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Protective Factors For Emerging Adults With Subclinical Adhd

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PROTECTIVE FACTORS FOR EMERGING ADULTS WITH SUBCLINICAL ADHD

by

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DEDICATION

I dedicate this work to my Dad, the late Maurice McGarragle M.D.

You have been and will continue to be my inspiration.

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I. INTRODUCTION

Subclinical Attention Deficit Hyperactivity Disorder (ADHD) symptoms are newly recognized as a significant problem for many emerging adults. Subclinical ADHD refers to inattentive and/or hyperactive symptoms which cause impairment but fail to meet current DSM-IV criteria for diagnosis. Adult ADHD literature began to focus on subclinical participants when these individuals were identified in studies; and were shown to experience similar impairment to their cohorts diagnosed with the disorder.

Adult ADHD

Impairment experienced by adult individuals with ADHD is well documented. Studies of adult ADHD in the past 2 decades have focused on exploring what types of functioning are affected by this condition. Adult ADHD patients were found to be at increased risk to abuse substances, and to fail to use effective contraception (Rowland, Lesesne, & Abramowitz, 2002). Additionally, higher rates of motor vehicle accidents, unemployment and divorce were found in this group (Barkley, Guevremont, Anatopoulos, DuPaul & Shelton, 1993; Kessler et al., 2006). Of significant concern is the undiagnosed and untreated adult ADHD patient. Many experts report that a comorbid mental illness is highly likely in undetected adult ADHD patients, ranging from Dysthmic Disorder, Generalized Anxiety disorder, to substance abuse and conduct problems (Kessler et al., 2006; Shekim, Asarnow, Hess, Zaucha & Wheeler, 1990). The consequences of untreated adult ADHD for individuals and society are apparent.

Adult ADHD was found to affect a significant proportion of the population with prevalence rates of 4.4%, in the United States as of 2006 (Kessler et al., 2006). As well, this condition was found to cause significant impairment in multiple domains of functioning.

Subclinical ADHD

The recent identification of individuals with subclinical ADHD has highlighted that they are similarly compromised in their functioning, and have a similarly significant prevalence (Murphy & Barkley, 1996b).

Prevalence rates range from 5% (Bussing, Mason, Bell, Porter & Garvan, 2010) to 10% in the limited studies examining subclinical ADHD in young adults (Gudjonsson, Sigurdsson, Eyjolfsdottir, Smari & Young, 2009). Unfortunately studies also show that these cases in the education system go undetected and are therefore unaddressed (Bussing et al. 2010).

Individuals with subclinical ADHD have been shown to exhibit impaired functioning in various domains, much like the impact full ADHD symptoms exert. One example of this impaired functioning is social impairment. Early education research established that children diagnosed with ADHD are at increased risk for not only impaired academic functioning, but impaired social functioning as well (Kats-Gold, Besser & Priel, 2007; Loe & Feldman, 2007). Similarly studies have shown that subclinical ADHD as well as full ADHD are positively related to social functioning problems (Gudjonsson et al., 2009). In particular, emotional control was found to be impaired in many college students with subclinical ADHD symptoms. This related to their overall social functioning as well as their ratings of satisfaction with life (Gudjonsson et al., 2009). This finding calls attention to the interconnected domains of functioning, and the significant impact subclinical ADHD symptoms can have on emotional adjustment.

Another domain in which subclinical ADHD individuals experience similar impairment to patients with full symptoms is mental health. It has been shown that high school students with subclinical ADHD and a full ADHD diagnosis are both at risk for internalizing and externalizing symptoms (Bussing et al., 2010). Firstly, students with subclinical ADHD were at increased risk to engage in conduct disordered behaviors including substance abuse, truancy, and involvement in the juvenile justice system (Bussing et

al., 2010). Secondly, this study also demonstrated that those participants with subclinical ADHD were more likely to experience significant anxiety and depression symptoms (Bussing et al., 2010). Perhaps most significant was the finding that subclinical ADHD students are at a higher risk than their full ADHD counterparts to develop a number of psychological disorders such as Oppositional Defiant Disorder, Generalized Anxiety Disorder, and Depression (Bussing et al., 2010). Researchers attributed this to the failure to recognize these students' impairment and failure to provide the support their ADHD counterparts would receive (Bussing et al., 2010).

Further to these findings comparing the impact of ADHD symptoms on adolescents meeting full DSM-IV criteria, and those with subclinical symptoms, Bussing and colleagues (2010) discovered a similar pattern in terms of academic functioning. Students with subclinical symptoms experienced similar impairment, as measured by grade point average (GPA) and graduation, but were found to exhibit higher risk for grade retention than students with full ADHD (Bussing et al., 2010). Clearly, a distinct group of impaired students has been 'falling through the cracks' of the education system.

Subclinical ADHD and Emerging Adulthood

In addition to research on adolescents, subclinical ADHD studies in the past few years have focused on students starting their academic college careers - a pivotal time point for understanding the impact of these symptoms. This unique developmental stage has received attention since it marks the process of determination of adult functioning: academically, socially, and then professionally. Throughout a student's college career he/she will live independently for the first time, develop a social support network, be expected to study and learn independently, perform academically, choose a focus of study, and often choose a career path. The development of these skills will have a significant influence on adult functioning. College adjustment variables have been studied since they greatly contribute to college

success (Norvilitis, Sun, & Zhang 2010; Norwalk, Norvilitis & MacLean, 2009). There were mixed findings on the relationship between subclinical ADHD and social adjustment, with no significant link found by Norwalk and colleagues in an all American college sample (2009), but a significant connection between subclinical and ADHD symptoms and social college adjustment for a Chinese student sample (Norvilitis et al., 2010). Specifically, this study demonstrated that subclinical ADHD predicted lower social adjustment in college for this population (Norvilitis et al., 2010). A consistent result across cultures and studies was that subclinical ADHD significantly predicted weaker study skills, and career decision making (Norvilitis et al., 2010; Norwalk et al., 2009). These two variables are considered relevant aspects of college adjustment which relate to academic performance. These findings support the relationship between subclinical ADHD and the multiple facets of college adjustment.

Subclinical ADHD symptoms are important to study because they have been shown to significantly relate to academic performance in high school and undergraduate college studies (Bussing et al., 2010; Norvilitis et al., 2010; Norwalk et al., 2009). A minimum standard of academic performance is required to earn passing grades and graduate in college. Further scrutiny is on the academic performance of students applying to graduate school and competing for admission based on their grade point average (GPA). Clearly, academic performance in undergraduate study has a strong influence on future professional functioning. It is for these reasons that subclinical ADHD symptoms and academic functioning in college warrants research attention.

Despite these implications of the relationship between subclinical ADHD symptoms and college adjustment and academic performance, there has been a relative lack of literature on the subject (DuPaul, Wyandt, O'Dell & Varejao, 2009; Norwalk et al., 2009). Investigators in this new area of study and ADHD experts alike have called for further investigation of this relationship, using an emerging adult college student population (Bussing et al., 2009; Du Paul et al., 2009; Norwalk et al., 2009).

Subclinical ADHD and academic performance relationship

The importance of studying subclinical symptoms along with educational performance and outcomes has been emphasized in the ADHD literature for many developmental stages (Kadesjo, Kadesjo, Hagglof & Gilberg, 2001). College retention, enrollment, and their relation to research and funding activities, are some of the reasons for universities to invest in promoting student success for students with full and subclinical ADHD (Norwalk et al., 2009). From an individual perspective, the importance of maximizing academic performance and adjustment in emerging adults is apparent. Adult ADHD experts concur; there is a need for further research which would closely examine the relationship between subclinical ADHD and academic performance (Bussing et al., 2009; Du Paul et al., 2009; Norwalk et al., 2009).

Further study of the relationship between subclinical ADHD and academic performance could fulfill this significant objective. By exploring this relationship, investigators could establish an understanding of the dynamic of influences between these variables. In reality, students with subclinical ADHD will experience varying amounts of impairment (DuPaul et al., 2009; Glutting, Youngstrom, & Watkins, 2005). Further understanding of this relationship could aid in answering the question: 'Why do certain subclinical ADHD emerging adult students succeed while others do not?'

Protective Factors

Learning about the relationship between subclinical ADHD and academic performance requires exploring mediators and moderators of this relationship. In various bodies of literature these variables are said to serve as risk or protective factors. Resiliency literature and education research have identified protective factors for at risk youth including internal variables: individual study habits, intellectual ability, interpersonal skills (Aluja & Branch, 2004); as well as external variables: classroom structure, teaching style, parental support, and presence of a mentor (Beam, Cen & Greenberger, 2002). Of particular interest of the internal subset are study habits and interpersonal skills, as they represent potentially non-fixed non-stable variables, which are relevant for future implications and potential intervention. The external protective variable of interest for the emerging adult population is the presence of a mentor. Among this group, presence of a mentor is the factor which is relevant to the college population. This reality is reflected in the literature (Ahrens, DuBois, Richardson, Fan, & Lozano, 2008; DuBois & Silverthorn, 2005).

Further, to address the protective function of these variables for the specific at risk population of interest: subclinical ADHD emerging adults, consideration of ADHD focused research is imperative. Since there has been very little established research on protective factors for subclinical ADHD students, studies on moderators for this population were reviewed for the aim of identifying relevant protective factors.

These protective factors were considered for the purpose of identifying relevant moderator variables at work in the relationship between subclinical ADHD and academic performance. Building a relational model for this relationship by identifying significant moderators or protective factors for subclinical ADHD emerging adults was the focus of this study. Educational and resiliency research as well as ADHD student resiliency research were considered toward this aim.

I. Interpersonal Skills. Interpersonal skills have been identified as a strong predictor of academic performance in education literature (Aluja & Blanch, 2004; McClelland, Morrison & Holmes, 2000; Petrids, Frederickson, & Furnham, 2004,). Beginning with early academic functioning, studies support that as children begin elementary education; their varying levels of social skills critically influence their school success (Foulks & Morrow, 1989). Investigators postulate that social behavioral characteristics contribute first to school adjustment at this stage in development, and then subsequently contribute to academic performance (Alexander, Entwisle, & Dauber, 1993; Cooper & Farran, 1991). In fact, classroom social skills were found to predict unique variance in academic performance not only at school entry, but at the end of second grade, in a study by McLelland and colleagues (2000). Further, this powerful relationship was demonstrated after controlling for baseline academic performance as well as background variables such as family stressors and socioeconomic status.

In similar research, a related concept of interpersonal skills - the trait emotional intelligence variable was shown to powerfully predict academic performance in secondary school students (Petrides et al., 2004). Trait emotional intelligence focuses on social skills along with related emotional processes. It represents empathy skills, assertiveness skills, and ability to process emotional content, and manage impulsivity. Focusing on the older adolescents, this work highlights that interpersonal skills continue to play a key role in students' academic performance. Importantly, Petrides and colleagues (2004) established that this emotional intelligence trait moderates the relationship between cognitive ability and academic performance.

Research on interpersonal skills and academic achievement has been further extended to the emerging adult college population. Strahan (2003) conducted a longitudinal project examining how social skills affect grade point average and academic persistence throughout the first 2 years of undergraduate

courses. Social skills emerged as a significant predictor of academic achievement throughout college (Strahan, 2003). Clearly, social emotional and interpersonal skills are significantly contributing to academic functioning throughout development.

ADHD resiliency literature – interpersonal skills. Education literature by Vance, Fernandez and Biber (1998) identified likeability, sense of humor and ability to get a long with peers and adults as a significant protective factors for ADHD boys, in terms of educational outcomes. This finding demonstrates the positive effect interpersonal skills may have on functioning, and on the relationship between ADHD symptoms and academic functioning. It was argued that this variable continues to be important throughout development, into emerging adulthood (Vance et al., 1998). In a study of undergraduate students with disabilities, including ADHD symptoms, interpersonal skills were also found to greatly impact educational outcomes (Wolf, 2001). This research shows that the protective factor interpersonal skills warrants attention and further study with subclinical ADHD and academic performance.

II. Study skills. As would be expected, education literature has consistently established individual study habits as an important predictor of academic performance – across development (Aluja & Blanch, 2004; Blumner & Richards, 1997; Murphy & Barkley, 1996b). Aluja and Blanch (2004) found that study skills mediated the relationship between personality factors and academic achievement for elementary school students. In addition, it has been demonstrated that study habits accounted for significant variance in a range of academic outcome variables in secondary school students (Duckworth, 2005). Later in development, study habits continue to play a key role in academic achievement. Blumner and Richards (1997) found that this variable strongly contributed to GPA (grade point average) for

undergraduate Engineering students when previous academic functioning (Scholastic Aptitude Test (SAT)) was controlled for.

ADHD and resiliency research: study habits. Study skills have been examined in resiliency literature along with recent research on subclinical ADHD in the undergraduate population. Subclinical ADHD college students have been shown to struggle academically: as shown by deficient study skills (time management and test-taking strategies) as well as lower grade point average (GPA) (Heiligenstein, Guenther, Levy, Savino & Fulwiler, 1999). In line with this finding study habits were found to account for a significant amount or variance of GPA in emerging adult students diagnosed with ADHD in a study by Murray and Wren (2003).

III. Presence of a mentor. The presence of a mentor in the life of an individual has been shown to fulfill a protective function as evidenced in multiple studies. Beginning in early development children benefit greatly from the presence of a mentor – in terms of mental health and social functioning (Rhodes, Bogat, Roffman, Edelman & Galasso, 2002). Beier, Rosenfeld, Spitalny, Zansky and Bontempo (2000) demonstrated that at risk adolescents who had adult mentors were significantly less likely to engage in several high-risk behaviors – drug use, smoking, alcohol use, weapon carrying and risky sexual practices.

Not only does mentorship positively influence behavior choices and social functioning – it has a powerful influence on academic functioning. Mentors were shown to positively influence undergraduate students' academic success in terms of retention and performance (Jacobi, 1991; Rowe, 1989).

ADHD Resiliency research- presence of a mentor. Du Paul and colleagues (2009) argue that external factors are important to academic outcomes in discriminating successful and unsuccessful students with ADHD. The presence of a mentor has been repeatedly identified in the literature as a protective factor (Du Paul et al., 2009; Mikami & Hinshaw, 2003; Scholl & Mooney, 2004; Vance et al., 1998). Young girls diagnosed with ADHD at risk to develop mental health problems and peer rejection were shown to be protected by the presence of a mentor (Mikami & Hinshaw, 2003). Similarly, Scholl and Mooney (2004) demonstrated that the protective factor of mentorship promoted resiliency in at risk adolescent youth, many of whom experience ADHD symptoms.

After reviewing the general education and resiliency literature, as well as research on protective factors and moderator variables promoting academic functioning for college students with ADHD symptoms, the internal variables: interpersonal skills and study habits, along with the external variable: presence of a mentor, emerged as important and relevant to the goal of this study.

Present Study

The present study contributed to subclinical ADHD research on emerging adults by responding to the call for additional study of a subclinical and academic functioning relational model. Through the study of these dynamics, moderator variables which may have a protective function were investigated.

II. REVIEW OF LITERATURE

ADHD Prevalence and Impairment

ADHD impairment across development: Childhood and Adolescence

ADHD (Attention Deficit Hyperactivity Disorder) is characterized by developmentally inappropriate symptoms of inattention, hyperactivity, and impulsivity (American Psychiatric Association, 2000). Symptoms of inattention include problems with alertness, arousal, selectivity, sustained attention, and distractibility (Barkley, Fischer, Smallish & Fletcher, 2006). Hyperactivity involves excessive, intense, age-inappropriate motor and/or vocal activity (Barkley et al., 2006). Difficulties with impulsivity include the tendency to respond quickly to situations without waiting for directions or considering the consequences of one's own actions, difficulty delaying gratification, and frequent engagement in risky or reckless behaviors (Barkley et al., 2006).

ADHD is reported to be the most common psychological disorder in children, affecting 4-6% of children between the ages of 6 and 12 years (Brown et al., 2001). Literature on prevalence rates of ADHD report a range from 3-6%. These findings highlight the significant portion of the population who are officially diagnosed and undoubtedly experience significant impairment. As is implied in requirements for clinical diagnosis, children with ADHD must experience inattentiveness, hyperactivity, and impulsivity to a developmentally inappropriate degree, and display these symptoms as a consistent response pattern which is pervasive and causes conflict with their environment demanding professional and educational intervention (Gonzalez & Sellers 2002). This conflict with their environment manifests in several domains of a child's functioning; including but not limited to: mental health, social and emotional functioning, along with academic adjustment and performance (Andrade, Brodeur, Waschbusch, Steward & McGee, 2009; Bauermeister, 2007; DuPaul et al, 2001; Gonzalez & Sellers, 2002; Lee & Hinshaw, 2006; Loe &

Feldman, 2007; Mason, Walker, Wine, Knoper, & Tercyak, 2007). The seriousness of the multifaceted impairment ADHD children experience is additionally reflected in rates of referral to mental health agencies accounted for by patients presenting with this disorder. It has been estimated that 40-70% of mental health clinic referrals for children are represented by patients experiencing ADHD and ADHD related problems (Cotugno, 1995).

The multiple forms of impairment experienced by ADHD patients are well documented. Beginning with preschool years, ADHD symptoms emerge in affected children. Epidemiological data indicated that approximately 2% of children from 3-5 years of age have ADHD (Lavigne et al., 1996), with the majority of ADHD patients exhibiting symptoms by age 7 years (American Psychiatric Association, 1994). As early as the preschool years, studies have shown that ADHD symptoms at this age are associated with chronic behavioral and academic impairment (Pierce, Ewing & Campbell, 1999). In addition, mothers of preschool children with ADHD report greater levels of parenting stress (Byrne, DeWolfe & Bawden, 1998) which is likely related to the association found between aberrant maternal-child interactions and ADHD in the preschool setting. Finally, preschool ADHD children are more likely to engage in aggressive social behaviors (Barkley & Murphy, 1998), spend minimal time in social interactions during play, (Alessandri, 1992), and are more likely to use medical services than their normal counterparts due to their greater risk for physical injuries because of impulsive behavior (Lahey et al., 1998).

Continuing into elementary school, young children with ADHD are more likely to be behind their fellow students in basic math concepts, prereading skills and fine motor abilities (DuPaul et al., 2001; Lahey et al., 1998; Mariani and Barkley, 1997; Shelton et al., 1998). Speech and language problems have been found to be associated with ADHD both in community and treatment samples (Canino et al.,

2004; Tannock & Schachar, 1996). Negative family variables are also associated with ADHD such as negative parent-child relationship, and parental negative discipline (Barkley, Fischer, Edelbrock, Smallish, 1991; Keown & Woodward 2002). In terms of academic functioning there are some varying findings with Barkley and colleagues (1990) finding special education, grade failure, school suspension and expulsion significantly related to ADHD, and demonstrating grade failure as a significant correlate of ADHD. Further, children with ADHD were shown to manifest significant underachievement, poor academic performance and educational problems (Biederman et al., 1996). Children with ADHD score significantly lower on reading and arithmetic achievement tests than controls. These children also experience higher rates of repeated grades, use of remedial academic services and placement in special education classes compared to controls (Lever, et al., 2004). In fact, ADHD patients are 4 to 5 times more likely to use special education services than their non ADHD counterparts (Jensen, Hoagwood & Roper, 2004). Into adolescence this impairment is apparent, with ADHD students possessing lower rates of high school graduation and participation in post secondary education (Loe & Feldman, 2007). Overall, it is clear that academic problems to some significant degree are consistently present for children with ADHD (Loe & Feldman, 2007).

Along with the established relationship between academic difficulties in ADHD children, the literature has also documented impaired mental health and behavioral problems across childhood and adolescence (Bauermeister, 2007; Costello, Mustillo, Erkanli, Keller, & Angold, 2003; Jensen, Martin & Cantwell, 1997). The link between ADHD and externalizing disorders Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD) has been well established for several decades (Bird, Gould, & Staghezza-Jaramillo, 1990; Hinshaw, 1987). More recently in the ADHD literature, the common comorbidity to ADHD – internalizing disorder Anxiety has been recognized (Angold, Costello & Erkanli, 1999; Jensen et al., 2001). Jensen and colleagues outlined commonly occurring comoribidites with

ADHD in children, and grouped these: (1) ADHD with ODD and/or CD (2) ADHD with Anxiety and no externalizing disorder (3) ADHD with both ODD and CD along with internalizing disorder Anxiety (2001). Although these are the most common and established co-occurring mental health impairments ADHD youth experience, there is also evidence for depressive disorder being related to ADHD as well (Costello et al., 2003; Ford, Goodman & Meltzer, 2003) along with greater engagement in tobacco and substance abuse in ADHD adolescent (Mason et al., 2007)

Finally, impaired social functioning in children with ADHD is demonstrated through a body of studies (Andrade et al., 2009; Lee & Hinshaw, 2006; Solanto Pope- Boyd, Tryon & Strepak, 2009). Social competence impairments in ADHD children have been evidenced in several studies (Henker & Whalen, 1999; Nixon, 2001, & Stormont, 2001). Interpersonal problems have been manifest as high levels of aggression, defiant, disruptive and intrusive behavior, poor peer interactions and impaired interpretation of social situations. Further supporting these findings, many studies also demonstrate this social skills deficit through the use of peer ratings or peer acceptance; and have found that children with ADHD receive significantly lower ratings of peer-nomination, as many as 50% are rejected by their peers (Guevremont & Dumas, 1994; Nixon, 2001; Storemont, 2001).

Adult ADHD

Increasingly, ADHD is being recognized as a disorder whose symptoms persist into adulthood. Researchers estimate that 50% to 65% of children diagnosed with ADHD continue to demonstrate specific symptoms of ADHD and general related behavior problems later in life (Kessler et al., 2006; Weiss & Hechtman, 1993).

According to leading ADHD researchers Barkley, Murphy and Fischer (2008) the condition is now a recognized and scientifically validated disorder in adults, and has been for at least 15 – 30 years. These experts encourage mental health professionals to work towards optimizing treatment and intervention of adult ADHD.

Prevalence. Barkley, Murphy and Fischer (2008) emphasize a focus on improving understanding and treatment of adult ADHD since it is a relatively common mental disorder among this population. Barkley and colleagues (2008) reported that the prevalence of ADHD in adults has been interpolated from longitudinal studies of ADHD children followed into adulthood to be approximately 3.3% to 5.3%. This proportion could represent greater than 11 million adults in the United States alone.

Recent research has reported varying prevalence rates; depending on the method of measurement used. Faraone and Biederman (2005) found prevalence rates ranging from 2.9 % to 4.4%. In an international study of the prevalence of self reported ADHD symptoms in university students, often referred to as 'emerging adults' prevalence ranged from 3.9% in the United States sample, 7.4% in the Italian sample and 9.8% in the New Zealand sample.

Impairment. The problem of Adult ADHD has significant impact on individuals, families, and society as a whole. This will be illustrated through description of the specific impairments associated with the disorder. These pervasive impairments negatively affect ADHD patients and to a lesser extent - those around them.

Adults with ADHD experience significant impairment across multiple domains of functioning. Currently, the literature has established that impaired functioning exists in social skills and relationship functioning, motor vehicle operation, substance abuse, behavioral functioning, emotional and mental health, employment performance, and academic function (Barkley et al., 1999; Kessler et al., 2006; Murphy & Barkley, 1996; Rowland, Lesesene, & Abramowitz, 2002; Shekim, Asarnow, Hess, Zaucha & Wheeler, 1990). A few of these findings will be reviewed in order to highlight the pervasive nature of impairment which occurs as a result of adult ADHD.

Firstly, adult ADHD patients are at increased risk to demonstrate substance use/abuse (Murphy & Barkley, 1996). Pomerleau, Downey, Stelson & Pomerleau found that ADHD adults are much more likely to be smokers (1995). ADHD adults were found to be more likely to have used a wide variety of drugs (the Drug Use Severity Index measure was used) than their healthy counterparts in a study by Faraone and colleagues (2007), with the exception of alcohol.

ADHD in adulthood is related to social skill deficits, as it is in children with ADHD (Young, 1999). Adults with ADHD frequently report interpersonal difficulties. Young proposes these difficulties may stem from communication skill deficits, inattention and distractibility causing the individual to struggle with listening effectively, or impulsivity contributing to social mistakes such as inappropriate interruptions in conversations (Young, 1999).

Relationship functioning has been shown to be impaired in adults with ADHD; they experience a higher rate of divorce (Gittelman, Mannuzza, Shenkar, & Bonugara, 1985; Kessler et al., 2006; Weiss & Hechtman, 1993). In terms of the cost of this disorder to families, the connection between substance abuse and the overall adjustment of adult patients and their family relationships is clear. Each of these

established areas of impairment demonstrates the damage this condition can cause marriages and parenting.

Adult ADHD has been highlighted as a 'public health concern' by leading researchers (Rowland, Lesesne, & Abramowitz, 2002) due to established impairment in motor vehicle operation, higher rates or unemployment, failure to use effective contraception and a higher rate of motor vehicle accidents. Specifically on the motor vehicle safety issue, Barkley, Guevremont, Anatopoulos, DuPaul & Shelton (1993) reported that ADHD patients had 50% more moving traffic violations, and were 3 times more likely to participate in a motor vehicle accident causing significant damage to the car.

Similarly to adolescents and children diagnosed with ADHD, adults with ADHD have significantly higher rates of comorbidity with certain psychiatric disorders (Marks, Newcorn & Halperin, 2001). As is the pattern with children, ADHD adults have been found to be at greater risk for comorbid oppositional defiant disorder (ODD) and Conduct Disorder (CD) than either clinical control groups without a diagnosis of ADHD or non referred adults. Approximately 24-35% of clinic-referred adults diagnosed with ADHD have ODD and 17-25% of these individuals have CD. Further, 24-43% of adults with diagnosed ADHD have generalized anxiety disorder, 52% have a history of overanxious disorder (Barkley, Murphy & Kwasnick, 1996; Biederman et al., 1993; Minde et al., 2003; Shekim et al., 1990). In addition, 13% of adult ADHD patients were found to have a lifetime panic disorder, and 18% a lifetime social phobia. These findings are somewhat consistent with comorbidity rates among children with ADHD. Research linking ADHD and depression have found evidence of a relationship in certain studies, such as Dysthmia occurring in 19-37% of clinic referred ADHD patients (Murphy, Barkley & Bush, 2002), and a prevalence rate of 27% for major depressive depression in ADHD adults (Barkley et al., 2008). However other studies have not been consistent with this; not all were able to replicate findings of ADHD adults being at

increased risk for depression (Weiss & Hechtman, 1993). Overall, studies on depression in ADHD adults showed some evidence of an association, but do not display the solid support represented in literature for the anxiety, ODD and CD links (Minde et al., 2003; Murphy et al., 2002; Barkley et al., 2008; Weiss & Hecktman, 1993).

Academic functioning was shown to be severely impaired in ADHD youth. This trend continues into adulthood, with a proportion of this group having difficulties with grade retentions, suspensions, and expulsions rising towards the end of adolescence (Barkley et al., 2008). Follow up studies show that once children with ADHD have reached adulthood, they have completed less education, achieved lower academic grades, failed more of their courses, failed to graduate high school and were less likely to attend college than the normal controls (Bussing et al., 2010; Mannuzza, Klein, Bessler, Malloy & LaPadula, 1993; Mannuzza, Klein, Bessler, Malloy & LaPadula, 1998; Weiss & Hechtman, 1993). Further, specific results included 32% of a hyperactive group failed to complete high school compared to none of the participants in the healthy group of this study. Significantly less hyperactive adults than control children ever enrolled in college (21% vs. 78%) or were currently enrolled in college at the follow up point of 21 years (15% vs. 66%) These percentages emphasize the magnitude of difference between a healthy adults' educational functioning and that of an adult with ADHD (Barkley, Fischer, Smallish & Fletcher, 2006).

Further to academic difficulties, the literature demonstrates that ADHD adults display impaired occupational functioning (Barkley, Murphy, & Fischer, 2008). Outcome studies on job performances found that occupational status was lower in ADHD adults than in control groups (Mannuzza et al., 1993; Weiss & Hechtman, 1993). The hyperactive group received significantly worse ratings from their

employer on their job performance (Weiss & Hechtman, 1993), more were laid off or fired (Barkley et al., 2006)

Subclinical ADHD

Symptoms of Subclinical ADHD have recently been identified in the literature as a significant problem in adults. Subclinical ADHD refers to inattentive and /or hyperactive and impulsive symptoms which cause impairment, but fail to meet DSM-IV criteria for diagnosis. Research has demonstrated that these symptoms can cause serious problems for individuals in numerous domains, including school, work and home (Bussing, Mason, Bell, Porter & Garvan, 2010; Faraone, Biederman & Mick, 2005; Mick & Faraone, 2000; Norwalk, Norvilitis & MacLean, 2009; Young & Gudjonsson, 2008). Adult ADHD literature began to focus on subthreshold and subclinical forms of ADHD when evidence mounted for the impairment these individuals experience; suggesting it may be similar to that of their full ADHD counterparts (Biederman & Mick, 2005; Bussing et al., 2010; Mick & Faraone, 2000)

Biederman, Mick and Faraone (2000) found that although up to 60% of individuals with a childhood diagnosis did not continue to meet full diagnostic criteria for ADHD as adults, 90% continued to experience significant impairment with subthreshold levels of ADHD symptoms. Faraone and colleagues continued the study of this atypical group (2006b, 2007b). They investigated the validity of an 'atypical' diagnosis of what they called subthreshold ADHD 'patients having impairing symptoms of ADHD that never exceeded the DSM-IV threshold for diagnoses'. Based on Robin and Guze's (1970) criteria for the validity of a psychiatric disorder, including validation criteria such as clinical correlates, family history, treatment response, laboratory studies, course and outcome, subthreshold ADHD was suggested to be a 'milder form of the disorder'. Young and Gudjonsson (2008) compared the neuropsychological deficits and clinical and psychosocial problems, of full ADHD adults to adults experiencing subclinical or

subthreshold symptom levels. Impairment in the form of neuropsychological functioning, mental health symptoms, relationship and social functioning, drug use, and illegal activity was shown to be remarkably similar for the full ADHD and subthreshold ADHD groups. This finding calls attention to the significant functioning deficits subclinical ADHD adults are experiencing.

Prevalence. Due to increasing literature confirming these results, Investigators generating these findings stress the importance of recognition of subclinical symptoms in research theory and intervention (Bussing et al., 2010; Norwalk et al., 2009; Young & Gudjonsson 2008). The importance of a research focus on subthreshold or subclinical ADHD is seen in the significant impairment present in these individuals along with the significant prevalence rates of this condition. Although studies are limited, recent research indicates that prevalence rates of subclinical ADHD ranges from 5% to 10% (Bussing et al., 2010; Gudjonsson, Sigurdsson, Eyjolfsdottir, Smari, & Young, 2009). This proportion of the adult population accounts for a large number of individuals experiencing pervasive impairment; impairment that is going unrecognized.

Impairment. Adults with subclinical ADHD symptoms can be described as having similarly compromised functioning to their ADHD counterparts. As reviewed for the full ADHD population, this compromised functioning manifests through impairment in social and relational functioning, substance use and abuse, involvement with the justice system, mental and emotional health, and academic functioning (Bussing et al., 2010; Du Paul et al., 2009; Loe & Feldman, 2007; Kats- Gold, Besser & Priel, 2007; Norvilitis et al., 2010; Norwalk et al., 2009; Young & Gudjonsson, 2000).

Subclinical ADHD participants were found to have significantly greater friendship problems than healthy adults (Young & Gudjonsson, 2008). In addition this study found that subclinical ADHD individuals presented more often for adult services, and engaged in a significantly larger number of antisocial activities than the normal control group (Young & Gudjonsson, 2008). Gudjonsson and colleagues demonstrated a negative relationship between subclinical ADHD symptoms and social functioning in college students (2009). Further, a significant negative association was found between subclinical ADHD symptoms and social adjustment in undergraduate students (Norvillitis, Sun & Zhang, 2010).

Adults with subclinical ADHD are at equal risk for substance use and abuse, as the full ADHD population (Faraone et al., 2007). Cigarette and marijuana use is significantly greater in full and subclinical ADHD groups, with the subthreshold individuals being more likely than the normal controls to develop an addiction or substance abuse problem (Faraone et al., 2007). Adolescents with subthreshold ADHD were found to abuse substances more often when they also experienced comorbid ODD (Oppositional Defiant Disorder). Young and Gudjonsson (2008) demonstrated that subclinical ADHD participants had significantly more drug problems than normal controls.

Greater conflict with the justice system is shown to be present for adolescents and young adults with subclinical ADHD (Bussing et al., 2010; Young and Gudjonsson 2008). Subclinical ADHD individuals had significantly more police contact as measured by the scale of police contact in the last year (Young & Gudjonnsson, 2008). In a study of older adolescents in their last year of high school, subclinical symptoms predicted involvement with the justice system (Bussing et al., 2010).

Although subclinical ADHD research is recent, a relationship has been established between subclinical symptoms and impairment in mental health. Gudjonsson and colleagues (2009) demonstrated

the relationship between subclinical ADHD and life satisfaction, depression and anxiety symptoms. Subclinical ADHD adults were shown to be significantly more depressed and anxious than normal controls (Young & Gudjonsson, 2008). No difference was found in emotional impairment: depression and anxiety symptoms in a full ADHD and subclinical ADHD in adolescent girls (Erialdi, Cohen, Marshall & Power, 2007).

Academic impairment in students with subclinical ADHD is strongly supported by the research. Subclinical ADHD symptoms were negatively related to academic adjustment, study skills and GPA (grade point average) in a large sample of undergraduate students (Norwalk et al., 2009). In addition, subclinical inattentive symptoms were a significant predictor of impaired career decision-making self-efficacy, study skills and academic adjustment (Nowalk, et al., 2009). Lewandowski, Lovette, Codding and Gordon (2008) found that subclinical ADHD was predictive of academic concerns, as measured by students' self-report in response to various questions. Academic functioning was found to be equally impaired in a group of 13 year-old girls with subthreshold ADHD and the full ADHD group (Eiraldi et al. 2007). In a community sample, children who displayed subclinical inattentive and hyperactive symptoms had lower scores on educational outcome measures (Loe & Feldman, 2007). Finally, similarly compromised academic functioning was again demonstrated in subclinical and full ADHD students in terms of higher likelihood of receiving learning disability services, lower standardized achievement scores in reading and math as well as lower grade point averages (Bussing et al., 2010). Perhaps most significant, subthreshold ADHD symptoms alone (not full ADHD) increased the risk of grade retention and risk of graduation failure (Bussing et al., 2010).

The recent literature demonstrates, subclinical ADHD patients are experiencing equal and in some cases, greater impairment, across various domains to their full ADHD cohorts. The main difference

between the groups being, that the subclinical individuals are not recognized, and therefore do not have access to the appropriate services.

Subclinical ADHD and Emerging Adulthood

Most recently, adult ADHD research has focused on a subpopulation of ADHD adults; the college student population (Berns, Conyers, Heiligenstein & Smith, 1998; Du Paul et al., 2001; Heiligenstein, Conyers, Schwanz, Palm, & Brallier, 2007). This group is likely a target for research attention for several reasons: the significant number of students who struggle with symptoms in this setting, the crucial nature of this developmental stage, the uniqueness of the group and associated lack of knowledge about the population, impairments and subsequent specific challenges they face, and finally, the evidence of the potential for success in adult ADHD college students (Advokat, Lane & Luo, 2010; DuPaul Wyandt, O'Dell & Varejao, 2009; Murray & Wray, 2003; Schwanz, Palm & Brallier, 2007; Spinella & Miley, 2003).

Prevalence. Studies in the past decade have built support for the significant presence of ADHD in undergraduate students (Barkley, 2006; Biederman, & Rhode, 2007; DuPaul et al., 2001; DuPaul et al., 2009; Heiligenstein, Guenther, Levy, Savino & Fulwiler, 1999; Polanczyk, Silva de Lima, Horta, Biederman & Rohde, 2007; Pope., 2010; Ward, Wender & Reimherr, 1993; Weyandt, Linterman, & Rice, 1995). A world wide pooled prevalence rate of 5.29% has been reported in 18 years and younger (Polanczyk et al., 2007). Although college students are generally 18 years of age and moderately older, a similar estimate of prevalence is not as available, since ADHD students' disability is protected information, kept confidential (Du Paul et al., 2009). The earliest investigation of ADHD in college students (Weyandt, et al., 1995) reported 7-8% of the sample reported ADHD symptoms –considered significant at 1.5 standard deviations above the mean, and 4% reporting significant symptoms defined as 2 standard

deviations above the mean. In 1999, Heiligenstein,and colleagues found that approximately 4% of students at a Midwestern university met criteria for ADHD- using DSM-III-R criteria. In an international study, Du Paul and colleagues (2001) found varying prevalence rates using a self-report measure, 2.9% of male students in the US; 7.4% of male students in Italy, females in the US 3.9%; and 0% in Italian females. Experts conclude that 2-8% of college students self report clinically significant ADHD symptoms, based on the few and recent studies (DuPaul et al., 2009). In the United Kingdom Pope and colleagues (2007) found a prevalence of 6.9% in undergraduate students, using a T-score of 66 or greater to designate students as 'at-risk' for ADHD. In a normative and criterion based combination study found that using 97th percentile of ADHD symptoms as a threshold, approximately 20% of students met the criteria for ADHD (McKee, 2008). In this same research, the DSM-IV criteria were also used, yielding a 7.48% prevalence rate. Importantly, Du Paul and colleagues (2009) highlight that the discrepancy in prevalence rates between normative and criterion- based approaches has implications for the diagnostic criteria for the college student population. In line with this idea, investigators have supported the dimensional study of ADHD, as well as the study of college students experiencing subclinical symptoms which are impairing (Schwanz et al., 2007)

Emerging adulthood development

Further to prevalence, another reason for the study of this subpopulation is the nature of the developmental phase these students are working through. College students are considered to be in 'Emerging Adulthood' a unique developmental stage which marks the process of determination of adult functioning, in the form of academic, social and professional development. At this stage, young adults are expected to study and learn independently, develop a social support network, perform academically, choose a focus of study, and eventually form a career path (Spinella & Miley, 2003).

According to developmental theorist Arnett (2000), emerging adulthood is a distinct developmental stage reflected by demographics, identity exploration and subjective self-perception of only having partially reached adulthood. Demographic changes in the timing of marriage and parenthood are one factor creating this period of emerging adulthood typical for young people in industrialized societies (Arnett, 2000). Research on individuals between 18-25 years of age demonstrates that self-sufficiency in terms of independent decision making and in finances mark the transition in an emerging adult's belief that they have reached adulthood (Arnett, 1997; Arnett, 1998; Arnett, 2000; Greene, 1992; Scheer, Unger & Brown, 1994). The subjective perception that they have left adolescence but have not yet completely entered adulthood is seen in the majority of individuals studied (Arnett, 1994a, 1997, 1998). This subjective sense represents another key feature of emerging adulthood. The vast opportunity for identity exploration in terms of love, work and worldviews also characterizes emerging adulthood (Arnett, 2000). Theory and research highlights the distinct nature of this phase as well as the importance of developmental achievements at this time in life, as it is the foundation for successful functioning in adulthood (Arnett, 2000).

The unique features of this subpopulation, emerging adult ADHD college students; is another important factor in the research focus on this group. According to ADHD expert Barkley and colleagues (2006; 2008) few adolescents with ADHD end up attending postsecondary institutions, and of those who do, fewer complete degree programs relative to their ADHD free peers. Literature by Advokat and colleagues (2010) echoes this report, describing ADHD undergraduates as a unique subset of adults with the disorder, due to this fact; that so few ADHD youth are likely to attend college. Further, it has been argued that ADHD college students represent a unique symptom profile, in that they are more likely to have a higher ability levels, greater academic success before college, and better compensatory skills than ADHD individuals in the general population (Glutting, Youngstrom, & Watkins, 2005). It appears that this

group may possess a resilient quality, or may be protected by certain factors, helping compensate for the impairments they face.

ADHD in Emerging Adults and college adjustment and functioning.

The specific obstacles ADHD emerging adults face in the college setting are evident in the typical impairments they experience. Similar to the trend of findings on ADHD adults in general, psychological adjustment, social functioning and more general functioning impairments ADHD college students experience is empirically established; impaired academic functioning has an even stronger support base.

In reviewing the literature, a general picture of development impairment is manifested as impaired social and general college adjustment. Shaw-Zirt, Popali-Lehane, Chaplin, & Bergman (2005) found that college students with ADHD exhibited lower levels of adjustment, social skills, and self-esteem as compared to a matched control group. A lower quality of life was demonstrated in students with ADHD relative to their non-ADHD counterparts (Grenwald-Mayes, 2002). Findings on social adjustment have some inconsistencies, for example no significant link was found between ADHD in college students and social adjustment (Norwalk et al., 2009). A similar investigation for a Chinese sample found that subclinical ADHD symptoms predicted social adjustment in college (Norvilitis et al., 2010).

Impaired academic functioning and impairment is well-studied in the emerging adult college population. Impulsivity is consistently related to lower grades and achievement scores, even when IQ has been partialed out of the equation (Miyakawa, 2001). Spinella and Miley (2003) demonstrated an inverse relationship between self-ratings of impulsivity and objective academic performance in a college course. In terms of academic functioning, specific academic adjustment skills were linked to ADHD in emerging

adult college students. Specifically, study skills were found to be impaired in students with full and subclinical ADHD as evidenced by higher levels of avoidance of study and procrastination, and these skills accounted for significant academic performance variance in ADHD emerging adults. This body of literature shows the impairment in academic adjustment and functioning as well as a more specific measure: actual academic performance. Students with ADHD in college had lower grade point averages (GPA), were five times more likely to be on academic probation and self-reported more academic problems (Heiligenstein et al., 1999). Du Paul and colleagues (2001) found a weak inverse relationship between self-reported subclinical and full ADHD symptoms and self-reported GPA's. Glutting and colleagues investigated the relationship between ADHD symptoms in emerging adults and academic functioning thoroughly (2005), using a self-report measure on symptoms for participants and their parents. A factor analysis in this study yielded 3 factors: student rated inattentiveness, student-rated hyperactivity, and student rated time-management problems. Inattentiveness predicted college GPA. Based on self-report rating for ADHD symptoms, Lewandowski and colleagues (2008) found that students with ADHD had greater problems with academic functioning including struggles with timed tests, lack of test completions on time, longer duration to complete assignments, and perception of working harder to achieve good grades. Further evidence for impaired academic functioning shown through impaired study skills was established by Reaser, Prevatt, Petscher and Proctor (2007). Specifically, ADHD students in college scored lower than healthy students and learning disorder students without ADHD in time management, concentration, selection of main ideas, and test-taking strategies. Consistent with these findings: Norwalk and colleagues (2009) studied the relationship between subclinical ADHD symptoms and study habits, skills and academic adjustment, finding a negative relationship.

Foundational Study. Schwanz, and colleagues' (2007) demonstrated how attention problems and hyperactivity predict college grade point in emerging adults. A sample of 316 undergraduate students in introductory sociology and psychology classes were administered the Behavior Assessment system for Children- Second Edition Self Report of Personality College to measure self reported attention and hyperactivity problems. Scores from this measure were entered into a regression equation as predictors of cumulative GPA. This study addressed gaps in the emerging adult with ADHD college population by studying the general population, to help understand the effect of behaviors regardless of a clinical diagnosis, and to study subclinical ADHD symptoms leading to functional impairment (Schwanz et al., 2007). Additionally, this study relied on self-report instruments as dependence on parental reports would be difficult and impractical as a source of data in general. Finally, this research added to understanding by measuring hyperactivity/impulsivity separately from inattentiveness, in order to learn about their independent contributions to achievement in this group.

Data from this study indicated that a statistically significant but small percentage of the variance in college GPA – 7% is accounted for by self-reported attention difficulties, with hyperactivity adding a significant yet small increase in the prediction of GPA at 2%. These results suggest a similar pattern to that found in literature on school age ADHD children. These findings show that academic risk continues into college for students with full and subclinical ADHD.

Evidence in the literature states that despite the difficulties this population faces, some do achieve success at the university level (Sparks, Javorsky, & Philips, 2004). The finding that certain subclinical ADHD students can overcome their obstacles and succeed academically in college is another reason for studying how subclinical ADHD impairment works in the emerging adult population.

Subclinical ADHD and Academic Functioning in Emerging Adults

A review of the recent literature on ADHD symptoms and forms of academic functioning shows strong support for a significant relationship. In summary, findings demonstrated that subclinical ADHD symptoms are not only related to academic adjustment (various study skills and academic performance) but were predictive of GPA in many cases. Since a minimum standard of academic performance is required to pursue postgraduate studies and competitive employment opportunities, academic functioning heavily impacts professional success after graduation. College retention, enrollment, related research and funding activities are all reasons cited for universities to invest in promoting student success for students with subclinical ADHD. Given the importance of the emerging adult phase for academic success, and the unique challenges faced by subclinical ADHD students, many researchers have called for further study of this relationship (Bussing et al., 2010; DuPaul et al., 2009; Glutting et al., 2005; Norwalk et al., 2009; Schwanz et al., 2007).

Future Research

Schwanz and colleagues (2007) have called for the further study of full and subclinical ADHD in the university population, to learn more about the impact of inattentive and hyperactive symptoms on academic and nonacademic functioning. It is reported that an increasing number of students with ADHD are pursuing college at this time, (DuPaul et al., 2009). Researchers emphasize the importance of a better understanding of the nature of ADHD in the college student population, with the aim of developing effective interventions to optimize the success of these students.

Future study of mediating/moderating variables. The handful of studies examining subclinical and full ADHD in emerging adults highlight the difference between this subgroup of ADHD students who managed to attend college and their fellow adult ADHD counterparts. Vogel and Adelman

(1993) identified some key differences between those ADHD students who were successful at college and those who were not: successful students were older, had more time in tutoring in adolescence, and were more likely to have taken a greater number of English classes. It has been postulated that college students with ADHD differ from their peers who do not attend college in several important ways (DuPaul et al., 2009; Glutting et al., 2005; Heiligenstein et al., 1999). Potential distinguishing factors between these groups that have been suggested are: cognitive abilities, past experience with school success, and better coping skills (Glutting et al., 2005). Schwanz and colleagues (2007) suggest that variables such as social stress, anxiety and alcohol abuse may help predict academic risk. Heiligenstein and colleagues (1999) suggested that external factors may also exert considerable influence on academic impairment in college students with and without ADHD symptoms. Possible external factors which could strengthen or weaken the association between ADHD and academic functioning are loss of family structure in college, and lack of direct contact with instructors (Heiligenstein et al., 1999). Since the research thus far established a relationship between ADHD and impaired academic skills, it is likely that certain internal and external factors could operate as moderating variables in this relationship. Despite the various suggested moderating variables, no research exists which investigates this possibility. The question remains: why do certain subclinical ADHD emerging adult students succeed, while others do not?

The literature on subclinical ADHD in emerging adults unanimously calls for further study of moderator and mediator variables of these symptoms and academic performance (DuPaul et al., 2009; Glutting et al., 2007, Lewandowski et al., 2008; Norvilitis et al., 2009; Schwanz et al., 2007; Young & Gudjonsson, 2008). This direction of study could identify moderator variables which could lessen the negative impact subclinical ADHD has on the academics' of so many university students. The discovery of potential moderating variables which could be 'protective factors' for this at risk group, could be a valuable contribution to the research. The experts concur; future research on the nature of the

relationship between subclinical and full ADHD and academic functioning, with exploration of potential mediating variables is much needed.

Moderation relationship. A moderator variable M is a variable which alters the strength of the causal relationship between X (the presumed to cause Y) and Y (Kenny, 2011). An example of the way a moderator function is: Cognitive Behavioral therapy (CBT) has been shown to reduce Anxiety symptoms more effectively for individuals who are treated closer to symptoms onset as opposed to others who go undiagnosed and treated for a longer period of time. It would be said then that time a patient is untreated after symptom onset moderates the causal effect of CBT therapy on anxiety. Moderation can weaken a causal effect, or can strengthen an effect. In this example, a larger time untreated would weaken the causal effect of CBT on reduction of Anxiety symptoms, and a lesser time untreated – a quicker commencement of CBT after symptoms development would strengthen the relationship between CBT and positive treatment outcome.

A classic moderator analysis measures the casual relationship between X and Y using a regression coefficient. Experts view a moderation analysis as an exercise of external validity in that the question is how universal is the causal effect. A crucial aspect of moderation is the measurement of X to Y causal relationship for varying values of the moderator M. The effect of X on Y for a given value of the moderator M is the simple effect X on Y.

The consequences of subclinical ADHD in a college student emerging adult population are well documented (Du Paul et al 2001; Glutting et al., 2005; Heiligenstein et al., 1999; Lewandowski et al., 2008; Miyakawa, 2001; Norwalk et al., 2008; Schwanz et al., 2007; Shaw-Zirt et al., 2005; Spinella & Miley, 2003). Ineffective study habits, poor test-taking strategies, inconsistent class attendance, lower

GPA's, and a greater occurrence of academic failure, and failure to graduate are among these consequences to individuals who struggle with full and subclinical ADHD symptoms.

Since academic adjustment and success is crucial to the development of an emerging adult, failure to meet these goals negatively impacts further academic pursuits, career opportunities, standard of living, and general adjustment. The seriousness of these consequences has led theorists and researchers to ask 'What can mitigate the relationship between subclinical ADHD and achievement consequences?' Studies have suggested certain variables which may mitigate this relationship such as social stress, cognitive abilities, past experience with school success, better coping skills. The present study investigated potential protective factors which could mitigate this relationship for a more positive outcome in the subclinical emerging adult college population.

Protective Factor Model

The present study's model of the relationship between subclinical ADHD symptoms and academic performance in the targeted population included a moderator variable. An illustration of the model would be represented by an emerging adult with subclinical ADHD symptoms; the academic performance outcome variable is negatively related to the level of symptoms experienced by the individual. There are variables which will influence this relationship, if they weaken the negative relationship between subclinical ADHD and academic performance, they would be acting as a moderator variable and would be considered a 'protective factor' for the individual.

Effective research is guided by model based theory. The model for the present study was a general psychopathology model with the selection of potential moderator variable potential protective

factors led by current literature on the ADHD population, research on education outcomes, and studies on ADHD students and their educational process. Therefore, based on the literature, specific variables were investigated. If any of these variables proved to act as moderators in the relationship, they would complete the model, and demonstrate a protective function in subclinical emerging adult college students.

Psychopathology model

In studying potential moderators the present study sought to build a psychopathology model for subclinical ADHD, and the consequences of this disorder in an emerging adult college student population. Research has established biological influences as an antecedent for ADHD, so it follows that this can be extended to subclinical ADHD. This antecedent is the stimulus for the expression of the disorder, the manifestation of subclinical ADHD symptoms in the various diagnostic criteria, to a level which is considered clinically significant. Similarly, the relationship between this disorder, and the consequences, impaired academic performance and underachievement has been well documented. The presence of a disorder and associated consequences is influenced by various maintaining conditions. In this case, potential moderator variables represent one type of maintaining condition of the disordered behavior and impaired achievement relationship.

Literature Bodies on potential protective factors. The present study focused on investigating potential moderators based on the review of ADHD literature, education literature, and resiliency literature. In order to identify protective variables, selection criteria included: variables which are non fixed and malleable to intervention as well as relevant to the emerging adult population.

A review of resiliency literature and education literature reveals that various protective factors which have been identified in research. Commonly identified internal variables are: individual study habits, intellectual ability, interpersonal skills, and success experience. Presence or history of a mentor, classroom structure, teaching style, and parental supports are external variables often cited.

Protective Factors

Since protective factors to be investigated should represent: relevant factors to emerging adults and factors which are malleable to intervention: Internal factors which suit this goal are interpersonal skills and study habits; and the history or presence of a mentor is the variable most relevant to this population. ADHD, resiliency and education literature will be presented in the rationale for the focus on these 3 variables as potential moderator protective factors.

Interpersonal Skills

Education and Resiliency Literature. Interpersonal skills have been well documented as a strong predictor of academic performance in the education literature (Aluja & Blanch, 2004; McClelland, Morrison & Holmes, 2000; Petrids, Frederickson, & Furnham, 2004). Chen & Jiang (2002) assert that resilient children show better capacities for empathy and positive peer relationships. One explanation for this influence is that social behavioral characteristics in early school years contribute first to school adjustment at this stage of development, and then subsequently contribute to academic performance (Alexander, Entwisle, & Dauber, 1993; Cooper & Farran, 1991). Evidence for the long term influence of social skills is shown by McLelland and colleagues (2000). These researchers found that class room

social skills predicted unique variance in academic performance not only at school entry, but this effect was present at the end of second grade. The strong impact of social skills on academic functioning is even more apparent in this study, since baseline academic performances and background factors such as socioeconomic status and family stressors were controlled for (McLelland et al., 2000). In addition to the influence of interpersonal skills on academic functioning, interpersonal skills such as empathy, assertiveness, emotional content processing together were found to function as a moderator, in the relationship between cognitive ability and students' academic performance (Petrides et al., 2004). Importantly, the role of interpersonal skills as a moderator, strengthening the relationship between intelligence and achievement was demonstrated later in development, during adolescence. Further into development, the literature on emerging adult undergraduate students shows that social skills continue to influence grade point average and academic persistence throughout university (Strahan, 2003). Interpersonal skills emerged as a significant predictor of achievement throughout students' undergraduate years (Strahan, 2003).

ADHD and Resiliency Literature. Social competence as displayed through popularity with adults was demonstrated to function as a protective factor 'buffer' for educational outcomes of 'at risk' adolescent girls with ADHD in a longitudinal study (Mikami & Hinshaw, 2006). This risk-resilience model purported by Mikam & Hinshaw (2006) was supported. As hypothesized, this social skill of building relationships with adults was shown to promote resilience in adolescents. ADHD symptoms predicted negative academic achievement over a 5 year period, but this social functioning factor positively influenced basic reading and math reasoning performance- as shown through a moderator significant effect.

DuPaul and colleagues investigated a number of factors using regression analyses to find the relative contributions of predictors to academic achievement variance in ADHD youth (2004). Specifically variance was examined over and above the variance accounted for by socioeconomic status (SES) and ethnicity. A large group of healthy children were compared to a large group of 4th grade students with full and subclinical levels of ADHD. This study found that interpersonal skills (as measured by the teachers' ratings on the social skills rating system) functioned as a predictor of academic achievement on standardized reading and math tests along with actual grades. This research is the first to identify a protective factor which is not educationally based, for ADHD children at risk for poor educational outcomes.

In the limited specific research on resiliency models for ADHD individuals at risk for poor academic achievement, the role of social skills is consistently shown to promote a more positive outcome. In addition, several academics and investigators have called for further study of predictors of resilience in ADHD youth and adults (DuPaul et al., 2004; Mikami & Hinshaw, 2006)

History or Presence of a Mentor

Education and Resiliency Literature. The prototypical relationship between youth and non-parental adults describes the mentoring relationship (Rhodes, Bogat, Roffman, Edelman & Galasso, 2002). Natural mentors have been identified in the research as 'informal'; a naturally occurring relationship which was not created by a social agency in the community (Zimmerman, Bingenheimer & Notaro, 2002). Resiliency theory is a framework used to understand natural mentor relationships (Sanchez, Esparza & Colon, 2008), explaining how youth from stressful backgrounds can become well-adjusted and successful as adults when they experience certain protective factors. In the earliest

literature, Werner and Smith (1982) identified that children living with poverty and instability became competent adults when they had at least one extra familial adult who provided emotional support. More recently, empirical research on volunteer mentoring programs has demonstrated only modest effects on youth outcomes (DuBois, Holloway, Valentine, & Cooper, 2002). This has led to the study of natural mentor relationships (Sanchez, Esparza, & Colon, 2008). Research on natural mentors has found that mentors are effective by providing guidance, encouragement and emotional support (Beam, Chen & Greenberger, 2002; Hirsch, Mickus, & Boerger, 2002; Liang, Tracy, Taylor, & Williams, 2002; Zimmerman et al., 2002). A natural mentor relationship has been described as 'developmentally normative' (Darling, Hamilton, Toyokawa & Matsuda, 2002) with adolescents seeing nonparental adults as ego ideals from which they can acquire information about careers, develop skills and learn adult behaviors. A review of the existing literature on natural mentors and their promotion of resiliency reveals their significant protective function; evident through better development in many domains of functioning (Ahrens, Dubois, Richardson, Fan & Lozano, 2008; Zimmerman et al., 2002; Campbell & Campbell, 1997; DuBois & Silverthorn, 2005; Klaw, 2003; Sanchez et al., 2008; Thompson & Kelly-Vance, 2001).

Although recent research suggests that formal mentor relationships arranged through agencies may not offer equal the positive influence as natural mentors, even this suggested 'inferior' mode of mentoring has documented protective effects (Thompson & Kelly-Vance, 2001). Boys who had received a mentor from the Big Brothers/Big Sisters program made significantly higher academic gains than those at risk boys in the treatment group (Thompson & Kelly-Vance, 2001). In this same vein, formal mentor relationships established between university faculty and students was shown to increased students' GPA, units completed per semesters' and lowered drop out rate (Campbell & Campbell, 1997). A study of urban youth at risk for drug use, delinquency and educational underachievement were shown to experience protective effects in terms of less conflict with the law, less substance abuse and a more

positive attitude towards school when they had a natural mentor (Zimmerman, et al., 2002). Clearly, the protective role mentoring plays applied to children as well as emerging adults in the college student population. A large nationally represented study on natural mentoring demonstrated favorable outcomes for mentored adolescents in terms of reduced problem behaviors, reduced gang membership, psychological well-being, proactive healthy choices, as well as specific education and work outcomes (DuBois & Silverthorn, 2005). Specifically adolescents across the United States who had natural mentors were significantly more likely to complete high school and attend college. Klaw (2003) focused on a specific population African American adolescent's transition from pregnancy until 2 years postpartum in their investigation of the benefits natural mentorship provides. Consistent with past research on a more general sample, natural mentors facilitated positive educational outcomes, with participants with a mentor being 3.5 times more likely to remain in school and graduate. More recently, youth in foster care were the focus of mentorship and resiliency study (Ahrens et al., 2008). Data from the National Longitudinal Study of Adolescent Health was used. This study found a trend toward greater educational attainment and achievement in mentored youth, suggested that natural mentoring may influence youth in foster care in a more consistent and broad manner (Ahrens et al., 2008). In a late adolescent population, the role of natural mentorship was examined by Sanchez and colleagues (2008). Their population was a group of urban diverse Latino high school students. The presence of a mentor was shown to be related to fewer absences, higher educational expectations, and greater expectancies for success and sense of belonging.

ADHD and Resiliency Literature. An intervention program called Challenging Horizons which used mentor relationships among other supports for ADHD adolescents was found to effectively promote academic outcomes (Evans et al., 2006). A similar approach to promoting academic outcomes of ADHD youth was evaluated by Evans, Serpell, Schultz & Pastor (2007). Evans and coauthors focused on using

academic skills training along with mentors for secondary school students, finding cumulative long-term benefits to academic outcomes for this group. A trend towards improvements in GPA was demonstrated for this group.

Mentor relationships formed by adolescent ADHD girls studied over a 5 year period were shown to predict better academic achievement (Mikami & Hinshaw, 2006).

Study Skills

Education Resiliency Literature. For some time, the crucial role study habits and/or skills play in academic achievement and educational outcomes has been well-established (Aluja & Blanch, 2004; Blumner & Richards, 1997). The predictive power of individual study skills has been repeatedly demonstrated across development for healthy children as well as students with various learning disabilities (DuPaul et al., 2004; Evans et al., 2007). Further to the supported direct relationship between study habits and achievement, studies also show how study skills function as a mediator (Aluja & Blanch, 2004). Using a large sample of elementary school students, study habits were found to mediate the relationship between personality and grade point average in each course (Aluja & Blanch, 2004). This result suggests that the stronger the study habits, the higher the achievement, even considering the variety of personality variables among a sample of 887 primary school students.

Later in development, the research continues to highlight the importance of study skills. Blumner & Richards (1997) found that the better first year engineering students' scored on the study habits measure, the better academic performance they demonstrated.

ADHD and Resiliency Literature. Lead Investigators of ADHD undergraduate students assert that compensatory skills is a distinguishing factor between those at risk ADHD students who succeed and those who do not (Glutting et al., 2005). According to the education literature which demonstrates the protective function study skills provides healthy children, it appears that study skills could likely represent these compensatory skills. The recent literature on ADHD in emerging adults builds support for study skills as a strong candidate for a compensatory or protective function. DuPaul and colleagues (2004) found that study skills accounted for a significant proportion of academic achievement in 1rst, 2nd, 3rd and 4th graders with ADHD; measured by standardized reading and math tests along with grade point average. Consistent with this finding, Evans and colleagues (2007) used a 3 year intervention programs for young adolescent with ADHD targeting study skills. Specifically, individual study and learning skills such as note-taking and organization strategies were taught to these at risk students. Within year analyses displayed a trend toward improvements in student grade point average.

Continuing across development, study skills continue to positively impact academic achievement in emerging adults (Advocat et al., 2010; Glutting et al., 2005; Meaux, Green & Broussard, 2009; Murray & Wren, 2003). Larose Robertson, Roy and Leagault (1998) demonstrated that exam preparation, prioritizing studies and belief in effective work methods (each different types of study skills) accounted for approximately 15% of the variance in college GPAs after controlling for high school grades and SAT scores. In a study of undergraduates with learning disorders, self-reported study habits accounted for a significant amount of variance in students' college GPA (Murray & Wren, 2003). Self-reported study habits and GPAs of ADHD diagnosed college students were compared to non-diagnosed undergraduates in a recent study by Advocat and colleagues (2010). ADHD students were found to withdraw from more classes, and take fewer notes; study in advance for exams less, and earn a lower GPA than healthy students. In addition, ADHD students were found to be more negatively impacted by not studying ahead

for an exam than were controls. These authors suggest that considering these results, despite the disadvantage ADHD students face in terms of academic achievement, compared to control students, this disparity could be eliminated if they were able to develop effective study habits (Adovat et al., 2010).

Significance of the Proposed Study

As the research shows, subclinical ADHD is a serious problem in emerging adults beginning their college careers. The pervasive impairment caused by subclinical ADHD is demonstrated in the literature; however the literature lacks further explanation of the relationship between these symptoms and academic success. Although the impaired functioning these students experience could be similar to their full ADHD counterparts, their deficit goes unrecognized and unaided. Recent studies have just begun to consider the relationship between subclinical and full symptoms and academic achievement, along with additional variables which could contribute to achievement in this unique group. Lead investigators have called for the further study of this relationship, along with potential internal and external variables impacting this relationship (Advocat et al., 2010; Schwanz et al., 2007). This study sought to build support for a relational model between subclinical ADHD symptoms and academic functioning, by investigating the role of potential protective factors highlighted in the literature. This research served to extend and refine recent studies by using a large sample of undergraduate students, to further learn about subclinical symptoms, their relationship to academic functioning, as well as study possible variables which may serve a protective function for this vulnerable group.

III. METHODS

Participants

Participants consisted of 200 students completing post-secondary education. Healthy controls comprised 50% of the population, being 100 students. The remaining 100 undergraduate students in the population were the subclinical ADHD participant group. Students with a full ADHD diagnosis were included in the study in addition to the essential 200 students (as healthy and subclinical ADHD number breakdown described). Based on recent literature, the number of participants with subclinical ADHD symptoms was projected to range from 5-10% in this student population (Bussing et al., 2010; Gudjonsson et al., 2009). The proportion of students qualifying for a full ADHD diagnosis in the university setting was projected to range from 4-5% according to prevalence literature (Gudjonsson et al., 2009; Bussing et al., 2009; Faraone & Biederman, 2005). Given this information, the target recruitment was 800-900 students in order to attain the needed quantity of participants in each group. As the full ADHD group was included in the study, but not imperative to the study's priority research questions, there was not a specific recruitment plan to target these participants.

Participant Characteristics

Participants were college students between the ages of 18-29 years. The mean age for participants in the nonclinical group was 21.87, with a median age of 21 years. For the subclinical participants the mean age was 22 years of age, with a median of 21 years. Of the total group of participants 61% were male, and 39% were female. Participants were representative of the United States population, currently enrolled in college, and had access to the internet. Important to note, the use of internet data collection may influence the participants in that internet users tend to be more highly educated, and tend to earn a higher income. A further description of the participants' characteristics is found in Chapter IV.

Recruitment

The online data collection service Survey Monkey was used as online data collection has become an established research method (Topp & Pawloski, 2002). Participants were recruited using the online research participation service: SurveyMonkey audience. SurveyMonkey audience is a large group of people recruited by survey monkey, with nearly one million members. Member sites: SurveyMonkey Contribute and SurveyMonkey ZoomPanel were both utilized in this study. These members are recruited primarily through SurveyMonkey surveys: respondents view an advertisement when they have completed a survey. In addition, traditional online advertising is also used by partnering with websites that are advertising a service or product; viewers are asked if they would be interested in joining the online service. SurveyMonkey audience members typically receive various incentives for their participation which include: a small donation to the charity of their choice along with enrollment in a chance to win $100 sweepstakes weekly draws, or the use of non-cash point system rewards. These points can be exchanged for sweepstake entries, or gift cards. This point incentive system wherein several surveys must be completed before gaining enough points to redeem rewards is used in order to minimize responders participating purely to earn cash. SurveyMonkey uses these types of incentives in order to encourage members to answer questions honestly. New members completed a profile regarding their key demographic, attitudinal and behavioral questions which allows survey monkey audience to send them relevant surveys. The survey monkey audience is a diverse group of people who reflect the American population. SurveyMonkey audience was used to recruit members who were in the 18-29 year age range and currently enrolled in college through random selection and invitation to participate in the current study.

Assessment Instruments

Predictor Measures

ADHD symptomatology. The DSM-IV based ADHD Rating Scale is made up of the 18 DSM-IV items for ADHD (Du Paul et al., 1998). This self report instrument consists of statements relating to symptoms of ADHD and assesses symptoms in a dimensional form. Nine items relate to problems with inattention- factor 1 and 9 items relate to problems with hyperactivity/impulsiveness- factor 2. Each item is scored on a 4 point rating scale of the frequency of ADHD symptoms (0= rarely or never, 1=sometimes, 2= often, 3=very often) based on their symptoms and behavior during the past 6 months. Barkley and Murphy (1996) reworded some of these DSM-IV items in order to have the criteria more accurately reflect adult functioning since the DSM-IV ADHD criteria were based on children and adolescents. Inattention (IA) item 1 was reworded by Barkley and Murphy (1996) into 'fails to give close attention to details in work' from 'makes careless mistakes in work'. IA item 4 were reworded as 'difficulty following through on instructions' from 'fails to finish activities or work'. A Hyperactivity/Impulsivity (HI) item 1 was reworded as 'fidgets with hands or feet' from 'squirms in seat'. HI item 4 was reworded from 'difficulty to relax in leisure time' to 'difficulty relaxing during holidays or leisure time in busy and noisy environments'. The ADHD Rating Scale has been widely used in many epidemiological and clinical studies in adults in the United States and the Netherlands (APA, 1994; Barkley & Murphy, 1996; Barkley & Murphy, 2006; Gudjonnson et al., 2009).

Reliability. Magnusson and colleagues (2006) found that inter-rater reliability between the self-report form and the significant other informant report form for the ADHD Rating Scale for Adults were as follows:

Self report total score compared to total score by informant= .71

Self report Inattentiveness (IA) versus informant IA = .74

Self-report hyperactivity/impulsiveness (HI) versus informant HI score = .65

These correlations were each significant at the .01 level, supporting the reliability of this measure.

A study by Gomez used model-based latent measurement theory: a theory that shows the relationship between responses to items and the ability or trait that each item is intended to measure (IRT) to evaluate this measure. IRT was used for several analyses. Firstly, it was used to generate item information function which tells the effectiveness or reliability of the item and scale as a whole. 'Information value' represents reliability of the relevant latent traits from the mean level onward. Gomez (2010) reported that all symptoms measured by the instrument had reasonable information values indicating that the ADHD rating scale for adults possesses reasonable reliability.

IRT was used to measure item discriminations. The item discrimination parameter is the ability of an item to discriminate among people with different levels of the trait. The item discrimination parameters for each of the items measuring inattention were considered acceptable to large. A typical range of item discrimination parameters is not established since IRT is a newer approach to psychometrics; however the testing did report estimates of standard deviation values (SDs) which could be used to estimate a range. These Beta values which represent approximately 2 SD's from the mean are reported here along with the item discrimination parameters. These Beta values representing approximately 2 SD's reflect on what a ceiling figure would be for each of the item discrimination parameters.

Item discrimination Parameter values for Inattentive Items

Careless mistakes= 1.53 Beta = 2.11

Poor sustaining attention for task= 1.91 Beta = 1.60

Doesn't listen when spoken to= 1.32 Beta = 2.21

Don't follow instructions, finish work= 1.84	Beta =2.25
Difficulty organizing tasks/activities= 1.61	Beta =2.00
Avoids task involving sustained effort= 1.85	Beta = 1.24
Loses things necessary for tasks= 1.35	Beta =1.91
Easily distracted= 2.12	Beta= 0.75
Forgetful in daily activities= 1.74	Beta = 1.33

Findings on the item discrimination parameters for the hyperactive/impulsive items were classified as acceptable to large, ranging from .93 ('feeling on the go') to 2.60 ('feels restless').

Item Discrimination Parameters for Items measuring hyperactivity/impulsiveness

Fidgets/ squirms = .69	Beta = 1.36
Leaves seat when seating expected = 1.32	Beta = 1.46
Feel restless =.33	Beta = 2.60
Difficulty with leisure activities = .74	Beta = 1.35
Feels on the go = .76	Beta= .93

Overall, using various statistical item response theory methods, Gomez (2010) demonstrated that virtually all criteria were good at discriminating different levels of relevant latent traits and exhibited reasonable reliability as represented by their information values being classified as reasonable.

Content Validity. Content validity showed a Cronbach's alpha of .88 for the 18 DSM-IV adult ADHD symptoms, .75 for the hyperactive-impulsive items, and .86 for the inattentive items. Item analyses for both symptom domains found that no one item unduly influenced the reliability of the total score;

further supporting content validity (Faraone & Biederman, 2005). These alpha coefficients meet Nunally's (1978) guideline that alpha should be at least .70, as well as were near to or exceeded the threshold of .80 for qualifying an alpha coefficient as excellent (Devellis, 1991). Similar findings supporting the content validity of this measure were generated by Gomez (2010) using item response theory analyses of the adult Self-Ratings of the ADHD Rating Scale, also known as the 'Current Symptoms Scale'. Gomez (2010) reported Cronbach's alpha for each of the three factors: (Inattention) - IA- .86; HYP (Hyperactivity) - .70; and IMP (Impulsiveness) - .79. In addition, internal consistency was shown by Magnusson and colleagues (2006) to be excellent; above .80. This examination of the scale also demonstrated fair consistency within scales when comparing the well validated diagnostic interview measure the Kiddie Schedule for Schizophrenia and Affective Disorders Present and Lifetime (KSADS-PL) to the Adult Rating Scale (Magnusson et al., 2006).

Divergent validity. Divergent validity of the measure was supported by lower correlations between non corresponding ratings than corresponding ratings (Magnusson et al., 2006). Sample correlations for non corresponding scales -interview based score on IA measure compared to informant based measure of HI = .28 compared to correlation between self report IA and interview based IA score at .74. In addition, interview based HI scores had a correlation of .35 to informant based IA scores, while self reported HI and interview HI ratings had a much larger correlation of .72. Clearly, non corresponding ratings have a much lower correlation than those that do correspond, supporting the divergent validity of the Adult ADHD Rating Scale.

Predictive validity. Kooij and colleagues (2008) studied a number of self-report measures of ADHD symptoms including: the ADHD Rating Scale, the Brown attention-Deficit Disorder Scale (BADDS),

the Conners' Adult ADHD Rating Scale (CAARS), and the Diagnostic Interview Schedule-IV Section L (DIS-L). They investigated the psychometric properties of these measures in order to evaluate their value and compare effectiveness. By calculating the amount of correctly diagnosed individuals (86.6% as opposed to only 60.9% for the CAARS-LV), it was found that the ADHD rating scale proved best for predicting clinical diagnosis (Kooij et al., 2008).

Further, the ADHD rating scale was shown to possess similar predictive validity to clinical interview measures (Magnusson et al., 2006). In their investigation of The ADHD Rating Scale, Magnusson and colleagues (2006) also used an adapted adult's semi structured diagnostic interview: the Schedule of Affective Disorders and Schizophrenia for School-Age Children (K-SADS). This study demonstrated that The ADHD Rating Scale self report measure was able to predict clinical diagnosis generated by the well validated and widely used K-SADS. Receiver Operating Characteristics (ROC) curves were plotted (with ADHD diagnoses as the state variable and self-report ratings as the independent variable) to assess the ability of the measure to predict diagnoses in childhood and adulthood. The prediction of a diagnosis by the ADHD Rating Scale was reported to have a sensitivity rating of .80 and a specificity of .87, representing the strong predictive validity of this measure.

The ADHD Rating Scales' ability to predict interview-generated diagnoses with a high degree of specificity and sensitivity provides strong support for measure (Magnusson et al., 2006).

Subclinical ADHD scoring. The ADHD Rating scale has recently been scored by summing the circled values on the (0-3) 4 point likert scale, with a total possible score of 54 in a number of ADHD in college student studies (Gudjonsson, Sigurdsson, Eyjolfsdottir, Smari & Young, 2009). Following precedent set by limited research on subclinical ADHD in emerging adults, this study used Young's (2008) suggested cutoff total score of 17 to qualify for subclinical ADHD symptoms. Young and Gudjonsson studied the neuropsychological deficits among adult ADHD patients who experienced full and

partial symptoms (2008). The ADHD Rating scale was used in this investigation; with full ADHD patients scoring a minimum of 36 total or scoring 3 points on at least 6 of the nine inattentive criteria or the 9 hyperactive criteria. Subclinical patients were considered to be represented by individuals with subthreshold symptoms or symptoms 'in partial remission'. Subclinical ADHD patients were classified when symptoms from the ADHD Rating scale were rated less frequent but scored a 17 or higher on this measure. This score was determined by aggregating scores applied to each of the 18 DSM-IV symptoms (e.g., 0=never, 1=sometimes, 2= often and 3= very often). According to earlier research by Young (1999a) 17 was chosen as the cutoff score for this group since it represents 1 SD above the mean of the normal control group.

Young's suggested cutoff. A score of 17 may appear low, when the measure itself contains 18 items, and a score of one on almost every item would amount to a subclinical score. Beyond a description of an instrument, considering the clinical picture of an individual who would score 1 on 17 of the 18 items is useful to illustrate the meaning of this cutoff score; what this score represents in terms of functioning. This individual would theoretically need to report that they sometimes – not rarely or infrequently, but sometimes: fail to give close attention to details, fidget and squirm, have difficulty sustaining my attention in tasks, leave my seat in situations in which seating is expected, don't listen when spoken to directly, feel restless, don't follow through on instructions and fail to finish work, struggle to engage in leisure activities quietly, have difficulty organizing activities and tasks, feel 'driven by a motor', avoid or am reluctant to engage in work that requires sustained mental effort, talk excessively, lose things necessary for tasks, blurt out answers before questions have been completed, am easily distracted, have trouble waiting my turn, forgetful in daily activities, and interrupt or intrude on others. When picturing an individual that experiences these symptoms – all of them, we see that this is many difficulties to struggles with even if, only 'sometimes'.

Other possible scoring profiles which would fulfill the 17 cutoff score necessary to qualify as subclinical ADHD are: 'often' for 9 of these items, or 'very often' struggling with 6 of the above items. 'Very often' on 6 of these items would qualify an individual for a full ADHD diagnosis according to DSM-IV criteria. These examples illustrate the significant impairment which can be represented by a score of 17 on the ADHD Rating Scale.

Moderator Measures

Moderator variables by definition influence the relationship between a predictor and an outcome variable. As described in Chapter II, potential moderator variables for the relationship between subclinical ADHD symptoms and academic performance could be considered 'protective variables' if they were to decrease the negative predictive influence these symptoms exert over academic outcomes in college students. The resiliency research on general educational outcomes for ADHD individuals reviewed showcases certain protective factors. These were investigated as potential moderators in the subclinical ADHD and achievement relationship.

Interpersonal Skills. The interpersonal Competence Questionnaire (ICQ) was used to measure interpersonal skills (Buhrmester, Furman, Wittenberg, & Reis, 1988). This instrument consists of 40 items designed to assess five domains of interpersonal competence: (a) initiating relationships (b) disclosing personal information (c) asserting displeasure with others (d) providing emotional support and advice and (e) managing interpersonal conflict. Each item of the ICQ briefly describes a common interpersonal situation; respondents are to use a 5-point rating scale to endorse their level of competence and comfort in handling each type of situation. The ICQ yields 5 subscale scores corresponding to these domains, as well as a total score representing general social competence.

This scale was developed using a pilot study of 121 undergraduate students, using 50 items – 10 items per each of the 5 hypothesized domains of competence. Using factor analysis, 5 factors were shown to correspond to the hypothesized domains. The 40 items not used in the questionnaire were selected by using the 8 items that had the highest loadings on each the five factors. The ICQ has been used in several studies on undergraduate students, adolescents and young adults (Buhrmester et al., 1988, Graf & Harland, 2005; Herzberg et al., 1998; Kanning, 2006; Lamke, Sollie, Durbin & Fitzpatrick, 1994).

Reliability. Buhrmester and colleagues (1988) originally found that test-retest reliabilities for the five subscales at 4 weeks ranged from .69 to .89, with an average of .78. The alpha reliabilities were satisfactory in a study by Herzberg and colleagues (1998): alpha coefficients for the scales being:

Initiation: .88

Negative assertion: .83

Disclosure: .80

Emotional support: .83

Conflict management: .78

ICQ Total Score: .92

In a more recent study (Graf & Harland, 2005) internal consistency reliabilities were also demonstrated to be adequate:

Initiation: .87

Negative assertion: .85

Disclosure: .81

Emotional support: .87

Conflict management: .77

ICQ Total Score: .90

***Validity*.** Discriminant validity was demonstrated to be adequate using correlations between the ICQ and other unrelated indices. For examples, low correlations ranging from r=.05 to r= .35 were found between the ICQ and Intercultural Sensitivity Scale (ISS) (Graf & Harland, 2005).

ICQ total scores were found to predict positive social interactions in an intercultural situation as measured by the intercultural decision qualify measure (Graf & Harland, 2005); providing evidence of predictive validity.

Presence of History of a Natural Mentor. Participants were asked in questionnaire format about the presence or history of a 'natural mentor'. A natural mentor refers to a relationship not formally arranged through a social agency or educational institution. Based on the natural mentorship literature the primary question to assess for the presence of history of a mentor will be 'Other than your parents or step-parents has there been and adult who made a positive impact on your life beginning prior to your 18th birthday?' 'This person may be a teacher, relative, neighbor, clergy, family friend or someone else whom you look up to for support and guidance.

The secondary question asked the participant to report the relationship type. According to the established research on mentors, respondents who identify a spouse or partner, or a same age friend were not considered to have a mentor. This question is open ended 'How did you meet this person (for example are they are teacher? Relative? Family friend? Neighbor?)'. The 3rd question asked the participant to identify whether the relationship continues or is in the past, and then the 4th question assessed the frequency of contact with the mentor (regardless of if relationship is presently still continuing

or was in the past). This 4th and final question was phrased as follows: 'Which description best describes how often you saw or spoke with this individual for the majority of your relationship (see or speak to it is current)'. Responses to Question 4 are as follows:

a. 1X/day—1X/week

b. 1X/2weeks—1X/month

c. 1X/2months—1X/3months

d. 1—3Xs/year

Study Skills. The Motivated Strategies for Learning Questionnaire (MSLQ) was used to measure study skills. This 81 item self-report measure assesses motivation for course work, study habits, and learning skills in university students. Items on the MSLQ are scored on a 7-point Likert scale, ranging from 'not at all true of me' to 'very true of me'. Of the 81 questions that make up the questionnaire, 31 items assess motivational beliefs, 31 items focus on learning strategies and motivation, and 19 items concern resource management. Examples of items are 'In a class like this, I prefer course material that really challenges me so that I can learn new things' 'When I become confused about something for this class, I go back and try to figure it out.' I make simple charts, diagrams, or tables to help me organize course material'.

The Learning strategies scales are *Rehearsal, Elaboration, Organization, Critical Thinking, and Metacognitive Self-Regulation.* Resource Management scales are *Time and Study Environment, Effort Regulation, Peer Learning and Help Seeking.* Motivational scales are *Intrinsic Goal Orientation, Extrinsic Goal Orientation, Task Value, Control of Learning Beliefs, Self-Efficacy for Learning and Performance and Test Anxiety.*

Intrinsic goal orientation refers to the degree to which a student perceives herself to be participating in a task for reasons such as challenge, curiosity and mastery. *Extrinsic goal orientation* concerns the degree to which a student perceives herself to be participating in a task for reasons such as grades, rewards, performance, evaluation by others and competition. *Task value* on the MSLQ refers to students' perceptions of the course material in terms of interest, importance, and utility. *Control of learning beliefs* refers to students' beliefs that their efforts to learn will lead to positive outcomes. Specifically it refers to the belief that outcomes are contingent upon effort instead of external factors. *Self efficacy* for learning and performance is expectancy for success, in terms of performance expectations, and self efficacy is self-appraisal of one's ability to master a task. *Rehearsal* describes strategies such as reciting and naming items from a list to be learned. *Elaboration* strategies are used to store information into long-term memory by establishing connections between items to be learned. Examples of these strategies are summarizing, creating analogies, generative note-taking and paraphrasing. *Organization* helps the learner select appropriate information and construct connections among the information to be learned, using strategies such as outlining, selecting the main idea, and clustering. *Critical thinking* is the degree to which students report applying previous knowledge to new situations in order to make critical evaluations, make decisions, or solve problems. *Meta cognitive self-regulation* includes three general activities: planning, monitoring and regulating. Metacognition refers to awareness and control of one's cognition, the MSLQ focuses on this control process. Planning can include in depth goal setting and task analysis, monitoring is efforts to track one's attention as well as self-testing, and regulating is the ongoing adjustment of cognitive activities. *Resource management* includes time and study environment management. *Time management* refers to scheduling, planning and general management. *Study environment management* involves creating an organized, quiet, and minimal distractions atmosphere. *Effort regulation* refers to a student's ability to control their effort and attention in spite of uninteresting

tasks and distraction. *Help seeking* is a student's awareness that they do not understand something and their help seeking behavior to remedy this. Finally, *peer learning* is collaborating with one's peers in order to achieve positive results academically (Pintrich, Smith, Garcia & McKeachie, 1993).

As the Manual for the MSLQ states (Pintrich & Garcia, 1991), subscales may be used in part or as a whole in order to generate subscale scores and a total score for study skills. The subscales: help seeking, peer learning, task value, test anxiety, intrinsic motivation and extrinsic motivation were not used in the present study since they do not as purely represent study skills, and this allowed for a more reasonable length of questionnaire completion time for participants.

Reliability and internal consistency. The MSLQ has been shown to possess strong psychometric properties. In terms of internal consistency, the motivational scales (intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance and test anxiety) are a reasonable representation of the data: task value beliefs concerning how interested students were in course material and their perception of the importance of the material had a high internal reliability coefficient alpha (.90) along with self-efficacy for learning (.93), test anxiety, intrinsic goal orientation, extrinsic goal orientation, and control of learning belief had lower but adequate coefficient alphas: .80, .74, .62, .68 respectively.

Internal consistency scores for learning strategy component were slightly lower but consistently significant, with the majority above .70. Scores for scales were as follows:

rehearsal=.69

elaboration= .75

organization= .64

critical thinking=.80

metacognitive self-regulation=.79

time and study environment management=.76

effort regulation=.69

peer learning=.76

help seeking=.52

These alpha scores suggest the MSLQ possesses good reliability in terms of internal consistency. This study analyzed the Cronbach alphas' for this measure in order to further validate adequate reliability. Items will be grouped in order to increase reliability if necessary.

The majority of the scales listed above which compose the MSLQ were shown to have predictive validity as reflected by significant correlations with students' final grades. Scores above .13 were significant at the alpha = .05 level. The correlations with final grade were as follows:

intrinsic goal orientation= .25

task value =.22

control of learning beliefs =.13

self-efficacy for learning and performances =.41

test anxiety = -.27

elaboration = .22

organization = .17

critical thinking = .15

metacognitive self-regulation = .30

time and study environment management =.28

effort regulation = .32

In the event that there is missing data on the MSLQ or the ICQ scaled scores, the mean score based on the number of items answered by each individual on that scale will be used.

Demographics and previous academic achievement. In addition to these measures, participants completed a brief questionnaire containing questions about demographic information (gender, age) and past or present use of testing accommodations, their final Grade 12 GPA upon graduation from high school, a question regarding how the participant funds their education, and how many hours/week do they work, and whether a participant has ever received 'a professional diagnosis of ADD or ADHD'.

Outcome Measures

Academic Performance. Using a legend showing percentage grades, translating to letter grades, and their associated 13 point value, academic performance will be measured based on 2 questions:

(1) What is your present cumulative average using the illustrated 13 point GPA standardized grading system?

13 A+ (93-100%)
12 A (87-93%)
11 A- (80-86%)
10 B+ (77-79%)
9 B (74-76%)
8 B- (70-73%)
7 C+ (67-69%)
6 C (64-66%)
5 C- (60-63%)
4 D+ (57-59%)
3 D (54-56%)
2 D- (50-53%)
1 lower

(2) For the class you are performing best in now what grade would you estimate would be assigned to you as of today?

13 A+ (93-100%)
12 A (87-93%)
11 A- (80-86%)
10 B+ (77-79%)
9 B (74-76%)
8 B- (70-73%)
7 C+ (67-69%)
6 C (64-66%)
5 C- (60-63%)
4 D+ (57-59%)
3 D (54-56%)
2 D- (50-53%)
1 lower

Procedure

Data collection was completed using the online survey service SurveyMonkey. Participants were recruited from SurveyMonkey audience members. Survey Monkey audience members who were currently enrolled in undergraduate studies and fall in the age range of 18-29 years were selected and invited to participate. In order for participants to take part they were first required to read the information sheet describing the study in order to obtain consent. The Information Sheet detailed the purpose of the study, potential benefits and risks to participants, the time required, and the Principal Investigator (PI)'s contact information should Participants have questions or concerns. Participants were assured their participation is voluntary and that they may withdraw at anytime without consequence. Informed consent was obtained when participants read through the online information sheet and clicked their agreement to participate in order to move forward and begin answering questions. The questionnaire participants completed consisted of The ADHD Rating Scale, the MSLQ, the ICQ; the final questionnaire will be composed of the natural mentor questions, demographic questions described above, questions on covariate high school GPA, and the 2 questions regarding current academic performance. In order to ensure participants met criteria to take part and were in fact a current undergraduate student, the first

question asked was if they were currently enrolled in post-secondary education. Participants were required to endorse this in order to continue with the questions.

Survey monkey contribute retains contact with their members via email. Once a participant completed the survey the SurveyMonkey audience service would record this and provide compensation. Compensation offered to members included various options such as contributions to charities, or the individual being entered to win a fairly valuable prize, earning token points which can be redeemed for various gift cards.

A total of 363 students completed the survey. Response errors were limited by a built in survey function requiring a participant to answer each item in order to continue and complete the study. There were 13 participants removed due to errors. The subclinical group data was collected by scoring the ADHD symptoms as surveys were completed and selecting the first 100 students whose scores qualified them as having subclinical ADHD students. The 100 participants in the nonclinical group were randomly selected from the remaining 250 students using SPSS. In the event of unexpected missing data after collection for either the study skills or interpersonal skills measure, mean scores on the items which are answered will be used for each participant's score on this variable.

Research Questions

1. Is there a difference in self-reported academic achievement between male and female college students whose scores on the ADHD Self-report Scale are rated as nonclinical or subclinical?

   H_{1a}: college students who have been categorized as subclinical on the ADHD Self-report Scale will have lower self-reported academic achievement than those categorized as nonclinical on this measure

H_{1b}: Female college students will have higher self-reported academic achievement than male students

H_{1c}: The interaction for self-reported academic achievement between the level of ADHD as determined by the ADHD Self-Report Scale and gender of the college students will be statistically significant after controlling for self-reported academic achievement.

2. What is the relationship between emerging adult students' self-reported academic achievement and their scores on the ADHD Self-report Scale?

   H_2: A statistically significant negative relationship exists between self-reported academic achievement and scores on the ADHD Self-report Scale

3. Will group differences exist between the subclinical ADHD participants and the nonclinical participants in terms of: study skills, interpersonal skills, and the presence of a mentor?

   H_{3a}: a statistically significant difference in level of study skills exists between the subclinical participants and nonclinical participants

   $H3_{b:}$ a statistically significant difference in level of interpersonal skills exists between the subclinical participants and nonclinical participants

   $H3_{c:}$ a statistically significant difference in the presence of mentor involvement exists between the subclinical participants and nonclinical participants

4. Can self-reported academic achievement be predicted by personal characteristics of college students?

H_4: Self-reported academic achievement can be predicted from age, gender, employment status, formal diagnosis of ADHD, first time in any college (FTIAC) status and Grade 12 grade point average.

5. Can internal and external protective factors and levels of ADHD symptoms predict self-reported academic performance?

H_3: Higher self-reported academic performance can be predicted from lower levels of ADHD symptoms, higher scores for study skills, higher scores for interpersonal scores and presence of a mentor.

6. Based on the results of Research Question 5, can the relationship between levels of ADHD and self-reported academic achievement be moderated by the predictor variable that accounts for the greatest amount of variance in self-reported academic achievement?

H_{6a}: Study skills will be the predictor variable that accounts for the greatest amount of variance in self-reported academic achievement

$H_{6b:}$ Study skills will moderate the relationship between levels of ADHD symptoms and self-reported academic achievement.

Data Analysis

The data from the surveys was entered into a data file for analysis using IBM-SPSS Ver. 19.0. The data analysis was divided into three sections. The first section used frequency distributions and measures of central tendency and dispersion to provide a profile of the participants. The second section of the data analysis used descriptive statistics to provide baseline information about each of the scaled variables. The results of the inferential statistical analyses were then used to test the hypotheses and associated research questions presented in the third section of the statistical analysis. Factorial analysis

of covariance, Pearson product moment correlations, one-way multivariate analysis of variance, moderator analysis, and stepwise multiple linear regression analysis were used to address the research questions and hypotheses. All decisions on the statistical significance of the inferential statistical analyses were made using a criterion alpha level of .05. Table 1 presents

Table 1

Statistical Analysis

Research Questions and Hypotheses	Variables	Statistical Analysis
1. Is there a difference in self-reported academic achievement between male and female college students whose scores on the ADHD Self-report Scale are rated as nonclinical, subclinical, or full clinical?		
H_{1a}: College students who have been categorized as subclinical on the ADHD Self-report Scale will have lower self-reported academic achievement as those categorized as nonclinical on this measure achievement. H_{1b}: Female college students will have higher self-reported academic achievement than male college students . H_{1c}: The interaction for self-reported academic achievement between the level of ADHD as determined by the ADHD Self-Report Scale and gender of the college students will be statistically significant after controlling for self-reported academic	<u>Dependent Variable</u> Self-reported academic achievement • Cumulative • Estimated for 'this course' <u>Independent Variables</u> Gender ADHD Scores • Nonclinical • Subclinical	A 2 x 2 factorial multivariate analysis of variance (MANOVA) will be used to determine if there is a difference in self-reported academic achievement between male and female students and by ADHD scores. If a statistically significant difference is obtained for the main effects (gender or ADHD scores) or interaction effect (gender x ADHD scores), post hoc tests will be used to determine the direction of the differences. For gender, the mean scores will be reviewed. Scheffé post hoc tests will be used to compare all possible pairwise comparisons among the three groups.

achievement.		Simple effects analysis will be used to test for statistically significant differences on the interaction between gender and ADHD scores.
2. What is the relationship between college students' self-reported academic achievement and their scores on the ADHD Self-report Scale?		
H_2: A statistically significant negative relationship exists between self-reported academic achievement and scores on the ADHD Self-report Scale	Self-reported academic achievement ADHD Scores	Pearson product moment correlations will be used to determine the direction and magnitude of the relation between self-reported academic achievement and ADHD scores.
3. Will group differences exist between the subclinical ADHD participants and the nonclinical participants in terms of: study skills, interpersonal skills, and the presence of a mentor?		
H_{3a}: A statistically significant difference in level of study skills exists between the subclinical participants and nonclinical participants H_{3b}: A statistically significant difference in level of interpersonal skills exists between the subclinical participants and nonclinical participants H_{3c}: A statistically significant difference in the presence of mentor involvement exists between the subclinical participants and nonclinical participants	<u>Dependent Variables</u> Study Skills Interpersonal skills Presence of a mentor <u>Independent Variable</u> ADHD Group • Subclinical • Nonclinical	A one-way multivariate analysis of variance (MANOVA) will be used to determine if there is a difference in study skills, interpersonal skills, and presence of a mentor by ADHD classification (subclinical or nonclinical). If a statistically significant difference is obtained on the omnibus F test, the between subjects tests will be examined to determine which of the dependent variables is contributing to the statistically significant result. The mean scores for the participants will be examined to determine the direction of the significant differences on each of the dependent variables.
4. Can self-reported academic achievement be predicted by personal characteristics of college students?		

H_4: Self-reported academic achievement can be predicted from age, gender, number of hours worked in a typical week, formal diagnosis of ADHD, first time in any college (FTIAC) status and Grade 12 grade point average.	Criterion Variable Self-reported academic achievement Predictor Variables Age Gender Formal diagnosis of ADHD Self-reported grade 12 grade point average Employment status FTIAC	A stepwise multiple linear regression analysis will be used to determine which of the predictor variables can be used to predict or explain self-reported academic achievement. Prior to computing the stepwise multiple linear regression analysis, the categorical variables will be dummy coded for use in the analysis. Pearson product moment correlations will be used to create a correlation matrix to determine which of the predictor variables are significantly related to the criterion variables. Only those predictor variables that significantly correlated to the criterion variable will be used in the stepwise multiple linear regression analysis.
5. Can internal and external protective factors and levels of ADHD symptoms predict self-reported academic performance?		
H_5: Higher self-reported academic performance can be predicted from lower levels of ADHD symptoms, higher scores for study skills, higher scores for interpersonal scores and presence of a mentor.	Criterion Variable Self-reported academic performance Predictor Variables Levels of ADHD symptoms Study skills Interpersonal scores	A stepwise multiple linear regression analysis will be used to determine which of the predictor variables can be used to predict or explain the criterion variable.
6. Based on the results of Research Question 5, can the relationship between levels of ADHD and self-reported academic achievement be moderated by the predictor variable that accounts for the greatest amount of variance in self-reported academic achievement		
H_{6a} Study skills will have	Criterion Variable	A moderator analysis will be

accounted For the greatest amount of Variance in self-reported Academic achievement H_{6b} Study skills will moderate the Relationship between levels of ADHD and self-reported Academic achievement	Self-reported academic achievement Predictor Variable Levels of ADHD Moderator Variable Study skills	used to determine if study skills alters the relationship between self-reported academic achievement and levels of ADHD. Complete moderation is said to occur when the relationship between the criterion and predictor variable becomes nonsignificant when the moderator takes on a specific value.

CHAPTER IV

RESULTS OF DATA ANALYSIS

The results of the data analyses that were used to describe the sample and address the research questions developed for the study are presented in this chapter. The chapter is divided into three sections. The first section uses descriptive statistics to provide a profile of the participants; the second section uses descriptive statistics used to present baseline information on the scaled variables. The third section of the chapter provides results of the inferential statistical analyses used to address the research questions and test the hypotheses developed for the study.

The purpose of the study was to further learn about subclinical ADHD symptoms, their relationship to academic functioning, as well as study possible variables which may serve a protective function for the subclinical ADHD college student population.

The participants in the study were emerging adults who were attending colleges and universities nationwide. A total of 200 students, 100 subclinical for ADHD and 100 nonclinical for ADHD, who met the inclusion criteria for the study, were selected. 363 students total completed the measures, 13 were removed due to errors in their responses. Errors were limited since there was a built in function on the survey, requiring responses to each item in order for a participant to continue. The first 100 students whose scores qualified them as having subclinical ADHD symptoms were selected; the 100 nonclinical students were randomly selected using SPSS from the remaining 250 students.

This process of participant selection makes a statement about prevalence. The limited subclinical ADHD literature reviewed had reported estimated prevalence rates ranging from 10-15%, however prevalence was 27.5% of those individuals recruited for the current study. This finding of a 27.5% prevalence rate of subclinical ADHD in recruited students is significant and requires further research.

Description of the Participants

The participants completed the ADHD Rating Scale (Barkley & Murphy, 2006) to determine their group membership based on the number and frequency of ADHD symptoms. Nonclinical participants scored from 0 to 17 on the measure, subclinical participants scored 18 or greater. The students also self-reported their age on the demographic survey. Results of these analyses are presented in Table 2.

Table 2

Descriptive Statistics: ADHD Symptoms

		ADHD Symptoms			Actual Range	
Group	Number	Mean	SD	Median	Minimum	Maximum
ADHD Symptoms						
Nonclinical	100	7.91	5.09	7.50	0	17
Subclinical	100	25.70	8.98	23.00	18	54
Age of the Participants						
Nonclinical	100	21.87	2.77	21	18	29
Subclinical	99	22.00	2.93	21	18	29

Missing Age Subclinical 1

The mean score for the number and frequency of symptoms reported by the nonclinical group was 7.91 (sd = 5.09), with a median of 7.50. The range of scores for the number and frequency of symptoms for this group was from 0 to 17. The subclinical group's range of symptoms was from 18 to 54, with a median of 23 symptoms. The mean score for the number and frequency of symptoms reported by the subclinical group was 25.70 (sd = 8.98).

The mean age of the participants in the nonclinical group was 21.87 (sd = 2.77) years, with a median age of 21 years. The range of ages for the nonclinical group was from 18 to 29 years. The subclinical group had a mean age of 22 (sd = 2.93) years, with a median of 21 years. The range of ages for the subclincal group was from 18 to 29 years. One participant from the subclinical group did not provide a response to this question.

The participants were asked to provide their gender and information regarding ADHD on the survey. Their responses were crosstabulated by group, subclinical or nonclinical, for presentation in Table 3.

Table 3

Crosstabulations: Gender by Group

	Group					
	Nonclinical		Subclinical		Total	
Characteristics of the Sample	N	%	N	%	N	%
Gender						
Male	67	67.0	55	55.0	122	61.0
Female	33	33.0	45	45.0	78	39.0
Total	100	100.0	100	100.0	200	100.0
Taking medications for ADHD						
No	100	100.0	81	81.0	181	90.5
Yes	0	0.0	19	19.0	19	9.5
Total	100	100.0	100	100.0	200	100.0
Professional ADHD Diagnosis						
No	97	97.0	69	69.0	166	83.0
Yes	3	3.0	31	31.0	34	17.0
Total	100	100.0	100	100.0	200	100.0

The majority of the participants (n = 122, 61.0%) were male. This number included 67 (67.0%) in the nonclinical group and 55 (55.0%) in the subclinical group. Of the 78 (39.0%) participants who reported their gender as female, 33 (33.0%) were in the nonclinical group and 45 (45.0%) were in the subclinical

group. The majority of students (n = 181, 90.5%), including 100 (100.0%) students in the nonclinical group and 81 (81.0%) in the subclinical group were not taking medication for ADHD. Nineteen (19.0%) students in the subclinical group were taking medications for ADHD. The majority of the participants (n = 166, 83.0%), including 97 (97.0%) students in the nonclinical and 69 (69.0%) students in the clinical group had not been diagnosed with ADHD. Of the 34 (17.0%) students who indicated they had been diagnosed with ADHD, 3 (3.0%) in the nonclinical group and 31 (31.0%) in the subclinical group had been diagnosed with ADHD.

The students were asked to provide information regarding their college programs and their working status. Crosstabulations were used to summarize their responses. The results of this analysis are presented in Table 4.

Table 4

Crosstabulations: College and Work Variables

	Group					
	Nonclinical		Subclinical		Total	
College and Work Variables	N	%	N	%	N	%
First Time in Any College						
No	42	42.0	37	37.0	79	39.5
Yes	58	58.0	63	63.0	121	69.5
Total	100	100.0	100	100.0	200	100.0
Funding for Education						
Loan/Job somewhat equal	10	10.0	14	14.0	24	12.0
Majority by job	14	14.0	11	11.0	25	12.5
Majority by loans	42	42.0	32	32.0	74	37.0
Parents pay majority	34	34.0	43	43.0	77	38.5
Total	100	100.0	100	100.0	200	100.0
Number of Hours Employed						
More than 30 hours	12	12.0	11	11.0	23	11.5
20 to 30 hours	11	11.0	22	22.0	33	16.5
15 to 20 hours	10	10.0	10	10.0	20	10.0
10 to 15 hours	9	9.0	10	10.0	19	9.5
Less than 10 hours	16	16.0	8	8.0	24	12.0
Don't work	42	42.0	39	39.0	81	40.5
Total	100	100.0	100	100.0	200	100.0

The majority of the students (n = 121, 60.5%) indicated they were in college for the first time. Included in this number were 58 (58.0%) in the nonclinical group and 63 (63.0%) in the subclinical group. Of the 79 (39.5%) students who had attended college before, 42 (42.0%) were in the nonclinical group and 37 (37.0%) were in the subclinical group.

The largest group of students (n = 77, 38.5%) indicated their parents pay the majority of costs. Included in this number were 34 (34.0%) students in the nonclinical group and 43 (43.0%) in the subclinical group. Forty-two 42.0%) students in the nonclinical group and 32 (32.0%) students in the subclinical group reported the majority of their funding for college was paid for by loans. Of the 25 (12.5%) students who indicated that the majority of their funding was paid for by their jobs, 14 (14.0%) were in the nonclinical group and 11 (11.0%) were in the subclinical group. Ten (10.0%) students in the nonclinical group and 14 (14.0%) students in the subclinical group were funding their education by loans and jobs equally.

Most of the participating students (n = 81, 40.5%) were not employed during their last semester. This number included 42 (42.0%) in the nonclinical group and 39 (39.0%) in the subclinical group. Of the 23 (11.5%) students who worked more than 30 hours a week, 12 (12.0%) were in the nonclinical and 11 (11.0%) were in the subclinical group. Eleven (11.0%) students in the nonclinical group and 22 (22.0%) students in the subclinical group were employed from 20 to 30 hours a week. Twenty (10.0%) of the students, including 10 (10.0%) in the nonclinical group and 10 (10.0%) in the subclinical group, worked from 15 to 20 hours a week. Nine (9.0%) students in the nonclinical group and 10 (10.0%) students in the subclinical group were working from 10 to 15 hours a week. Of the 24 (12.0%) students who were working less than 10 hours a week, 16 (16.0%) were in the nonclinical group and 8 (8.0%) were in the subclinical group.

The participants were asked to self-report their high school grade point average, their cumulative grade point average, and their current course grade using a 13 point scale ranging from 1 for lower than a D- and 13 for A+. Their responses were summarized using descriptive statistics for presentation in Table 5.

Table 5

Descriptive Statistics: Self-reported Grade Point Averages by Group

					Range	
Group	Number	Mean	SD	Median	Minimum	Maximum
High School GPA						
Nonclinical	100	11.07	2.16	12.00	2	13
Subclinical	100	10.33	2.37	11.00	1	13
Cumulative College GPA						
Nonclinical	100	10.84	2.07	11.00	2	13
Subclinical	100	9.92	2.46	10.00	2	13
Course Grade						
Nonclinical	100	11.70	1.95	12.00	2	13
Subclinical	100	11.06	1.99	12.00	4	13

The nonclinical group self-reported their high school GPAs as 11.07 (sd = 2.16; approximately an A- average), with a median score of 12.00. The range of self-reported high school GPAs was from A+ to D-. The mean score for self-reported high school GPA for the subclinical group was 10.33 (sd = 2.37), with a median of 11.00. The range of scores for the subclinical group was from A+ to less than D-.

The participants in the nonclinical group self-reported their cumulative college GPA was 10.84 (sd = 2.07), with a median of 11.00. The GPAs for the nonclinical group ranged from A+ to D-. The subclinical group self-reported their cumulative college GPAs as 9.92 (sd = 2.46), with a median of 10.00. The range of cumulative college GPAs for the subclinical group ranged from D- to A+.

The students' self-report of their grade for the course in which they were doing best academically was 11.70 (sd = 1.95) for the nonclinical group. The median score for this course was 12.00, with a range from less than a D- to A+. The students in the subclinical group self-reported the grade for the course in which they were doing best as 11.06 (sd = 1.99), with a median score of 12.00. The range of scores for the subclinical group for this course was from D+ to A+.

The emerging adults were asked to indicate if there had been an adult who had made a positive impact in their life prior to their 18th birthday. The person, acting as a mentor, could be a teacher, relative, neighbor, clergy, family friend, or other person to whom the participant looked to for support and guidance. They were then asked to report the frequency with which they saw or spoke with this individual for the majority of their relationships. Table 6 presents results of this analysis.

Table 6

Crosstabulations: Presence or History of a Mentor by Group

	Group					
	Nonclinical		Subclinical		Total	
Presence of History of a Mentor	N	%	N	%	N	%
Presence of a Mentor						
No	31	31.0	40	40.0	71	35.5
Yes	69	69.0	60	60.0	129	64.5
Frequency of Contact						
1x/day – 1x/ week	53	53.0	43	43.0	96	48.0
1x/2 weeks – 1x/month	18	18.0	19	19.0	37	18.5
1x/2 months – 1x/3 months	8	8.0	14	14.0	22	11.0
1x3x months – yearly	21	21.0	24	24.0	45	22.5

The majority of participants in both the nonclinical (n = 69, 69.0%) and subclinical (n = 60, 60.0%) reported they either had a mentor presently or at sometime in the past. The largest group of emerging adults in both the nonclinical (n = 53, 53.0%) or subclinical (n = 43, 43.0%) groups indicated that they saw or spoke to this mentor daily or at least one time a week. Of the 37 (18.5%) participants who saw or

spoke to their mentor one time every two weeks to one time a month, 18 (18.0%) were in the clinical group and 19 (19.0%) were in the subclinical group. Eight (8.0%) participants in the clinical group and 14 (14.0%) in the subclinical group reported they saw or spoke to their mentors one time every two months to once every three months. Forty-five (22.5%) participants, including 21 (21.0%) in the nonclinical and 24 (24.0%) in the subclinical groups, saw their mentors from every three months to once a year

Description of the Scaled Variables

The responses to the surveys were scored using the author's protocols. Descriptive statistics were used to summarize the results and provide baseline information on each of the instruments. Table 7 presents results of this analysis.

Table 7: Descriptive Statistics: Scaled Variables – Baseline Information

				Actual Range		Possible Range	
Group	Number	Mean	SD	Minimum	Maximum	Minimum	Maximum
Interpersonal Skills							
Nonclinical	100	3.26	.90	1.24	5.00	1	5
Subclinical	100	3.00	.76	1.00	5.00	1	5
Motivated Strategies for Learning Questionnaire							
Time Management/ Study Environment. Management							
Nonclinical	100	35.97	5.40	18.00	54.00	8	56
Subclinical	100	33.94	6.82	16.00	56.00	8	56
Organization							
Nonclinical	100	16.83	5.84	4.00	28.00	4	28
Subclinical	100	16.23	5.20	5.00	28.00	4	28
Elaboration							
Nonclinical	100	28.41	7.20	6.00	42.00	6	42
Subclinical	100	25.75	6.50	7.00	42.00	6	42
Rehearsal							
Nonclinical	100	18.72	6.69	4.00	28.00	4	28
Subclinical	100	17.38	6.28	4.00	28.00	4	28
Critical Thinking							
Nonclinical	100	20.96	6.69	6.00	35.00	5	35
Subclinical	100	21.60	6.28	5.00	35.00	5	35
Meta-cognitive self-regulation							
Nonclinical	100	48.55	11.63	21.00	78.00	12	84
Subclinical	100	49.22	11.49	24.00	84.00	12	84
Effort regulation							
Nonclinical	100	16.05	2.92	8.00	26.00	4	28
Subclinical	100	16.72	3.64	7.00	28.00	4	28
Control of learning							
Nonclinical	100	19.80	5.01	8.00	28.00	4	28
Subclinical	100	18.11	4.35	8.00	28.00	4	28
Self-efficacy for learning							
Nonclinical	100	37.25	8.82	17.00	49.00	7	49
Subclinical	100	31.70	7.61	14.00	49.00	7	49
Total score – Study skills							
Nonclinical	100	242.54	45.50	110.00	342.00	54	378
Subclinical	100	230.65	46.00	232.70	378.00	54	378

Mean scores on the answered items for each participant were used for the Interpersonal Competence Questionnaire in order to address missing data on this measure.

The range of actual scores for the two instruments, Interpersonal Skills and Motivated Strategies for Learning, were similar to the possible range of scores. The mean scores for the subscales measuring Motivated Strategies for Learning will be used to address the research questions and associated hypotheses.

Research Questions and Hypotheses

Six research questions and associated hypotheses were tested using inferential statistical analyses. All decisions on the statistical significance of the findings were made using a criterion alpha level of .05.

Research questions 1. Is there a difference in self-reported academic achievement between male and female first year university students whose scores on the ADHD Self-report Scale are rated as nonclinical or subclinical?

H1a: First year university students who have been categorized as either full clinical or subclinical on the ADHD Self-report Scale will have lower self-reported academic achievement as those categorized as nonclinical on this measure.

H1b: Female first year university students will have higher self-reported academic achievement than male first year university students.

H1c: The interaction for self-reported academic achievement between the level of ADHD as determined by the ADHD Self-Report Scale and gender of the first year university students will be statistically significant after controlling for self-reported academic achievement.

The self-reported academic achievement as measured by college grade point average and course grade point average were used as the dependent variables in a 2 x 2 factorial multivariate analysis of variance (MANOVA). The independent variables were level of ADHD (nonclinical or subclinical) and gender (male and female). Table 8 presents results of this analysis.

Table 8

Multivariate Analysis of Variance – Self-Reported Academic Achievement by ADHD Level and Gender

Source of Variation	Hotellings Trace	F Ratio	DF	Sig	η^2
Level of ADHD	.04	3.57	2, 194	.030	.04
Gender	.01	.52	2, 194	.595	.01
Level of ADHD x Gender	.01	.42	2, 194	.660	.01

The comparison of self-reported academic achievement by level of ADHD was statistically significant, F (2, 194) = 3.57, p = .030, η^2 = .04. Self-reported academic achievement did not differ between male and female students, F (2, 194) = .52, p = .595, η^2 = .01. When the interaction between level of ADHD and gender on self-reported academic achievement was compared, no statistically significant difference was found, F (2, 194) = .42, p = .660, η^2 = .01. To determine which of the two self-reports of academic achievement (overall college GPA and course grade) were contributing to the statistically significant omnibus F for level of ADHD, the between subject effects were examined. Table 9 presents results of this analysis.

Table 9

Between Subjects Effects – Self-reported Academic Achievement by ADHD Level

Source	Sum of Squares	DF	Mean Squares	F Ratio	Sig	η^2
Overall GPA	35.90	1, 195	35.90	6.90	.009	.03
Course GPA	13.96	1, 195	13.96	3.58	.060	.02

The comparison of overall GPA by ADHD level was statistically significant, F (1, 195) = 6.90, p = .009, η^2 = .03. This result indicated that overall GPA differed significantly between participants with nonclinical and subclinical ADHD levels. The results of the comparison of course GPA between nonclinical and subclinical ADHD levels were not statistically significant, F (1, 195) = 3.58, p = .060, η^2 = .02. To further examine the differences between the subclinical group and the nonclinical group, descriptive statistics were obtained on both the overall GPA and course GPA. Table 10 presents results of this analysis.

Table 10

Descriptive Statistics – Self-reported Academic Achievement by ADHD Level and Gender

Self-reported Academic Achievement	Number	Mean	SD
Overall College GPA			
ADHD Level			
Nonclinical	99	10.86	2.07
Subclinical	100	9.92	2.46
Gender			
Male	121	10.47	2.54
Female	78	10.26	1.92
Interaction Overall College GPA x Gender			
Nonclinical male	66	10.97	2.12
Nonclinical female	33	10.64	1.98
Subclinical male	55	9.87	2.88
Subclinical female	45	9.98	1.84
Course GPA			
ADHD Level			
Nonclinical	99	11.70	1.95

Subclinical	100	11.06	1.99
Gender			
Male	121	11.51	1.95
Female	78	11.17	2.06
Interaction Overall College GPA x Gender			
Nonclinical male	66	11.88	1.86
Nonclinical female	33	11.33	2.10
Subclinical male	55	11.07	1.97
Subclinical female	45	11.04	2.04

The mean scores for overall college GPA were significantly higher for students with nonclinical ADHD levels (m = 10.86, sd = 2.07) than for students with subclinical ADHD levels (m = 9.92, sd = 2.46). Based on this result, it appears that emerging adults with nonclinical levels of ADHD symptoms self-reported better academic achievement than emerging adults with subclinical levels of ADHD. The remaining comparisons provided support for the nonsignificant findings for gender and the interaction of ADHD levels and gender on college GPA. The null hypothesis comparing academic achievement by ADHD levels is rejected, while the null hypotheses for gender and for the interaction between ADHD levels and gender are retained.

Research question 2. What is the relationship between first-year university students' self-reported academic achievement and their scores on the ADHD Self-report Scale?

H2: A statistically significant negative relationship exists between self-reported academic achievement and scores on the ADHD Self-report Scale.

Pearson product moment correlations were used to examine the strength and direction of the relationship between self-reported academic achievement (overall college GPA and course GPA) and their scores on the ADHD Self-report Scale. The results of this analysis are presented in Table 11.

Table 11

Pearson Product Moment Correlations – Self-reported Academic Achievement and ADHD Scores

Self-reported Academic Achievement	N	r	P
Overall college GPA	200	-.19	.008
Course GPA	199	-.13	.068

The correlation assessing the relationship between overall college GPA and self-reported ADHD scores was statistically significant, r = -.19, p = .008. The negative direction of the relationship indicated that emerging adults who reported a lower level of ADHD symptoms were more likely to self-report higher overall college GPAs. The correlation between course GPA and ADHD symptoms was not statistically significant, r = -.13, p = .068. This relationship, while not statistically significant, was in the same direction, with lower levels of ADHD symptoms associated with higher course GPA. Based on these findings, the null hypothesis of no relationship between self-reported academic achievement and ADHD symptoms was rejected.

3. Will group differences exist between the subclinical ADHD participants and the healthy participants in terms of study skills, interpersonal skills, and the presence of a mentor?

H3a: A statistically significant difference in level of study skills exists between the subclinical participants and healthy participants.

The total score for study skills was used as the dependent variable in a one-way ANOVA, with the ADHD level (nonclinical or subclinical) used as the independent variables. The results of this analysis are presented in Table 12.

Table 12

One-way Analysis of Variance: Study Skills by ADHD Level

Source	Sum of Squares	DF	Mean Square	F Ratio	Sig	η^2
Between Subjects	8,118.72	1	8,118.72	3.70	.056	.02
Within Subjects	434,169.49	198	2,192.78			
Total	442,288.21	199				

The results of the one-way ANOVA comparing total scores on study skills by ADHD level was not statistically significant, $F (1, 198) = 3.70$, $p = .056$, $\eta^2 = .02$. This finding indicated that emerging adults' scores for study skills did not differ relative to their ADHD statuses. To investigate differences in study skills further, the subscales of study skills were used as dependent variables in a one-way MANOVA. The independent variable in this analysis was the ADHD level of the participant. Table 13 presents results of this analysis.

Table 13

One-way Multivariate Analysis of Variance: Study Skills by ADHD Level

Hotelling's Trace	F Ratio	DF	Sig	η^2
.30	6.35	9, 190	<.001	.23

The results of the one-way MANOVA used to compare the 10 subscales measuring study skills by ADHD level was statistically significant, $F (10, 189) = 6.35$, $p < .001$, $\eta^2 = .23$. This result indicated that a statistically significant difference exists between emerging adults who have nonclinical ADHD symptoms and those that have subclinical symptoms. The effect size of .23 was moderate, indicating that the finding has some practical significance in addition to the statistical significance. To determine which of the

subscales were contributing to the statistically significant result on the MANOVA, the one-way ANOVAs were examined. Table 14 presents results of this analysis.

Table 14

One-Way ANOVAs: Study Skills by ADHD Level

Study Skills	Sum of Squares	DF	Mean Squares	F Ratio	Sig	η^2
Time management/Study environment management	206.05	1, 198	206.05	5.44	.021	.03
Organization	18.00	1, 198	18.00	.59	.444	.01
Elaboration	356.00	1, 198	356.00	7.57	.006	.04
Rehearsal	89.78	1, 198	89.78	3.22	.074	.02
Critical thinking	20.48	1, 198	20.48	.49	.486	.01
Meta-cognitive self-regulation	22.45	1, 198	22.45	.17	.682	.01
Effort regulation	22.45	1, 198	22.45	2.06	.153	.10
Control of learning	142.81	1, 198	142.81	6.49	.012	.03
Self-efficacy for learning	1,540.13	1, 198	1,540.13	22.71	<.001	.10

Four of the 9 subscales produced statistically significant outcomes. A statistically significant difference was obtained for the subscale measuring time management/study environment management between the two groups, $F (1, 198) = 5.44$, $p = .021$, $\eta^2 = .03$. The results of the between subjects comparison for elaboration between the emerging adults at the two ADHD levels was statistically significant, $F (1, 198) = 7.57$, $p = .006$, $\eta^2 = .04$. When control of learning was used as the dependent variable, the difference between emerging adults at the two ADHD levels was statistically significant, $F (1, 198) = 6.49$, $p = .012$, $\eta^2 = .03$. The comparison of scores for self-efficacy for learning between the two groups of emerging adults was statistically significant, $F (1, 198) = 22.71$, $p < .001$, $\eta^2 = .10$. The other five subscales, organization, rehearsal, critical thinking, meta-cognitive self-regulation, and effort

regulation, did not differ significantly between the emerging adults with nonclinical ADHD symptoms and subclinical ADHD symptoms. To determine the direction of the differences between the two groups of emerging adults, descriptive statistics were obtained for the total score and each of the 10 subscales measuring study skills. Table 15 presents results of this analysis.

Table 15

Descriptive Statistics: Study Skills by ADHD Level

	ADHD Level					
	Nonclinical			Subclinical		
Study Skills	N	M	SD	N	M	SD
Total Score	100	247.92	46.59	100	235.17	47.06
Time management/Study environment management	100	35.97	5.40	100	33.94	6.82
Organization	100	16.83	5.84	100	16.23	5.20
Elaboration	100	28.41	7.20	100	25.75	6.50
Rehearsal	100	18.72	5.69	100	17.38	4.83
Critical thinking	100	20.96	6.69	100	21.60	6.28
Meta-cognitive self-regulation	100	48.55	11.63	100	49.22	11.49
Effort regulation	100	16.05	2.92	100	16.72	3.64
Control of learning	100	19.80	5.01	100	18.11	4.35
Self-efficacy for learning	100	42.62	10.12	100	36.23	8.86

The total score was higher for emerging adults with nonclinical ADHD symptoms (m = 247.92, sd = 46.59) than for emerging adults with subclinical ADHD symptoms (m = 235.17, sd = 47.06), although this difference was not statistically significant. The mean scores for time management/study environment management differed significantly between emerging adults with nonclinical ADHD symptoms (m = 35.97, sd = 5.40) and those with subclinical symptoms (m = 33.94, sd = 6.82). The comparison of scores on elaboration indicated that emerging adults with nonclinical ADHD symptoms (m = 28.41, sd = 7.20) and emerging adults with subclinical ADHD symptoms (m = 25.75, sd = 6.50) was statistically significant. The

mean scores for control of learning differed significantly between emerging adults with nonclinical ADHD symptoms (m = 19.80, sd = 5.01) and emerging adults with subclinical ADHD symptoms (m = 18.11, sd = 4.35). A statistically significant difference was obtained for the comparison of mean scores for self-efficacy for learning between emerging adults with nonclinical symptoms (m = 42.62, sd = 10.12) and those with nonclinical symptoms (m = 36.23, sd = 8.86). The remaining subscales did not differ between the two groups. Based on these mixed findings on the comparison of study skills and associated subscales, the null hypothesis cannot be rejected.

H3b: A statistically significant difference in level of interpersonal skills exists between the subclinical participants and nonclinical participants.

The scores for interpersonal skills were used as the dependent variable in a one-way analysis of variance, with the ADHD status used as the independent variable. The results of this analysis are presented in Table 16.

Table 16

One-way Analysis of Variance: Interpersonal Skills by ADHD Level

Source	Sum of Squares	DF	Mean Square	F Ratio	Sig	η^2
Between Subjects	733.45	1	733.45	6.34	.013	.03
Within Subjects	22,918.51	198	115.75			
Total	23,651.96	200				

The results of the one-way ANOVA used to compare scores for interpersonal skills by ADHD level was statistically significant, F (1, 198) = 6.34, p = .013, η^2 = .03. This result indicated that emerging adults with nonclinical ADHD symptoms differed from emerging adults with subclinical ADHD symptoms. Table 17 presents the descriptive statistics for interpersonal skills by group.

Table 17

Descriptive Statistics: Interpersonal Skills by ADHD Level

Group	N	M	SD
Nonclinical	100	45.43	11.49
Subclinical	100	41.60	9.98

The mean scores for interpersonal skills were higher for emerging adults with nonclinical ADHD symptoms (m = 45.43, sd = 11.49) than for emerging adults with subclinical ADHD symptoms (m = 41.60, sd =9.98). Based on these findings, the null hypothesis of no difference for interpersonal skills between emerging adults with nonclinical ADHD symptoms and those with subclinical symptoms was rejected.

H3c: A statistically significant difference in the presence of mentor involvement exists between the subclinical participants and nonclinical participants.

The emerging adults were asked if they had a mentor who had a positive effect on their life. Their responses were crosstabulated by ADHD level. The results of this analysis are presented in Table 18.

Table 18

Crosstabulations: Presence or History of a Mentor by Group

	Group					
	Nonclinical		Subclinical		Total	
Presence of History of a Mentor	N	%	N	%	N	%
Presence of a Mentor						
No	31	31.0	40	40.0	71	35.5
Yes	69	69.0	60	60.0	129	64.5
χ^2 (1) = 1.40, p = .237						

The majority of the participants (n = 129, 64.5%) indicated they had a mentor either previously or at the present time. This number included 69 (69.0%) in the nonclinical group and 60 (60.0%) in the subclinical group. The results of the chi-square test for independence used to test the association between the absence/presence of a mentor and ADHD group was not statistically significant, $\chi 2$ (1) = 1.40, p = .237. Based on this finding, the null hypothesis of no difference was retained.

4. Can self-reported academic achievement be predicted by personal characteristics of first year university students?

H4: Self-reported academic achievement can be predicted from age, gender, number of hours worked in a typical week, formal diagnosis of ADHD, high school grade point average, and first time in any college (FTIAC) status.

Pearson product moment correlations were used to determine the strength and direction of the relationships between the criterion variables, self-reported academic achievement and the demographic variables. Table 19 provides the results of this analysis.

Table 19

Pearson Product Moment Correlations – Study Variables

	Criterion Variables					
	Cumulative Grade Point Average			Course Grade Point Average		
Predictor Variables	n	r	p	n	r	P
Age	199	.03	.715	198	-.08	.255
Gender	200	-.04	.547	199	-.09	.233
High school grade point average	200	.44	<.001	199	.29	<.001
Diagnosed with ADHD	200	-.18	.009	199	-.09	.193
First time in any college	200	-.05	.493	199	.01	.955
Number of hours worked	200	.05	.462	199	.17	.018

Statistically significant correlations were obtained between cumulative grade point average and high school grade point average ($r = .44$, $p < .001$) and diagnosed with ADHD ($r = -.18$, $p = .009$. Course grade point average was significantly correlated with high school grade point average ($r = .29$, $p < .001$) and number of hours worked ($r = .17$, $p = .018$). These variables were used in subsequent stepwise multiple linear regression analysis for this research question.

A stepwise multiple linear regression analysis was used to determine which of the predictor variables (age, gender, ethnicity, number of enrolled credit hours, number of hours worked in a typical week, formal diagnosis of ADHD, high school grade point average, and FTIAC status) could predict cumulative grade point average. The results of this analysis are presented in Table 20.

Table 20

Stepwise Multiple Linear Regression Analysis: Self-reported Cumulative Grade Point Average

Predictor	Constant	b Weight	ß-Weight	Δ r^2	t-Value	Sig
Included Variables						
High school grade point average	5.66	.44	.44	.19	6.84	<.001
Excluded Variables						
Age			.12		1.83	.069
Gender			.01		.15	.883
Diagnosed with ADHD			-.08		-1.26	.210
FTIAC status			-.09		-1.43	.156
Employment status			.02		.24	.810
Multiple R	.44					
Multiple R^2	.19					
F Ratio	46.84					
DF	1, 198					
Sig	<.001					

One predictor variable, high school grade point average, entered the stepwise multiple linear regression equation, accounting for 19% of the variance in self-reported cumulative grade point averages, $F (1, 198) = 46.84$, $p < .001$. The remaining predictor variables did not enter the stepwise multiple linear

regression equation, indicating they were not statistically significant predictors of self-reported cumulative grade point averages.

A second stepwise multiple linear regression analysis was completed using the same set of predictor variables (age, gender, ethnicity, number of enrolled credit hours, number of hours worked in a typical week, formal diagnosis of ADHD, high school grade point average, and FTIAC status). The criterion variable in this analysis is self-reported course grades. Table 21 presents results of this analysis.

Table 21

Stepwise Multiple Linear Regression Analysis: Self-reported Course Grade Point Average

Predictor	Constant	b Weight	ß-Weight	Δ r^2	t-Value	Sig
Included Variables						
High school grade point average	8.16	.24	.28	.08	4.11	<.001
Employment status		.15	.14	.02	2.12	.035
Excluded Variables						
Age			.01		-.04	.967
Gender			-.04		-.59	.553
Diagnosed with ADHD			-.01		-.04	.971
FTIAC status			-.03		-.40	.693
Multiple R	.32					
Multiple R^2	.10					
F Ratio	11.50					
DF	2, 197					
Sig	<.001					

Two predictor variables, high school grade point average and employment status entered the stepwise multiple linear regression equation, explaining 10% of the variance in self-reported course grades, $F (2, 197) = 11.50$, $p < .001$. High school grade point average entered the stepwise multiple linear regression equation first, accounting for 8% of the variance in self-reported course grades, ß = .24, $\Delta r^2 = .08$, $t = 4.11$, $p < .001$. Employment status entered the stepwise multiple linear regression equation explaining an additional 2% of the variance in self-reported course grades, ß = .14, $\Delta r^2 = .02$, $t = 2.12$, $p = .035$. The remaining predictor variables did not enter the stepwise multiple linear regression equation,

indicating they were not statistically significant predictors of self-reported course grades. Based on these findings, the null hypothesis of no relationship is rejected.

5. Can internal and external protective factors and levels of ADHD symptoms predict self-reported academic performance?

H_5: Higher self-reported academic performance can be predicted from lower levels of ADHD symptoms, higher scores for study skills, higher scores for interpersonal scores and presence of a mentor.

Prior to completing the stepwise multiple linear regression analyses, a correlation matrix was developed for the criterion and predictor variables included in the analyses. Results of this analysis are presented in Table 22.

Table 22

Pearson Product Moment Correlations – Study Variables

	Criterion Variables					
	Cumulative Grade Point Average			Course Grade Point Average		
Predictor Variables	n	r	p	n	r	P
ADHD symptoms	200	-.19	.008	199	-.13	.068
Interpersonal skills	200	.16	.025	199	.19	.009
Presence of a mentor	200	.08	.251	199	.18	.010
Time management/Study Environment	200	.27	<.001	199	.16	.025
Organization	200	.22	.002	199	.13	.070
Elaboration	200	.23	.001	199	.21	.003
Rehearsal	200	.14	.050	199	.17	.016
Critical thinking	200	.15	.030	199	.21	.003
Meta-cognitive self-regulation	200	.19	.007	199	.08	.243
Effort regulation	200	.05	.490	199	.03	.698
Control of learning	200	.07	.327	199	.19	.009
Self-efficacy for learning	200	.33	<.001	199	.35	<.001
Total score for study skills	200	.26	<.001	199	.23	.001

Statistically significant correlations were obtained between cumulative grade point average and ADHD symptoms ($r = -.19$, $p = .008$), interpersonal skills ($r = .16$, $p = .025$), time management/study environment ($r = .27$, $p = < .001$), organization ($r = .22$, $p = .002$), elaboration ($r = .23$, $p = .001$), rehearsal ($r = .14$, $p = .050$), critical thinking ($r =.15$, $p = .030$), meta-cognitive self-regulation ($r = .19$, $p = .007$), self-efficacy ($r = .33$, $p < .001$), self-efficacy for learning ($r = .33$, $p < .001$). The correlations between course grade point average and interpersonal skills ($r = .19$, $p = .009$), presence of a mentor ($r = .18$, $p = .010$), time management/study environment ($r = .16$, $p = .025$), elaboration ($r = .21$, $p = .003$), rehearsal ($r = .17$, $p = .016$), critical thinking ($r = 21$, $p = .003$), control of learning ($r = .19$, $p = .009$), self-efficacy for learning

(r = .35, p < .001), and total score for study skills (r = .23, p = .001). These variables were used in subsequent stepwise multiple linear regression analyses.

Self-reported cumulative grade point average (GPA) was used as the criterion variable in a stepwise multiple linear regression analysis. The predictor variables in this analysis were ADHD symptoms, presence of a mentor, total score for study skills, and interpersonal skills. Table 23 presents results of this analysis.

Table 23

Stepwise Multiple Linear Regression Analysis: Self-reported Cumulative Academic Performance (Total Score for Study Skills)

Predictor	Constant	b Weight	ß-Weight	Δ r^2	t-Value	Sig
Included Variables						
Total score for study skills	7.95	.01	.26	.07	3.82	<.001
ADHD symptoms		-.04	-.19	.03	-2.73	.007
Excluded Variables						
Presence of a mentor			.05		.76	.446
Interpersonal skills			-.01		-.17	.865

Multiple R	.32
Multiple R^2	.10
F Ratio	11.20
DF	2, 197
Sig	<.001

Two predictor variables, total score for study skills and ADHD symptoms, entered the stepwise multiple linear regression equation, accounting for 10% of the variance in self-reported cumulative academic performance, F (2, 197) = 11.20, p < .001. This result indicated that the two predictor variables were explaining a statistically significant amount of variance in self-reported cumulative academic performance. The total score for study skills entered the stepwise multiple linear regression equation first, accounting for 7% of the variance in self-reported cumulative academic performance, ß = .26, Δr^2 = .07, t = 3.82, p < .001. ADHD symptoms entered the stepwise multiple linear regression analysis, explaining an

additional 3% of the variance in self-reported cumulative academic performance, ß = -.19, Δr^2 = .03, t = -2.73, p = .007. The negative relationship between ADHD symptoms and self-reported cumulative academic performance indicated that greater intensity of ADHD symptoms was associated with lower self-reported cumulative academic performance. The remaining predictor variables, presence of a mentor and interpersonal skills, did not enter the stepwise multiple linear regression equation, indicating they were not statistically significant predictors of self-reported cumulative academic performance.

A stepwise multiple linear regression analysis was used to determine if higher self-reported academic performance could be predicted from lower levels of ADHD symptoms, higher scores for each of the nine subscales measuring study skills, higher scores for interpersonal scores and presence of a mentor. Results of this analysis are presented in Table 24.

Table 24

Stepwise Multiple Linear Regression Analysis: Self-reported Cumulative Academic Performance (Subscale Scores for Study Skills)

Predictor	Constant	b Weight	ß-Weight	Δ r^2	t-Value	Sig
Included Variables						
Self-efficacy for learning	8.08	.11	.47	.11	5.65	<.001
Control of learning		-.11	-.21	.03	-2.56	.011
Excluded Variables						
AHDH symptoms			.09		-1.27	.207
Time management/Study environment management			.11		1.27	.205
Organization			.09		1.16	.246
Elaboration			.02		.20	.839
Rehearsal			-.09		-1.01	.312
Critical thinking			-.01		-.16	.871
Meta-cognitive self-regulation			.07		.95	.344
Effort regulation			-.09		-1.24	.218
Interpersonal skills			.01		.12	.909
Presence of a mentor			.06		.82	.412

Multiple R	.38
Multiple R^2	.14
F Ratio	16.54
DF	2, 197

Sig	<.001

Two of the study skills, self-efficacy for learning and control of learning, entered the stepwise multiple linear regression equation, explaining 14% of the variance in self-reported cumulative academic performance, $F (2, 197) = 16.54$, $p < .001$. This result indicated that the two predictors were accounting for a statistically significant amount of variance in self-reported cumulative academic achievement. Self-efficacy for learning entered the stepwise multiple linear regression equation, accounting for 11% of the variance in self-reported cumulative academic achievement, ß = .47, $\Delta r^2 = .11$, $t = 5.65$, $p < .001$. An additional 3% of the variance in self-reported cumulative academic achievement was accounted for by control of learning, ß = -.21, $\Delta r^2 = .03$, $t = -2.56$, $p = .011$. The negative direction of the relationship between control of learning and self-reported cumulative academic achievement, indicated that students who had lower control of learning tended to have higher self-reported cumulative academic achievement. The remaining predictor variables did not enter the stepwise multiple linear regression equation, indicating they were not statistically significant predictors of self-reported academic achievement.

A stepwise multiple linear regression analysis was used to determine if ADHD symptoms, total scores for study skills, presence of a mentor, and interpersonal skills could be used to predict the criterion variable, self-reported course grades. The results of this analysis are presented in Table 25.

Table 25

Stepwise Multiple Linear Regression Analysis: Self-reported Course Grades (Total Score for Study Skills)

Predictor	Constant	b Weight	ß-Weight	Δ r^2	t-Value	Sig
Included Variables						
Total score for study skills	8.00	.01	.22	.05	3.19	.002
Presence of a mentor		.70	.17	.03	2.47	.015
Excluded Variables						
ADHD symptoms			-.12		-1.68	.094
Interpersonal skills			.05		.64	.523

Multiple R	.28
Multiple R^2	.08
F Ratio	8.67
DF	2, 197
Sig	<.001

A total of 8% of the variance in self-reported course grades was explained by two predictor variables, total score for study skills and presence of a mentor, F (2, 197) = 8.67, p < .001. This result provides evidence that the two predictor variables were accounting for a statistically significant amount of variance in self-reported academic achievement. Total score for study skills entered the stepwise multiple linear regression equation first, accounting for 5% of the variance in self-reported course grades, ß = .22, Δr^2 = .05, t = 3.19, p =.002. Presence of a mentor entered the stepwise multiple linear regression equation, accounting for an additional 3% of the variance in self-reported course grades, ß = .17, Δr^2 = .03, t = 2.47, p =.015. The remaining predictor variables, ADHD symptoms and interpersonal skills, were not statistically significant predictors of self-reported course grades.

Self-reported course grades were used as the criterion variable in a stepwise multiple linear regression analysis. The predictor variables in this analysis were the presence of a mentor, ADHD symptoms, the nine subscales measuring study skills, and interpersonal skills. Table 26 presents results of this analysis.

Table 26

Stepwise Multiple Linear Regression Analysis: Self-reported Course Grades (Subscale Scores for Study Skills)

Predictor	Constant	b Weight	ß-Weight	Δ r^2	t-Value	Sig
Included Variables						
Self-efficacy for learning	7.81	.07	.33	.12	4.97	<.001
Presence of a mentor		.60	.14	.02	2.17	.031
Excluded Variables						
AHDH symptoms			-.04		-.53	.594
Interpersonal skills			<.01		-.01	.996
Time management/Study environment management			-.10		-1.16	.247
Organization			-.06		-.75	.454
Elaboration			-.09		-.94	.350
Rehearsal			-.07		-.81	.420
Critical thinking			.03		.43	.669
Meta-cognitive self-regulation			-.10		-1.42	.159
Effort regulation			-.08		-1.12	.263
Control of learning			-.05		-.64	.520

Multiple R	.38
Multiple R^2	.14
F Ratio	16.18
DF	2, 197
Sig	<.001

Two independent variables, self-efficacy for learning and presence of a mentor, entered the stepwise multiple linear regression equation, accounting for 14% of the variance in self-reported course grades, $F (2, 197) = 16.18$, $p < .001$. Self-efficacy for learning entered the stepwise multiple linear regression equation first, explaining 12% of the variance in self-reported course grades, ß = .33, $\Delta r^2 = .12$, $t = 4.97$, $p < .001$. An additional 2% of the variance in self-reported course grades was explained by presence of a mentor, ß = .14, $\Delta r^2 = .02$, $t = 2.17$, $p = .031$. The positive direction of the relationships between the predictor variables and the criterion variable indicated that higher scores for self-efficacy for learning and having a mentor were associated with higher self-reported course grades. The remaining predictor variables did not enter the stepwise multiple linear regression equation, indicating they were not

statistically significant predictors of self-reported course grades. Based on the findings of these analyses, the null hypothesis of is rejected.

6. Based on the results of Research Question 5, can the relationship between levels of ADHD and self-reported academic achievement be moderated by the predictor variable from the regression analyses that accounts for the greatest amount of variance in self-reported academic achievement?

H_6: Study skills will moderate the relationship between levels of ADHD symptoms and self-reported academic achievement.

ADHD symptoms were used as the predictor variable in a moderator analysis, with self-reported cumulative grade point average used as the criterion variable. The total score for study skills was used as the moderating variable in this analysis since this variable accounted for the most variance in academic achievement. Table 27 presents results of this analysis.

Table 27

Moderation Analysis – Study Skills as the Predictor Variable

Study skills moderate the relationship between levels of ADHD and	b	SE_b	B
Self-reported Cumulative Grade Point Average	-.17	.04	-.83**

**p < .01

The results of the moderating analysis were statistically significant; indicating that study skills was moderating the relationship between ADHD symptoms and cumulative grade point average. Based on these findings, the null hypothesis was rejected.

Summary

Chapter 4 has presented the results of the statistical analyses that were used to describe the sample and address the research questions posed for the study. A discussion of the findings, along with recommendations for practitioners and further research are included in Chapter 5.

CHAPTER V

DISCUSSION

Subclinical ADHD is just beginning to be recognized as a significant problem for emerging adults. Most of the limited research on this topic indicates that individuals with subclinical ADHD experience impairment equal to that of their full ADHD counterparts. Studies have also demonstrated that because subclinical young adults often are unidentified and therefore unaided, the consequences to their academic development are substantial.

The purpose of this study was to extend and refine recent research by using a large sample of college students to learn about subclinical ADHD symptoms and their relationship to academic functioning. This study sought to examine a possible relational model between these two variables by investigating potential protective factors suggested in the literature such as interpersonal skills, presence of a mentor, and study skills.

Findings provided valuable information and insight on the dynamics of the subclinical ADHD relationship to achievement. The goals of investigating potential protective factors for subclinical ADHD undergraduate students, adding to this relational model and assessing for moderation functions were achieved. The contributions this study offers to the subclinical ADHD research will be discussed, along with the significance and practical implications of these findings. Finally, limitations and suggestions for future research will be reviewed.

Findings and Implications

Subclinical ADHD and Nonclinical ADHD Group Differences

Three subhypotheses were developed to address the first research question, "Is there a difference in self-reported academic achievement between male and female first year university students whose scores on the ADHD Self-report Scale are rated as nonclinical or subclinical?" The first subhypothesis examined group differences in academic achievement between emerging adult college students with subclinical ADHD and those who were nonclinical. The finding that emerging adult college students with subclinical ADHD had significantly lower self-reported academic achievement than nonclinical participants supported previous research (Miyakawa, 2001; Norwalk et al., 2008; Shaw-Zirt, 2005). This significant group difference could reflect the academic impairment that subclinical ADHD individuals face. Based on this statistically significant difference, the null hypothesis was rejected. The second subhypothesis compared male and female emerging college students on academic achievement, with the interaction between group and gender tested in the third subhypothesis. No significant gender differences were found for academic achievement, and no significant interaction was demonstrated between ADHD symptoms and gender, therefore in this case, the null hypotheses were retained.

Subclinical ADHD and Academic Achievement Relationship

The relationship between subclinical ADHD symptoms and self-reported academic achievement was tested in the second research question, "What is the relationship between first-year university students' self-reported academic achievement and their scores on the ADHD Self-report Scale?" Consistent with previous research, a significant negative relationship was shown to exist between subclinical ADHD symptoms and self-reported academic achievement (Du Paul et al., 2001; Norwalk et al., 2008). The direction of this relationship indicated that emerging adults with lower self-reported

subclinical ADHD symptoms were more likely to have higher cumulative grade point averages (GPA). The correlation assessing the relationship between symptoms and cumulative GPA was r=-.19, p=.008, while the correlation for symptoms and course grade was not statistically significant at r=-.13, p=.068. Given that the direction of the relationship remained consistent for the course grade variable, it did not contradict the significant finding for cumulative GPA; therefore the null hypothesis was rejected.

Subclinical and Nonclinical ADHD Participants: Protective factor Group Differences

The third research question, "Will group differences exist between the subclinical ADHD participants and the healthy participants in terms of: study skills, interpersonal skills, and the presence of a mentor?" was tested using three subhypotheses. Protective factors: study skills, interpersonal skills, and presence of a mentor had been shown to promote resilience in individuals with full ADHD pathology (Wolf, 1999; Vance, Fernandez & Biber, 1998; Murray & Wren, 2003). Many studies found that ADHD and subclinical ADHD individuals exhibit deficits in study skills and interpersonal skills (Gudjonsson et al., 2009; Heiligenstein et al., 1999; Norvilitis et al., 2010). Extending these findings, this study found that significant subclinical versus nonclinical group differences in these protective factors do exist.

Study Skills. As hypothesized, a statistically significant group difference was found between nonclinical participants and subclinical ADHD participants in terms of their study skills. Subclinical participants were shown to have significantly lower levels of the following study skills: elaboration, management of time, and study environment, control of learning beliefs, and self-efficacy for learning. But since total study skills and the other study skills subcategories: organization, rehearsal, critical thinking, meta-cognitive self-regulation, and effort regulation were not found to differ significantly, the null hypothesis was retained. This finding provided mixed support for the hypothesis that the groups would

differ significantly in terms of level of study skills. The finding that subclinical ADHD students had lower levels of elaboration, time and study environment management, control of learning beliefs and self-efficacy for learning supported previous research which showed that this group lacks important study skills (Murray & Wren, 2003; Reaser et al., 2007; Spinella & Miley, 2003). These studies identified procrastination and time management as being deficient in students with ADHD. Importantly, the effect size for the one-way MANOVA used to compare the 10 study skills subscales by ADHD level was considered moderate = .23, indicating that the study skills difference between these groups also had practical significance. This finding contributed to the subclinical ADHD body of research in terms of offering practical significance, as well as breaking down study skills into specific skill sets, and demonstrating which sets represent the important skill gaps seen in subclinical ADHD students.

Interpersonal skills. Previous findings on interpersonal skills in ADHD individuals have been slightly mixed. While no significant connection was found between subclinical ADHD and social functioning in college students in one study (Norwalk et al., 2009), Gudjonsson and colleagues found that subclinical ADHD was related to social functioning problems in a college student population (2009). The current study found support for this link by showing that subclinical ADHD participants had a lower level of self-reported interpersonal skills. Given this finding, the null hypothesis that there would be no difference for interpersonal skills for adults with nonclinical symptoms and subclinical ADHD symptoms was rejected. This result indicated that emerging adults with subclinical ADHD symptoms experience significant social impairment.

Mentor involvement. Although previous mentor research established that the involvement of a mentor promoted resiliency for at risk ADHD youth, there is no current empirical support for subclinical ADHD individuals differing from nonclinical individuals on this factor (Du Paul et al., 2009; Mikami & Hinshaw, 2003, Scholl & Mooney, 2004; Vance et al., 1998). In line with this, the current study did not demonstrate support for subclinical to nonclinical group differences in terms of mentor involvement; therefore the null hypothesis was retained.

Personal characteristics and Academic achievement

The fourth research question "Can personal characteristics predict self-reported Academic achievement in college students?" investigated: age, gender, number of hours worked in a typical week, formal ADHD diagnosis, high school grade point average, and first time in any college (FTIAC) status. Only 2 personal traits emerged as predictors: high school GPA and hours worked.

As expected, high school GPA predicted both cumulative GPA (accounting for 19% variance) as well as course grade (accounting for 8% of the variance). Employment status: hours worked in a typical week predicted course GPA explaining 2% of the variance.

Subclinical ADHD Symptom Prevalence

Previous studies on subclinical ADHD have reported prevalence rates ranging from 5% (Bussing et al., 2010) to 10% (Gudjonsson et al., 2009). Based on these findings, an unexpectedly high prevalence rate was found. A total of 363 students were recruited for the current study. From the 363 students, 100 were found to qualify as having subclinical ADHD symptoms representing a prevalence of 27.5% of students with subclinical ADHD symptoms in those recruited. For the purpose of examining this unexpectedly high prevalence rate, these two studies (Bussing et al., 2010, Gudjonsson et al., 2009) will

be compared with the current in terms of instruments used to measure ADHD, criterion for qualifying a participant as having subclinical ADHD symptoms, and participant populations.

Bussing and colleagues (2010). Bussing and colleagues (2010) completed a longitudinal study of students throughout high school years, ending in their senior year. Using the Diagnostic Interview Schedule for Children (DISC-4) and the Schedule of Affective Disorders and Schizophrenia for School-Aged Children, Present and Lifetime (KSADS-PL) participants and their parents were interviewed in order to measure ADHD symptoms. Participants qualified as low risk, subthreshold ADHD or subclinical ADHD, or full ADHD. Subclinical ADHD participants were required to endorse at least 4 or 5 of the 9 inattentive criteria, or 4 or 5 of the hyperactive/impulsive criteria. This requirement for subclinical ADHD classification is stringent in comparison to the present study and other recent work (Gudjonsson et al., 2009). If we consider an individual who endorses that they very often have 3 inattentive and 3 hyperactive impulsive, (a score of 18 by the current study's standards) the clinical picture suggests they are experiencing impairment enough to warrant subclinical ADHD classification. Participants were selected from a diverse community sample of students in a Florida school district. There were 332 participants total, with 5% being considered to have subclinical ADHD symptoms. The average age for participants upon study completion was 17 years. Of the sample 50% were considered to be living in poverty as indicated by entitlement to subsidized lunches, and 56% were female.

Gudjonsson and colleagues (2009). This research group sampled participants entirely from the University of Iceland with participants being 29% male and 70% female. This predominantly female participant pool may have influenced the subclinical ADHD prevalence rate found since research has established a higher reported occurrence of ADHD symptoms in males (Barkley, 1990). Another note on the population is that the mean age of male participants was 22.5 and the mean age of the female participants was 23.7. The age of these participants could reflect a population of students who are in their

3rd or 4th year of a degree. Since ADHD individuals are less likely to be successful in college (Barkley, 2006; 2008) it could be argued that there could naturally be less prevalence of subclinical ADHD students in this group of participants. Participants were approached in class and required to complete paper pencil self-report questionnaires. Similarly to the current study, the Adult ADHD Rating Scale was used to measure symptoms. This measure is an 18 –item questionnaire consisting of statement relating to symptoms of ADHD, using a 4-point rating scale of frequency of symptoms *(*0=*never,* 1= *sometimes,* 2= *often,* 3= *very often)*. Also similarly to the present study, the cutoff score of 17 suggested by Young (1999) was used to classify an individual as having subclinical ADHD. This cutoff was suggested by additional previous work (Young & Gudjonsson, 2008) which examined the neuropsychological deficits of patients with partial and full ADHD symptoms. This cutoff score represents a score that is 1 standard deviation above the mean on this scale.

Current Study. The current study used the Adult ADHD Rating Scale to measure clinical symptoms. This instrument has been shown to have strong psychometric properties: with several studies demonstrating reliability (Gomez, 2010; Magnusson et al., 2006) content validity (Faraone & Biederman, 2005; Magnusson et al., 2006), divergent validity (Magnusson et al., 2006), and divergent validity (Kooij et al., 2008; Magnusson et al., 2006). The questionnaire used in the current study has been validated and widely used in research (APA, 1994; Barkley & Murphy, 1996; Barkley & Murphy, 2006; Gudjonnson et al., 2009). The cutoff score on the measure which qualified participants as having subclinical ADHD symptoms was 17, based on the earlier work of Gudjonssson and colleagues (2008; 2009). As mentioned, Young (1999) originally suggested this cutoff score for the measure, and Young and Gudjonsson (2008) later supported this by demonstrating the score represented ADHD symptoms which were 1 standard deviation above the mean on this scale. From a clinical perspective, a score of 17 or higher could represent an individual who sometimes experiences 17 out of the 18 inattentive and

hyperactive /impulsive criteria, or an individual who very often experiences 6 of the inattentive symptoms. These are just two examples but when the many combinations of frequency symptoms endorsement are considered, it is clear that a score of 17 or higher shows clinical impairment. Participants were 200 students, 100 subclinical ADHD students and 100 considered nonclinical. The mean age was 22 years, which was very similar to the work by Gudjonsson and colleagues (2009). The nature of the sample was unique since data collection was online, participants were required to be 'college students', and there was no exclusion of students who attended community college as opposed to students attending varying levels of prestigious universities across the country. Because of this, it is likely that a portion of the participants in the current study were community college students as opposed to Gudjonsson and colleagues study (2009) in which each participant was a university student. Since it is reported that (Barkely, 2006;2008) a fewer number of individuals with ADHD symptoms attend university or complete degrees, and a community college setting is less academically demanding it could be that community college student participants may have a higher prevalence rate of subclinical ADHD. This difference between the studies (Gudjonsson et al., 2006), the university student only participants in that study Gudjonsson et al., 2006) and the inclusion of community college students in the present study could have contributed to the unexpectedly higher prevalence rate. In addition, males made up 61% of the participants in the study. Based on research which established a higher occurrence of ADHD symptoms in males (Barkley, 1990), this relatively larger portion of male participants may have contributed to the unexpectedly high prevalence rate found as well.

Comparing this study to the recent research on subclinical ADHD prevalence reveals some key differences. Bussing and colleagues used a measure of subclinical ADHD 4 or 5 of either of the inattentive type symptoms or the hyperactive/impulsive type symptoms which may have been too restrictive. Since this measure was more stringent, there may have been a number of participants who

could have qualified as having subclinical symptoms but were excluded from this group. The assessment used by Bussing and colleagues (2010) may have been too restrictive to accurately assess prevalence of subclinical ADHD. It is difficult to further compare the present study to Bussing and colleagues since the populations are so different: the prior being adult college students and the latter being high school students.

Gudjonsson and colleagues (2009) used a population more similar in age to the current study. The important contrast with the current study in terms of population is that all their participants were from the University of Iceland, whereas a portion of participants in this study were community college students. It could be speculated that since community college has lower academic standards for acceptance this setting may contain a higher prevalence of subclinical ADHD individuals. Therefore, this population difference may contribute to a higher prevalence of subclinical participants being found in the current study. Since Gudjonsson and colleagues (2009) and the current study used the same subclinical ADHD measure and qualifying cutoff score, it is likely that the differences in prevalence rate found were due to variables other than these two factors.

Overall, an overly restrictive measure of subclinical ADHD in Bussing and colleagues' (2010) study and population differences between Gudjonsson's (2009) study and the present may each be potential contributors to this unexpected finding. Nonetheless a 27.5% prevalence rate of subclinical ADHD is significant and requires further research to explore differing prevalence rates in different settings and replicate findings.

The nature of the population and findings

To review: leading ADHD expert Barkley (2006; 2008) reported that few ADHD adolescents end up attending college and even less manage to complete degree programs. Many experts (Bussing et al., 2010; Gudjonsson et al., 2009; Schwanz et al., 2007) have argued that ADHD college students represent a unique and resilient subpopulation. Until now it has been reported that so few are likely to be attending postsecondary institutions (Barkley; 2006; 2008) so those that are will be more likely to possess resilient qualities and skills. It has been reported that individuals in this special group are more likely to have stronger ability, greater academic success prior to college, better coping skills and better compensatory skills than their non college student ADHD peers (Glutting, Youngstrom & Watkins 2005). Additional factors which distinguished ADHD students who were successful at college from those who were not were: age (successful students were older), more time in tutoring in adolescence, and having taken more English classes previously (Vogel & Adelman, 1993).

Examining the characteristics of the sample used for this study, we see that the subclinical ADHD participants resembled the description of this resilient subpopulation of students with ADHD symptoms, the main difference being that their level of symptoms was subclinical. The mean age of subclinical ADHD participants was 22 years, while the mean age of the nonclinical participants was 21.87. A slight difference but this does match what would be expected in that the subclinical ADHD students were slightly older. This would match the description of a typical trait distinguishing the successful college student with ADHD symptoms from the unsuccessful. If the characteristics of our relatively resilient subclinical population had to be predicted, based on the literature it would be reasonable to expect an older population which had possibly spent more time in college, with fewer completed credits. Given the success distinguishing trait of age in ADHD college students discussed by Vogel and Adelman (1993), we would expect that the current population would be relatively older. Therefore this finding of a mean age of

22 years supports the theory that the subclinical ADHD participants studied represented a unique and resilient subpopulation of subclinical ADHD emerging adults.

Academic Achievement Predictors

The fifth research question "can levels of ADHD and protective factors predict academic performance?" was investigated with the hypothesis: higher self-reported academic performance can be predicted by lower ADHD symptoms, and higher scores for study skills, interpersonal skills and mentor involvement. While previous research has examined how full ADHD symptoms predict college GPA, and how study habits predict GPA in ADHD adults (Glutting et al., 2002; Murray & Wren, 2003; Schwanz, Palm & Brallier, 2007; Spinella & Miley, 2003), the current study was the first examination of how subclinical ADHD symptoms, study skills and other protective factors could predict academic achievement in this population.

Subclinical ADHD Symptoms

There was mixed support for the hypothesis that ADHD symptoms would predict academic achievement. For the outcome variable, cumulative GPA, ADHD symptoms were found to significantly predict achievement, accounting for 3% of the variance. This finding supported previous studies that demonstrated that inattentiveness and hyperactivity symptoms could account for some variance in college GPA (Glutting et al., 2002; Schwanz, Palm & Brallier, 2007). The amount of variance that subclinical ADHD symptoms accounted for in this study (3%) was less than that reported by Schwanz et al (2007), who reported a total of 9%. In order to understand this difference, it is important to consider that this study focused on subclinical symptoms, whereas the work by Schwanz and colleagues (2007) used a

largely full ADHD student population. Given this difference, it would appear that subclinical symptoms are not posing as great a direct threat to individuals as full clinical symptoms.

When course grade was used as the academic achievement outcome variable, subclinical ADHD symptoms were not found to be a statistically significant predictor leading to the null hypothesis being retained. One reason for this inconsistent finding could be that one course grade does not represent academic performance as well as cumulative GPA does. For instance, an individual's grade in one course provides specific information about their academic performance in that one particular class. This could reflect the individual's interest in the course material, preference for the professor, or a multitude of other factors. However, cumulative GPA is based on a student's performance in several courses, and therefore gives a more complete picture of the participants' academic functioning overall.

Further to the unclear relationship between ADHD symptoms, study skills and achievement, ADHD symptoms were not demonstrated to be a consistent significant predictor of cumulative GPA, as it failed to enter in an additional regression analysis run to examine subset of study skills. Two regression analyses were run to examine predictors of academic achievement: one including the total study skills scores as well as other variables, the other included each of the study skill subtype scores. Since these study skills subtypes comprise the total study skills score, a regression could not be run with both the total and the subtype's scores in order to conserve the statistical integrity of the analyses. Again research would benefit from further investigation of this relationship, in order to determine how subclinical symptoms have varying influence on achievement according to protective factors like study skills.

Study Skills

Total study skills. Next, study skills were investigated as a possible predictor of academic achievement. The results of the regression analysis were consistent with past research, showing that

study skills significantly predicted cumulative GPA as well as course grade. As mentioned, the majority of studies have focused solely on the relationship between ADHD symptoms and grades. Spinella and Miley (2003) were the exception when they investigated study skills in emerging adults with full ADHD. They found that weaker study skills in the form of 'study avoidance' did negatively predict academic performance, accounting for 5% variance. The present study found that total study skills accounted for a greater portion of achievement variance for each achievement variable than this previous study. Total study skills accounted for 7% of the cumulative GPA variance and accounted for 5% of the course grade variance. Since total study skills consistently predicted achievement, the null hypothesis was rejected. Interestingly, in this study of subclinical ADHD students, study skills accounted for a larger amount of achievement variance than that reported in previous research on students with full ADHD. This could reflect the more thorough measure of study skills used in this study. Study skills accounting for a greater amount of variance in the current study on subclinical ADHD individuals than for a similar study on full ADHD participants emphasizes the powerful protective function study skills play for subclinical ADHD students. Further research comparing how study skills differentially predict achievement for controls versus subclinical individuals is suggested.

Study skill subtypes. In a separate regression analysis, several types of individual study skills were considered. Self-efficacy for learning and control of learning emerged as significant predictors of cumulative GPA, accounting for a total variance of, 11% and 3% respectively. This finding underscores the importance of study skills

Self-efficacy for learning. Self-efficacy for learning: "an individual's self-appraisal of one's ability to master a learning task and expectancy for success" predicted cumulative GPA, and accounted for the largest amount of variance and consistently predicted achievement: course grade and cumulative GPA.

Self-efficacy for learning accounted for 11% of cumulative GPA variance and 12% of course grade variance. When the authors designed this instrument they viewed the concept of study skills broadly and described certain subtypes as a direct study skill and others as motivational study skills. Their view of self-efficacy for learning was that although it reflects beliefs and not pure actions, it is integral to effective study skills (Pintrich, Smith, Garcia & McKeachie, 1991). These findings reflect the importance of this variable, and they contributed to the literature by identifying a specific subtype of study skill which is very important for subclinical ADHD students.

Control of learning beliefs. Control of learning beliefs accounted for less variance of cumulative GPA, and did not consistently predict achievement, not entering into the regression analyses using course grade. As opposed to self-efficacy for learning, Control of learning had a negative association with cumulative GPA. This indicated that as control of learning was lower, GPA would be higher. The direction of this relationship is the opposite of that predicted by MSLQ authors (Pintrich et al., 1991), who suggested that if a student feels they can control their learning they are more likely to study effectively.

Mentor Involvement

The hypothesis that mentor involvement (at present or in the past) would predict academic achievement received mixed support. Although mentor involvement positively predicted course grade accounting for 2% of the variance, it did not predict cumulative GPA. The impact mentor involvement had on course grade could reflect participants' reporting a mentor who was associated with current academic work they were doing. Due to these inconsistent findings, the null hypothesis was retained.

Interpersonal Skills

Although previous research had examined social skills such as likeability and ability to get along with peers and academic outcomes in students with ADHD (Vance, Fernandez & Biber, 1998; Wolf, 1999), this study was unique in examining the predictive power of interpersonal skills for subclinical ADHD students at any age. Finally interpersonal skills were investigated as a potential predictor of academic achievement. The hypothesis that interpersonal skills would predict academic performance was not supported and the null hypothesis was retained. Interpersonal skills consistently failed to predict achievement: for course grade and for cumulative GPA.

Protective Factor moderation of subclinical ADHD symptoms and achievement relationship

Previous studies have identified factors that distinguish successful ADHD undergraduate students from the unsuccessful, and factors that predict their academic achievement (Vogel et al., 1993; Heiligenstein et al., 1999; Glutting, Youngstrom & Watkins., 2005; Schwanz, Palm & Brallier, 2007). This was the first to identify a predictor of achievement for this population, and investigate its' role as a potential moderator of the relationship between subclinical ADHD symptoms and academic achievement. The moderation analysis was significant indicating that total study skills did moderate the relationship between subclinical ADHD symptoms and cumulative GPA. Therefore, the null hypothesis that study skills will not moderate the relationship was rejected. This finding implied that when subclinical ADHD symptoms were combined with study skills, study skills served to weaken the negative influence these symptoms had on academic achievement, thereby providing a protective function. Further, by demonstrating that study skills moderate this relationship, this study offered results of practical relevance by building support for a relational model and identifying a protective factor to promote academic resiliency in subclinical ADHD college students.

Significance of Findings

Subclinical ADHD is a newly recognized problem for emerging adult college students which is not yet well understood or addressed. The limited literature up to this point has shown that there is a significant prevalence of individuals with subclinical ADHD being unrecognized and unaided in the college population. (Bussing et al., 2010; Gudjonsson et al., 2009, Norvilitis, Sun, & Zhang 2010; Norwalk, Norvilitis & MacLean, 2009).

Clinical Picture of Subclinical ADHD. The criteria in the Adult ADHD Rating Scale used in the current study, and the utilizing a cutoff score of 17 and above to qualify as subclinical symptoms emphasizes the importance of this problem by drawing attention to the clinical picture of subclinical ADHD. An individual with subclinical ADHD could respond on the measure: sometimes have difficulty sustaining attention, sometimes struggle to listening effectively, often have difficulty following through on instructions properly, often forgetful in daily activities, sometimes talk excessively, sometimes am easily distracted, very often lose things, sometimes interrupt others, very often has difficulty organizing and very often fails to give close attention to details. This would yield a score of 18, a number close to the threshold, or in other words the minimum amount of symptoms required to qualify as having subclinical ADHD. When a person struggling to these varying degrees in these areas is considered, we see an individual who is clinically impaired. This is an emerging adult who if left unrecognized may experience substantial consequences academically and in other domains as well.

Subclinical ADHD predicted academic achievement. Subclinical ADHD predicting academic achievement was one of the main significant findings of the current study. It must be acknowledged however that this variable only accounted for 3% of the variance. This relatively small amount of variance may seem to minimize the importance of subclinical ADHD; however it is crucial to consider the many

variables which do contribute to academic outcomes to recognize the weight of this finding. Intelligence, previous education, self-discipline, socioeconomic status (SES), tutoring and countless other variables predict some portion of academic achievement (Duckworth & Seligman, 2005; Eccles, Vida & Barber, 2004; Glutting, Youngstrom & Watkins 2005; Vogel & Adelman, 1993) These variables are fixed, meaning when an emerging adult arrives at college their history of tutoring, family support, intelligence, and SES, cannot be altered in order to promote their academic functioning. In contrast, subclinical ADHD symptoms could possibly be addressed and accommodations made for them. As treatment for ADHD has shown to greatly benefit patients, particularly in the academic domain (Hechtman et al., 2004) we can only assume that intervention of some kind could likely also benefit the subclinical ADHD college student.

Despite the small amount of variance that subclinical ADHD accounted for, the finding that this variable did significantly predict academic outcomes and may be accommodated for and addressed is clinically relevant, and warrants further research.

Study skills predicted academic achievement. This finding demonstrated that a participants' total study skills score predicted their cumulative GPA, accounting for 10% of the variance. Again, this is not a relatively large portion explaining achievement, yet study skills represent a variable that is non-fixed, as opposed to the majority of other predictors of academic outcome. Accounting for the remaining variance are variables like IQ, family support, quality of education in earlier years. Clearly, these factors cannot be changed for the subclinical emerging adult college student. On the contrary, study skills can be taught in order to promote achievement (VanOverwalle & DeMetsenaere, 2011).

Self-efficacy for learning predicted academic achievement. Self-efficacy was defined by the instruments' authors as an individual's appraisal of their ability to either master learning or their

expectancy for success in a learning setting. The MSLQ (Motivation Strategies for Learning Questionnaire) was designed to measure many study skill subtypes including this motivational belief system as the authors conceptualized it to be integral to effective study skills (Pintrich, Smith, Garcia & McKeachie, 1991). Self-efficacy for learning was another significant finding predicting achievement, and accounting for 11% of academic achievement variance. This finding is significant for different reasons. Firstly, as mentioned so many predictors of achievement accounting for larger or smaller amounts of variance are fixed traits or past experiences which cannot be changed. However, self-efficacy for learning could be used as the target of intervention to promote students' academic performance. Therefore, as mentioned, this is one variable that can actually be influenced, and because it is one of the few that can, this finding is significant despite the modest variance accounted for. Secondly, this specific study skills subtype emerged as rather influential when we consider it was 1 of 9 study skill subtypes measured that significantly predicted academic performance at all. This significant finding suggests that this belief about one's ability to succeed in learning is more important than expected. These reasons underscore the importance of these findings, their importance clinically and the need for understanding and future research.

Study skills moderated the subclinical ADHD and academic achievement relationship. This finding demonstrated that study skills influence this relationship in that they decrease the negative influence that subclinical ADHD has on achievement, and therefore serve as a protective factor. Although variances accounted for by study skills were not very large, they are clinically relevant since they can be influenced. This finding on moderation further emphasizes this, since study skills were shown to protect subclinical ADHD individuals from the negative influence their symptoms could have on their achievement.

Wider Implications and applications

Results of this study contribute to the literature and understanding of subclinical ADHD and it's relationship to achievement, but they are also relevant to the undergraduate education system, earlier education, and the clinical setting. The implications and applications of the findings will be discussed for each of these domains.

Undergraduate education system. The results underscore the importance of recognizing subclinical ADHD students and focusing on building their study skills. This would serve to promote this empirically validated protective factor. In the college setting, where administration values retention and seeks to promote optimum student performance by addressing disabilities, subclinical ADHD students are presently unidentified. The findings that subclinical symptoms are related to poorer academic performance, that subclinical ADHD students have a significant study skills deficit, and that study skills protect from the negative influence of these symptoms, highlight the need for screening and intervention in the college setting. Screening could be as time efficient as using a self-report questionnaire such as the 18 item ADHD Rating scale used in this study. Further, intervention programs for students could target study skills since they were demonstrated to moderate the negative influence of subclinical ADHD symptoms on academic achievement. Self-efficacy for learning would be especially important to target in this intervention, since this study skills subtype significantly predicted achievement. In addition, time management, study environment management, and elaboration which were each also identified as significantly lacking in the subclinical ADHD students, would be worthwhile content to include in structured teaching interventions and support for students with academic difficulties and learning disorders.

Clinical application. The recognition of subclinical ADHD is important in the clinical setting as well. Screening for these symptoms could benefit patients struggling academically. Psychoeducation on

symptoms along with academic coaching to build up the deficit of study skills could more effectively address patient's needs.

Early education. Finally, earlier recognition of subclinical ADHD symptoms in the elementary and secondary school years would benefit students. This would allow for the early development of a proven protective factor through effective intervention: teaching and building important study skills.

Limitations

Given the design of this study there were 2 possible threats to internal validity: instrumentation and selection of participants. The selection of instruments appeared to have been effective, since the scales appeared to measure the intended variables and possessed adequate psychometric properties. Selection of participants for the subclinical participant group was done using randomization in order to address this threat to internal validity.

Possible threats to external validity were interaction effects of selection of participants and the independent variable (IV), interaction effects of setting and the independent variable (IV), and reactive effects of experimental arrangements.

As discussed, a possible interaction effect between the Independent variable and the selection of participants was that individuals who chose to participate had more time available to them or were more likely to be 'hardier'. Since registering with survey monkey, agreeing to the time commitment and completing the relatively long questionnaire is an extra demand on students, it is possible that those who would volunteer would be higher functioning than those who would not. This interaction effect supports the argument that the subclinical ADHD participants in this study appeared to represent a relatively resilient subgroup.

Possible interaction effects of setting and the Independent Variable were avoided through the use of survey monkey computerized format of data collection. Since the participants were taken from a pool of registered survey monkey members who represented a nationwide diverse group, the risk for setting effects was minimized.

Halo effect could be a possible threat to validity. This effect takes the form of responders who are self-reporting displaying a bias of self-inflation of socially desirable traits; in this case it would be course grade or cumulative GPA. This sort of bias is expected for self-report data collection. Unfortunately for the current study a secondary source of corroboration of academic achievement was not available.

Another potential limitation and threat to external validity was reactive effects of experimental arrangements. This could have taken the form of participants reacting to being in a study and responding to questions in a way they perceived they should.

Future research directions

The present study investigated how study skills predicted achievement for a sample of 200 students, 100 who had subclinical ADHD symptoms and 100 who did not. Future examination of how study skills predict achievement is recommended using the present sample or a new population in order to compare a subclinical group to a nonclinical group, in order to learn if study skills predict a different amount of variance of achievement depending on the group.

Subclinical compared to full ADHD symptoms. In order to build on the present study and further establish the limited literature on subclinical ADHD, the study of subclinical ADHD students comparing them to full ADHD students (in terms of achievement, study skills and interpersonal skills) is suggested to further explore the question of similar impairment. In addition, it would be interesting for

further studies on subclinical ADHD to compare primarily inattentive subclinical endorsers to primarily hyperactive/impulsive subclinical symptoms endorsers on study skills, achievement, and other social/emotional forms of impairment.

Prevelance. The unexpected finding of a 27.5% prevalence rate of subclinical ADHD is significant. As discussed the difference in this prevalence rate and those recently reported may reflect study differences: one an overly restrictive measurement of subclinical ADHD (Bussing et al. 2010), and the other using a population more likely to have a lower subclinical ADHD prevalence rate (Gudjonsson et al., 2009). There are clearly very few studies addressing subclinical ADHD prevalence, more are needed. The current study's unexpectedly high prevalence rate finding further requires further research in order to replicate findings.

Achievement variance accounted for by subclinical ADHD. The relatively small amount of academic achievement variance (3%) accounted for by academic achievement was an unexpected finding. One possible explanation for this lower than expected achievement variance could reflect the indirect role study skills play in this relationship. According to findings from the present study, study skills moderated the relationship between subclinical ADHD and academic achievement, and therefore lessened the academic impairment of predicted by subclinical ADHD. Given this, the lower than expected amount of variance explained by subclinical symptoms may not reflect lesser impairment due to the symptoms but perhaps reflects the protective function study skills are serving in the relationship between subclinical ADHD and cumulative GPA. Further research is necessary on the role study skills deficits play in the impairment subclinical ADHD students' experience.

Another important explanation for the relatively small amount of academic achievement variance (3%) accounted for by achievement could be explained in part by the subclinical ADHD participants in the study being relatively accomplished compared to their nonstudent peers, that they could have reflected a group which is high functioning and resilient. If this were the case, future studies could find that subclinical ADHD symptoms account for a larger portion of achievement variance. To this end, future research should be done using a high school senior population of subclinical and nonclinical students.

Self-efficacy for learning. As one of the few non fixed variables contributing to achievement variance, self-efficacy emerged as a consistent predictor, and therefore warrants future research. Subclinical participants were found to have a deficit in this study skill subtype. Although the 11% of achievement variance is modest, self-efficacy for learning represents a unique variable which is open to intervention, in order to address the significant clinical problem of subclinical ADHD. It is for these reasons that the literature requires further understanding of how this 'motivational study skill' operates, when it develops, what contributes to its development, and how does it lead students to success?

Finally, the finding that study skills moderate the relationship between subclinical ADHD and cumulative GPA needs to be replicated.

Conclusions

Different explanations about the modest achievement variance found to be accounted for by subclinical ADHD have been presented in order to consider different avenues for further research. Although different explanations about the modest variance (3%) subclinical ADHD accounted for have been reviewed, the primary conclusions from these findings are that these symptoms are a clinically significant problem, which along with study skills account for a modest portion of achievement in emerging adult college students. Because so few of the variables that would contribute to this variance

are fixed, and study skills, self efficacy for learning, and the impairment of subclinical ADHD have potential for improvement, they are a uniquely valuable focus for future research and intervention.

APPENDIX A: DEMOGRAPHIC QUESTIONNAIRE, MENTOR QUESTIONNAIRE

Please indicate your answer by checking or circling the choice that fits you best.

2. Age in years :

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3. Sex (A) Male (B) Female

4. What was your final GPA when you graduated high school? (Using this 13 point GPA grading system *-circle closest)*

13	12	11	10	9	8	7	6	5	4	3	2	1
(A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	lower)

A+	(93-100%)
A	(87-93%)
A-	(80-86%)
B+	(77-79%)
B	(74-76%)
B-	(70-73%)
C+	(67-69%)
C	(64-66%)
C-	(60-63%)
D+	(57-59%)
D	(54-56%)
D-	(50-53%)

5. Do you presently qualify for testing accommodations at your school?
   a. No
   b. Yes

6. How do you fund your education?

   a. Parents cover all tuition and housing costs

   b. Self
      i. Majority paid by loans
      ii. Majority paid by job
      iii. Loan/job somewhat equal

   c. Parents contribute to half your tuition and housing costs

7. Have you ever received a professional ADHD diagnosis?

    a. NO
    b. YES

8. Are you currently taking medication for ADHD?

    a. YES
    b. NO

9. Is this your first time being enrolled in college/university since high school?

    a. NO
    b. YES

10. If you work, approximately how many hours/week

    a. Less than 10
    b. 10-15
    c. 15-20
    d. 20-30
    e. 30 +

11. Other than your parents or step-parents has there been and adult who made a positive difference in your life at anytime beginning *before you were 18 years old?*

    (This person may be a teacher, relative, neighbor, or someone else whom you look up to for support and guidance)

    a. YES
    b. NO

12. How do/did meet this person, (for example are they a teacher? Relative? Family friend? Neighbor?)

13. Do you currently have this relationship or was it in the past?

    a. CURRENT
    b. PAST

14. Please circle the description which best describes how often you saw or spoke with this individual for the majority of your relationship (see or speak to if it's current)

    a. 1X/day—1X/week
    b. 1X/2weeks—1X/month
    c. 1X/2months—1X/3months
    d. 1—3Xs/year

15. What is your present cumulative average (average for all courses)? *Please circle one*

    13 A+ (93-100%)
    12 A (87-93%)
    11 A- (80-86%)
    10 B+ (77-79%)
    9 B (74-76%)
    8 B- (70-73%)
    7 C+ (67-69%)
    6 C (64-66%)
    5 C- (60-63%)
    4 D+ (57-59%)
    3 D (54-56%)
    2 D- (50-53%)
    1 lower

16. For the class you believe you are doing best in- what grade would you estimate would be assigned to you as of today? *Please circle one*

    13 A+ (93-100%)
    12 A (87-93%)
    11 A- (80-86%)
    10 B+ (77-79%)
    9 B (74-76%)
    8 B- (70-73%)
    7 C+ (67-69%)
    6 C (64-66%)
    5 C- (60-63%)
    4 D+ (57-59%)
    3 D (54-56%)
    2 D- (50-53%)
    1 lower

APPENDIX B: INTERPERSONAL COMPETENCE QUESTIONNAIRE(ICQ)

Directions: the next few items describe social situations that sometimes put people 'on the spot'. Please indicate how comfortably you believe you do (or would) handle these situations.
(5= I'm very good at this, very comfortable to 1= I'm poor at this, very uncomfortable)

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1. Asking or suggesting to someone new that you get together and do something, for example go out together.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

---

2. Telling a close companion you don't like a certain way s/he has been treating you.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

---

3. Confiding in a new friend and letting him/her see your softer more sensitive side.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

---

4. Being able to patiently and sensitively listen to a close companion 'let off steam 'about outside problems he/she is going through.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

---

5. Being able admit that you might be wrong when a disagreement with a close companion begins to build into a serious fight.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

6. Finding and suggesting things to do with new people who you find interesting and attractive.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

7. Standing up for your rights when a friend is neglecting you or being inconsiderate.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

8. Letting a new companion get to know the 'real' you.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

9. Help a close companion get to the heart of a problem he/she is experiencing.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

10. Being able to put begrudging (resentful) feelings aside when having a fight with a close companion

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

11. Introducing yourself to someone you might like to get to know

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

12. Confront your friend when s/he has broken a promise.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

13. Telling a close friend about the things that secretly make you anxious or afraid.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

14. Being a good and sensitive listener with a close companion who is upset.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

15. When having a conflict with a close companion, really listening to his/her complains and not trying to 'read' his/her mind.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

16. Calling on the phone a new acquaintance to set up a time to get together and do something.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

17. Telling a close companion s/he had done something to hurt your feelings.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

18. Telling a close companion how much you appreciate and care for him/her.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

19. Being able to say and do things to support a close companion when he/she is feeling down.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

20. Being able to take a close companion's perspective in a fight and really understand his/her point.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

21. Going to parties or gatherings where you don't know people well in order to start up new relationships.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

---

22. Telling an acquaintance s/he has done something that made you angry.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

---

23. Knowing how to move a conversation with an acquaintance beyond superficial talk in order to really get to know each other.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

---

24. When a close companion needs help and support, being able to give advice in ways that are received well.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

---

25. When angry with a close companion, being able to accept that s/he has a valid point of view even if you don't agree with that view.

1	2	3	4	5
Poor at this				I'm very good at this
Very uncomfortable				very comfortable

APPENDIX C: MSLQ (MOTIVATED STRATEGIES FOR LEARNING QUESTIONNAIRE)

Circle what best describes you in a current or past class- for the following items:

Part A: Motivation

1. If I study in appropriate ways, then I will be able to learn the material in this course.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

2. I believe I will receive an excellent grade in this class.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

3. I 'm certain I can understand the most difficult material presented in the readings for this course.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

4. It is my own fault if I don't learn the material in this course.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

5. I'm confident I can learn the basic concepts taught in this course.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

6. I'm confident I can understand the most complex material presented by the instructor in this course.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

7. If I try hard enough, then I will understand the course material.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

8. I'm confident I can do an excellent job on the assignments and tests in this course.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

9. I expect to do well in this class.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

10. If I don't understand the course material it is because I didn't try hard enough.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

11. I'm certain I can master the skills being taught in this class.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

12. Considering the difficulty of this course, my teacher and my skills I think I will do well in this course

1	2	3	4	5	6	7
Not at all true of me						very true of me

Part B: Learning Strategies

13. When I study the readings for this course, I outline the material to help me organize my thoughts

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

14. During class time I often miss important points because I'm thinking of other things

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

15. I usually study in a place where I can concentrate on my course work.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

16. When reading for this course, I make up questions to help focus my reading

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

17. I often feel so lazy or bored when I study for this class that I quit before I finish what I planned to do.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

18. I often find myself questioning things I hear or read in this course to decide if I find them convincing.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

19. When I become confused about something I'm reading for this class, I go back and try to figure it out.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

20. When I study for this course, I go through the readings and my class notes and try to find the most important ideas.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

21. I make good use of my study time for this course.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

22. If the course readings are difficult to understand, I change the way I read the material.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

23. When a theory, interpretations, or conclusion is presented in class or in the readings, I try to decide if there is good supporting evidence.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

24. I work hard to do well in this class even though I don't like what we are doing

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

25. I make simple charts, diagrams, or tables to help me organize course material.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

26. I treat the course material as a starting point and try to develop my own ideas about it

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

27. I find it hard to stick to a study schedule

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

28. When I study for this class, I pull together information from different sources, such as lectures, readings and discussions.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

29. Before I study new course material thoroughly, I often skim it to see how it is organized.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

30. I ask myself questions to make sure I understand the material I have been studying in this class.

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

31. I try to change the way I study in order to fit the course requirements and the instructor's teaching style

1	2	3	4	5	6	7
Not at all true of me						very true of me

---

32. I often find that I have been reading for this class but don't know what it was all about.

1	2	3	4	5	6	7
Not at all true of me						very true of me

33. When the course work is difficult, I either give up or only study the easy parts.

1	2	3	4	5	6	7
Not at all true of me						very true of me

34. I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying for the course

1	2	3	4	5	6	7
Not at all true of me						very true of me

35. I try to relate ideas in this subject to those in other courses whenever possible

1	2	3	4	5	6	7
Not at all true of me						very true of me

36. When I study for this course, I go over my class notes and make an outline of important concepts.

1	2	3	4	5	6	7
Not at all true of me						very true of me

37. When reading for the class, I try to relate the material to what I already know.

1	2	3	4	5	6	7
Not at all true of me						very true of me

38. I have a regular place set aside for studying.

1	2	3	4	5	6	7
Not at all true of me						very true of me

39. I try to play around with ideas of my own related to what I am learning in this course

1	2	3	4	5	6	7
Not at all true of me					very true of me	

---

40. When I study for this course, I write brief summaries of the main ideas from the readings and my class notes.

1	2	3	4	5	6	7
Not at all true of me					very true of me	

---

41. I try to understand the material in this class by making connections between the readings and the concepts from the lectures.

1	2	3	4	5	6	7
Not at all true of me					very true of me	

---

42. I make sure that I keep up with the weekly readings and assignments for this course.

1	2	3	4	5	6	7
Not at all true of me					very true of me	

---

43. Whenever I read or hear an assertion or conclusion in this class, I think about possible alternatives.

1	2	3	4	5	6	7
Not at all true of me					very true of me	

---

44. I attend this class regularly.

1	2	3	4	5	6	7
Not at all true of me					very true of me	

---

45. Even when course materials are dull and uninteresting, I manage to keep working until I finish.

1 2 3 4 5 6 7
Not at all true of me very true of me

---

46. When studying for this course I try to determine which concepts I don't understand well.

1 2 3 4 5 6 7
Not at all true of me very true of me

---

47. I often find that I don't spend very much time on this course because of other activities.

1 2 3 4 5 6 7
Not at all true of me very true of me

---

48. When I study for this class, I set goals for myself in order to direct my activities in each study period.

1 2 3 4 5 6 7
Not at all true of me very true of me

---

49. If I get confused taking notes in class, I make sure I sort it out afterwards.

1 2 3 4 5 6 7
Not at all true of me very true of me

---

50. I rarely find time to review my notes or readings before an exam.

1 2 3 4 5 6 7
Not at all true of me very true of me

---

51. I try to apply ideas from course readings in other class activities such as lecture and discussion.

1 2 3 4 5 6 7
Not at all true of me very true of me

APPENDIX D: THE ADHD RATING SCALE

CURRENT SYMPTOMS SCALE—SELF-REPORT FORM

Name_____ **Date**_____

Instructions: Please circle the number next to each item that best describes your behavior *during the past 6 months.*

Items:	Never or rarely	Sometimes	Often	Very often
1. Fail to give close attention to details or make careless mistakes in my work	0	1	2	3
2. Fidget with hands or feet or squirm in seat	0	1	2	3
3. Have difficulty sustaining my attention in tasks or fun activities	0	1	2	3
4. Leave my seat in situations in which seating is expected	0	1	2	3
5. Don't listen when spoken to directly	0	1	2	3
6. Feel restless	0	1	2	3
7. Don't follow through on instructions and fail to finish work	0	1	2	3
8. Have difficulty engaging in leisure activities or doing fun things quietly	0	1	2	3
9. Have difficulty organizing tasks and activities	0	1	2	3
10. Feel "on the go" or "driven by a motor"	0	1	2	3
11. Avoid, dislike, or am reluctant to engage in work that requires sustained mental effort	0	1	2	3
12. Talk excessively	0	1	2	3
13. Lose things necessary for tasks or activities	0	1	2	3
14. Blurt out answers before questions have been completed	0	1	2	3
15. Am easily distracted	0	1	2	3
16. Have difficulty awaiting turn	0	1	2	3
17. Am forgetful in daily activities	0	1	2	3
18. Interrupt or intrude on others	'0	1	2	3

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ABSTRACT

PROTECTIVE FACTORS FOR EMERGING ADULTS WITH SUBCLINICAL ADHD

by

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May 2013

Advisor: Dr. Stephen Hillman

Major: Educational Psychology

Degree: Doctor of Philosophy

This study investigated the understudied and significant problem of subclinical ADHD in emerging adult college students. Limited literature had estimated a significant prevalence of 10-15% in this age group (Bussing et al., 2010). Studies have established that although individuals with subclinical ADHD do not meet full DSM-IV criteria for ADHD, they experience significant academic impairment nonetheless (Kats-Gold, Besser & Priel, 2007). ADHD experts have demonstrated that subclinical ADHD individuals need to be identified in order to provide the appropriate academic accommodation (Bussing et al., 2010; Du Paul et al., 2009; Norwalk, Norvilitis & MacLean, 2009). This study used the online survey service survey monkey and a large sample of college students to learn about the relationship between subclinical ADHD and academic performance. Potential protective factors: interpersonal skills, history of a mentor, and study skills were investigated as moderators of this relationship. 200 college students participated in this study; 100 qualified as having subclinical ADHD, the other 100 were nonclinical. Students completed self report questionnaires online measuring ADHD symptoms, interpersonal skills, presence of a mentor, demographic information, and their cumulative and course grade point averages (GPA). Subclinical ADHD students were found to have lower achievement. A negative relationship between level of subclinical ADHD symptoms and GPA was demonstrated. Subclinical ADHD students were shown to

possess study skills deficits: certain sub skills in particular. Importantly, subclinical ADHD was shown to significantly predict GPA. Study skills, self-efficacy for learning in particular predicted GPA accounting for 11% variance. Finally, this study built a relational model between subclinical ADHD and GPA in emerging adults by demonstrating that study skills moderated this relationship, and therefore, served as a protective factor for at-risk subclinical ADHD college students.

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