks of receiving the survey invitation the first closest friend had not started his or her online survey, and the third closest friend was contacted if the second closest friend has not started the survey after approximately two weeks.

Close friend surveys included the friend's demographic information and measures on their participant's current ADHD symptoms and social functioning. For the close friend, the demographic information measure was presented first, followed by the measures on ADHD symptoms and then social functioning.

Raffle Prize Winners. Winners of the raffle prizes (i.e., Amazon gift cards) were chosen once all data collection was complete. Once participants requested a link to start the survey, they were assigned an identification (ID) number, and their three close friends were assigned corresponding ID numbers. Participant ID numbers started as 1001, 1002, etc. and close friends had ID numbers that corresponded with the last three digits, e.g. for participant 1001, the three close friends were 4001, 5001, and 6001, with 4001 being the friend ranked first/as the closest by the participant; the second participant was 1002 and the close friends were 4002, 5002, and 6002. Participants and close friends were chosen as raffle winners using Google's random number generator online (found by typing "random number generator" into Google), with minimum as one and maximum as last

close friend's ID number. The first random number that matched a participant's ID number who also had the close friend complete the survey was the grand prize \$100 gift card winner. The first five random numbers that matched participant or close friend ID numbers were chosen as winners, with the grand prize winner being disqualified from winning a \$25 gift card since each participant or close friend could only win one gift card. Winners were notified by email (and called via phone if necessary) that they won and had two weeks to claim their prize, and gift cards were mailed to winners at the mailing address that they specified. If winners did not respond within two weeks to claim their prize (i.e., and therefore researchers cannot obtain a specified mailing address), another winner was picked at random using the same methods detailed above.

Measures

Measures for the participant took approximately 20-25 minutes to complete. Close friend measures took approximately 10-15 minutes to complete. (See Appendix A for measures).

Demographic information. Participants and close friends completed a questionnaire about their demographic information, including their age, gender, race/ethnicity, socioeconomic status (SES; i.e., family's approximate annual household income), and more (see Table 2.2). Participants also reported any diagnosed physical and/or mental health disorders, along with alcohol and drug use. Participants reported if they currently took any ADHD medications, which kind (e.g., Adderall, Ritalin), and for which purpose (e.g., "for my diagnosed ADHD," "I don't have a prescription but it helps me study," "I use it for recreational purposes," or "other: please specify"). Participants

only also reported whether anyone in their immediate family was diagnosed with ADHD (e.g., parents, siblings, grandparents). The close friends were asked basic demographic information as well as if he or she was a USC student. Additionally, both the participant and close friend were each asked how he or she knows the other, for how long he or she has known the other, and how close he or she feels to the other (i.e., rate closeness from where 0=not close at all and 10= extremely close). Both participant and close friend responded to how they each classify the nature of their relationship (i.e., classify the other person as an acquaintance/classmate only, a casual friend, a good friend, one of his/her best friends, or not a friend at all) as well as rated how close they feel to each other (i.e., 0=not close at all, 10= extremely close). Demographic information took approximately 5-10 minutes to complete.

ADHD symptoms. The instructions for the ADHD symptom items stated that the measure should be filled out to reflect the behavior of the participant when he or she is not on any stimulant medication (e.g., Ritalin, Adderall, Concerta) or other medication used to enhance attention (e.g., Strattera). Total continuous ADHD symptoms were used in analyses. ADHD symptoms from participant and friend reports were combined, such that a symptom were considered endorsed if either the participant or friend endorsed the symptoms; if both participant and friend endorsed a symptom, it was only counted once. Martel, Nigg, and Schimmack (2017) noted that, while there is no formal consensus on how to integrate ratings across multiple informants for adult ADHD, the “or” algorithm (i.e., a symptom is present if at least one rater endorses a symptom a present) is the most common approach used in research studies to date. Owens and Hoza (2003) also supported the use of a multi-informant assessment approach for ADHD, as they found

that using combined parent and teacher ratings (on Disruptive Behavior Disorder Rating Scale) was more advantageous than parent ratings alone; they also found that this combined rater approach yielded ADHD prevalence rates consistent with previous research.

Current Symptoms Scale. The Current Symptoms Scale (CSS; Barkley & Murphy, 2006) was used to assess continuous ADHD symptoms. The CSS has 18 items measuring ADHD symptoms (of both inattention and hyperactivity/impulsivity) that correspond with *DSM-IV-TR* criteria (APA, 1994). The CSS Self-Report Form was used to assess ADHD symptoms of participants, and the CSS Other-Report Form was used for friends' ratings of participants' ADHD symptoms. Each item is answered on a 4-point scale (0 = *not at all*, 1 = *sometimes*, 2 = *often*, 3 = *very often*), with responses of "often" or "very often" indicating clinically significant symptom endorsement. Adequate validity for the CSS has been demonstrated through previous research, which has found significant group differences between ADHD and control adults (Barkley, Murphy, DuPaul, & Bush, 2002; Murphy, Barkley, & Bush, 2001). The internal reliability of the CSS is excellent for current ADHD symptoms, for both self-report (Cronbach's $\alpha = .93$) and informant report (Cronbach's $\alpha = .95$; Katz, Petscher, & Welles, 2009). For the current study, the internal reliability for participant self-reported ADHD symptoms was good (Cronbach's $\alpha = .88$) and for friend-reported was acceptable to good (Cronbach's $\alpha = .79$). Internal reliability for the subscales has also been shown to be adequate (e.g., Cronbach's $\alpha = .86$ for Inattention symptoms subscale and $= .70$ for Hyperactive-Impulsive symptoms subscale; Gomez, 2011). Self-report ratings significantly correlated with other raters (e.g., parent, spouse/intimate partner) in previous research ($r = .70$ in

Barkley, Murphy, & Fischer, 2008; $r = .64 - .75$ in Murphy & Barkley, 1996). Participant self-reported and friend-reported ADHD symptoms were combined (i.e., a symptom was considered present if participant or friend endorsed the symptom as present) so that one measure of continuous ADHD symptoms was used in analyses, as is the most common method utilized in previous research (Martel et al., 2017; Pelham, Gnagy, Greenslade, & Milich, 1992).

ODD symptoms. Symptoms of Oppositional Defiant Disorder (ODD) were also collected, and total ODD symptoms were used as a covariate in the data analyses.

Current Symptoms Scale. In addition to assessing ADHD symptoms and impairment, the CSS was also used to assess ODD symptoms in the current study (Barkley & Murphy, 2006). The CSS has 8 items measuring behaviors associated with ODD. The CSS Self-Report Form was used to assess ODD symptoms of participants, and the CSS Other-Report Form was used for the friend report of participants' ODD symptoms. As stated previously, the CSS has adequate validity and reliability, and self-reports have been found to correlate with reports from others, such as parents or spouses (Barkley, Murphy, DuPaul, & Bush, 2002; Barkley, 2011; Barkley, Murphy, & Fischer, 2008; Murphy & Barkley, 1996; Gomez, 2011; Katz, Petscher, & Welles, 2009).

Social functioning. Social functioning was assessed by two separate measures. Total continuous social functioning scores were used in analyses, with separate analyses for each of the social functioning measures. Subscales of each of the measures were examined separately in exploratory analyses.

Social Emotional Questionnaire. The Social Emotional Questionnaire (SEQ; Bramham, Morris, Hornak, Bullock, & Polkey, 2009) was used to assess participants' social functioning, specifically social and affective symptoms. There is a Participant Version and Informant Version of the SEQ, and prior factor analyses revealed five subscales of social functioning: emotion recognition, empathy, social conformity, antisocial behavior, and sociability. The SEQ took approximately 10 to 15 minutes to complete. Both Participant and Informant Versions of the SEQ consist of 30 items rated on a Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), with some items being reverse scored. The SEQ has been shown to have moderately high internal reliability (Cronbach's $\alpha = 0.6969$). For the current study, the internal reliability for participant self-reported SEQ was good (Cronbach's $\alpha = .86$) and internal reliability for friend-reported SEQ was also good (Cronbach's $\alpha = .86$). The Participant and Informant total and subscale scores of the SEQ were also cross validated with another measure of interpersonal and emotional functioning, with results indicating that the SEQ is a valid measure of social and emotional functioning (Bramham et al., 2009).

Interpersonal Competency Questionnaire. The Interpersonal Competency Questionnaire (ICQ; Buhrmester, Furman, Wittenberg, & Reis, 1988) was used to assess participants' social functioning, specifically interpersonal competence. The ICQ consists of 40 items, which briefly depict common interpersonal situations, and assesses five domains of interpersonal competence: initiating relationships, disclosing personal information, asserting displeasure with others, providing emotional support and advice, and managing interpersonal conflict. Respondents are asked to indicate their level of competence and comfort in handling each type of situation, using Levenson and

Gottman's (1978) 5-point rating scale (i.e., 1 = "I'm poor at this; I'd feel so uncomfortable and unable to handle this situation, I'd avoid it if possible" to 5 = "I'm EXTREMELY good at this; I'd feel very comfortable and could hand this situation very well"). Psychometric properties of the ICQ were tested using several samples of undergraduate students. The ICQ originally had participants make one rating for how they would react with a same-sex friend and one rating for how they would react with an opposite-sex date or romantic partner; for the current study, only ratings for how the participant would rate their response with a platonic friend were used, but it was shown that correlations between ratings of a friend and a romantic partner were high (ranging from $r = .68$ to $.84$), indicating ratings were quite stable across ratings of these two interaction partners. Internal reliability of the ICQ's five dimensions is moderately high (Cronbach's α ranging from $.77$ to $.87$, with a mean α of $.83$). For the current study, the internal reliability for participant self-reported ICQ was excellent (Cronbach's $\alpha = .94$) and internal reliability for friend-reported ICQ was also excellent (Cronbach's $\alpha = .96$). Test-retest reliability correlations after four weeks were high for all five of the dimensions (ranging from $r = .69$ to $.89$). The ICQ was also shown to have adequate convergent and discriminant validity through comparison to a variety of measures, and had strong evidence for the usefulness of the ICQ in distinguishing among the various domains of interpersonal competence (Buhrmester et al., 1988).

For the friend-reported ICQ, items remained the same as the participants' self-reported measures, but the items were adapted for friend reports (i.e., changing "I" to "your friend," and adapting other wording as necessary).

Anxiety symptoms. Total continuous anxiety symptoms were used in analyses.

Screen for Adult Anxiety Related Disorders. The Screen for Adult Anxiety Related Disorders (SCAARED; Angulo et al., 2017) was used to measure participants' self-reported anxiety symptoms. The SCAARED is a 44-item measure that yields four factors: somatic/panic/agoraphobia, generalized anxiety, social anxiety, and separation anxiety. This measure takes approximately 5 to 7 minutes to complete. Respondents are asked to choose one of three options that best describes them over the past three months, and these three options are scored from 0 to 2 (i.e., 0 = *Not True or Hardly Ever True*; 1 = *Somewhat True or Sometimes True*; 2 = *Very True or Often True*) rating scale. The total anxiety score ranges from 0 to 88, with higher scores indicating increased anxiety symptoms and scores of 23 and above indicating the potential presence of an anxiety disorder; this total score was used to measure continuous symptoms of anxiety in the current study. The SCAARED has been shown to have excellent internal reliability (Cronbach's $\alpha = 0.97$), and all factors have excellent internal consistency, with coefficient values ranging from 0.86 (separation anxiety) to 0.94 (generalized anxiety), and have eigenvalues greater than one (Angulo et al., 2017). The SCAARED also has good discriminant validity between anxiety and other disorders, as well as within anxiety disorders for generalized and social anxiety; participants with and without anxiety disorders were also significantly separated (Angulo et al., 2017). For the current study, the internal reliability for participant self-reported anxiety symptoms was excellent (Cronbach's $\alpha = .97$). The SCAARED was adapted from the Screen for Child Anxiety Related Emotional Disorders (SCARED; Birmaher et al., 1997; Birmaher et al., 1999),

which is widely used in both research and clinical settings, and has excellent psychometric properties.

Depression symptoms. Total continuous depression symptoms were used in analyses.

Center for Epidemiologic Studies Depression Scale- Revised. The Center for Epidemiologic Studies Depression Scale- Revised (CESD-R; Eaton, Smith, Ybarra, Muntaner, & Tien, 2004) was used to measure participants' self-reported depression symptoms. The CESD-R was developed as a revision to the original Center for Epidemiologic Studies Depression Scale (CESD; Radloff, 1977) to reflect a more updated understanding of depression and current symptoms defined by the APA (2013). The CESD-R is a 20-item measure that assesses depression symptoms in the nine groups defined in the DSM-5: sadness (dysphoria), loss of interest (anhedonia), appetite, sleep, thinking/concentration, guilt (worthlessness), tired (fatigue), movement (agitation), and suicidal ideation. The measure takes approximately 5 minutes to complete. Respondents are asked to choose which response describes them best for the last two weeks for each depression item, with responses scored from 0 to 4 (*0 = not at all or less than one day last week; 1 = 1-2 days; 2 = 3-4 days; 3 = 5-7 days; 4 = nearly every day for 2 weeks*). The total depression score ranges from 0 to 60 (using the original CESD scoring method), with scores of 16 and above indicating clinical significance (i.e., subthreshold depression symptoms, or possible, probably, or meets criteria for major depressive episode depending on symptom presentation). The CESD-R has been shown to have excellent internal consistency (Cronbach's $\alpha = 0.92$ and 0.93 in two different samples, the second of which was exclusively college students) and theoretically consistent convergent and

divergent validity with several anxiety measures that included positive correlations with the negative affect but negative correlation to positive affect, which is specific to depression (Van Dam & Earleywine, 2011). The CESD-R is a psychometrically sound instrument that is widely used in psychology and epidemiology research. For the current study, the internal reliability for participant self-reported depression symptoms was excellent (Cronbach's $\alpha = .95$).

Data Analyses

Data analyses for the current study were performed using IBM SPSS Statistics software version 23. Only those participants who also had a close friend respond to the survey (any response beyond the consent question) and also met eligibility criteria (i.e., participants were age 18 years or older; participants were not both a participant or friend rater; a close friend was not a friend rater more than once; participant had a close friend who was platonic and not a romantic partner or family member) were included in data analyses. The sample used in the current study's data analyses was comprised of 179 participants (82.7% female and 80.4% Caucasian) and their close friend raters (76.0% female and 76.0% Caucasian; see Table 2.2). Hierarchical multiple regression analyses models (i.e., one set of research questions examined anxiety symptoms as the outcome, and then the same set of research questions were examined except with depression symptoms as the outcome) were used to answer the research questions.

Continuous measures of ADHD symptoms and social functioning were used as predictor (i.e., independent) variables in the data analyses. Continuous measures of anxiety symptoms and depression symptoms were used as the outcomes (i.e., dependent)

variables in separate data analyses. Variables that were used as covariates in the data analyses were from the demographic questionnaire. Covariates used in each data analysis were significantly correlated to a predictor and/or outcome variable. All predictor variables were centered before being used in data analyses.

A series of hierarchical multiple regression analyses were conducted, all with whichever demographic variables were significantly correlated with predictor and/or outcome variables included as covariates in the first step of each model. The outcome variables were either anxiety symptoms or depression symptoms. The ADHD symptoms variable was added in the second step of each model, and each measure of social functioning was added in the third step (i.e., SEQ-Participant, SEQ-Friend, ICQ-Participant, ICQ-Friend) of their respective models. An interaction term of ADHD symptoms and each measure of social functioning was created and added in the fourth step of each model to examine the moderating effect of social functioning on the relation between ADHD symptoms and anxiety or depression symptoms. There were eight primary models in total examining the social functioning measures separately (i.e., examining SEQ-Participant, SEQ-Friend, ICQ-Participant, or ICQ-Friend for anxiety symptoms as the outcome, and then the same with depression symptoms as the outcome). Results of each model are presented in tables, including B , SE , β , t , and p values, as well as R^2 , ΔR^2 , F for ΔR^2 , and df values.

Hierarchical multiple regression allows for the isolation of unique variance contributed by predictor variables while accounting for the influence of potential covariates in a hypothesis-driven model (Petrocelli, 2003). Furthermore, by using multiple, hierarchical steps, researchers can test whether additional predictors can explain

a proportion of variance in the outcome that is significant relative to a possibly more parsimonious model. This ability is also necessary to be able to test the significance of variable interactions relative to their main effects. The variables are entered in the order in which it is anticipated that they account for variance, in a hypothesis-driven manner. Since incrementally more complex models are compared, the most parsimonious model is started with the suspected variable (based on previous literature) that would account for a significant amount of the variance in the outcome (Petrocelli, 2003). Since ADHD symptoms are expected to have a significant association with internalizing symptoms, ADHD symptoms were placed into the model before social functioning. Covariates were included in the first step so that they can be controlled for and that the variance contributed by ADHD symptoms and social functioning above and beyond the covariates can be determined. However, the order in which the variables are entered into the regression model could potentially impact the results, in that this could cause a small change in variance added for social functioning or the interaction between ADHD symptoms and social functioning, since much of the variance has already been accounted for in the earlier steps (Petrocelli, 2003). This could affect the importance that one attributes to each of the predictor variables. However, when using theory-driven, hypotheses-based ordering of predictors, the benefits of hierarchical multiple regression outweigh these potential ordering effects on results (see Table 2.3).

Race was recoded with dummy coding (where 0 = Caucasian, 1 = Non-Caucasian), since if each race were dummy coded individually, there would be very small sample sizes for most non-Caucasians groups (e.g., 1 Middle Eastern participant, 1 Native Hawaiian or Pacific Islander). Additionally, many individual covariates would

have needed to be added to all models, which would decrease power. For details of racial background of the participants and close friends, refer to Table 2.2.

Power Analyses

Using G*Power software (Faul, Erdfelder, Buchner, & Lang, 2009), a priori power analyses were conducted to ensure that there would be sufficient power to test statistical significance at the error rate of .05. Using 7 total predictor variables (e.g., 3 predictors of interest, and 4 covariates), a total of 54 participants are needed to detect a large effect size of .35, and a total of 119 participants are needed to detect a medium effect size of .15. A total of 863 participants are needed to detect a small effect size of .02. Although detecting small effect sizes may not be possible, there was sufficient power to detect both medium and large effect sizes.

Missing Data

There were no missing data for participants' measures because the survey was set up such that participants must provide an answer for every item in every measure until the information gathering questions on their nominated close friends. However, there was a small amount of missing data for close friend raters. Approximately 88.8% of participants' close friends completed all measures (i.e., 159 close friends of the 179 participants completed all measures). For close friend raters who did not complete all measures, some of the data is missing likely due to close friends prematurely discontinuing the survey at various points in the survey. The pairwise deletion method was used to handle all missing data so that cases that were missing data were excluded only for the variables in each particular model. Pairwise deletion was chosen so that the

number of cases included in each model could be maximized. Additionally, according to the power analyses, 119 participants were needed to detect a medium effect size, and the pairwise deletion method left more participants than this upon which analyses were conducted.

Covariates

If found to be significantly correlated with predictor variables (i.e., ADHD symptoms or social functioning) or the outcome variables (i.e., anxiety symptoms or depression symptoms), the following demographic variables were potentially used as covariates in data analyses: participant age, gender, race, family income, class year (i.e., grade/year in college), ODD symptoms, relationship closeness between participant and friend, and/or number of years the participant and friend have known each other (Barkley, Murphy, & Fischer, 2008; Cuffe, Moore, & McKeown, 2005). These potential covariates were informed by the literature and were chosen because they may be related to the predictor and outcome variables (e.g., gender may be controlled since females report more internalizing symptoms than males; age may be controlled since ADHD symptoms may be expressed differently over time; class/grade in college may be controlled since students with ADHD are less likely to graduate from college, etc.; Barkley, Murphy, & Fischer, 2008).

Significance Level

For the eight primary regression analyses, the significance level was alpha adjusted using Bonferroni correction to correct for multiple analyses being conducted. Since there was a hypothesized direction of relations for these eight main analyses, a one-

tailed p value was used. Thus, the significance level is $p < .012$ for the eight main analyses (i.e., $.05$ divided by 8 main analyses = $.006$; $.006 \times 2 = .012$, the one-tailed p value). For all other analyses, the significance level used was $p < .05$.

Table 2.1 *Survey Completion Data*

Participant Survey Completion	# of Individuals	%
Started the survey	1140 participants	100
Consented “yes” to the survey	1076 participants	94.4
Participants who provided friend information	760 participants	66.7
Participants who gave 1 friend’s information	462 participants	40.5
Participants who gave 2 friends’ information	110 participants	9.6
Participants who gave 3 friends’ information	188 participants	16.5
Excluded due to also completing the close friend survey for another participant	9 participants	.8
Participants who were excluded due to age	2 participants	.2
Used in final data analyses	179 participants	15.7
 Close Friend Survey Completion	 # of Individuals	 % out of 211 close friends
Started the survey	211 close friends	100
Consented “yes” to the survey	206 close friends	97.7
Excluded due to completing the close friend survey for two separate participants	3 close friends	1.4
Individuals who completed the close friend survey	203 close friends	96.2
Responders who were romantic partners (excluded from data)	12 individuals	5.7
Responders who were family members (excluded from data)	10 individuals	4.7
Responders who were platonic friends	179 close friends	84.8
Participant and close friend pairs used in final data analyses	179 dyads	84.8

Table 2.2 *Demographic and descriptive variables for participants and close friends (N=179)*

Participants			Close Friends		
	<i>n</i>	<i>%</i>		<i>n</i>	<i>%</i>
<i>Gender</i>	--	--	<i>Gender</i>	--	--
Female	148	82.7	Female	136	76.0
Male	31	17.3	Male	38	21.2
			Missing	5	2.8
<i>Age (in years)</i>	--	--	<i>Age (in years)</i>	--	--
18	37	20.7	18	25	14.0
19	52	29.1	19	53	29.6
20	51	28.5	20	47	26.3
21	26	14.5	21	30	16.8
22	11	6.1	22	13	7.3
23	2	1.1	23	2	1.1
			24	3	1.7
			25	1	.6
			Missing	5	2.8
<i>Class Year</i>	--	--	<i>Class Year</i>	--	--
First Year (i.e., freshman)	64	35.8	First year (i.e., freshman)	34	19.0
Second Year	42	23.5	Second year	63	35.2
Third Year	44	24.6	Third year	36	20.1
Fourth Year	24	13.4	Fourth year	18	10.1
Fifth year	5	2.8	Fifth year or more	1	.6
Sixth year or more	0	0	Not a current undergraduate student	22	12.3
			Missing	5	2.8
<i>Race/Ethnicity</i>	--	--	<i>Race/Ethnicity</i>	--	--
Caucasian	144	80.4	Caucasian	136	76.0
African American	19	10.6	African American	26	14.5
Hispanic	2	2.2	Hispanic	2	1.1
Asian	6	3.4	Asian	6	3.4
Middle Eastern	1	.6	Middle Eastern	0	0
Native Hawaiian or Pacific Islander	1	.6	Native Hawaiian or Pacific Islander	0	0
Multiracial	2	1.1	Multiracial	3	1.7
Prefer not to answer	2	1.1	Prefer not to answer	1	.6
			Missing	5	2.8
<i>Average Annual Household Income</i>	--	--	<i>Average Annual Household Income</i>	--	--
Less than \$23,000	7	3.9	Less than \$23,000	16	8.9
\$23,000 to \$49,999	16	8.9	\$23,000 to \$49,999	14	7.8
\$50,000 to \$99,999	32	17.9	\$50,000 to \$99,999	40	22.3
\$100,000 to \$149,999	37	20.7	\$100,000 to \$149,999	27	15.1

\$150,000 to \$249,999	21	11.7	\$150,000 to \$249,999	26	14.5
More than \$250,000	29	16.2	More than \$250,000	19	10.5
Don't know/prefer not to answer	37	20.7	Don't know/prefer not to answer	32	17.9
			Missing	5	2.8
<i>ADHD diagnosis of participant</i>	--	--	<i>ADHD diagnosis of friend</i>	--	--
No ADHD Diagnosis	164	91.6	No ADHD Diagnosis	155	86.6
ADHD Diagnosis	15	8.4	ADHD Diagnosis	18	10.1
ADHD-I	8	4.5	Missing	6	3.4
ADHD-H/I	1	.6			
ADHD-C	5	2.8	<i>USC Student Status</i>	--	--
Not sure	1	.6	Current undergraduate student at USC	124	69.3
			Current graduate student at USC	3	1.7
<i>Does participant feel s/he should be diagnosed with ADHD?</i>	--	--	Previous USC undergraduate or graduate student	13	7.3
Yes	31	17.3	Not a USC student or USC alumni	34	19.0
No	111	62.0	Missing	5	2.8
Not sure	37	20.7			

Table 2.3 *Hierarchical multiple regression model summary*

<i>Step</i>	<i>Variables Included</i>	<i>Rationale</i>
Step 1	Covariates	- Included to control for effects of these variables
Step 2	ADHD Symptoms	- Main predictor of interest - Anticipated to be significantly associated with internalizing symptoms - Wanted to examine effect of ADHD symptoms independent of other predictors/variables, so that significance of main effect can be examined relative to the variable interaction
Step 3	Social Functioning	- Secondary predictor of interest - Anticipated to be associated with ADHD symptoms - Included on its own (i.e., not just in the interaction term) so that effect of social functioning could be determined, so that the significance of main effects can be examined relative to the variable interaction
Step 4	Interaction of ADHD Symptoms and Social Functioning	- Included to determine if social functioning moderates the relation between ADHD symptoms and internalizing symptoms

CHAPTER 3

RESULTS

Assumptions

The assumptions of a multiple regression moderation model were examined, including a linear relation between the predictor and outcome variables, independence of residuals, homoscedasticity, and normal distribution of errors. Measures were taken to address any violations of the aforementioned assumptions (e.g., examined the effects of outliers). The six assumptions of regression indicated for each variable were addressed as follows:

- (1) Independence of errors (residuals) was assessed by examining the Durbin-Watson statistic and was indicated for all models (Anxiety: SEQ-Participant = 1.931, SEQ-Friend = 1.930, ICQ-Participant = 1.984, ICQ-Friend = 1.994; Depression: SEQ-Participant = 1.931, SEQ-Friend = 2.223, ICQ-Participant = 1.956, ICQ-Friend = 1.983).
- (2) The studentized residuals were plotted against the (unstandardized) predicted values so that the linear relation between the predictor variables and outcome variables could be assessed. Additionally, partial regression plots between each independent variable and dependent variable were also created to examine this assumption. Partial regression plots showed approximately linear relationships between the continuous predictor variables (ADHD Symptoms,

SEQ-Participant, ICQ-Participant, SEQ-Friend, ICQ-Friend) and the outcome variables (Anxiety Symptoms and Depression Symptoms).

- (3) Homoscedasticity of residuals (equal error variances) was assessed by examining the scatter plots of studentized residuals and unstandardized predicted values. Homoscedasticity of residuals was indicated for all variables, which was assessed by equally spread residuals across the scatter plots of studentized residuals and (unstandardized) predicted values.
- (4) Absence of multicollinearity was assessed by examining the correlation coefficients, and the Tolerance/VIF values. The bivariate correlation coefficients indicated absence of multicollinearity for all independent variables (i.e., all correlation coefficients were less than 0.7), and the Tolerance/VIF values indicated absence of multicollinearity in all variables as well (i.e., all VIF values were less than 10).
- (5) Absence of significant outliers was assessed by examining the studentized deleted residuals, with any cases that were greater than ± 3 standard deviations being considered potential outliers. Two cases were greater than 3 standard deviations above the mean for age; these potential outlier cases were included in all analyses since removing them since an upper age limit was not specified and their inclusion did not change the main analyses results. Absence of leverage points was indicated, since all cases had leverage values below .02. Absence of influential points was also indicated, as all cases had Cook's Distance values below 1.

(6) Normal distribution of errors (residuals) was assessed by inspection of histograms with superimposed normal curves and an examination of P-P Plots. Normal distribution of errors was indicated for all variables.

Depression Symptoms

The depression symptoms variable was found to have a standard deviation that was larger than the mean. Based on the distribution of values for depression symptoms, the non-normalness was not a function of a large number of participants with responses of zero, but rather was a function of a few participants with values over 50. Consequently, the depression symptoms variable was winsorized; it was normalized in order to continue with linear regression analyses. The depression symptoms variable was winsorized at the 95th percentile, such that all depression scores over 48 (i.e., the score at the 95th percentile) were recoded to 48 and analyses were run with this winsorized depression symptoms variable.

Descriptive Statistics

In order to gain more insight into the current study's sample, descriptive analyses (i.e., histograms, means, standard deviations, skewness, and kurtosis) were calculated for each of the predictor and outcome variables (see Table 3.1). The mean age of the sample was 19.60 years ($SD= 1.21$). According to the CSS of the combined participant self-report and close friend report, the average number of ADHD symptoms was 4.55 ($SD= 4.06$), with a range from the minimum of 0 symptoms to the maximum of 17 symptoms. The mean score for the SEQ-Participant self-report was 109.68 ($SD= 12.31$), with a minimum of 46 and a maximum of 130. The mean score for the SEQ-Friend report was

111.31 ($SD= 12.49$), with a minimum of 46 and a maximum of 136. The mean score for the ICQ-Participant self-report was 136.77 ($SD= 24.30$), with a minimum of 40 and a maximum of 195. The mean score for the ICQ-Friend report was 148.76 ($SD= 30.38$), with a minimum of 0 and a maximum of 200.

The mean anxiety symptom score, as measured by the SCAARED, was 27.20 ($SD=19.83$), with a minimum of 0 and a maximum of 80. For the SCAARED, any scores of 25 or above are suggestive of an anxiety disorder; in the current study, 48.6% of participants (i.e., 87 out of 179) had scores of 25 or above, suggesting that almost half may meet criteria for an anxiety disorder. The mean depression symptom score, as measured by the CESD-R, was 14.06 ($SD =14.07$), with a minimum score of 0 and a maximum score of 75 (however this maximum score was winsorized to 48, the 95th percentile). For the CESD-R raw scores of 0 to 15 are considered average, while scores of 16 and above are considered to meet criteria for subthreshold depression or clinical depression. For the current study, 31.4% (i.e., 61 out of 179 participants) had scores that were above average. More details can be found in Table 3.1.

Descriptive analyses were also conducted on the relationship closeness and nature of the relationship as reported by participants and close friends (see Table 3.2). The mean relationship closeness (where 1= not close at all and 10= extremely close) of the sample measured by participant report was 8.50 ($SD= 1.42$) and by friend report was 8.60 ($SD= 1.45$). Approximately 76.0% of participants and 78.8% of rated relationship closeness as an 8 or higher. For the nature of the relationship reported by participant or friend (where 1 = not a friend at all, 2= an acquaintance/classmate, 3=a casual friend, 4= a good friend, 5=one of my best/closest friends), the mean according to participant report was 4.74

($SD = .55$) and according to friend report was 4.74 ($SD = .58$). Approximately 95.6% of participants classified their friend as a good friend or best/closest friend and 91.0% of close friends classified the participant as a good friend or best/closest friend.

Correlations among Study Variables

Correlations between all demographic information variables and predictor and outcome variables were also examined (see Table 3.3). Any demographic information variables that were significantly correlated with the predictor variables (i.e., ADHD symptoms or social functioning) or the outcome variables (i.e., anxiety symptoms or depression symptoms) were included as covariates in the analyses regarding anxiety and depression. There were many correlations among the covariates, predictor variables, and outcome variables, in the anticipated directions.

The number of years that the participant and close friend have known each other was reported by both the participant and the close friend. Neither number of years reported by participant nor number of years reported by the friend were significantly correlated with any predictor or outcome variables, and thus were not included in analyses. As expected and as a validity check, the correlation between participant-reported number of years and friend-reported number of years were significantly correlated with each other ($r = .83, p < .001$), with an average number of years being 4.05 year ($SD = 4.51$) as reported by participants and 4.38 years ($SD = 4.68$) as reported by friends. Participant-reported nature of the relationship ($M = 4.74; SD = .55$) and friend-reported nature of the relationship ($M = 4.74; SD = .58; r = .62, p < .001$) as well as and

participant-reported ($M= 8.50$; $SD= 1.42$), and friend-reported closeness of the relationship ($M= 8.60$; $SD= 1.45$; $r = .50$, $p < .001$) were significantly correlated with each other (see Table 3.3).

Increased ADHD symptoms were associated with increased ODD symptoms and being a person of color (see Table 3.3). As predicted, increased ADHD symptoms were associated with lower friend-reported social functioning per the ICQ measure, as well as increased anxiety symptoms and increased depression symptoms.

Higher participant-rated social functioning per the SEQ measure was associated with higher friend-rated social functioning per the SEQ measure, higher participant-rated social functioning per the ICQ measure, and higher friend-rated social functioning per the ICQ measure. Lower participant-rated social functioning per the SEQ measure was associated with increased ODD symptoms.

Higher participant-rated social functioning per the ICQ measure was associated with higher friend-rated social functioning per the ICQ measure. Higher participant-rated social functioning per the ICQ measure was associated with fewer ODD symptoms and higher participant-reported relationship closeness with the nominated close friend. As expected, lower (i.e., poorer) participant-rated social functioning per the ICQ measure was also associated with increased anxiety symptoms and increased depression symptoms.

Higher friend-rated social functioning per the SEQ measure was associated with higher friend-rated social functioning per the ICQ measure. Higher friend-rated social

functioning per the SEQ measure was associated with higher chance of being Caucasian, higher income, and lower ODD symptoms.

Higher friend-rated social functioning per the ICQ measure was associated with increased age, higher participant class year, and lower ODD symptoms. Higher friend-rated social functioning per the ICQ measure was associated with higher participant-reported relationship closeness, and friend-reported relationship closeness. As expected, lower friend-rated social functioning per the ICQ measure was associated with higher ADHD symptoms.

Increased anxiety symptoms were associated with being female and higher ODD symptoms. As expected, increased anxiety symptoms were associated with higher ADHD symptoms, lower participant-rated social functioning per the ICQ measure, and lower friend-rated social functioning per the ICQ measure. Increased anxiety symptoms were also associated with increased depression symptoms.

Increased depression symptoms were associated with higher ODD symptoms. As expected, increased depression symptoms were also associated with increased ADHD symptoms, lower participant-rated social functioning per the ICQ measure, and lower friend-rated social functioning per the ICQ measure.

Primary findings: Anxiety symptoms as the dependent variable

Gender was included as a covariate for all regression analyses with anxiety symptoms as the outcome. Since the sample was overwhelmingly female, it begged the question as to whether it was practical or useful to include gender as a covariate. All analyses with anxiety symptoms as the outcome were conducted both with and without

gender as a covariate so that the effect of gender as a covariate could be determined. There were no or changes in significance of main effects or interaction terms between when gender was included as a covariate and when it was not. Since including gender as a covariate was consistent with the protocol of including variables that were significantly associated with predictor and/or outcome variables, gender was included as a covariate. Additionally, including gender as a covariate provided insight into gender predicting increased anxiety symptoms for females, the details of which can be seen below.

The first regression model examined whether participant-reported social functioning (i.e., as assessed by SEQ-Participant measure) moderated the relation between ADHD symptoms and anxiety symptoms (see Table 3.4). The first step of the analysis examined the main effects of the three covariates (i.e., race, gender, and ODD symptoms) on anxiety symptoms, with the first step accounting for 23% of the variance. Results indicated that gender and ODD symptoms significantly predicted anxiety symptoms. Specifically, females and those with higher ODD symptoms had more anxiety symptoms. In the second step, gender and ODD symptoms continued to significantly predict anxiety. The main effect of ADHD symptoms was added in the second step and significantly predicted anxiety symptoms as well. The second step accounted for 7% of additional variance. As ADHD symptoms increased, anxiety symptoms increased. In the third step, gender, ODD symptoms, and ADHD symptoms continued to be predictive of anxiety symptoms, but participant-reported social functioning (i.e., SEQ-Participant) was not significantly predictive of anxiety symptoms as anticipated; the third step did not significantly account for additional variance. In the fourth and final step, gender, ODD symptoms, and ADHD symptoms still significantly predicted anxiety symptoms, but

contrary to hypothesis, the interaction between ADHD symptoms and participant-reported social functioning (i.e., SEQ-Participant) was not significant; the fourth step did not significantly account for additional variance. This suggests that participant-reported social functioning as assessed by the SEQ did not moderate the relation between ADHD symptoms and anxiety symptoms.

The second regression model examined whether friend-reported social functioning (i.e., as assessed by SEQ-Friend measure) moderated the relation between ADHD symptoms and anxiety symptoms (see Table 3.5). The first step of the analysis examined the main effects of the four covariates (i.e., race, gender, ODD symptoms, and family income) on anxiety symptoms, and accounted for 21% of the variance. Results indicated that ODD symptoms significantly predicted anxiety symptoms. Specifically, those with higher ODD symptoms had more anxiety symptoms. In the second step, ODD symptoms continued to significantly predict anxiety. Gender also significantly predicted anxiety symptoms, such that females had increased anxiety symptoms. The main effect of ADHD symptoms was added in the second step and significantly predicted anxiety symptoms as well. The second step added 8% of additional variance. As ADHD symptoms increased, anxiety symptoms increased. In the third step, gender, ODD symptoms, and ADHD symptoms continued to be predictive of anxiety symptoms, but friend-reported social functioning (i.e., SEQ-Friend) was not significantly predictive of anxiety symptoms as anticipated. The third and fourth step did not significantly account for additional variance. In the fourth and final step, gender, ODD symptoms, and ADHD symptoms still significantly predicted anxiety symptoms, but contrary to hypothesis, the interaction between ADHD symptoms and friend-reported social functioning (i.e., SEQ-

Friend) was not significant. This suggests that friend-reported social functioning as assessed by the SEQ did not moderate the relation between ADHD symptoms and anxiety symptoms.

The third regression model examined whether participant-reported social functioning (i.e., as assessed by ICQ-Participant measure) moderated the relation between ADHD symptoms and anxiety symptoms (see Table 3.6). The first step of the analysis examined the main effects of the four covariates (i.e., race, gender, ODD symptoms, and participant-reported relationship closeness) on anxiety symptoms, and accounted for 24% of the variance. Results indicated that gender and ODD symptoms significantly predicted anxiety symptoms. Specifically, females and those with higher ODD symptoms had more anxiety symptoms. In the second step, gender and ODD symptoms continued to significantly predict anxiety. The main effect of ADHD symptoms was added in the second step and significantly predicted anxiety symptoms as well. As ADHD symptoms increased, anxiety symptoms increased. The second step accounted for an additional 7% of variance. In the third step, gender, ODD symptoms, and ADHD symptoms continued to be predictive of anxiety symptoms, and participant-reported social functioning (i.e., ICQ-Participant) was also significantly predictive of anxiety symptoms as anticipated. As social functioning as assessed by the ICQ-participant decreased, anxiety symptoms increased as predicted. The third step accounted for an additional 6% of variance, however the fourth step did not account for additional variance. In the fourth and final step, gender, ODD symptoms, ADHD symptoms, and ICQ-participant still significantly predicted anxiety symptoms, but contrary to hypothesis, the interaction between ADHD symptoms and participant-reported social functioning (i.e., ICQ-Participant) was not

significant. This suggests that participant-reported social functioning as assessed by the ICQ did not moderate the relation between ADHD symptoms and anxiety symptoms.

The fourth regression model examined whether friend-reported social functioning (i.e., as assessed by ICQ-Friend measure) moderated the relation between ADHD symptoms and anxiety symptoms (see Table 3.7). The first step of the analysis examined the main effects of the seven covariates (i.e., race, gender, ODD symptoms, age, class year, participant-reported closeness, and friend-reported closeness) on anxiety symptoms. Results indicated that gender and ODD symptoms significantly predicted anxiety symptoms, and the first step accounted for 25% of the variance. Specifically, females and those with higher ODD symptoms had more anxiety symptoms. In the second step, gender and ODD symptoms continued to significantly predict anxiety. The main effect of ADHD symptoms was added in the second step and significantly predicted anxiety symptoms as well. The second step accounted for an additional 9% of variance. As ADHD symptoms increased, anxiety symptoms increased. In the third step, gender, ODD symptoms, and ADHD symptoms continued to be predictive of anxiety symptoms, but friend-reported social functioning (i.e., ICQ-Friend) was not significantly predictive of anxiety symptoms as anticipated. The third and fourth steps did not account for additional variance. In the fourth and final step, gender, ODD symptoms, and ADHD symptoms were still significantly predicting anxiety symptoms, but contrary to hypothesis, the interaction between ADHD symptoms and friend-reported social functioning (i.e., ICQ-Friend) was not significant. This suggests that friend-reported social functioning as assessed by the ICQ did not moderate the relation between ADHD symptoms and anxiety symptoms.

Primary findings: Depression symptoms as the dependent variable

The fifth regression model examined whether participant-reported social functioning (i.e., as assessed by SEQ-Participant measure) moderated the relation between ADHD symptoms and depression symptoms (see Table 3.8). The first step of the analysis examined the main effects of the two covariates (i.e., race and ODD symptoms) on depression symptoms, and the first step accounted for 18% of the variance. Results indicated that ODD symptoms significantly predicted depression symptoms. Specifically, those with higher ODD symptoms had more depression symptoms. In the second step, ODD symptoms continued to significantly predict depression. The main effect of ADHD symptoms was added in the second step and significantly predicted depression symptoms as well. As ADHD symptoms increased, depression symptoms increased. The second step accounted for an additional 14% of variance. The third step did not significantly account for additional variance. In the third step, ODD symptoms and ADHD symptoms continued to be predictive of depression symptoms, but participant-reported social functioning (i.e., SEQ-Participant) was not significantly predictive of depression symptoms as anticipated. The fourth step did not significantly account for additional variance when using the significance level specified by the Bonferroni correction, however would have been significant if a traditional significance level was used ($p = .019$). In the fourth and final step, ODD symptoms and ADHD symptoms still significantly predicted depression symptoms. Additionally, the main effect of participant-reported social functioning (i.e., SEQ-Participant) was significant in this step using a traditional significance level ($p < .05$), however was not significant when using the specified Bonferroni correction significance level. The fourth step accounted for an

additional 2% of variance. Lower (i.e., poorer) social functioning predicted increased depression symptoms as expected. Consistent with hypothesis, the interaction between ADHD symptoms and participant-reported social functioning (i.e., SEQ-Participant) was also significant when using a traditional significance level ($p < .05$), however was not significant when using the specified Bonferroni correction significance level. When using the traditional significance level ($p < .05$), this suggests that participant-reported social functioning as assessed by the SEQ may moderate the relation between ADHD symptoms and depression symptoms, $\Delta R^2 = .3517$, $F(5, 171) = 18.5539$, $p < .001$. Simple slope analyses were plotted for this significant interaction (see Figure 3.1). The simple slope analyses revealed ADHD symptoms were significantly related to depression symptoms at low, average, and high levels of social functioning (i.e., significant at all levels; $p = < .001$, $p = < .001$, $p = < .001$, respectively). The analyses revealed that participants with the highest ADHD symptoms and lowest (i.e., most poor) social functioning had the most depression symptoms, as expected.

The sixth regression model examined whether friend-reported social functioning (i.e., as assessed by SEQ-Friend measure) moderated the relation between ADHD symptoms and depression symptoms (see Table 3.9). The first step of the analysis examined the main effects of the three covariates (i.e., race, family income, and ODD symptoms) on depression symptoms, and the first step accounted for 21% of the variance. Results indicated that ODD symptoms significantly predicted depression symptoms. Specifically, those with higher ODD symptoms had more depression symptoms. In the second step, ODD symptoms continued to significantly predict depression. The main effect of ADHD symptoms was added in the second step and significantly predicted

depression symptoms as well. As ADHD symptoms increased, depression symptoms increased. The second step accounted for an additional 14% of the variance. In the third step, ODD symptoms and ADHD symptoms continued to be predictive of depression symptoms, but friend-reported social functioning (i.e., SEQ-Friend) was not significantly predictive of depression symptoms as anticipated. The third and fourth steps did not account for additional variance. In the fourth and final step, ODD symptoms and ADHD symptoms still significantly predicted depression symptoms, but contrary to hypothesis, the interaction between ADHD symptoms and friend-reported social functioning (i.e., SEQ-Friend) was not significant. This suggests that friend-reported social functioning as assessed by the SEQ did not moderate the relation between ADHD symptoms and depression symptoms.

The seventh regression model examined whether participant-reported social functioning (i.e., as assessed by ICQ-Participant measure) moderated the relation between ADHD symptoms and depression symptoms (see Table 3.10). The first step of the analysis examined the main effects of the three covariates (i.e., race, ODD symptoms, and participant-reported relationship closeness) on depression symptoms, and the first step accounted for 19% of the variance. Results indicated that ODD symptoms significantly predicted depression symptoms. Specifically, those with higher ODD symptoms had more depression symptoms. In the second step, ODD symptoms continued to significantly predict depression. The main effect of ADHD symptoms was added in the second step and significantly predicted depression symptoms as well. As ADHD symptoms increased, depression symptoms increased. The second step accounted for an additional 14% of variance. In the third step, ODD symptoms and ADHD symptoms

continued to be predictive of depression symptoms, and participant-reported social functioning (i.e., ICQ-Participant) was also significantly predictive of depression symptoms as anticipated. Lower (i.e., poorer) social functioning as assessed by the ICQ-participant significantly predicted increased depression symptoms as expected. The third step accounted for an additional 5% of variance. In the fourth and final step, ODD symptoms, ADHD symptoms, and ICQ-participant still significantly predicted depression symptoms, and the fourth step accounted for an additional 2% of variance. Consistent with the hypothesis, the interaction between ADHD symptoms and participant-reported social functioning (i.e., ICQ-Participant) was significant. This suggests that participant-reported social functioning as assessed by the ICQ moderates the relation between ADHD symptoms and depression symptoms, $\Delta R^2 = .4004$, $F(6, 170) = 18.9229$, $p < .001$. Simple slope analyses were examined for this significant interaction (see Figure 3.2). The simple slope analyses revealed ADHD symptoms were significantly related to depression symptoms at low, average, and high levels of social functioning as assessed by participant-reported ICQ (i.e., significant at all levels; $p = < .001$, $p = < .001$, $p = < .001$, respectively). The analyses revealed that participants with the highest ADHD symptoms and lowest (i.e., most poor) social functioning had the most depression symptoms, as expected.

The eighth regression model examined whether friend-reported social functioning (i.e., as assessed by ICQ-Friend measure) moderated the relation between ADHD symptoms and depression symptoms (see Table 3.11). The first step of the analysis examined the main effects of the six covariates (i.e., race, ODD symptoms, age, class year, participant-reported closeness, and friend-reported closeness) on depression

symptoms, and the first step accounted for 21% of the variance. Results indicated that ODD symptoms significantly predicted depression symptoms. Specifically, those with higher ODD symptoms had more depression symptoms. In the second step, ODD symptoms continued to significantly predict depression. The main effect of ADHD symptoms was added in the second step and significantly predicted depression symptoms as well. As ADHD symptoms increased, depression symptoms increased. The second step accounted for an additional 16% of variance. In the third step, ODD symptoms and ADHD symptoms continued to be predictive of depression symptoms, but friend-reported social functioning (i.e., ICQ-Friend) was not significantly predictive of depression symptoms as anticipated. The third and fourth steps did not account for additional variance. In the fourth and final step, ODD symptoms and ADHD symptoms still significantly predicted depression symptoms. Contrary to hypothesis, the interaction between ADHD symptoms and friend-reported social functioning (i.e., ICQ-Friend) was not significant. This suggests that friend-reported social functioning as assessed by the ICQ did not moderate the relation between ADHD symptoms and depression symptoms.

Exploratory Analyses

Exploratory analyses examined comparisons of the average participants' self-reports and friends' reports of ADHD symptoms and social functioning, and also examined participant- and friend-reported social functioning in the same models.

Dependent means t-tests comparing participant and friend reports.

Exploratory analyses compared the average participants' self-reports and friends' reports of ADHD symptoms, social functioning as measured by the SEQ, and social functioning

as measured by the ICQ, and relationship closeness using dependent means t-tests and of nature of the relationship using cross-tabulations. Chi-Square Test of Independence was utilized to determine the concordance of participant and friend ratings of the nature of the relationship. There was a significant difference in the scores for participant-reported ADHD symptoms ($M= 13.35, SD=10.28$) and friend-reported ADHD symptoms ($M= 8.75, SD =7.30$) conditions; $t(163)= 5.217, p < .001$. This suggests that participants self-reported significantly higher ADHD symptoms than friend-reported ADHD symptoms of the participants. There was not a significant difference in the scores for participant-reported social functioning as assessed by the SEQ ($M = 110.44, SD =11.98$) and friend-reported social functioning as assessed by the SEQ ($M = 111.31, SD =12.49$) conditions; $t(162)= -.730, p = .466$. This suggests that participant-reported and friend-reported social functioning as assessed by the SEQ did not differ. There was a significant difference in the scores for participant-reported social functioning as assessed by the ICQ ($M = 136.83, SD =24.73$) and friend-reported social functioning as assessed by the ICQ ($M = 148.76, SD =30.38$) conditions; $t(158)= -4.407, p < .001$. This suggests that friends' report of the participants' social functioning as assessed by the ICQ was significantly higher (i.e., better) than the participants' self-report of their own social functioning.

There was not a significant difference in the scores for participant-reported relationship closeness ($M = 8.50, SD =1.41$) and friend-reported relationship closeness ($M = 8.60, SD =1.45$) conditions; $t(170)= -.584, p = .560$. This suggests that participant-reported and friend-reported relationship closeness ratings did not differ. Friend ratings of the nature of their relationship were not equally distributed among participant ratings of the nature of their relationship, $\chi^2 (9, 171) = 97.18, p < .001$. How the participant

classified the nature of their friendship was significantly associated with how the friend rated the nature of their friendship. It was found that 89.7% of participants who rated their friend as a 5 (where 1= not a friend at all, 2= an acquaintance/classmate only, 3= a casual friend, 4= a good friend, and 5= one of my best/closest friends) also had their friend rate the participant as a 5 (one of my best/closest friends).

Examining participant and friend ratings in the same model. Two additional regression analyses were conducted for Analysis 1 with anxiety symptoms as the outcome variable, such that participant and friend ratings of social functioning were included in the same model to examine which is a better predictor of anxiety symptoms. *For social functioning measure #1 (SEQ):* The first step included entering all demographic variables determined to be significantly related to the predictor and/or outcome variables, and these demographic variables were used as covariates. The second step added total ADHD symptoms. The third step added predictor variables of self-report and friend-report of the SEQ social functioning measure, while keeping anxiety symptoms as the outcome variable. The fourth step entered the interactions of the predictors ADHD symptoms and social functioning ratings, with anxiety symptoms as the outcome variable. The same steps as above were repeated, except with self-report and friend-report of the ICQ social functioning measure in the third and fourth steps (instead of SEQ). These two regression analyses were also conducted for Analysis 2 with depression symptoms as the outcome variable.

Interaction among ADHD symptoms and participant-reported and friend-reported social functioning and its effect on anxiety symptoms. Exploratory analyses examined whether participant-reported social functioning and friend-reported social

functioning (i.e., as assessed by SEQ-Participant and SEQ-Friend measures) moderated the relation between ADHD symptoms and anxiety symptoms (see Table 3.12). The first step of the analysis examined the main effects of the four covariates (i.e., race, gender, ODD symptoms, and family income) on anxiety symptoms, and the first step accounted for 21% of the variance. Results indicated that gender and ODD symptoms significantly predicted anxiety symptoms. Specifically, females and those with higher ODD symptoms had more anxiety symptoms. In the second step, gender and ODD symptoms continued to significantly predict anxiety. The main effect of ADHD symptoms was added in the second step and significantly predicted anxiety symptoms as well. As ADHD symptoms increased, anxiety symptoms increased. The second step accounted for an additional 8% of variance. In the third step, gender, ODD symptoms, and ADHD symptoms continued to be predictive of anxiety symptoms, but participant-reported social functioning (i.e., SEQ-Participant) and friend-reported social functioning (i.e., SEQ-Friend) were not significantly predictive of anxiety symptoms as anticipated. The third and fourth steps did not account for additional variance. In the fourth and final step, gender, ODD symptoms, and ADHD symptoms still significantly predicted anxiety symptoms, but contrary to hypothesis, the two-way interactions between ADHD symptoms and social functioning (i.e., SEQ-Participant and SEQ-Friend) were not significant. The three-way interaction between ADHD symptoms, participant-reported social functioning (i.e., SEQ-Participant), and friend-reported social functioning (i.e., SEQ-Friend) was not significant. This suggests that participant-reported and friend-reported social functioning as assessed by the SEQ did not moderate the relation between ADHD symptoms and anxiety symptoms.

Whether participant-reported social functioning and friend-reported social functioning (i.e., as assessed by ICQ-Participant and ICQ-Friend measures) moderated the relation between ADHD symptoms and anxiety symptoms was also examined (see Table 3.13). The first step of the analysis examined the main effects of the seven covariates (i.e., race, gender, ODD symptoms, age, class year, participant-reported relationship closeness, and friend-reported relationship closeness) on anxiety symptoms, and the first step accounted for 25% of the variance. Results indicated that gender and ODD symptoms significantly predicted anxiety symptoms. Specifically, females and those with higher ODD symptoms had more anxiety symptoms. In the second step, gender and ODD symptoms continued to significantly predict anxiety. The main effect of ADHD symptoms was added in the second step and significantly predicted anxiety symptoms as well. As ADHD symptoms increased, anxiety symptoms increased. The second step accounted for an additional 9% of variance. In the third step, gender, ODD symptoms, and ADHD symptoms continued to be predictive of anxiety symptoms. Participant-reported social functioning (i.e., ICQ-Participant) significantly predicted anxiety symptoms, such that lower (i.e., poorer) social functioning predicted increased anxiety symptoms. However, friend-reported social functioning (i.e., ICQ-Friend) was not significantly predictive of anxiety symptoms as anticipated. The third step accounted for an additional 6% of variance. The fourth step did not significantly account for additional variance. In the fourth and final step, gender, ODD symptoms, ADHD symptoms, and participant-reported social functioning (i.e., ICQ-Participant) still significantly predicted anxiety symptoms. The two-way interactions between ADHD symptoms and social functioning (i.e., ADHD and ICQ-Participant, and ADHD and ICQ-

Friend) were not significant, however the three-way interaction between ADHD symptoms, participant-reported social functioning (i.e., ICQ-Participant), and friend-reported social functioning (i.e., ICQ-Friend) was significant (although the fourth step did not significantly account for additional variance). This suggests that participant-reported and friend-reported social functioning as assessed by the ICQ did not moderate the relation between ADHD symptoms and anxiety symptoms.

Interaction among ADHD symptoms and participant-reported and friend-reported social functioning and its effect on depression symptoms. Exploratory analyses also examined whether participant-reported social functioning and friend-reported social functioning (i.e., as assessed by SEQ-Participant and SEQ-Friend measures) moderated the relation between ADHD symptoms and depression symptoms (see Table 3.14). The first step of the analysis examined the main effects of the three covariates (i.e., race, family income, and ODD symptoms) on depression symptoms, and the first step accounted for 21% of the variance. Results indicated that ODD symptoms significantly predicted depression symptoms. Specifically, those with higher ODD symptoms had more depression symptoms. In the second step, ODD symptoms continued to significantly predict depression. The main effect of ADHD symptoms was added in the second step and significantly predicted depression symptoms as well. As ADHD symptoms increased, depression symptoms increased. The second step accounted for an additional 14% of variance. In the third step, ODD symptoms and ADHD symptoms continued to be predictive of depression symptoms. Participant-reported social functioning (i.e., SEQ-Participant) was predictive of depression symptoms, such that those with lower (i.e., poorer) social functioning had increased depression symptoms.

However, friend-reported social functioning (i.e., SEQ-Friend) was not significantly predictive of depression symptoms. The third step accounted for an additional 4% of variance, however the fourth step did not account for additional variance. In the fourth and final step, ADHD symptoms still significantly predicted depression symptoms, but ODD symptoms was no longer significantly predicting depression symptoms. As predicted, the two-way interaction between ADHD symptoms and social functioning (i.e., SEQ-Participant) was significant, suggesting that participant-reported social functioning as assessed by the SEQ moderated the relation between ADHD symptoms and depression symptoms (see the regression model in Table 3.8 and Figure 3.1 for analysis of this significant interaction). However, the two-way interaction between ADHD symptoms and friend-reported social functioning (i.e., SEQ-Friend) and the three-way interaction between ADHD symptoms, participant-reported social functioning (i.e., SEQ-Participant), and friend-reported social functioning (i.e., SEQ-Friend) were not significant. This suggests that participant-reported and friend-reported social functioning as assessed by the SEQ moderates the relation between ADHD symptoms and depression symptoms, however suggests that friend-reported social functioning as assessed by the SEQ did not moderate the relation between ADHD symptoms and depression symptoms.

Exploratory analyses also examined whether participant-reported social functioning and friend-reported social functioning (i.e., as assessed by ICQ-Participant and ICQ-Friend measures) moderated the relation between ADHD symptoms and depression symptoms (see Table 3.15). The first step of the analysis examined the main effects of the six covariates (i.e., race, ODD symptoms, age, class year, participant-reported relationship closeness, and friend-reported relationship closeness) on depression

symptoms, and the first step accounted for 19% of the variance. Results indicated that ODD symptoms significantly predicted depression symptoms. Specifically, those with higher ODD symptoms had more depression symptoms. In the second step, ODD symptoms continued to significantly predict depression. The main effect of ADHD symptoms was added in the second step and significantly predicted depression symptoms as well. As ADHD symptoms increased, depression symptoms increased. The second step accounted for an additional 16% of variance. In the third step, ODD symptoms and ADHD symptoms continued to be predictive of depression symptoms. Participant-reported social functioning (i.e., ICQ-Participant) significantly predicted depression symptoms, such that lower (i.e., poorer) social functioning predicted increased depression symptoms, as expected. However, friend-reported social functioning (i.e., ICQ-Friend) was not significantly predictive of depression symptoms. The third step accounted for an additional 7% of variance, and the fourth step also accounted for an additional 7% of variance. In the fourth and final step, ODD symptoms, ADHD symptoms, and participant-reported social functioning (i.e., ICQ-Participant) still significantly predicted depression symptoms. As expected, the two-way interaction between ADHD symptoms and participant-reported social functioning (i.e., ICQ-Participant) was significant, suggesting that participant-reported social functioning as assessed by the ICQ moderated the relation between ADHD symptoms and depression symptoms (see the regression model in Table 3.10 and Figure 3.2 for analysis of this significant interaction). The two-way interaction between ADHD symptoms and friend-reported social functioning (i.e., ADHD and ICQ-Friend) was not significant. This suggests that friend-reported social functioning as assessed by the ICQ did not moderate the relation between ADHD

symptoms and depression symptoms. The three-way interaction between ADHD symptoms, participant-reported social functioning (i.e., ICQ-Participant), and friend-reported social functioning (i.e., ICQ-Friend) was not significant.

Table 3.1 *Descriptive Statistics of Variables*

	N	Mean	Std. Dev.	Minimum	Maximum	Skewness	Kurtosis
Age	179	19.60	1.21	18	23	.47	-.35
Gender	179	.83	.38	0	1	-1.74	1.05
Race	177	.19	.39	0	1	1.62	.65
Family Income	142	3.96	1.45	1	6	-.14	-.83
Class Year	179	2.24	1.16	1	5	.49	-.83
ODD Sx	179	1.12	1.50	0	8	1.73	3.31
Closeness- P	179	8.50	1.42	4	10	-.77	.09
Closeness- F	171	8.60	1.45	2	10	-1.50	3.64
ADHD Sx	179	4.55	4.06	0	17	.94	.18
SEQ-P	179	109.68	12.31	46	130	-2.09	8.26
ICQ-P	179	136.77	24.31	40	195	-.55	1.27
SEQ-F	163	111.31	12.49	46	136	-1.25	3.57
ICQ-F	159	148.76	30.38	0	200	-1.08	3.31
Anxiety	179	27.20	19.84	0	80	.69	-.36
Depression	179	14.06	14.07	0	48	1.16	.32

Note. N = 179. Sx = Symptoms. P = Participant-reported. F = Friend-reported. Std. Dev. = Standard Deviation. The covariates are age (years), gender (0 = male; 1 = female), race (0 = Caucasian; 1 = Non-Caucasian), family income (average annual income; 1=Less than \$23,500; 2=\$23,000-\$50,000; 3=\$50,000-\$99,999; 4=\$100,000-\$149,999; 5=\$150,000-\$249,999; 6=More than \$250,000); class year (1 = first year, i.e., freshman), ODD symptoms, relationship closeness reported by participant or friend (1= not close at all; 10= extremely close).

Table 3.2 *Descriptive Information for Relationship Closeness and Nature of the Relationship for Participant and Close Friend Reports*

Closeness	Participants			Close Friends		
	Frequency	%	Cumulative Percent	Frequency	%	Cumulative Percent
1 = not close at all	0	0	0	0	0	0
2	0	0	0	1	.6	.6
3	0	0	0	2	1.1	1.8
4	2	1.1	1.1	0	0	1.8
5	4	2.2	3.4	4	1.7	3.5
6	9	5.0	8.4	4	2.2	5.8
7	28	15.6	24.0	20	11.2	17.5
8	39	21.8	45.8	44	24.6	43.3
9	38	21.2	67.0	39	21.8	66.1
10 = extremely close	59	33.0	100.0	58	32.4	100.00
Total	179	100.0		171	95.5	
Missing	0	0		8	4.5	
Mean	8.50			8.60		
Std. Dev.	1.42			1.45		
Minimum	4			2		
Maximum	10			10		
Nature	Frequency	%	Cumulative Percent	Frequency	%	Cumulative Percent
1 = Not a friend at all	0	0	0	0	0	0
2 = an acquaintance/classmate only	1	.6	.6	2	1.1	1.2
3 = a casual friend	7	3.9	4.5	6	3.4	4.7
4 = a good friend	30	16.8	21.2	26	14.5	19.9
5 = one of my best/ closest friends	141	78.8	100.0	137	76.5	100.0
Total	179	100.0		171	95.5	
Missing	0	0		8	4.5	
Mean	4.74			4.74		
Std. Dev.	.55			.58		
Minimum	2			2		
Maximum	5			5		

Note. Nature = Nature of the relationship reported by participant or friend, where 1 = not a friend at all, 2= an acquaintance/classmate, 3=a casual friend, 4= a good friend, 5=one of my best/closest friends. Closeness = relationship closeness reported by participant or friend, where 1= not close at all; 10= extremely close.

Table 3.3 *Correlations among Variables*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Age	1.00														
2. Gender	-.12	1.00													
3. Race	.08	-.20**	1.00												
4. Family Income	.06	-.03	-.40**	1.00											
5. Class Year	.91**	-.10	.09	.06	1.00										
6. ODD Sx	-.06	-.01	.05	-.10	-.07	1.00									
7. Closeness- P	.07	.07	-.08	.11	.05	.05	1.00								
8. Closeness- F	.13	.07	-.01	.05	.14	.05	.50**	1.00							
9. ADHD Sx	.06	-.11	.18*	-.03	.04	.34**	-.01	-.03	1.00						
10. SEQ-P	.13	.06	.06	.04	.10	-.22**	.08	-.02	.07	1.00					
11. ICQ-P	.10	-.003	.13	-.09	.03	-.18**	.19*	.06	.11	.56**	1.00				
12. SEQ-F	.12	.08	-.18*	.18*	.13	-.23**	.15	.06	-.08	.23**	.12	1.00			
13. ICQ-F	.18*	.09	-.07	.11	.17*	-.29**	.16*	.31**	-.20*	.24**	.25**	.52**	1.00		
14. Anxiety	-.11	.19**	.13	-.14	-.10	.39**	-.08	-.09	.40**	-.04	-.26**	-.06	-.24**	1.00	
15. Depression	-.06	.01	.14	-.16	-.06	.40**	-.10	-.03	.51**	-.12	-.22**	-.11	-.29**	.69**	1.00

Note. $N = 179$. * $p < 0.05$; ** $p < 0.01$. Sx = Symptoms. P = Participant-reported. F = Friend-reported. Std. Dev. = Standard Deviation. The covariates are age (years), gender (0 = male; 1 = female), race (0 = Caucasian; 1 = Non-Caucasian), family income (average annual income; 1=Less than \$23,500; 2=\$23,000-\$50,000; 3=\$50,000-\$99,999; 4=\$100,000-\$149,999; 5=\$150,000-\$249,999; 6=More than \$250,000); class year (1 = first year, i.e., freshman), ODD symptoms, relationship closeness reported by participant or friend (1= not close at all; 10= extremely close).

Table 3.4 Hierarchical Multiple Regression for ADHD Symptoms and SEQ-Participant with Anxiety Symptoms as the Outcome

Step and Variable	B	SE	β	t	p-value	R ²	ΔR^2	F for ΔR^2	df
SEQ-Participant									
1. (Covariates)	--	--	--	--	--	--	--	--	--
Race	8.04	3.47	.16	3.32	.02				
Gender	12.32	3.55	.24	3.47	.001*				
ODD Symptoms	5.18	.88	.39	5.87	<.001*				
Total Step 1						.23*	.23*	16.72	173
2.	--	--	--	--	--				
Race	5.83	3.35	.12	1.74	.08				
Gender	13.45	3.40	.26	3.96	<.001*				
ODD Symptoms	3.88	.90	.30	4.33	<.001*				
ADHD Symptoms	1.43	.34	.30	4.23	<.001*				
Total Step 2						.30*	.07*	17.89	172
3.	--	--	--	--	--				
Race	5.91	3.37	.12	1.75	.08				
Gender	13.57	3.42	.26	3.96	<.001				
ODD Symptoms	3.79	.93	.29	4.06	<.001				
ADHD Symptoms	1.45	.34	.30	4.23	<.001				
SEQ-Participant	-.04	.11	-.03	-3.85	.70				
Total Step 3						.30	.001	.15	171
4.	--	--	--	--	--				
Race	5.95	3.38	.12	1.76	.08				
Gender	13.77	3.46	.27	3.98	<.001				
ODD Symptoms	3.66	.97	.28	3.76	<.001				
ADHD Symptoms	1.51	.37	.31	4.12	<.001				
SEQ-Participant	-.05	.11	-.03	-.48	.64				
ADHD x SEQ-Participant	-.014	.03	-.03	-.46	.64				
Total Step 4						.30	.001	.21	170

Note. Covariates included in analysis were coded in the following manner: race (0 = Caucasian; 1 = Non-Caucasian), gender (0 = male; 1 = female), and total ODD symptoms. Outcome is anxiety symptoms as measured by the SCAARED.

* $p < 0.012$ (one-tailed with Bonferroni correction for 8 main analyses) for steps that significantly accounted for additional variance.

Table 3.5 Hierarchical Multiple Regression for ADHD Symptoms and SEQ-Friend with Anxiety Symptoms as the Outcome

Step and Variable	B	SE	β	t	p-value	R ²	ΔR^2	F for ΔR^2	df
SEQ-Friend									
1. (Covariates)	--	--	--	--	--	--	--	--	--
Race	7.09	4.33	.15	1.64	.10				
Gender	11.04	4.49	.20	2.46	.02				
ODD Symptoms	4.92	1.06	.38	4.64	<.001*				
Family Income	-.66	1.23	-.05	-.54	.59				
Total Step 1						.21*	.21*	8.08	123
2.	--	--	--	--	--				
Race	3.79	4.23	.08	.90	.37				
Gender	13.32	4.33	.24	3.07	.003*				
ODD Symptoms	3.52	1.08	.27	3.25	.001*				
Family Income	-.91	1.17	-.07	-.78	.44				
ADHD Symptoms	1.59	.44	.31	3.60	<.001*				
Total Step 2						.28*	.08*	12.98	122
3.	--	--	--	--	--				
Race	3.72	4.27	.08	.87	.39				
Gender	13.34	4.35	.24	3.07	.003				
ODD Symptoms	3.48	1.11	.27	3.13	.002				
Family Income	-.89	1.18	-.06	-.75	.45				
ADHD Symptoms	1.58	.44	.31	3.59	<.001				
SEQ-Friend	-.03	.14	-.01	-.18	.86				
Total Step 3						.28	<.001	.03	121
4.	--	--	--	--	--				
Race	3.85	4.31	.08	.90	.37				
Gender	13.27	4.38	.24	3.03	.003				
ODD Symptoms	3.42	1.13	.26	3.01	.003				
Family Income	-.84	1.20	-.06	-.70	.49				
ADHD Symptoms	1.59	.44	.31	3.58	<.001				
SEQ-Friend	-.02	.15	-.01	-.16	.87				
ADHD x SEQ-Friend	-.01	.04	-.03	-.32	.75				
Total Step 4						.28	.001	.10	120

Note. Covariates included in analysis were coded in the following manner: race (0 = Caucasian; 1 = Non-Caucasian), gender (0 = male; 1 = female), total ODD symptoms, and family income (average annual income; 1=Less than \$23,000; 2=\$23,000-\$49,999; 3=\$50,000-\$99,999; 4=\$100,000-\$149,999; 5=\$150,000-\$249,999; 6=More than \$250,000). Outcome is anxiety symptoms as measured by the SCAARED. * $p < 0.012$ (one-tailed with Bonferroni correction for 8 main analyses) for steps that significantly accounted for additional variance.

Table 3.6 *Hierarchical Multiple Regression for ADHD Symptoms and ICQ-Participant with Anxiety Symptoms as the Outcome*

Step and Variable	B	SE	β	t	p-value	R ²	ΔR^2	F for ΔR^2	df
ICQ-Participant									
1. (Covariates)	--	--	--	--	--	--	--	--	--
Race	7.65	3.46	.15	2.21	.03				
Gender	12.65	3.54	.24	3.57	<.001*				
ODD Symptoms	5.25	.88	.40	5.96	<.001*				
Closeness-Participant	-1.50	.93	-.12	-1.61	.11				
Total Step 1						.24*	.24*	13.30	172
2.	--	--	--	--	--				
Race	5.47	3.35	.11	1.64	.10				
Gender	13.76	3.39	.26	4.06	<.001*				
ODD Symptoms	3.95	.89	.30	4.42	<.001*				
Closeness-Participant	-1.44	.89	-.10	-1.62	.11				
ADHD Symptoms	1.42	.34	.29	4.22	<.001*				
Total Step 2						.31*	.07*	17.84	171
3.	--	--	--	--	--				
Race	7.22	3.23	.14	2.23	.03				
Gender	14.08	3.25	.27	4.33	<.001*				
ODD Symptoms	3.04	.89	.23	3.44	.001*				
Closeness-Participant	-.67	.87	-.05	-.77	.44				
ADHD Symptoms	1.67	.33	.34	5.08	<.001*				
ICQ-Participant	-.21	.05	-.26	-4.04	<.001*				
Total Step 3						.37*	.06*	16.34	170
4.	--	--	--	--	--				
Race	7.10	3.24	.14	2.19	.03				
Gender	13.86	3.27	.27	4.24	<.001				
ODD Symptoms	3.11	.89	.24	3.49	.001				
Closeness-Participant	-.69	.87	-.05	-.79	.43				
ADHD Symptoms	1.60	.34	.33	4.65	<.001				
ICQ-Participant	-.22	.05	-.26	-4.05	<.001				
ADHD x ICQ-Participant	.01	.01	.05	.72	.47				
Total Step 4						.37	.002	.52	169

Note. Covariates included in analysis were coded in the following manner: race (0 = Caucasian; 1 = Non-Caucasian), gender (0 = male; 1 = female), total ODD symptoms, and relationship closeness reported by participant (1= not close at all; 10= extremely close). Outcome is anxiety symptoms as measured by the SCAARED. * $p < 0.012$ (one-tailed with Bonferroni correction for 8 main analyses) for steps that significantly accounted for additional variance.

Table 3.7 Hierarchical Multiple Regression for ADHD Symptoms and ICQ-Friend with Anxiety Symptoms as the Outcome

Step and Variable	B	SE	β	t	p-value	R ²	ΔR^2	F for ΔR^2	df
ICQ-Friend									
1. (Covariates)	--	--	--	--	--	--	--	--	--
Race	6.54	3.79	.13	1.73	.09				
Gender	13.69	4.03	.25	3.40	.001*				
ODD Symptoms	5.57	1.01	.40	5.53	<.001*				
Age	-.61	2.88	-.04	-.21	.83				
Class Year	-.05	3.02	-.003	-.02	.99				
Closeness-Participant	-1.22	1.24	-.08	-.98	.33				
Closeness-Friend	-1.12	1.20	-.08	-.93	.35				
Total Step 1						.25*	.25*	6.84	148
2.	--	--	--	--	--				
Race	4.05	3.62	.08	1.12	.27				
Gender	15.21	3.82	.28	3.98	<.001*				
ODD Symptoms	4.13	1.01	.30	4.10	<.001*				
Age	-1.28	2.73	-.08	-.47	.64				
Class Year	.30	2.85	.02	.11	.92				
Closeness-Participant	-1.25	1.17	-.08	-1.06	.29				
Closeness-Friend	-.89	1.14	-.06	-.79	.43				
ADHD Symptoms	1.64	.38	.32	4.34	<.001*				
Total Step 2						.33*	.09*	18.82	147
3.	--	--	--	--	--				
Race	4.15	3.63	.08	1.14	.26				
Gender	15.22	3.83	.28	3.98	<.001				
ODD Symptoms	3.89	1.05	.28	3.69	<.001				
Age	-1.15	2.74	-.07	-.42	.68				
Class Year	.27	2.86	.02	-.10	.92				
Closeness-Participant	-1.21	1.18	-.08	-1.03	.31				
Closeness-Friend	-.66	1.18	-.05	-.56	.58				
ADHD Symptoms	1.61	.38	.31	4.23	<.001				
ICQ-Friend	-.04	.06	-.06	-.77	.44				
Total Step 3						.33	.003	.60	146
4.	--	--	--	--	--				
Race	4.14	3.64	.08	1.14	.26				
Gender	15.21	3.83	.28	3.96	<.001				
ODD Symptoms	3.89	1.06	.28	3.67	<.001				
Age	-1.15	2.75	-.07	-.42	.68				
Class Year	.27	2.87	.02	-.10	.92				
Closeness-Participant	-1.21	1.18	-.08	-1.02	.31				
Closeness-Friend	-.65	1.20	-.04	-.54	.59				
ADHD Symptoms	1.60	.38	.31	4.21	<.001				
ICQ-Friend	-.04	.06	-.06	-.76	.45				
ADHD x ICQ-Friend	-.001	.01	-.004	-.06	.95				
Total Step 4						.33	<.001	.003	145

Note. Covariates included in analysis were coded in the following manner: race (0 = Caucasian; 1 = Non-Caucasian), gender (0 = male; 1 = female), total ODD symptoms, age (in years), class year, and relationship closeness reported by participant and by friend (1= not close at all; 10= extremely close). Outcome is anxiety symptoms as measured by the SCAARED. * p < 0.012 (one-tailed with Bonferroni correction for 8 main analyses) for steps that significantly accounted for additional variance.

Table 3.8 Hierarchical Multiple Regression for ADHD Symptoms and SEQ-Participant with Depression Symptoms as the Outcome

Step and Variable	B	SE	β	t	p-value	R ²	ΔR^2	F for ΔR^2	df
SEQ-Participant									
1. (Covariates)	--	--	--	--	--	--	--	--	--
Race	4.27	2.48	.12	1.72	.09				
ODD Symptoms	3.73	.65	.40	5.79	<.001*				
Total Step 1						.18*	.18*	18.75	174
2.	--	--	--	--	--				
Race	1.86	2.30	.05	.81	.42				
ODD Symptoms	2.44	.63	.26	3.90	<.001*				
ADHD Symptoms	1.42	.24	.41	6.03	<.001*				
Total Step 2						.32*	.14*	36.33	173
3.	--	--	--	--	--				
Race	2.04	2.29	.06	.89	.38				
ODD Symptoms	2.16	.65	.23	3.35	.001				
ADHD Symptoms	1.48	.24	.43	6.23	<.001				
SEQ-Participant	-.12	.07	-.11	-1.63	.10				
Total Step 3						.33	.01	2.67	172
4.	--	--	--	--	--				
Race	2.06	2.26	.06	.91	.36				
ODD Symptoms	1.74	.66	.19	2.63	.01				
ADHD Symptoms	1.67	.25	.48	6.74	<.001				
SEQ-Participant	-.16	.07	-.14	-2.10	.04				
ADHD x SEQ-Participant	-.05	.02	-.16	-2.37	.02				
Total Step 4						.35	.02	5.60	171

Note. Covariates included in analysis were coded in the following manner: race (0 = Caucasian; 1 = Non-Caucasian) and total ODD symptoms. Outcome is depression symptoms as measured by the CESD-R. * p < 0.012 (one-tailed with Bonferroni correction for 8 main analyses) for steps that significantly accounted for additional variance.

Table 3.9 Hierarchical Multiple Regression for ADHD Symptoms and SEQ-Friend with Depression Symptoms as the Outcome

Step and Variable	B	SE	β	t	p-value	R ²	ΔR^2	F for ΔR^2	df
SEQ-Friend									
1. (Covariates)	--	--	--	--	--	--	--	--	--
Race	2.24	3.13	.06	.72	.48				
Family Income	-1.00	.90	-.10	-1.11	.27				
ODD Symptoms	4.06	.78	.42	5.22	<.001*				
Total Step 1						.21*	.21*	10.78	124
2.	--	--	--	--	--				
Race	-1.28	2.95	-.04	-.43	.67				
Family Income	-1.29	.82	-.13	-1.57	.12				
ODD Symptoms	2.69	.76	.28	3.53	.001*				
ADHD Symptoms	1.54	.31	.41	5.02	<.001*				
Total Step 2						.34*	.14*	25.19	123
3.	--	--	--	--	--				
Race	-1.58	2.97	-.04	-.53	.60				
Family Income	-1.21	.83	-.12	-1.46	.15				
ODD Symptoms	2.53	.78	.26	3.25	.001				
ADHD Symptoms	1.53	.31	.40	5.00	<.001				
SEQ-Friend	-.10	.10	-.07	-.97	.34				
Total Step 3						.35	.005	.93	122
4.	--	--	--	--	--				
Race	-1.36	3.00	-.04	-.46	.65				
Family Income	-1.13	.84	-.11	-1.35	.18				
ODD Symptoms	2.43	.79	.25	3.07	.003				
ADHD Symptoms	1.54	.31	.41	5.01	<.001				
SEQ-Friend	-.09	.10	-.07	-.93	.35				
ADHD x SEQ-Friend	-.02	.03	-.05	-.69	.49				
Total Step 4						.35	.003	.48	121

Note. Covariates included in analysis were coded in the following manner: race (0 = Caucasian; 1 = Non-Caucasian), family income (average annual income; 1=Less than \$23,000; 2=\$23,000-\$49,999; 3=\$50,000-\$99,999; 4=\$100,000-\$149,999; 5=\$150,000-\$249,999; 6=More than \$250,000), and total ODD symptoms. Outcome is depression symptoms as measured by the CESD-R. * p < 0.012 (one-tailed with Bonferroni correction for 8 main analyses) for steps that significantly accounted for additional variance.

Table 3.10 Hierarchical Multiple Regression for ADHD Symptoms and ICQ-Participant with Depression Symptoms as the Outcome

Step and Variable	B	SE	β	t	p-value	R ²	ΔR^2	F for ΔR^2	df
ICQ-Participant									
1. (Covariates)	--	--	--	--	--	--	--	--	--
Race	3.96	2.48	.11	1.60	.11				
ODD Symptoms	3.77	.64	.40	5.87	<.001*				
Closeness-Participant	-1.05	.68	-.11	-1.55	.12				
Total Step 1						.19*	.19*	13.41	173
2.	--	--	--	--	--				
Race	1.58	2.30	.04	.69	.49				
ODD Symptoms	2.49	.62	.27	3.99	<.001*				
Closeness-Participant	-.98	.62	-.10	-1.58	.12				
ADHD Symptoms	1.41	.23	.41	6.02	<.001*				
Total Step 2						.33*	.14*	36.25	172
3.	--	--	--	--	--				
Race	2.65	2.24	.07	1.18	.24				
ODD Symptoms	1.92	.62	.21	3.08	.002*				
Closeness-Participant	-.49	.61	-.05	-.80	.42				
ADHD Symptoms	1.56	.23	.45	6.78	<.001*				
ICQ-Participant	-.13	.04	-.23	-3.60	<.001*				
Total Step 3						.38*	.05*	12.97	171
4.	--	--	--	--	--				
Race	2.86	2.21	.08	1.30	.20				
ODD Symptoms	1.77	.62	.19	2.87	.005*				
Closeness-Participant	-.44	.60	-.04	-.73	.47				
ADHD Symptoms	1.74	.24	.50	7.34	<.001*				
ICQ-Participant	-.13	.04	-.23	-3.60	<.001*				
ADHD x ICQ-Participant	-.02	.10	-.16	-2.57	.011*				
Total Step 4						.40*	.02*	6.61	170

Note. Covariates included in analysis were coded in the following manner: race (0 = Caucasian; 1 = Non-Caucasian), total ODD symptoms, and relationship closeness reported by participant (1= not close at all; 10= extremely close). Outcome is depression symptoms as measured by the CESD-R. * p < 0.012 (one-tailed with Bonferroni correction for 8 main analyses) for steps that significantly accounted for additional variance.

Table 3.11 Hierarchical Multiple Regression for ADHD Symptoms and ICQ-Friend with Depression Symptoms as the Outcome

Step and Variable	B	SE	β	t	p-value	R ²	ΔR^2	F for ΔR^2	df
ICQ-Friend									
1. (Covariates)	--	--	--	--	--	--	--	--	--
Race	2.67	2.71	.07	.98	.33				
ODD Symptoms	4.24	.73	.43	5.82	<.001*				
Age	-.02	2.08	-.002	-.01	.99				
Class Year	-.28	2.19	-.02	-.13	.90				
Closeness-Participant	-1.25	.90	-.12	-1.40	.16				
Closeness-Friend	.06	.87	.01	.07	.95				
Total Step 1						.21*	.21*	6.54	149
2.	--	--	--	--	--				
Race	.02	2.46	.001	.01	.99				
ODD Symptoms	2.83	.69	.29	4.09	<.001*				
Age	-.78	1.86	-.06	-.42	.68				
Class Year	.08	1.95	.01	.04	.97				
Closeness-Participant	-1.26	.80	-.12	-1.57	.12				
Closeness-Friend	.31	.78	.03	.40	.69				
ADHD Symptoms	1.60	.26	.44	6.21	<.001*				
Total Step 2						.37*	.16*	38.60	148
3.	--	--	--	--	--				
Race	.10	2.47	.003	.04	.97				
ODD Symptoms	2.65	.72	.27	3.67	<.001				
Age	.69	1.87	-.06	-.37	.71				
Class Year	.06	1.96	.01	.03	.98				
Closeness-Participant	-1.24	.80	-.11	-1.54	.13				
Closeness-Friend	.49	.81	.05	.60	.55				
ADHD Symptoms	1.58	.26	.43	6.09	<.001				
ICQ-Friend	-.03	.044	-.06	-.82	.42				
Total Step 3						.37	.003	.67	147
4.	--	--	--	--	--				
Race	.03	2.46	.001	.01	.99				
ODD Symptoms	2.59	.72	.26	3.60	<.001				
Age	-.68	1.86	-.06	-.37	.72				
Class Year	.04	1.95	.003	.02	.98				
Closeness-Participant	-1.22	.80	-.11	-1.52	.13				
Closeness-Friend	.63	.81	.06	.78	.44				
ADHD Symptoms	1.56	.26	.43	6.02	<.001				
ICQ-Friend	-.02	.04	-.05	-.63	.53				
ADHD x ICQ-Friend	-.01	.01	-.10	-1.41	.16				
Total Step 4						.38	.008	2.00	146

Note. Covariates included in analysis were coded in the following manner: race (0 = Caucasian; 1 = Non-Caucasian), total ODD symptoms, age (in years), class year, and relationship closeness reported by participant and by friend (1= not close at all; 10= extremely close). Outcome is depression symptoms as measured by the CESD-R. * p < 0.012 (one-tailed with Bonferroni correction for 8 main analyses) for steps that significantly accounted for additional variance.

Table 3.12 Hierarchical Multiple Regression for ADHD Symptoms, SEQ-Participant, and SEQ-Friend with Anxiety Symptoms as the Outcome

Step and Variable	B	SE	β	t	p-value	R ²	ΔR^2	F for ΔR^2	df
SEQ-Participant & SEQ-Friend									
1. (Covariates)	--	--	--	--	--	--	--	--	--
Race	7.09	4.33	.15	1.64	.10				
Gender	11.04	4.49	.20	2.46	.02*				
ODD Symptoms	4.92	1.06	.38	4.63	<.001**				
Family Income	-.66	1.23	-.05	-.54	*				
Total Step 1					.59	.21***	.21***	8.08	123
2.	--	--	--	--	--				
Race	3.79	4.23	.08	.90	.37				
Gender	13.32	4.33	.24	3.07	.003**				
ODD Symptoms	3.52	1.08	.27	3.25	.001**				
Family Income	-.91	1.17	-.07	-.78	.44				
ADHD Symptoms	1.59	.44	.31	3.60	<.001**				
Total Step 2					*	.28***	.08***	12.98	122
3.	--	--	--	--	--				
Race	3.75	4.29	.08	.87	.38				
Gender	13.42	4.38	.24	3.06	.003				
ODD Symptoms	3.43	1.14	.26	3.01	.003				
Family Income	-.88	1.19	-.07	-.74	.46				
ADHD Symptoms	1.60	.45	.31	3.55	.001				
SEQ-Participant	-.03	.14	-.02	-.21	.84				
SEQ-Friend	-.02	.15	-.01	-.14	.89				
Total Step 3						.29	<.001	.04	120
4.	--	--	--	--	--				
Race	4.02	4.36	.08	.92	.36				
Gender	13.78	4.47	.25	3.08	.003				
ODD Symptoms	2.84	1.21	.22	2.35	.02				
Family Income	-.57	1.23	-.04	-.46	.65				
ADHD Symptoms	2.06	.53	.40	3.86	<.001				
SEQ-Participant	-.14	.17	-.08	-.85	.40				
SEQ-Friend	.02	.15	.01	.13	.90				
ADHD x SEQ-Participant	-.05	.04	-.12	-1.18	.24				
ADHD x SEQ-Friend	.01	.04	.03	.32	.75				
SEQ-Participant x SEQ-Friend	-.02	.01	-.11	-1.27	.21				
ADHD x SEQ-Participant x SEQ-Friend	-.004	.003	-.12	-1.29	.20				
Total Step 4						.31	.02	.92	116

Note. Covariates included in analysis were coded in the following manner: race (0 = Caucasian; 1 = Non-Caucasian), gender (0 = male; 1 = female), total ODD symptoms, and family income (average annual income; 1=Less than \$23,000; 2=\$23,000-\$49,999; 3=\$50,000-\$99,999; 4=\$100,000-\$149,999; 5=\$150,000-\$249,999; 6=More than \$250,000). Outcome is anxiety symptoms as measured by the SCAARED. * $p < 0.05$ (two-tailed). ** $p < 0.01$ (two-tailed). *** $p < 0.001$ (two-tailed) for steps that significantly accounted for additional variance.

Table 3.13 Hierarchical Multiple Regression for ADHD Symptoms, ICQ-Participant, and ICQ-Friend with Anxiety Symptoms as the Outcome

Step and Variable	B	SE	β	t	p-value	R ²	ΔR^2	F for ΔR^2	df
ICQ-Participant & ICQ-Friend									
1. (Covariates)	--	--	--	--	--	--	--	--	--
Race	6.54	3.79	.13	1.73	.09				
Gender	13.69	4.03	.25	3.40	.001**				
ODD Symptoms	5.57	1.01	.40	5.53	<.001***				
Age	-.61	2.88	-.04	-.21	.83				
Class Year	-.05	3.02	-.003	-.02	.99				
Closeness-Participant	-1.22	1.24	-.08	-.98	.33				
Closeness-Friend	-1.12	1.20	-.08	-.93	.35				
Total Step 1						.25***	.25***	6.84	148
2.	--	--	--	--	--				
Race	4.05	3.62	.08	1.12	.27				
Gender	15.21	3.82	.28	3.98	<.001***				
ODD Symptoms	4.13	1.01	.30	4.10	<.001***				
Age	-1.28	2.73	-.08	-.47	.64				
Class Year	.30	2.85	.02	.11	.92				
Closeness-Participant	-1.25	1.17	-.08	-1.06	.29				
Closeness-Friend	-.89	1.14	-.06	-.79	.43				
ADHD Symptoms	1.64	.38	.32	4.34	<.001***				
Total Step 2						.33***	.09***	18.82	147
3.	--	--	--	--	--				
Race	6.39	3.54	.13	1.81	.07				
Gender	15.70	3.67	.29	4.28	<.001***				
ODD Symptoms	2.98	1.04	.21	2.86	.005**				
Age	.37	2.66	.02	.14	.89				
Class Year	-1.47	2.78	-.08	-.53	.60				
Closeness-Participant	-.24	1.16	-.02	-.21	.84				
Closeness-Friend	-.72	1.13	-.05	-.63	.53				
ADHD Symptoms	1.93	.37	.38	5.15	<.001***				
ICQ-Participant	-.22	.06	-.27	-3.70	<.001***				
ICQ-Friend	-.01	.05	-.01	-.11	.91				
Total Step 3						.39**	.06**	7.17	145
4.	--	--	--	--	--				
Race	5.41	3.50	.11	1.55	.12				
Gender	14.39	3.67	.27	3.92	<.001				
ODD Symptoms	3.03	1.04	.22	2.92	.004				
Age	-.68	2.66	-.04	-.25	.80				
Class Year	-.90	2.75	-.05	-.33	.74				
Closeness-Participant	.32	1.16	.02	.28	.78				
Closeness-Friend	.02	1.16	.001	.02	.99				
ADHD Symptoms	2.03	.39	.40	5.21	<.001				
ICQ-Participant	-.29	.06	-.36	-4.50	<.001				
ICQ-Friend	.05	.06	.07	.87	.38				
ADHD x ICQ-Participant	.004	.01	.02	.26	.80				
ADHD x ICQ-Friend	.01	.01	.08	.92	.36				
ICQ-Participant x ICQ-Friend	.001	.002	.04	.46	.64				
ADHD x ICQ-Participant x ICQ-Friend	-.001	<.001	-.28	-2.91	.004				
Total Step 4						.43	.04	2.26	141

Note. Covariates included in analysis were coded in the following manner: race (0 = Caucasian; 1 = Non-Caucasian), gender (0 = male; 1 = female), total ODD symptoms, age (in years), class year, and relationship closeness reported by participant and by friend (1= not close at all; 10= extremely close). Outcome is anxiety symptoms as measured by the SCAARED. * $p < 0.05$ (two-tailed). ** $p < 0.01$ (two-tailed). *** $p < 0.001$ (two-tailed) for steps that significantly accounted for additional variance.

Table 3.14 Hierarchical Multiple Regression for ADHD Symptoms, SEQ-Participant, and SEQ-Friend with Depression Symptoms as the Outcome

Step and Variable	B	SE	β	t	p-value	R ²	ΔR^2	F for ΔR^2	df
SEQ-Participant & SEQ-Friend									
1. (Covariates)	--	--	--	--	--	--	--	--	--
Race	2.24	3.13	.06	.72	.48				
Family Income	-.99	.90	-.10	-1.11	.27				
ODD Symptoms	4.06	.78	.42	5.22	<.001***				
Total Step 1						.21***	.21***	10.78	124
2.	--	--	--	--	--				
Race	-1.28	2.95	-.04	-.43	.67				
Family Income	-1.29	.82	-.13	-1.57	.12				
ODD Symptoms	2.69	.76	.28	3.53	.001**				
ADHD Symptoms	1.54	.31	.41	5.02	<.001***				
Total Step 2						.34***	.14***	25.19	123
3.	--	--	--	--	--				
Race	-1.40	2.90	-.04	-.48	.63				
Family Income	-1.14	.81	-.11	-1.41	.16				
ODD Symptoms	2.12	.78	.22	2.73	.007**				
ADHD Symptoms	1.66	.30	.44	5.47	<.001***				
SEQ-Participant	-.25	.10	-.20	-2.62	.01*				
SEQ-Friend	-.05	.10	-.04	-.54	.59				
Total Step 3						.38*	.04*	3.92	122
4.	--	--	--	--	--				
Race	-.63	2.91	-.02	-.22	.83				
Family Income	-.79	.82	-.08	-.97	.34				
ODD Symptoms	1.60	.81	.17	1.97	.051				
ADHD Symptoms	2.02	.35	.54	5.74	<.001***				
SEQ-Participant	-.35	.11	-.27	-3.11	.002**				
SEQ-Friend	-.01	.10	-.004	-.05	.96				
ADHD x SEQ-Participant	-.06	.03	-.20	-2.16	.03*				
ADHD x SEQ-Friend	<.001	.03	.001	.01	.99				
SEQ-Participant x SEQ-Friend	<.001	.01	-.001	-.02	.99				
ADHD x SEQ-Participant x SEQ-Friend	-.001	.002	-.06	-.67	.51				
Total Step 4						.42	.03	1.66	117

Note. Covariates included in analysis were coded in the following manner: race (0 = Caucasian; 1 = Non-Caucasian), gender (0 = male; 1 = female), family income (average annual income; 1=Less than \$23,000; 2=\$23,000-\$49,999; 3=\$50,000-\$99,999; 4=\$100,000-\$149,999; 5=\$150,000-\$249,999; 6=More than \$250,000), and total ODD symptoms. Outcome is depression symptoms as measured by the CESSD-R. * $p < 0.05$ (two-tailed). ** $p < 0.01$ (two-tailed). *** $p < 0.001$ (two-tailed).

Table 3.15 Hierarchical Multiple Regression for ADHD Symptoms, ICQ-Participant, and ICQ-Friend with Depression Symptoms as the Outcome

Step and Variable	B	SE	β	t	p-value	R ²	ΔR^2	F for ΔR^2	df
ICQ-Participant & ICQ-Friend									
1. (Covariates)	--	--	--	--	--	--	--	--	--
Race	2.67	2.71	.07	.98	.33				
ODD Symptoms	4.24	.73	.43	5.82	<.001***				
Age	-.02	2.08	-.002	-.01	.99				
Class Year	-.28	2.19	-.02	-.13	.90				
Closeness-Participant	-1.26	.90	-.12	-1.40	.16				
Closeness-Friend	.06	.87	.01	.07	.95				
Total Step 1						.19***	.19***	4.94	151
2.	--	--	--	--	--				
Race	.02	2.46	.001	.01	.99				
ODD Symptoms	2.83	.69	.29	4.09	<.001***				
Age	-.78	1.86	-.06	-.42	.68				
Class Year	.08	1.95	.01	.04	.97				
Closeness-Participant	-1.26	.80	-.12	-1.57	.12				
Closeness-Friend	.31	.78	.03	.40	.69				
ADHD Symptoms	1.60	.26	.44	6.21	<.001***				
Total Step 2						.33***	.16***	36.32	150
3.	--	--	--	--	--				
Race	1.48	2.41	.04	.62	.54				
ODD Symptoms	2.07	.72	.21	2.89	.004**				
Age	.25	1.82	.02	.14	.89				
Class Year	-1.04	1.92	-.08	-.54	.59				
Closeness-Participant	-.62	.80	-.06	-.78	.44				
Closeness-Friend	.45	.78	.04	.58	.56				
ADHD Symptoms	1.78	.26	.49	6.92	<.001***				
ICQ-Participant	-.14	.04	-.24	-3.40	.001**				
ICQ-Friend	-.01	.04	-.02	-.21	.84				
Total Step 3						.41***	.07***	8.26	148
4.	--	--	--	--	--				
Race	1.70	2.31	.05	.74	.46				
ODD Symptoms	1.92	.69	.19	2.78	.006**				
Age	.23	1.76	.02	.13	.90				
Class Year	-1.28	1.84	-.10	-.70	.49				
Closeness-Participant	-.02	.78	-.002	-.03	.98				
Closeness-Friend	.44	.77	.04	.58	.57				
ADHD Symptoms	2.06	.26	.57	2.99	<.001***				
ICQ-Participant	-.16	.04	-.27	-3.68	<.001***				
ICQ-Friend	.01	.04	.02	.32	.75				
ADHD x ICQ-Participant	-.03	.01	-.25	-3.56	.001**				
ADHD x ICQ-Friend	-.002	.01	-.02	-.22	.82				
ICQ-Participant x ICQ-Friend	-.002	.001	-.09	-1.22	.23				
ADHD x ICQ-Participant x ICQ-Friend	<.001	<.001	-.15	-1.65	.10				
Total Step 4						.48**	.07**	4.87	144

Note. Covariates included in analysis were coded in the following manner: race (0 = Caucasian; 1 = Non-Caucasian), total ODD symptoms, age (in years), class year, and relationship closeness reported by participant and by friend (1= not close at all; 10= extremely close). Outcome is depression symptoms as measured by the CESD-R. Outcome is depression symptoms as measured by the CESD-R. * $p < 0.05$ (two-tailed). ** $p < 0.01$ (two-tailed). *** $p < 0.001$ (two-tailed).

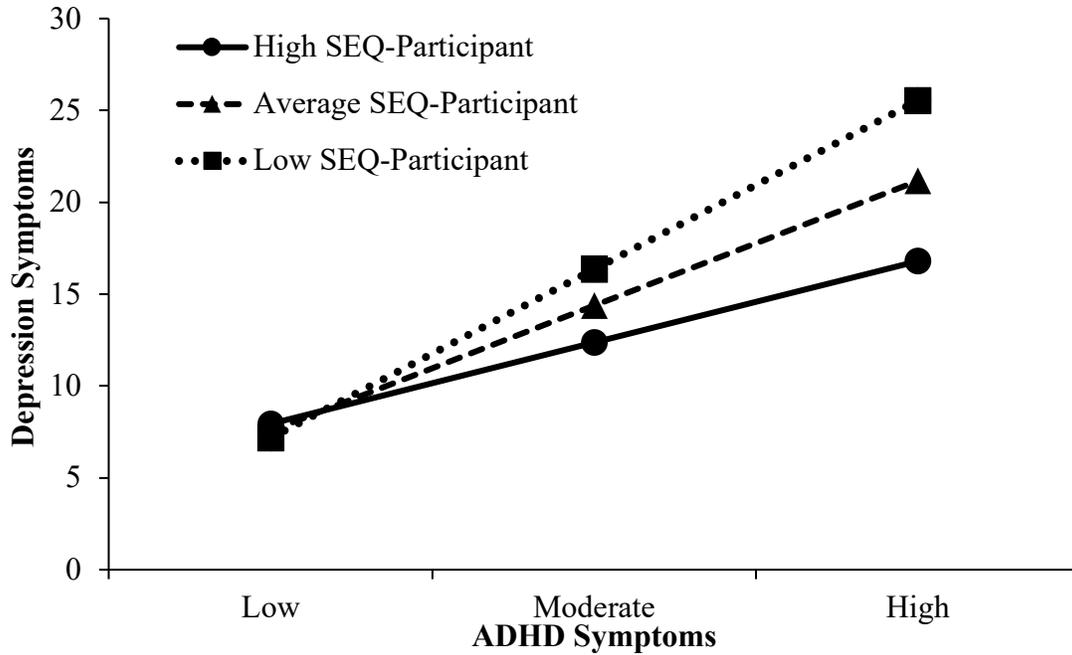


Figure 3.1 *Participant-reported social functioning as assessed by the SEQ moderates the relation between ADHD symptoms and depression symptoms.*

Note. The lines represent the effect of the interaction of ADHD symptoms and participant-rated social functioning (i.e., SEQ-Participant) on number of depression symptoms. The lines represent one standard deviation below the mean (1 SD Below), the mean, and one standard deviation above the mean (1 SD Above) for participant-rated social functioning as assessed by the SEQ, following the procedures outlined by Cohen et al. (2003). The simple slopes at the social functioning mean and one standard deviation above and one standard deviation below the mean were all statistically significant, $p < .001$.

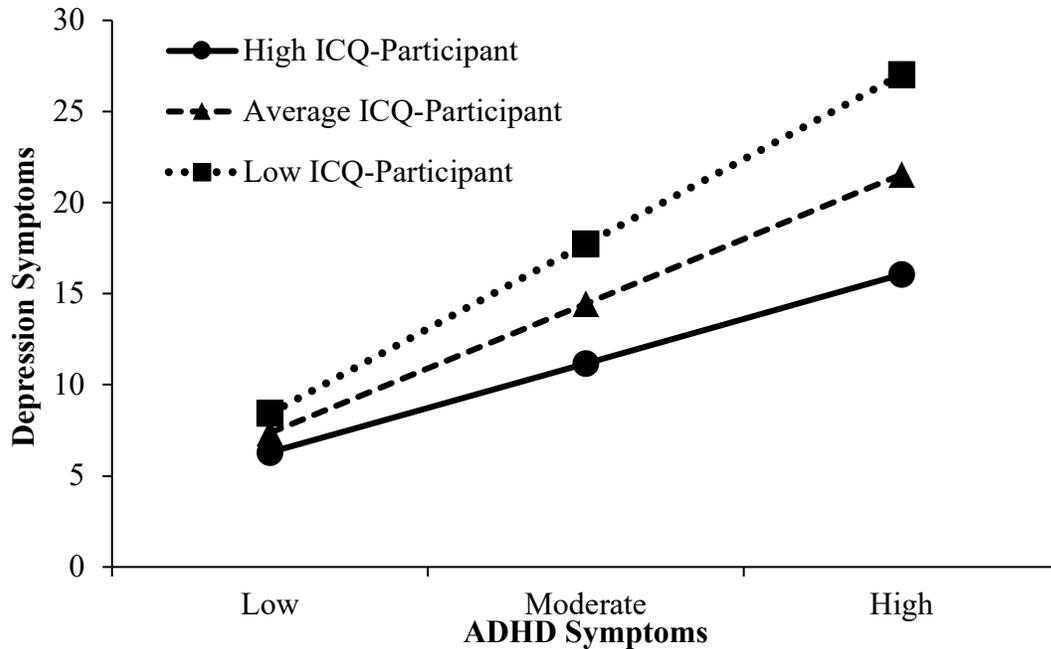


Figure 3.2 *Participant-reported social functioning as assessed by the ICQ moderates the relation between ADHD symptoms and depression symptoms.*

Note. The lines represent the effect of the interaction of ADHD symptoms and participant-rated social functioning (i.e., ICQ-Participant) on number of depression symptoms. The lines represent one standard deviation below the mean (1 SD Below), the mean, and one standard deviation above the mean (1 SD Above) for participant-rated social functioning as assessed by the ICQ, following the procedures outlined by Cohen et al. (2003). The simple slopes at the social functioning mean and one standard deviation above and one standard deviation below the mean were all statistically significant, $p < .001$.

CHAPTER 4

DISCUSSION

The present study examined the associations among ADHD symptoms, social functioning, and anxiety and depression symptoms in a sample of undergraduate students enrolled at a large traditional four-year southeastern university. Specifically, social functioning was examined as a potential moderator of the relation between ADHD symptoms and internalizing symptoms. Two social functioning measures, i.e., the SEQ and ICQ, were used so that multiple aspects of social functioning could be explored. The SEQ provides insight into the social and affective aspects of social functioning, such as empathy, sociability, emotion recognition, while the ICQ focuses on skills of interpersonal competence, such as managing interpersonal conflict, initiating relationships, and asserting displeasure with others. This study offers an important contribution to the existing literature by incorporating a multi-rater method, with self-reported and close friend-rated ADHD symptoms and social functioning, and self-reported internalizing symptoms in a college student population. Additionally, the sample is generalizable to a normative college population, with the exception of the sample being majority female. This study brings insight into the role of ADHD, social functioning, and internalizing symptoms in college students, especially female college students.

Primary Findings

Hypothesis 1 of the current study examined the association between ADHD symptoms and social functioning. Three of the four ways that this was examined did not indicate a significant association. Only friend-reported social functioning as assessed by the ICQ was significantly associated with ADHD symptoms, in that poor friend-reported social functioning was associated with increased ADHD symptoms, as expected. However, even this was a small to moderate sized association. Thus, hypothesis 1 was not considered to be supported. These findings are in stark contrast to previous studies that have found that college students with ADHD have poorer social skills, worse social functioning, and increased negative features in relationships (e.g., difficulty managing conflict, tendency for confrontation, less likely to be influenced by constructive feedback; Shaw-Zirt et al., 2005; Kern et al., 1999; McKee, 2014). Although previous findings support the significant association between ADHD and impairment in social functioning, there is previous research that is consistent with the current study's lack of significant association. Rabiner and colleagues (2008) found that undergraduates with and without an ADHD diagnosis did not differ significantly on levels of social dissatisfaction; as previously mentioned, this study only had four items measuring social dissatisfaction and did not assess other aspects of social functioning such as social skills and socio-emotional factors.

One potential explanation for the current study's findings could be that the SEQ and ICQ measures were not tapping into the aspects of social functioning that relate to ADHD symptoms. The SEQ and ICQ measures did not include items that may be directly associated with skills required for the organization/planning/execution of social events

and some other skills that may be beneficial in social interactions; some of these skills that could be helpful to interpersonal relationships are effectively attending to social conversations (i.e., attentively listening as others talk and using active listening skills), letting others speak without interrupting in a way that is perceived as rude or aversive, inhibiting impulsive responses in social conflict (e.g., when upset or angry, can still pause to think before speaking and impulsively saying something hurtful), organizing/making plans with friends ahead of time, remembering social events, arriving on time to social events, remembering to respond to friends' texts/phone calls in a timely manner, and remembering important information about friends. Perhaps these aforementioned skills may be more difficult for those with ADHD since they relate directly to specific ADHD symptoms. These difficulties may apply to individuals with ADHD symptoms, however the SEQ and ICQ did not assess these skills specifically, which would be helpful to do in future research and to include in future measures of social functioning in college students.

Another explanation could be that certain subscales (i.e., certain aspects of social functioning) are related to ADHD, while other aspects are not. Since the current study examined total scores and did not examine the individual subscales of social functioning of the SEQ (i.e., emotion recognition, empathy, social conformity, antisocial behavior, sociability) or of the ICQ (i.e., initiation, conflict management, negative assertion, disclosure, emotional support), it is unknown as to whether certain social skills or facets of social functioning may be more closely associated with ADHD than others. One other potential explanation could be that the current study utilized continuous ADHD symptoms, and perhaps social functioning would have been significantly associated with ADHD if it were assessed by diagnosis instead of a wide continuum of symptoms. Many

of the previous studies that found significant associations between ADHD and social functioning examined ADHD-diagnosed individuals, versus individuals who have varying, possibly subthreshold ADHD symptoms or no ADHD symptoms at all. It is possible that if the current study examined only those individuals with an ADHD diagnosis or those who meet criteria for an ADHD diagnosis, the results may be different. Lastly, the current study had a majority female sample, which may have influenced the relation between ADHD symptoms and social functioning; adult women have been found to have better social skills than men, so it is a potential that ADHD symptoms and social functioning would have been significantly associated with each other had the sample represented both genders equally or if the sample was majority male (Penny, Mueser, & North, 1995).

Hypothesis 2 examined the association between ADHD symptoms and internalizing symptoms, with anxiety and depression symptoms measured separately, and this hypothesis was supported. As expected, ADHD symptoms were significantly associated with increased anxiety symptoms and increased depression symptoms, which is consistent with previous literature (Angold & Costello, 1993; Angold, Costello, & Erklani, 1999; Costello, Egger, & Angold, 2004; Last, Hersen, Kazdin, Finkelstein, & Strauss, 1987; Pliszka, Carlson, & Swanson, 1999; Tannock, 2000). When predicting anxiety symptoms, the additional of ADHD symptoms accounted for an additional 7% to 9% of variance, and accounted for an additional 14% to 16% of variance when predicting depression symptoms. These results reiterate the importance of clinicians, university staff, parents, and college students themselves in recognizing the link between ADHD symptoms and internalizing issues among college students. It should be noted that there

the overlap in symptoms between ADHD and internalizing disorders (e.g., concentration difficulty, restlessness/fidgeting) could contribute to the association between ADHD and internalizing symptoms; however, as previously stated, studies have found this association between ADHD and internalizing symptoms is simply due to overlapping diagnostic criteria (Milberger et al, 1995; Biederman et al, 1995; Murphy & Tsuang, 1995).

It is especially important for clinicians to assess for and to integrate interventions for internalizing symptoms for individuals being treated for ADHD. Even for the general college population, college can be a stressful time during which many students feel increased internalizing symptoms, as one study found the prevalence of undergraduates being diagnosed or treated for anxiety or depression in the last 12 months was 9.2% and 8.3%, respectively, while 46.4% of students felt overwhelming anxiety and 28.4% felt so depressed that it was difficult to function (ACHA, 2011). Since college is already a period of increased stress for the general student population (Sax, 1997; ACHA, 2011), those individuals with ADHD who attend college may need even more supports and access to treatment than the general student population.

Multiple studies have found that individuals with higher ADHD symptoms had increased rates of anxiety and depression symptoms and/or diagnoses (Alexander & Harrison, 2013; Anastopolous & King, 2015; Kessler et al., 2006; Prevatt et al., 2015). College students experiencing ADHD symptoms “encounter unique challenges related to school and the college lifestyle, including difficulties with academics, social skills, adaptation to college, and relationships,” which may contribute to increased risk for internalizing symptoms (p. 1-2; Prevatt et al., 2015). Undergraduates diagnosed with

ADHD report more difficulty with specific study skills, such as time management, motivation, concentration, and test taking and study strategies, than those without ADHD, which can make succeeding academically more difficult (Reaser, Prevatt, Petscher, & Proctor, 2007). Adapting to the college lifestyle, which requires college students to be self-motivated to attend class, complete coursework, and study, and to live independently, may also prove to be more challenging for students with ADHD (Prevatt et al., 2015). With these difficulties in mind, it makes sense that college students with ADHD have been found to have lower grade point average (GPA), lower achievement success, poorer academic coping skills and strategies, withdraw from a greater number of courses, are more likely to be placed on academic probation, and take longer to complete degree programs than their counterparts without ADHD (Heiligenstein, Guenther, Levy, Savino, & Fulwiler, 1999; Barkley et al., 2008). Considering these difficulties and the potential for multiple failures, it is not surprising that college students with ADHD have increased internalizing symptoms because of these unique challenges (Prevatt et al., 2015). Safren and colleagues (2004) posited that these neuropsychiatric deficits that are characteristic of ADHD often result in a history of failure, underachievement, and relationship problems, and that chronic failure and underachievement propagate dysfunctional cognitive responses (e.g., “I can’t do it,”) which then consequently increase negative affect and mood disturbances (e.g., depression, anxiety, anger, guilt). The externalizing symptoms associated with ADHD may be more disruptive to others and may lead universities and clinicians to focus on targeting ADHD symptoms; however, the

internal difficulty with anxiety and/or depression may cause even more suffering to the individual with ADHD and the treatment of internalizing symptoms should not be overlooked.

Hypothesis 3 examined whether social functioning moderated the relation between ADHD symptoms and internalizing symptoms, with anxiety and depression measured separately. Hypothesis 3 was not supported for anxiety symptoms, however it was mostly supported for participant-reported social functioning moderating the relation between ADHD symptoms and depression symptoms. It was found that participant-reported social functioning as assessed by both the SEQ and ICQ moderated the relation between ADHD symptoms and depression symptoms when utilizing a traditional significance level (i.e., $p < .05$). However, it is important to note that only the ICQ moderation model survived the Bonferroni correction, which was necessary due to the high number of analyses being conducted. Thus, the SEQ moderation model can be considered not significant and not robust due to not surpassing the significance level specified by the Bonferroni correction. Perhaps with increased power the moderation effect could have been significant, but there is also a possibility that this finding was due to chance from conducting so many analyses. The ICQ moderation model can be considered strong and robust since it survived the Bonferroni correction. Specifically, it was found that individuals with higher ADHD symptoms and poor self-reported social functioning as assessed by the ICQ had the most depression symptoms, which was consistent with hypotheses. These results are consistent with previous research, which also found significant associations among ADHD, social functioning, and depression (Becker et al., 2013; Blackman et al., 2005; Karustis et al., 2000). However, it is

important to note that the SEQ-Participant interaction and ICQ-Participant interaction each added in the fourth respective step of the regression model both accounted for 2% of additional variance, despite ICQ-Participant interaction surviving the Bonferroni correction and the SEQ-Participant not surviving. Clinically, it may make more sense to note that both SEQ-Participant and ICQ-Participant accounted for roughly equal amounts of variance when predicting depression symptoms, and therefore both social-emotional aspects and interpersonal effectiveness aspects of social functioning are important to consider clinically.

The current study's findings bolster the conclusion of Blackman and colleagues (2005) that social impairment may play a critical role in the relation between ADHD and depression. This speaks to the importance of assessing social functioning when assessing and treating undergraduates with ADHD symptoms and depression symptoms. Perhaps one method of decreasing the association between ADHD and depression in undergraduates could be through increasing social functioning, which may include more social skills training, social problem solving, and increasing prosocial qualities in relationships. Although future research would need to assess this, it seems that improving social functioning, specifically the concrete interpersonal communication skills assessed by the ICQ, may act as a buffer to prevent or decrease depression symptoms for those with increased ADHD symptoms. However, the current study utilized cross sectional data, so it is important to note that it is also possible that difficulties in social functioning could also occur as a result of depression symptoms, not just as a precursor to or moderator of depression symptoms, for individuals with ADHD symptoms. For example, one of the main criteria for depression is loss of interest in usual activities, which often

can include loss of interest in socializing and therefore can cause impairments in social functioning (APA, 2013). Longitudinal data collection could help clarify the direction and nature of this association between ADHD, social functioning, and depression. Additionally, it is important to note that depression symptoms could cause a cognitive bias shift causing participants to report an overly negative view of their social functioning relative to their friends' reports (APA, 2013); this would mean that participants with depressive symptoms could possibly report more social impairment than is actually objectively present in reality.

However, the moderating effect of friend-reported social functioning on the relation between ADHD symptoms and depression symptoms was not significant, which was contrary to hypotheses. This is especially surprising for the friend-reported SEQ since it was not significantly different from participant-reported SEQ. The friend-reported ICQ was significantly higher than participants' self-reported ICQ, meaning that the friends' report of participants' social functioning was more positive/better than participants themselves. It is possible that the friends' more favorable view of the participants' social functioning as assessed by the ICQ caused this lack of moderation effect. It is also possible that certain aspects of friend-reported social functioning (i.e., subscales of the ICQ or SEQ) are more impactful than the total score, and could possibly have a moderating effect when isolated.

Social functioning as measured by the SEQ did not moderate the relation between ADHD symptoms and anxiety symptoms as expected. This is inconsistent with previous research that had found significant associations among ADHD, social functioning, anxiety symptoms (Karustis et al., 2000). Becker and colleagues (2014) did find similar

results to the current study, in that a comorbid depression diagnosis, but not a comorbid anxiety diagnosis, was significantly associated with lower parent-reported social functioning in 10- to 14-year-old ADHD-diagnosed youth. However, Becker and colleagues (2014) also found that anhedonia and social anxiety symptoms were associated with lower youth-reported social skills, and lower youth- and parent-reported social acceptance. Perhaps various aspects of social functioning and social skills (i.e., certain subscales) do moderate the relation between ADHD and certain types of anxiety (i.e., social anxiety subscale), as opposed to the total social functioning/total social skills or total anxiety symptoms. Perhaps the social anxiety subscale (instead of a total anxiety symptoms) would yield a moderating effect of social functioning on anxiety. Additionally, the current study's lack of findings could be due to the fact that the sample had a relatively high mean for anxiety, which could have obfuscated the relations among ADHD, social functioning, and anxiety.

Exploratory Analyses

Dependent means t-tests comparing participant and friend reports.

Exploratory analyses were conducted in order to determine whether participant reports of ADHD symptoms, social functioning, and descriptive information on the friendship differed from friend reports. These exploratory analyses found that participants' self-reported ADHD symptoms were significantly higher than friend-reported ADHD symptoms of the participants. One explanation for this could be that hyperactivity/impulsivity symptoms of ADHD, which are more externalized and observable behaviors, tend to decrease at a higher rate than inattention symptoms over time and into adulthood (Martel, Von Eye, Nigg, 2012; Biederman, Mick, & Faraone,

2000). Additionally, for adolescents and adults with ADHD symptoms, hyperactivity symptoms may be limited to subjective feelings of restlessness (APA, 2013; Weyandt et al., 2003). It has been found that adults with ADHD commonly report having mental restlessness (Weyandt et al., 2003). Conners, Erhard, Epstein, Parker, Sitarenios, and Sparrow (1999) conducted a large-scale study in adults using self-rated symptoms of ADHD, and factor analyses found that the hyperactivity/restlessness factor primarily consisted of items related not to hypermotility (as found in children with ADHD) but rather items related to “inner restlessness” (p. 148) or cognitive and physical restlessness. Weyandt and colleagues (2003) examined mental restlessness in college students specifically, and found that those with ADHD reported significantly higher ratings of internal restlessness than those without ADHD. Thus, it is possible that friends of participants reported less ADHD symptoms than participants self-reported due to participants experiencing more internal, mental restlessness rather than more externalized symptoms of ADHD that may be more easily observed by others.

Participant and friend reports of social functioning. Participant-reported and friend-reported social functioning as assessed by the SEQ did not differ, suggesting that participants and their friends had similar scores on the SEQ. However, the friends’ reports of the participants’ social functioning as assessed by the ICQ were significantly higher (i.e., better) than the participants’ self-report of their own social functioning. Both of these results are somewhat surprising, since much of the previous research has found that individuals with ADHD tend to overestimate their competence in various areas of functioning, including social functioning. Children with ADHD have been found to self-report more competence in social functioning than is reported by parents and teachers,

with this self-reported overestimation of skills being termed the positive illusory bias (Hoza et al., 2004; Hoza, Pelham, Dobbs, Owens, & Pillow, 2002). Although most of the previous research on positive illusory bias and ADHD has been examined in children and adolescents, Prevatt, Proctor, Best, Baker, Van Walker, and Taylor (2012) found that in a sample of college students specifically, those students with ADHD were more likely to overestimate their competence (i.e., engage in positive illusory bias) on driving and work ratings than those without ADHD; although this study did not assess social functioning specifically, their results suggest that college students with ADHD may be susceptible to the positive illusory bias.

Although the positive illusory bias has been found to be present in individuals with ADHD in previous research, some research has found results inconsistent with this as well. Friedman and colleagues (2003) found that adults with ADHD rated themselves as having significantly less social and emotional competence than controls without ADHD; it was also found that even though adults with ADHD used more words to describe emotionally intense film scenes and rated the scenes as more emotionally intense than controls, they used significantly fewer emotion-related words than did controls. These results from self-report and performance measures suggest that adults with ADHD may be less able to accurately recognize the emotions of others and communicate the nature of their emotions (Friedman et al., 2003).

Since previous research examining the differences between self- and other-reports in individuals with ADHD seems to find conflicting results, and especially since this has not been examined much in the college student population, it would be beneficial for future research to explore this area further. Future research should include both self- and

other-ratings as well as directly observable performance measures with objective data on social functioning to determine what, if any, discrepancies exist between self-report, other-report, and actual objective data of social functioning of undergraduates with ADHD.

It is unclear as to why participants' and friends' reports differed on the ICQ but not the SEQ. One possible explanation could be that the SEQ and ICQ tap into different aspects of social functioning; specifically, the SEQ assesses social and affective aspects of social functioning (i.e., emotion recognition, empathy, social conformity, antisocial behavior, and sociability), while the ICQ assesses interpersonal competence skills (i.e., initiating relationships, disclosing personal information, asserting displeasure with others, providing emotional support and advice, and managing interpersonal conflict). One explanation as to why participants self-reported significantly lower social functioning than did the friends on the ICQ could be that participants had more negative views of their own interpersonal skills/competency. For the current study's participant sample, 31.4% (i.e., 61 out of 179 participants) had depression scores that were above average. A core symptom of depression is feelings of worthlessness or excessive or inappropriate guilt; since approximately one-third of the participant sample had above average depression symptoms, it is possible that there were many participants who have feelings of worthlessness and guilt, which may include feelings of ineffectiveness in regards to their social functioning and peer relationships (APA, 2013).

Participant and friend reports of relationship closeness and nature of the relationship. Although no specific hypotheses were made regarding the participant and friend reports of relationship closeness and the nature of the relationship, examining these

factors provides insight into the friendships of the sample. It appears that the participants and friends had very similar ratings on both relationship closeness and nature of the relationship. Participants and friends did not differ in their ratings of relationship closeness, suggesting the participants and friends had similar perspectives on how close they felt to each other. The sample appears to have high ratings of closeness, with participant and friend mean ratings of 8.50 and 8.60 out of 10, respectively, where 10 is “extremely close,” suggesting that the current study is representative of dyads in which the two individuals are very close friends. For nature of the relationship, an overwhelming majority of participants and friend raters classified the other as either a good friend or one of their best/closest friends. It seems that the sample is composed of dyads in the individuals consider the other to be someone who is within their close friend group. With the majority of the relationship closeness rated so high and nature of the relationship rated as being good or best friends, it suggests that the current study’s sample is comprised mostly of friend raters who actually are close friends of the participant. With the close friend raters being close friends of the participants in reality, it seems that these close friend raters in the sample have sufficient insight into and knowledge of the social behaviors and social functioning of the participants.

Interaction among ADHD symptoms and participant-reported and friend-reported social functioning. Exploratory analyses also examined participant-reported and friend-reported social functioning within the same regression model to determine the nature of the interaction between participant and friend report, and its effect on the relation between ADHD symptoms and internalizing symptoms. Perhaps the more important factor in exacerbating the link between ADHD symptoms and anxiety

symptoms is the worsened participant-reported interpersonal competence and social skills measured by the ICQ, as opposed to the more social and affective aspects of social functioning measured by the SEQ. The ICQ's items assessing interpersonal competency (i.e., assertiveness, initiation of socializing, and management of conflict) could possibly be more closely linked to anxiety than the social functioning components measured by the SEQ. Poorer social functioning measured by the ICQ was significantly associated with increased anxiety symptoms, however social functioning measured by the SEQ was not significantly associated with anxiety. When both participant and friend report of social functioning measured by the ICQ were included in the same model, it was clear that participant-reported social functioning predicted increased anxiety symptoms. Clinically, this suggests that it is very important for interventions for undergraduates to include self-report of presenting concerns, as relying on reports from other raters may not give the full picture that includes the individual's own perceptions.

ODD Symptoms and Gender. Although not a main analysis of the study, the associations among ODD symptoms, gender, ADHD symptoms, social functioning, and internalizing symptoms were examined and are notable.

ODD Symptoms. Increased ODD symptoms were significantly correlated with increased ADHD symptoms, increased anxiety and depression symptoms, and lower (i.e., poorer) social functioning by participant and friend report for both ICQ and SEQ. Additionally, ODD symptoms significantly predicted increased anxiety and depression symptoms in all moderation models. It appears that in the current study's sample, ODD symptoms are more closely associated with social functioning than ADHD symptoms are and has an influence on internalizing symptoms similar to that of ADHD symptoms.

While the effects of other covariates (e.g., age, race, household income) are negligible, ODD symptoms stands out as a factor that is strongly associated with ADHD, social functioning, anxiety, and depression.

It is not surprising that ODD symptoms are associated with poor social functioning, as high emotional reactivity and interpersonal sensitivity are core features of ODD (APA, 2013; Scholtens, Diamantopoulou, Tillman, & Rydell, 2012). Additionally, multiple ODD symptoms relate directly to social interactions (e.g., “is easily annoyed by others,” “is spiteful and vindictive,” “blames others for mistakes,” “deliberately annoys or upsets people”), which would therefore affect social functioning (APA, 2013; Scholtens et al., 2012). In addition to exhibiting symptoms that may adversely affect social interactions, individuals with ODD symptoms may also have deficient social problem-solving skills. In an experimental study in which 7- to 12-year-old boys with ODD or conduct disorder (CD) alone, those with ADHD alone, or those with ADHD and ODD/CD were presented video of problematic social situations and were asked to elicit response indicative of social problem solving skills; it was found that both boys with ODD/CD, with ADHD, and with ADHD plus ODD/CD all encoded fewer social cues and generated fewer responses than typical controls, however those with ODD/CD alone or with ADHD plus ODD/CD chose aggressive responses more often and also felt significantly more confident in their ability to carry out this aggressive response (Matthys, Cuperus, & Van Engeland, 1999). Matthys and colleagues (1999) noted that it is important to differentiate between youth with ADHD alone and those with ODD/CD alone or those with ADHD and ODD/CD since those with ADHD were only affected in encoding of and in response generation, while those with ODD/CD or ADHD plus

ODD/CD were affected throughout the entire social problem-solving process. With deficiencies in social problem-solving skills and with core symptoms that adversely impact social interactions, it makes sense that previous research has found that youth with an ODD diagnosis are more likely to be rejected by peers, receive negative peer nominations, and have impaired interpersonal relationships (Burke, Loeber, & Birmaher, 2002).

These findings suggest that it would be important to assess for ODD symptoms when assessing for ADHD symptoms, social functioning, and internalizing symptoms, since ODD symptoms seems to be closely linked to them all. While much of the previous research on ODD has focused on those with diagnoses, it seems that the current study's findings, which used continuous symptoms of ODD, still suggests that ODD is associated with increased ADHD and internalizing symptoms and poorer social functioning. Assessing ODD symptoms, even when at subthreshold levels, could lead to identification of problem areas for college students. Through treatment, individuals with ODD symptoms could learn strategies to manage and decrease symptoms of ODD in the hopes of having a positive effect on social functioning and internalizing symptoms. Since ODD symptoms seemed to be associated with social functioning and internalizing symptoms either as much as or more so than ADHD symptoms, it is important that future research explore ODD's associations in this young adult college student population.

Gender. Exploring gender was also not a main analysis of the current study, however it is notable that being female was significantly associated with increased anxiety symptoms, which is consistent with previous literature (APA, 2013). Anxiety was actually the only variable that was significantly associated with gender in the current

study. The current study had a majority female sample, so it is uncertain as to whether gender's effect on anxiety is so influential due to the sample being overwhelmingly female or due to an actual observed effect. It is possible that the same effects would not be observed if the sample were majority male or an equal number of male and female. While it is important to keep this in mind, due to previous literature's findings of the same relation between gender and anxiety, it is likely that being female truly was associated with increased anxiety symptoms. It will be important for future research examining the undergraduate student population to include larger numbers of males in their samples so that the possible differences between genders can be ascertained with even more certainty. Additionally, since females are more likely to present with primarily inattentive symptoms than males, differences in ADHD subtypes should also be explored (APA, 2013). Mostly importantly, clinicians and universities should be aware of this increased risk for anxiety symptoms for females, especially for those females who have other risk factors for anxiety, such as ADHD or poor social functioning. Ensuring that these female college students are identified and receive proper treatment will be of utmost importance.

Strengths of the Current Study

The current study is one of the first of its kind. While previous studies have relied on only one rater, the current study used data from participant and close friend reports. This allowed for examination of patterns of behaviors both from participants' self-reported perspective and from the perspective of a close friend.

The methodology of the study was designed in a way to standardize procedures across participants and to minimize bias and confounding effects. Additionally, potentially biased data was excluded from data analyses (e.g., excluding romantic partners and family members; participants could not also be a close friend rater for another participant).

The sample used in the current study allows for more generalizability than previous studies. While many studies often lack variety in their participant pool, the current study's sample was diverse in SES and undergraduate class year, and the race/ethnicity makeup of participants was similar to that of the university. The sample is generalizable to a normative college population, with the exception of being majority female.

The current study also examined continuous ADHD symptoms instead of an ADHD diagnosis status (i.e., at least 6 symptoms of inattention or hyperactivity/impulsivity). Having participants with a range of ADHD symptoms represented in the sample allow for more specificity and takes into account individuals who may be experiencing subthreshold ADHD symptoms, which would have been lost if ADHD diagnosis alone was used.

Social functioning was assessed via two different measures in the current study. While the SEQ assessed more social and affective aspects of social functioning, the ICQ assessed interpersonal competence and social skills. Having both of these measures

included in the study allowed for a more thorough assessment and understanding of social functioning and how it may relate to ADHD symptoms and internalizing symptoms.

Limitations and Future Directions

While this study has many strengths and is possibly the first of its kind to be conducted, it also has several limitations that should be acknowledged, and future research could expand upon these limitations. The current study did not use longitudinal data. Given the cross-sectional nature of the design, conclusions are limited regarding the direction of the relations among ADHD, social functioning, and internalizing symptoms. A longitudinal design could clarify the causal pathway direction for social functioning and internalizing symptoms, which would be important to prevention and treatment of these issues.

Although the measures were initially intended to be presented in a randomized order, the researchers decided to present the measures in a standardized specific order since certain measures needed to be prioritized over others in case participants stopped before the data collection was completed; for example, if a participant discontinued the survey prematurely, it would be most helpful to have demographic information and ADHD symptoms, so these measures were collected first. Future analyses could examine whether ADHD symptoms predicted premature discontinuation of the survey.

Anxiety symptoms were assessed by the self-reported SCAARED measure. One potential reason why the social functioning measures did not moderate the relation between ADHD symptoms and anxiety symptoms as expected (i.e., the two-way

interactions moderation models) could be that the current study's population seemed to have a relatively high average for anxiety symptoms ($M = 29.06$, $SD = 20.13$). One study that explored the psychometrics of the SCARED (i.e., the child and adolescent version of the SCAARED) found that "anxiety cases" had an average total score of 26.76 ($SD = 14.68$) and "nonanxiety cases" had an average score of 17.24 ($SD = 12.06$) (Birmaher, Brent, Chiapetta, Bridge, Monga, & Baugher, 1999). The current study's average anxiety score on the SCAARED is higher than the average of just the "anxiety cases" in the study by Birmaher and colleagues (1999); this suggests that the current study's participants may have more anxiety than other samples. If the participants in the current study had more anxiety symptoms in general, there may not be as much variation in anxiety scores to see a significant effect of social functioning. Although it falls outside the scope of the current study's focus, it would be beneficial to examine social phobia symptoms specifically from the SCAARED. Examining social phobia symptoms specifically could reveal whether social functioning relates more to social-related anxiety versus a general total score of anxiety symptoms that encompasses multiple types of anxiety (i.e., panic disorder, somatic symptoms, generalized anxiety, separation anxiety, social anxiety).

The current paper only examined the total continuous scores of overall social functioning. However, future analyses could assess the various subscales of the SEQ and the ICQ to determine which aspects of social functioning and interpersonal competence skills have the most influence on ADHD symptoms and internalizing symptoms.

The current study excluded family members or romantic partners, however, future research could examine the relations among ADHD, social functioning, and internalizing

symptoms may differ based on whether social functioning differs within romantic relationships, familial relationships, and platonic relationships.

The current study only focused on undergraduate students. Future research is needed to examine the relation between ADHD, social functioning, and internalizing symptoms in other age groups. Specifically, it would be beneficial to investigate the current study's research questions in other age groups, such as middle school and high school-aged students. Adolescence is a critical period in youths' well-being and social development, and teens with more negative interactions in friendships have higher levels of social anxiety and depression (La Greca & Harrison, 2005). Examining the effects of ADHD, social functioning, and internalizing disorders in this age group could yield better prevention and treatment options for adolescents with ADHD. Additionally, since many individuals with ADHD experience symptoms throughout the lifespan, it would be beneficial for future research to examine the ADHD symptoms, social functioning, and internalizing symptoms in general adult populations as well.

Additionally, the current study recruited from the general community, and while some of the participants had existing diagnoses of ADHD, future research could examine these variables within clinical populations since results may differ between clinical (i.e., ADHD-diagnosed participants) and general community samples.

Although efforts were made to recruit a diverse sample with equal representation of class year and gender, the sample was inadvertently a female majority (82.7% female). This majority female sample may limit generalizability of the findings to the male population. It is possible that the results may differ if the same relations were examined

among equal number males and females. A sample with a larger number of males may have yielded different results, especially for anxiety, since females tend to have higher levels of anxiety than males (APA, 2013). Future research should aim to recruit additional males so that males and females can be equally represented in the sample. Although it is outside of the scope of the current paper, future research could also compare moderation analyses between males and females to explore potential gender differences.

The sample collected may have also been biased or affected by the recruitment method of the study, specifically the description of the study. Per the USC IRB's directive, the study advertised that its purpose was to examine social behaviors of college students and whether these behaviors were related to factors "such as emotions, attention, or other concerns." By explicitly stating the study would be assessing emotions and attention, this may have either drawn more people with difficulty with emotions and/or attention, or could have caused an aversion to individuals with difficulty with emotions and/or attention who then consequently avoid participating in the survey. While changing the study's description is not possible due to ethical guidelines outlined by the USC IRB, it is important to note that the type of individuals that were attracted to or distanced from the survey may have been affected by the way in which the study was described in advertisements.

Finally, another limitation is that the current study conducted multiple analyses. Conducting multiple analyses increases the chances of potentially having a type 1 error (i.e., the rejection of a true null hypothesis or a "false positive"). Due to conducting so many analyses, a Bonferroni correction was used, which can be limiting since the

significance level was decreased so much. It is possible that additional results with small effects could have been found if there had been increased power, with possibly a larger sample size and/or fewer analyses.

Implications

The current study reiterated the importance of monitoring college students with ADHD symptoms for internalizing symptoms, since they are at a greater risk of experiencing them compared to college students without ADHD symptoms. Since individuals with the hyperactive/impulsive symptoms of ADHD are usually seen as being “on the go,” and do not fit the typical withdrawn symptoms or “low energy” profile of depression, these findings are of great importance. These individuals could be easily overlooked in regard to internalizing symptoms, but screening these students for anxiety and depression would be beneficial and lead to more effective treatment. Specifically, those individuals with high ADHD symptoms and poor social function appear to be at the biggest risk for depression symptoms; it may be especially helpful to these individuals to have treatment incorporate the improvement of social functioning, as this may decrease depression symptoms as well.

Females are also at a greater risk for anxiety symptoms compared to males, which is consistent with previous literature. Identifying ADHD symptoms and internalizing symptoms, both at subthreshold symptoms and clinical levels, earlier would greatly improve the well-being and outcomes of these individuals. Without this knowledge and early identification, these students would most likely experience increasing ADHD and

internalizing symptoms throughout their college years and possibly well into adulthood, and may suffer from the resulting impairment that both ADHD and internalizing issues can cause.

Hopefully the findings of this study can assist both clinicians and university staff in delivering more effective services to undergraduates with ADHD symptoms. In the future, it would be beneficial for other studies to expand upon the research of the current study to continue exploring the relations among ADHD symptoms, social functioning, and anxiety and depression symptoms, in an effort to continually strive for more effective assessment, identification, and treatment interventions for individuals experiencing these concerns.

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APPENDIX A

MEASURES

Current Symptoms Scale – Self-Report Form

Instructions: Please select the number next to each item that best describes your behavior *during the past 6 months*, where:

0 = Never or rarely

1 = Sometimes

2 = Often

3 = Very Often

1. Fail to give close attention to details or make careless mistakes in my work
2. Fidget with hands or feet or squirm in seat
3. Have difficulty sustaining my attention in tasks or fun activities
4. Leave my seat in situations in which seating is expected
5. Don't listen when spoken to directly
6. Feel restless
7. Don't follow through on instructions and fail to finish work
8. Have difficulty engaging in leisure activities or doing fun things quietly
9. Have difficulty organizing tasks or activities
10. Feel "on the go" or "driven by a motor"

11. Avoid, dislike, or am reluctant to engage in work that requires sustained mental effort
12. Talk excessively
13. Lose things necessary for tasks or activities
14. Blur out answers before questions have been completed
15. Am easily distracted
16. Have difficulty awaiting turn
17. Am forgetful in daily activities
18. Interrupt or intrude on others

How old were you when these problems with attention, impulsiveness, or hyperactivity first began to occur? _____ years old

Instructions: Again, please select the number next to each item that best describes your behavior *during the past 6 months*, where:

0 = Never or rarely

1 = Sometimes

2 = Often

3 = Very Often

1. Lose temper
2. Argue
3. Actively defy or refuse to comply with requests or rules

4. Deliberately annoy people
 5. Blame others for my mistakes or misbehavior
 6. Am touchy or easily annoyed by others
 7. Am angry or resentful
 8. Am spiteful or vindictive
-

Current Symptoms Scale – Other Report Form

Instructions: Please rate the person named above (i.e., your friend) by selecting the number next to each item that best describes this person's behavior *during the past 6 months*, where:

0 = Never or rarely

1 = Sometimes

2 = Often

3 = Very Often

1. Fails to give close attention to details or make careless mistakes in his/her work
2. Fidgets with hands or feet or squirms in seat
3. Has difficulty sustaining his/her attention in tasks or fun activities
4. Leaves his/her seat in situations in which seating is expected
5. Doesn't listen when spoken to directly
6. Seems restless
7. Doesn't follow through on instructions and fails to finish work

8. Has difficulty engaging in leisure activities or doing fun things quietly
9. Has difficulty organizing tasks or activities
10. Seems to be “on the go” or “driven by a motor”
11. Avoids, dislikes, or is reluctant to engage in work that requires sustained mental effort
12. Talks excessively
13. Loses things necessary for tasks or activities
14. Blurts out answers before questions have been completed
15. Is easily distracted
16. Has difficulty awaiting turn
17. Is forgetful in daily activities
18. Interrupts or intrudes on others
19. If you indicated that this person experienced any of the problems above, at what age did these problems develop? At approximately ____ years old

Social-Emotional Questionnaire – Participant Version (SEQ-Participant)

Please say how much you agree or disagree with the following statements. You can strongly agree, slightly agree, be in between, slightly disagree or strongly disagree. Please select the number to the right of the question.

1	2	3	4	5
Strongly disagree	Slightly disagree	In between	Slightly agree	Strongly agree

1. I express my feelings appropriately in public
2. I avoid arguments
3. When others are afraid, I reassure them
4. I speak my mind
5. I notice when other people are happy
6. I am critical of others
7. I am amusing
8. I notice when other people are frightened
9. When others are happy, I am pleased for them
10. I am not aggressive
11. I co-operate with others
12. I notice when other people are disgusted
13. I am impatient with other people
14. I am apologetic
15. When others are angry, I calm them down
16. I am confident meeting new people
17. I have difficulties making and keeping close relationships
18. I notice when other people are sad
19. I am sociable
20. When others are disgusted, I am appalled for them
21. I take a long time to make decisions
22. I do what I want to and do not care what others think

23. I notice when other people are angry
24. I do things without thinking
25. I have good manners
26. I am close to my family
27. I let someone know if I find them attractive
28. I keep in touch with old friends
29. I prefer being alone than with others
30. When others are sad, I comfort them

SEQ subscale items with factor loadings:

Emotion Recognition: 5, 8, 12, 18, 23

Empathy: 3, 9, 15, 20, 30

Social Conformity: 11, 14, 25

Antisocial Behavior: 2, 6(R), 13, 24

Sociability: 4(R), 16, 17(R), 19, 21, 27(R), 29

- **Emotion Recognition subscale** = items assess participants' perceived ability to recognize emotions in others.
- **Empathy subscale** = items assess empathic responsiveness, or the extent to which participants understand and feel the emotions felt by others.
- **Social Conformity subscale** = items assess the extent to which the participant follows social conventions that are associated with positive social behaviors.

- **Antisocial Behavior subscale** = items assess negative social behaviors, such as being critical of others, being impatient, or lacking thoughtfulness.
 - **Sociability subscale** = items assess participants' degree of self-confidence in social situations.
-

Social-Emotional Questionnaire – Informant Version (SEQ-Friend)

Please say how much you agree or disagree with the following statements. You can strongly agree, slightly agree, be in between, slightly disagree or strongly disagree. Please select the number to the right of the question.

1	2	3	4	5
Strongly disagree	Slightly disagree	In between	Slightly agree	Strongly agree

1. He/she expresses their feelings appropriately in public
2. He/she avoids arguments
3. When others are afraid, he/she reassures them
4. He/she speaks their mind
5. He/she notices when other people are happy
6. He/she is critical of others
7. He/she is amusing
8. He/she notices when other people are frightened

9. When others are happy, he/she is pleased for them
 10. He/she is not aggressive
 11. He/she co-operates with others
 12. He/she notices when other people are disgusted
 13. He/she is impatient with other people
 14. He/she is apologetic
 15. When others are angry, he/she calms them down
 16. He/she is confident meeting new people
 17. He/she has difficulties making and keeping close relationships
 18. He/she notices when other people are sad
 19. He/she is sociable
 20. When others are disgusted, he/she is appalled for them
 21. He/she takes a long time to make decisions
 22. He/she does what they wants to and does not care what others think
 23. He/she notices when other people are angry
 24. He/she does things without thinking
 25. He/she has good manners
 26. He/she is close to their family
 27. He/she lets someone know if he/she finds them attractive
 28. He/she keeps in touch with old friends^[SEP]
 29. He/she prefers being alone than with others^[SEP]
 30. When others are sad, he/she comforts them
-

Interpersonal Competency Questionnaire - Participant Version (ICQ-Participant)

Instructions: Indicate your level of competence and comfort in handling each type of situation, using a 5-point rating scale, where:

1 = "I'm poor at this; I'd feel so uncomfortable and unable to handle this situation, I'd avoid it if possible";

2 = "I'm only fair at this; I'd feel uncomfortable and would have lots of difficulty handling this situation";

3 = "I'm OK at this; I'd feel somewhat uncomfortable and have some difficulty handling this situation";

4 = "I'm good at this; I'd feel quite comfortable and able to handle this situation";

5 = "I'm EXTREMELY good at this; I'd feel very comfortable and could hand this situation very well"

1. Asking or suggesting to someone new that you get together and do something, e.g., go out together.
2. Telling a companion you don't like a certain way he or she has been treating you.
3. Revealing something intimate about yourself while talking with someone you're just getting to know.
4. Helping a close companion work through his or her thoughts and feelings about a major life decision, e.g., a career choice.
5. Being able to admit that you might be wrong when a disagreement with a close companion begins to build into a serious fight.

6. Finding and suggesting things to do with new people whom you find interesting and attractive.
7. Saying “no” when a date/acquaintance asks you to do something you don’t want to do.
8. Confiding in a new friend/date and letting him or her see your softer, more sensitive side.
9. Being able to patiently and sensitively listen to a companion “let off steam” about outside problems s/he is having.
10. Being able to put begrudging (resentful) feeling aside when having a fight with a close companion.
11. Carrying on conversations with someone new whom you think you might like to get to know.
12. Turning down a request by a companion that is unreasonable.
13. Telling a close companion things about yourself that you’re ashamed of.
14. Helping a close companion get to the heart of a problem s/he is experiencing.
15. When having a conflict with a close companion, really listening to his or her complaints and not trying to “read” his/her mind.
16. Being an interesting and enjoyable person to be with when first getting to know people.
17. Standing up for your rights when a companion is neglecting you or being inconsiderate.
18. Letting a new companion get to know the “real you.”
19. Helping a close companion cope with family or roommate problems.

20. Being able to take a companion's perspective in a fight and really understand his or her point of view.
21. Introducing yourself to someone you might like to get to know (or date).
22. Telling a date/acquaintance that he or she is doing something that embarrasses you.
23. Letting down your protective "outer shell" and trusting a close companion.
24. Being a good and sensitive listener for a companion who is upset.
25. Refraining from saying things that might cause a disagreement to build into a big fight.
26. Calling (on the phone) a new date/acquaintance to set up a time to get together and do something.
27. Confronting your close companion when he or she has broken a promise.
28. Telling a close companion about the things that secretly make you feel anxious or afraid.
29. Being able to say and do things to support a close companion when s/he is feeling down.
30. Being able to work through a specific problem with a companion without resorting to global accusations ("you always do that").
31. Presenting good first impressions to people you might like to become friends with (or date).
32. Telling a companion that he or she has done something to hurt your feelings.
33. Telling a close companion how much you appreciate and care for him or her.
34. Being able to show genuine empathetic concern even when a companion's problem is uninteresting to you.

35. When angry with a companion, being able to accept and s/he has a valid point of view even if you don't agree with that view.
36. Going to parties or gatherings where you don't know people well in order to start up new relationships.
37. Telling a date/acquaintance that he or she has done something that made you angry.
38. Knowing how to move a conversation with a date/acquaintance beyond superficial talk to really get to know each other.
39. When a close companion needs help and support, being able to give advice in ways that are well received.
40. Not exploding at a close companion (even when it is justified) in order to avoid a damaging conflict.

5 Subscales of ICQ:

Initiation: 1, 6, 11, 16, 21, 26, 31, 36

Negative Assertion: 2, 7, 12, 17, 22, 27, 32, 37

Disclosure: 3, 8, 13, 18, 23, 28, 33, 38

Emotional Support: 4, 9, 14, 19, 24, 29, 34, 39

Conflict Management: 5, 10, 15, 20, 25, 30, 35, 40

Interpersonal Competency Questionnaire (ICQ) – Informant Version (ICQ-Friend)*

**Note: This was adapted from self-report to informant version by Danielle Willis.*

Instructions: Indicate your friend's level of competence and comfort in handling each type of situation, using a 5-point rating scale, where:

- 1 = "S/he poor at this; s/he would feel so uncomfortable and unable to handle this situation, s/he would avoid it if possible";
- 2 = "S/he is only fair at this; s/he would feel uncomfortable and would have lots of difficulty handling this situation";
- 3 = "S/he OK at this; s/he would feel somewhat uncomfortable and have some difficulty handling this situation";
- 4 = "S/he is good at this; s/he would feel quite comfortable and able to handle this situation";
- 5 = "S/he is EXTREMELY good at this; s/he would feel very comfortable and could hand this situation very well"

1. Asking or suggesting to someone new that they get together and do something, e.g., go out together.
2. Telling a companion s/he doesn't like a certain way the companion has been treating him/her.
3. Revealing something intimate about himself/herself while talking with someone s/he is just getting to know.

4. Helping a close companion work through his or her thoughts and feelings about a major life decision, e.g., a career choice.
5. Being able to admit that s/he might be wrong when a disagreement with a close companion begins to build into a serious fight.
6. Finding and suggesting things to do with new people whom s/he finds interesting and attractive.
7. Saying “no” when a date/acquaintance asks him/her to do something s/he doesn’t want to do.
8. Confiding in a new friend/date and letting him or her see your friend’s softer, more sensitive side.
9. Being able to patiently and sensitively listen to a companion “let off steam” about outside problems s/he is having.
10. Being able to put begrudging (resentful) feeling aside when having a fight with a close companion.
11. Carrying on conversations with someone new whom s/he thinks s/he might like to get to know.
12. Turning down a request by a companion that is unreasonable.
13. Telling a close companion things about himself/herself that s/he is ashamed of.
14. Helping a close companion get to the heart of a problem the companion is experiencing.
15. When having a conflict with a close companion, really listening to his or her complaints and not trying to “read” his/her mind.

16. Being an interesting and enjoyable person to be with when first getting to know people.
17. Standing up for his/her rights when a companion is neglecting him/her or being inconsiderate.
18. Letting a new companion get to know the “real him/her.”
19. Helping a close companion cope with family or roommate problems.
20. Being able to take a companion’s perspective in a fight and really understand his or her point of view.
21. Introducing himself/herself to someone s/he might like to get to know (or date).
22. Telling a date/acquaintance that he or she is doing something that embarrasses your friend.
23. Letting down his/her protective “outer shell” and trusting a close companion.
24. Being a good and sensitive listener for a companion who is upset.
25. Refraining from saying things that might cause a disagreement to build into a big fight.
26. Calling (on the phone) a new date/acquaintance to set up a time to get together and do something.
27. Confronting his/her close companion when the companion has broken a promise.
28. Telling a close companion about the things that secretly make him/her feel anxious or afraid.
29. Being able to say and do things to support a close companion when the companion is feeling down.

30. Being able to work through a specific problem with a companion without resorting to global accusations (“you always do that”).
 31. Presenting good first impressions to people s/he might like to become friends with (or date).
 32. Telling a companion that he or she has done something to hurt your friend’s feelings.
 33. Telling a close companion how much s/he appreciates and cares for the companion.
 34. Being able to show genuine empathetic concern even when a companion’s problem is uninteresting to him/her.
 35. When angry with a companion, being able to accept that the companion has a valid point of view even if s/he doesn’t agree with that view.
 36. Going to parties or gatherings where s/he doesn’t know people well in order to start up new relationships.
 37. Telling a date/acquaintance that date/acquaintance has done something that made your friend angry.
 38. Knowing how to move a conversation with a date/acquaintance beyond superficial talk to really get to know each other.
 39. When a close companion needs help and support, being able to give advice in ways that are well received.
 40. Not exploding at a close companion (even when it is justified) in order to avoid a damaging conflict.
-

Screen for Adult Anxiety Related Disorders (SCAARED) – Participant Self-report

Directions: Below is a list of sentences that describe how people feel. Read each phrase and decide if it is “Not True or Hardly Ever True” or “Somewhat True or Sometimes True” or “Very True or Often True” for you. Then, for each sentence, select the box that corresponds to the response that seems to describe you now *or within the past 3 months*.

0 = Not True or Hardly Ever True

1 = Somewhat True or Sometimes True

2 = Very True or Often True

1. When I feel nervous, it is hard for me to breathe.
2. I get headaches when I am at school, at work or in public places.
3. I don't like to be with people I don't know well.
4. I get nervous if I sleep away from home.
5. I worry about people liking me.
6. When I get anxious, I feel like passing out.
7. I am nervous.
8. It is hard for me to stop worrying.
9. People tell me that I look nervous.
10. I feel nervous with people I don't know well.
11. I get stomachaches at school, at work, or in public places.
12. When I get anxious, I feel like I'm going crazy.
13. I worry about sleeping alone.

14. I worry about being as good as other people.
15. When I get anxious, I feel like things are not real.
16. I have nightmares about something bad happening to my family.
17. I worry about going to work or school, or to public places.
18. When I get anxious, my heart beats fast.
19. I get shaky.
20. I have nightmares about something bad happening to me.
21. I worry about things working out for me.
22. When I get anxious, I sweat a lot.
23. I am a worrier.
24. When I worry a lot, I have trouble sleeping.
25. I get really frightened for no reason at all.
26. I am afraid to be alone in the house.
27. It is hard for me to talk with people I don't know well.
28. When I get anxious, I feel like I'm choking.
29. People tell me that I worry too much.
30. I don't like to be away from my family.
31. When I worry a lot, I feel restless.
32. I am afraid of having anxiety (or panic) attacks.
33. I worry that something bad might happen to my family.
34. I feel shy with people I don't know well.
35. I worry about what is going to happen in the future.
36. When I get anxious, I feel like throwing up.

37. I worry about how well I do things.
38. I am afraid to go outside or to crowded places by myself.
39. I worry about things that have already happened.
40. When I get anxious, I feel dizzy.
41. I feel nervous when I am with other people and I have to do something while they watch me (for example: speak, play a sport.)
42. I feel nervous when I go to parties, dances, or any place where there will be people that I don't know well.
43. I am shy.
44. When I worry a lot, I feel irritable.

SCORING:

- A total score of ≥ 23 may indicate the presence of an **Anxiety Disorder**.
 - A score of 5 for items 1, 2, 6, 9, 11, 12, 15, 17, 18, 19, 22, 25, 28, 32, 36, 38, 40 may indicate **Panic Disorder** or **Significant Somatic Symptoms**.
 - A score of 12 for items 5, 7, 8, 14, 21, 23, 24, 29, 31, 35, 37, 39, 44 may indicate **Generalized Anxiety Disorder**.
 - A score of 3 for items 4, 13, 16, 20, 26, 30, 33 may indicate **Separation Anxiety SOC**. A score of 7 for items 3, 10, 27, 34, 41, 42, 43 may indicate **Social Anxiety Disorder**.
-

**Center for Epidemiologic Studies Depression Scale-Revised (CESD-R) – Participant
Self-report**

Directions: Choose the option you most agree with. The response values for each question are:

0= Not at all or less than one day last week

1= 1-2 days last week

2 = 3-4 days last week

3 = 5-7 days last week

4 = Nearly every day for 2 weeks

1. My appetite was poor.
2. I could not shake off the blues.
3. I had trouble keeping my mind on what I was doing.
4. I felt depressed.
5. My sleep was restless.
6. I felt sad.
7. I could not get going.
8. Nothing made me happy.
9. I felt like a bad person.
10. I lost interest in my usual activities.
11. I slept much more than usual.
12. I felt like I was moving too slowly.

13. I felt fidgety.
14. I wished I were dead.
15. I wanted to hurt myself.
16. I was tired all the time.
17. I did not like myself.
18. I lost a lot of weight without trying to.
19. I had a lot of trouble getting to sleep.
20. I could not focus on the important things.

The 20 items in CESD-R scale measure symptoms of depression in nine different groups as defined by the DSM5.

1. **Sadness** (Dysphoria): Question numbers 2,4, 6
2. **Loss of Interest** (Anhedonia): Question numbers 8, 10
3. **Appetite**: Question numbers 1, 18
4. **Sleep**: Question numbers 5, 11, 19
5. **Thinking / Concentration**: Question numbers 3, 20
6. **Guilt** (Worthlessness): Question numbers 9, 17
7. **Tired** (Fatigue): Question numbers 7, 16
8. **Movement** (Agitation): Question numbers 12, 13
9. **Suicidal ideation**: Question numbers 14, 15

The determination of possible depressive symptom category is based upon an algorithm with the following logic:

- **Meets criteria for Major depressive episode:** Anhedonia or dysphoria nearly every day for the past two weeks, plus symptoms in an additional 4 DSM symptom groups noted as occurring nearly every day for the past two weeks;
- **Probable major depressive episode:** Anhedonia or dysphoria nearly every day for the past two weeks, plus symptoms in an additional 3 DSM symptom groups reported as occurring either nearly every day for the past two weeks, or 5-7 days in the past week;
- **Possible major depressive episode:** Anhedonia or dysphoria nearly every day for the past two weeks, plus symptoms in an additional 2 other DSM symptom groups reported as occurring either nearly every day for the past two weeks, or 5-7 days in the past week;
- **Subthreshold depression symptoms:** People who have a CESD-style score of at least 16 but do not meet above criteria;
- **No clinical significance:** People who have a total CESD-style score less than 16 across all 20 questions.