**Cognitive Responses to Stress, Depression, and Anxiety and their Relationship to**

**ADHD (Attention Deficit Hyperactivity Disorder) Symptoms**


By


Sandra J. Alexander


A thesis submitted to the Department of Psychology

in conformity with the requirements for

the degree of Doctor of Philosophy


Queen's University

Kingston, Ontario, Canada

December, 2009

**Abstract**

This research sought to answer the question "To what extent do symptoms related to depression, anxiety and stress interfere with the valid measurement of Attention Deficit Hyperactivity Disorder (ADHD)?" More specifically, "To what extent do these factors affect the Conner's Adult ADHD Rating Scale (CAARS; Conners, Erdhardt, & Sparrow, 1999) and the BADDS (Brown Attention Deficit Disorder Scale; T. E. Brown, 1996), popular measures of ADHD status?" I examined the number of people in "higher stress situations" scoring above accepted critical values on the subscales of the CAARS and on the BADDS in comparison to the general population. Multiple regression analyses were conducted to determine the relationship between the level of depression, anxiety, stress, and ADHD symptomatology and to determine the amount of variance of CAARS and BADDS scores accounted for by each of these other psychological variables. Three separate groups of people participated in this study: students from a Psychology 100 subject pool; students going to health or counselling services; and a group of nurses employed in a local hospital. Participants completed questionnaires regarding self-reported levels of depression, anxiety, stress, life experiences, role stress, coping skills, and ADHD symptoms. Self-reported levels of depression, anxiety, stress, and other factors were positively correlated with scores on the measures of ADHD symptomatology. People who reported more anxiety, more depression, and/or more stress were more likely to score above critical values on the ADHD measures.

**Co-Authorship**

I assumed primary responsibility for the conceptualization, design, and execution of the

research reported in this thesis.  My co-supervisors, Allyson Harrison and Brian Butler

assisted in all aspects of the thesis and in the preparation of the manuscripts.  Dr.

Harrison will appear as co-author.

**Acknowledgements**

I would like to thank my co-supervisors Dr. Brian Butler and Dr. Allyson Harrison.  As well as being approachable and supportive, they have also been kind and very patient. Their expertise, enthusiasm, and understanding during my balancing act of academics and family was greatly appreciated.

As well, I would like to acknowledge my committee members, Dr. Rod Lindsay and Dr. Alistair McLean, for their helpful suggestions and comments.  Their input was much appreciated.  A special thank you to Dr. Lindsay for stepping in as my supervisor upon Dr. Butler's retirement.  Thanks also to Lenora Duhn and Dr. Leandre Fabrigar for their assistance.

I am extremely grateful to Jan Wilson, Kathy Henderson, Mary Acreman, Tracy Riley, and Michelle Deslisle for their encouragement and support.  I am so glad that I got to know all of you.

I would also like to acknowledge my family for their encouragement, in particular my lovely daughters, Stephanie and Victoria, my husband Jamie, and my wonderful sister and best friend Cheryl Anne.

Most of all, I would like to dedicate this work to my mom, Lorraine.  I have never known a more beautiful, loving, strong and courageous person.  She will always be in my heart.

## Table of Contents

**List of Tables**

## List of Figures

**Chapter 1**

**Adult ADHD**

Although Attention Deficit Hyperactivity Disorder (ADHD) has been traditionally

thought of as a disorder of childhood, recent studies have recognized it as a lifelong

problem (Weiss & Murray, 2003). ADHD is suspected to continue into adulthood in one-

quarter to one-half of the cases diagnosed with children (Harrison, 2004; Troller, 1999;

Weiss & Murray, 2003; Young, Toone & Tyson, 2003). In general, adults with ADHD

experience significant educational, occupational, and interpersonal difficulties. In

comparison to a non-ADHD, non-clinical control group, adults with ADHD have been

found to experience: more academic underachievement; more difficulties with work,

relationships, and society (i.e., antisocial behaviour and police contact); more substance

misuse; and more personal difficulties (Young et al., 2003). Compared to a non-ADHD

clinical control group, adults with ADHD are more impaired in the areas of academic

achievement and display more antisocial and criminal behaviour (Young et al., 2003).

Furthermore, studies have shown that adults with ADHD have a greater prevalence of

motor vehicle collisions due to inattention, road rage, and fast, impulsive, aggressive

driving (Jerome, 2003).

**Symptoms and Criteria for ADHD**

ADHD is "characterized by age-inappropriate levels of inattention, with or

without impulsivity and overactivity, across multiple settings" (Harrison, 2004, p. 8).

The Diagnostic and Statistical Manual of Mental Disorders, fourth edition, text revision

(DSM-IV-TR; American Psychiatric Association [APA], 2000) recognizes three types of

ADHD (inattentive, hyperactive, and mixed). The DSM-IV-TR (APA, 2000) diagnostic

criteria for ADHD may be found in Appendix A, along with the specific symptom criteria required for diagnosis of this disorder. To be diagnosed with ADHD, the symptoms must cause clinically significant impairments in at least two major life settings such as work, education, and home or social life (APA, 2000; Troller, 1999) and cannot be attributed primarily to another disorder (APA, 2000).  As well, current practice requires evidence that the symptoms appeared before age seven (APA, 2000), although this criterion has been questioned and is being reexamined (Barkley & Brown, 2008).

There are three types of ADHD symptoms: inattentive (e.g., often does not seem to listen when spoken to directly), hyperactive (e.g., is often "on the go" or often acts as if "driven by a motor"), and impulsive (e.g., often has difficulty awaiting turn) (APA, 2000).  Specifically with respect to exclusion criteria, the DSM-IV TR notes that ADHD may not be diagnosed if the symptoms are better accounted for by another mental disorder (e.g., mood disorder, anxiety disorder, etc.).  Clinicians are supposed to address this, however, there is reason to believe they rely mainly on self-report of symptoms (Gathje, Lewandowski & Gordon, 2008; McCann & Roy-Byrne, 2004)

Although the DSM-IV-TR lists some possible exclusion criteria, it must be noted that there are other illnesses (e.g., chronic pain) or life events (general stress, bereavement) that may produce similar symptoms, in particular inattentive type symptoms.  However, these are not specifically included in the exclusion criteria. Furthermore, even for the conditions that are mentioned, there is no guidance as to how to differentiate their symptoms from those caused exclusively by ADHD.  Additionally, although the DSM-IV-TR contains the criteria of the symptoms not being "better

accounted for by another mental disorder", it is not clear to what extent these other

disorders may mimic, or have symptoms that overlap with those of ADHD.

**Importance of Correct Diagnosis**

When diagnosing ADHD, it is crucial to be able to differentiate the symptoms of

this disorder from other causes of attention and concentration problems (Harrison, 2004;

Schenk, 2002; Weinstein, Staffelbach, & Biaggio, 2000). Misdiagnosis of ADHD may

result in both inappropriate treatment (e.g., if a stimulant such as Ritalin

(methylphenidate) is prescribed when the person does not actually have ADHD), and

failure to recognize an underlying true condition that could improve if properly treated

(Harrison, 2004).

Some have asserted that adults with ADHD rarely seek or abuse stimulants

(Lamberg, 2003); however, some of the drugs used to treat ADHD are substances of

abuse (Shaffer, 1994). Babcock and Byrne (2000) found that more than 16% of students

responding to their survey at a liberal arts college reported recreational methylphenidate

(i.e., Ritalin) use. McCabe, Knight, Teter, and Wechsler (2001) in a study involving 119

four year colleges in the United States and 10,904 randomly selected students, found that

non-medicinal use by students over the year previous to their study ranged from 0% to

25% at individual colleges.[1] DeSantis, Webb, and Noar (2008) report illicit student use

of ADHD prescription stimulants by up to 34% of students. In addition, Ritalin is a drug

that is sometimes illicitly used by school-aged children (Center for Addiction and Mental

Health, 2005). Not only is there abuse potential, but also some feel that there is a risk

that inappropriate exposure to Ritalin or other stimulants may cause permanent side

---

[1] *Researchers in the United States sometimes refer to post-secondary students as college students, and sometimes refer to them as university students; therefore these terms are used interchangeably within this thesis when citing results from studies conducted in the United States.*

effects (Breggin, 1999). Indeed, as Harrison (2004) points out, Ritalin and Dextroamphetamine, the two most popular drugs used to treat ADHD, have a number of detrimental side effects, including the possibility of developing a tic disorder in specific individuals with high vulnerability (Breggin, 1999; Lamberg, 2003; Lowe, Cohen, Detlor, Kremenitzer, & Shaywitz, 1982). A release by McLean Hospital, a Harvard Medical School Affiliate, based on research by Carlezon, Mague, and Andersen (2003) reports that early Ritalin exposure in animal studies may cause long-term effects on the brain, specifically a reduced ability to experience pleasure and reward and the expression of despair like behaviours in stressful situations.

On the other hand, Pennington (2002) partially disagrees with the above concerns, stating that worries about growth retardation, tic disorders, abuse of stimulants, over prescription of stimulants, and overdiagnoses of ADHD are not supported by research. However, he still feels there is "valid concern about the misdiagnosis of ADHD" as "not all practitioners prescribing stimulant medication for ADHD have the time or the training to make this demanding differential diagnosis accurately" (p. 175). There is still a lack of knowledge about the long-term effects of psychostimulants (Accardo & Blondis, 2001), and controversy as to the safety of these medications exists within the literature.

A further consideration is malingering, or intentional mimicking of symptoms for external gain (Quinn, 2003). While many individuals have legitimate symptoms, it is important for the clinician to be aware of the potential benefits of being diagnosed with a disorder such as ADHD, particularly in postsecondary settings. Some of these benefits include free computers, free software, extra time on exams, assistance with note taking, and as noted above, medication prescription; strong incentives indeed for those who wish

to take advantage of a system designed to help those with a diagnosable disorder. Therefore, malingering or symptom exaggeration may cause difficulty for clinicians trying to accurately diagnose adult ADHD (Quinn, 2003). Students in the United States have initiated lawsuits against educational institutions when they have been refused accommodations due to disagreement among experts over their ADHD diagnosis (Gordon, Barkley & Murphy, 1997). Although Canadians are not generally litigious, this is still an important consideration for universities. Given the potential negative consequences of not being diagnosed when one does have ADHD, as well as the negative consequences of being misdiagnosed when one has a disorder or difficulty other than ADHD, it is essential to diagnose accurately.

Unfortunately, adult diagnosis can be very difficult. One criterion for diagnosis of ADHD is that the symptoms must be present prior to age seven. Adult clients do not always have access to records of childhood behaviour. Although people may claim to have had symptoms prior to age seven, clinicians are often unable to obtain corroboration of this if records, such as school report cards with teacher comments, are unavailable. As there is no definitive test for ADHD, diagnosis often relies on checklists and self-reports (McCann & Roy-Byrne, 2004). These checklists have no anchors that allow one to objectively define frequency and severity; rather, the questions included in such checklists are subjective in nature (e.g., how frequent is "frequently" or "often"?). Also many symptoms may be easily endorsed by respondents wishing to appear to have ADHD when, in fact, they do not have this disorder (Quinn, 2003).

**Guidelines and Tools for Assessment of ADHD**

The research literature concerning ADHD provides many guidelines for best practice in the assessment of ADHD based on current knowledge.  One recommendation for clinicians and other health-care practitioners responsible for diagnosing ADHD is to use sound measures from varied sources, as well as observation when making their diagnostic decisions.  It is important to note, however, that no standardized procedure exists for diagnosing ADHD (Weinstein et al., 2000).

Self-report checklists exist to assist clinicians in identifying possible ADHD traits in adults.  These include, among others, the Brown Attention Deficit Disorder Scale (BADDS; T. E. Brown, 1996) and the Conner's Adult ADHD Rating Scale (CAARS; Conners, Erdhardt, & Sparrow, 1999).  Although the literature cautions that these self-report checklists should never be the only data on which a diagnosis of ADHD is made, McCann and Roy-Byrne (2004) report that "many adults have been told that they have ADHD based largely (and sometimes solely) on their responses to self-report indices of symptoms" (p. 181).  Gathje, Lewandowski, and Gordon (2008) concur, pointing out that some clinicians and researchers have based diagnostic decisions primarily on symptoms, despite clear DSM-IV guidelines that require impairment to be considered.  We know for instance from Harrison's (2004) study that many non-ADHD university students score high on the Brown Attention-Activation Disorder Scale (BAADS; T. E. Brown, 1996) (a scale that is virtually identical to the BADDS), suggesting that many adults have symptoms that look like those found in ADHD-inattentive type (which is the sub-type primarily assessed by the BAADS/BADDS).

Further research must be carried out on assessment instruments such as the

CAARS to determine how sensitive and specific are its scales to the diagnosis of ADHD.

Although research has found the CAARS to distinguish well between adults known to

have ADHD and a non-clinical control group (Gallagher & Blader, 2001), it is largely

unknown whether this measure is able to distinguish between those who have ADHD and

those with other causes for experiencing attention and memory problems (e.g., increased

levels of stress, depression, or anxiety). Until recently there was no data on the ability of

the CAARS to distinguish suspected cases of ADHD from other psychiatric cases.

Conners et al. (1998) considered this to be "one of the most important future research

agendas".   There is evidence, however, to suggest that the CAARS subscales can be

affected by conditions other than ADHD (Suhr, Hammers, Dobbins-Buckland, Zimak, &

Hughes, 2008).

The symptoms of ADHD are ubiquitous, in the sense that many people experience

them to some extent, and it is more a matter of degree (severity, duration, and intensity)

than actual presence of these symptoms that would determine whether one is clinically

impaired.  Furthermore, many of the symptoms listed are present in a number of other

disorders (Suhr, Hammers, Dobbins-Buckland, Zimak, & Hughes, 2008).  For instance,

people with depression, anxiety and stress may experience difficulty with memory,

agitation, or inability to concentrate.   Other studies have identified the overlap between

the symptoms of ADHD and posttraumatic stress disorder (PTSD; Harrison & Wilson,

2005). It certainly seems possible that many of the symptoms sampled by the CAARS

could be found in disorders other than ADHD, such as eating disorders, anxiety,

depression, dissociative disorders, or increased stress.  For example, people who have

eating disorders may find their concentration and attention affected because they are constantly thinking about food, or because they are unable to concentrate as a result of the metabolic effects of self-starvation. The inability to concentrate on or attend to external stimuli is one of the primary features of dissociative identity disorder. Dissociative identity disorder is a low base-rate disorder that "can imitate or be masked by ADHD" (Schenk, 2002). Increased stress and/or anxiety could also interfere with concentration and attention because these conditions may cause people to overfocus on the area about which they are concerned to the exclusion of other stimuli that may be important.

While the DSM-IV-TR (APA, 2000) does mention both mood disorders and anxiety disorders in the differential diagnosis section for ADHD, very little is said about how to differentiate these conditions from true ADHD other than by saying that, for other mental disorders, the "symptoms of inattention typically have an onset after age 7 years, and the childhood history of school adjustment generally is not characterized by disruptive behavior or teacher complaints concerning inattentive, hyperactive, or impulsive behavior" (p. 91). As the following section relates there is very little mention of ADHD in the depression or anxiety sections of the DSM-IV-TR.

**Depression Symptoms**

Although, some symptoms of depression such as sadness, a sense of worthlessness or guilt, reduction of sexual interest, or recurrent thoughts of death or suicide ideation are not related to symptoms of ADHD, a review of the DSM-IV-TR (APA, 2000) reveals that many symptoms are similar. These symptoms include difficulty thinking, concentrating or making decisions, complaints that are common to many

disorders.  Depressed individuals may also complain of memory difficulties or appear

easily distracted.  As well, "many individuals report or exhibit increased irritability (e.g.,

persistent anger, a tendency to respond to events with angry outbursts or blaming others,

or an exaggerated sense of frustration over minor matters)" (p. 349).   The DSM-IV-TR

(APA, 2000) also notes that depression can cause psychomotor changes such as agitation,

which is defined as the inability to sit still and various other "fidgety type" behaviours,

which may look like the restlessness or fidgety behaviour seen in ADHD, and that during

a depressive episode even the smallest tasks seem to require substantial effort.  Insomnia

is a common sleep disturbance associated with a major depressive episode, and a lack of

sleep can contribute to or exacerbate ADHD-like symptoms such as difficulty

concentrating.  The DSM-IV-TR (APA, 2000) states that in 20% to 30% of cases "some

depressive symptoms insufficient to meet full criteria for a major depressive episode may

persist for months to years and may be associated with some disability or distress" (p.

354).  This is particularly important as some of the ADHD-like symptoms may be

mistaken for ADHD if they have persisted for years but are not obviously signs of

depression.

The DSM-IV-TR (APA, 2000) states:

Distractibility and low frustration tolerance can occur in both Attention-
Deficit/Hyperactivity Disorder and a Major Depressive Episode; if the criteria are
met for both, Attention-Deficit/Hyperactivity Disorder may be diagnosed in
addition to the Mood Disorder.  However, the clinician must be cautious not to
overdiagnose a Major Depressive Episode in children with Attention-
Deficit/Hyperactivity Disorder whose disturbance in mood is characterized by
irritability rather than by sadness or loss of interest" (p. 355).

Interestingly, in spite of the obvious overlap of many of the symptoms, the

distractibility and low frustration tolerance symptoms mentioned above are the only

symptoms mentioned as occurring in both ADHD and a major depressive episode in the differential diagnoses section for a major depressive episode, and caution with overdiagnoses is mentioned only in the context of children's mood. In the section of the DSM-IV-TR (APA, 2000) devoted to major depressive disorder it is mentioned that other mental disorders such as substance-related disorders, panic disorder, obsessive-compulsive disorder, anorexia nervosa, bulimia nervosa, and borderline personality disorder frequently co-occur with major depressive disorder. While the above may not be intended as an exhaustive list, it is interesting to note that adult ADHD does not warrant a mention, despite the similarity of many of the symptoms. Interestingly, the DSM-IV-TR (APA, 2000) does mention that there may be an increased incidence of attention-deficit/hyperactivity disorder in the children of adults with major depressive disorder. ADHD, however, is not specifically mentioned in the differential diagnosis section for either major depressive disorder (other than a referral to the major depressive episode section mentioned above) or dysthymic disorder, despite the similarity and overlap of many of the symptoms. Indeed, the dysthymic disorder section mentions only that, in children, dysthymic disorder may be associated with ADHD.

**Anxiety Symptoms**

The diagnostic features section for PTSD in the DSM-IV-TR (APA, 2000) reports that "some individuals report irritability or outbursts of anger (Criterion D2) or difficulty concentrating or completing tasks (Criterion D3)" (p. 464), symptoms also experienced by those with ADHD. As stated previously, a study by Harrison and Wilson (2005) has identified overlap between PTSD and ADHD symptoms. Weinstein, Staffelbach and Biaggio (2000) also identify overlap of symptoms between PTSD and ADHD and caution

"misdiagnosis may easily occur in the absence of careful differential diagnosis that is supported by a detailed history" (p. 361). The DSM-IV-TR (APA, 2000) lists symptoms of generalized anxiety disorder, which appear to overlap with those found in ADHD, such as difficulty concentrating and irritability. Once again, disturbed sleep is associated with anxiety, which may cause secondary cognitive symptoms similar to those of ADHD (such as exacerbation of difficulty concentrating, irritability, or restlessness in an effort to keep oneself awake). The person with an anxiety disorder "finds it difficult to keep worrisome thoughts from interfering with attention to tasks at hand" (p. 473). Restlessness, feeling keyed up or on edge, and irritability are physical symptoms also noted to occur with anxiety disorders (APA, 2000). Despite this apparent overlap, no mention is made in the anxiety section of the DSM-IV-TR regarding differential diagnosis of ADHD and anxiety.

**Stress Symptoms**

There are many signs to indicate when a person is experiencing too much stress. According to the Health Canada website (2007), signs "may include feelings of irritability, sadness or guilt; change in sleep patterns; change in weight or appetite; difficulty in concentrating or making decisions; negative thinking; loss of interest, enjoyment or energy in something you used to enjoy; and restlessness". Thus, some of the symptoms of stress also are signs of depression and anxiety.

Stress can cause a great deal of distress and discomfort; indeed, a poll conducted by Ipsos-Reid found that one in six Canadians (17%), "agree that there has been a time in their life when they've been under so much stress that they've wanted to commit suicide" (Wright, 2002). According to Shields (2004) in the 2000/01 Canadian Community

Health Survey "26% of people aged 18 or older characterized their life as "quite stressful" or "extremely stressful" (p. 11). In 2002, 25% of Canadians surveyed regarding work stress reported that their days were "quite a bit" stressful, while 5.4% reported their days were "extremely" stressful (Statistics Canada, 2002).

What is meant by "stress", however, is not always clear. Selye (1974) coined the term "stress", which refers to a non-specific response syndrome. He considered stress to not necessarily be bad, and posits that similar biochemical effects are experienced whether the situation is positive or negative (Selye, 1974). Although Selye's definition of stress was a useful starting point, for the purposes of this thesis we examined the negative aspects of stress such as the signs of chronic non-specific arousal (e.g., difficulty relaxing and being easily upset) as measured by the stress subscale of the depression, anxiety, and stress scale (DASS; Lovibond & Lovibond, 1995).

Lazarus (1984) states, "psychological stress is a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (p. 19). In order to tap into these facets of stress, participants were asked to rate their stress level, ability to cope, and feelings of being overwhelmed.

**Predictions and Rationale**

If the above conditions of depression, anxiety and stress can mimic the symptoms of ADHD, then one would expect that specific groups of people who do not have ADHD may nevertheless score high on subscales of the CAARS, particularly on the inattentive subscales. Scoring past the critical values while not having ADHD may be related to symptoms of depression, anxiety, or stress. As well, there may be other factors, such as

participant's coping abilities and the number of recent negative life experiences that affect peoples' scores on ADHD measures.

We predicted the following: specifically: 1. Students going to the health or counselling services at a major Canadian university would report higher levels of stress, depression, and anxiety than students in the general population. 2. The scores on the DASS (Depression, Anxiety, and Stress Scale) would be positively correlated with scores on the CAARS. 3. Students who require health and counselling services would score higher on the BADDS and various CAARS subscales than would students in the general population.

We anticipated that a group who are chronically under stress in the workplace should also yield high scores on the stress, depression, and anxiety scales and their scores on these indices would be positively correlated with scores on the CAARS measure.

**Summary**

We investigated the false positive rate for the CAARS, and examined possible causes of false positive classifications (i.e., depression, anxiety, and stress). In other words, "How many adults who do not have ADHD score past critical value levels for suspicion of ADHD on the CAARS or the BADDS, and what are the possible reasons for this occurrence?"

We predicted above that specific identifiable groups of people would score higher than average on the CAARS. If true, it would suggest that the CAARS is non-specific, in that it is unable to differentiate between people who were experiencing high levels of depression, anxiety, and/or stress and people who have ADHD. If true, this suggests physicians, psychologists, and others who diagnose ADHD need to be extremely cautious

in interpreting the information obtained by scales such as the CAARS.  This study

enabled us to investigate the frequency of participants with scores outside of the normal

range on the CAARS, and explore some of the possible causes for such symptom

elevation.  If the CAARS proved to have a higher than acceptable false positive rate, such

information would be important to disseminate to all who employ this scale in their

clinical practice.  Likewise, if elevated CAARS scores proved to be specific to ADHD

(i.e., not excessively elevated in the groups selected for this study), this too would be

important information to share.

    To be clear, the question is not whether the CAARS measures the symptoms of

ADHD.  The question is whether the CAARS is able to differentiate between people who

have these types of symptoms because of a neurologically based disorder (ADHD) that is

present at all times in their lives, and those who are experiencing similar symptoms due

to more transient issues (i.e., depression, anxiety, and stress).  Knowing which scales may

be problematic for differentiating between ADHD and depression, anxiety, and stress will

assist clinicians in knowing when caution should be exercised in interpreting the results

of the CAARS, the BADDS, or other self-report measures.

**An Overview of the Three Studies**

    This research consisted of three parts, examining the levels of depression, anxiety,

stress, and ADHD symptoms and the psychometric properties of the CAARS among

three different groups.  Participants were asked whether they have ever been diagnosed

with or suspected of having ADHD.  They rated their level of stress, coping and feelings

of being overwhelmed by the stress in their life.  Negative life experiences and role stress

also were considered for some of the groups

Study number one consisted of administering the CAARS to undergraduate students at a major Canadian university who were enrolled in an introductory psychology class and participating in the experimental subject pool and were over the age of 18.  The purpose of this first study was to examine the association between depression, anxiety, and stress and symptoms of ADHD.  It is suspected that students may score higher on the inattention scales of the CAARS due to the increased demands placed on students in university, and the increased pressure of trying to do well in a competitive academic environment.  In fact, researchers have found that it is not uncommon for university students to report memory problems, problems becoming interested in things, loss of temper, irritability, fatigue, impatience, and difficulty concentrating while reading (Gouvier, Uddo-Crane, & Brown, 1988; J. L. Wong, Regennitter, & Barrios, 1994). Having local norms for university students made comparisons with some of the other groups in this research more meaningful, in particular the comparisons with students recruited in study two.

Study two was conducted in the health and counselling services at a major Canadian university.  Health services acts as a family physician service for most undergraduate students at the university, and deals with a steady stream of health issues such as sexually transmitted infection checks, tuberculosis testing, mental health complaints, pap smears, and upper respiratory complaints (M. Condra, personal communication, June 23, 2009).  University students also go to the counselling service for a variety of reasons such as difficulty with adjustment (e.g., to university, to becoming an adult, to adult responsibilities), stress and anxiety, self-confidence, low mood, relationships (e.g., personal, family), cross-cultural issues, and eating/weight

issues (M. Condra, personal communication, June 23, 2009). The above list is by no means exhaustive.

A previous study conducted at these same services found that an unexpectedly large number of university students scored above the critical value score (i.e., a score above 55) on the Brown Attention-Activation Disorder Scale (BAADS), which the manual says is highly indicative of ADHD (Harrison, 2004). According to Gallagher and Blader (2001) the CAARS has advantages over the BADDS due to its established reliability with adults and the fact that it was normed on a larger sample. Until recently no study had investigated the extent to which similar results to Harrison's (2004) study (i.e. high false positive rates) may be obtained with the CAARS. Suhr et al. (2008), however, found that the CAARS could not reliably discriminate between those whose symptoms were genuine, those with psychological problems, and those feigning ADHD.

Estimates of the prevalence of ADHD among adults have varied between 1% and 6 % (Gallagher & Blader, 2001; Harrison, 2004; Weiss & Murray, 2003). In a previous study of the BAADS, 21.2% of students waiting for a medical appointment at health services scored above the critical value criteria (55) indicating a high probability of ADD (i.e., Attention Deficit Disorder also known as ADHD-inattentive; Harrison, 2004). Of those visiting counselling services, 62.5% fell above this critical value. Since none of these students reported a previous diagnosis of ADHD, and the rates are much higher than the normal base rates for ADHD in the general population, Harrison (2004) suspected that other factors might have been affecting these clients' endorsement of ADD symptoms on the BAADS. Suhr et al. (2008) also found non-specificity of ADHD symptoms in their study, however, they did not use the BAADS.

Study number three explored the relationship between the scores on the CAARS and scores on measures of depression, anxiety, and stress levels in nurses at a local hospital. Nurses were chosen as participants for this study because their jobs are considered to be highly stressful due to a unique combination of high responsibility (people's lives) and low control (must follow Dr.'s orders and hospital policy). As well, the majority of nurses are female and many of them have multiple roles (wife, mother, housekeeper, worker, student), which may increase their experienced levels of stress, anxiety, or depression. Shields (2004) reports that women in particular are vulnerable to "stress proliferation", which "refers to the development and spread of stress across all facets of a person's life" (p. 13). An example provided by Shields (2004) discusses how stress at work increases tension at home, which then leads to further increases in problems at work. Women are known to be more likely than men to report stressors involving significant others, possibly due to being socialized to assume more nurturing roles (Shields, 2004). In a study examining gender differences in psychological distress, women reported a higher prevalence of high distress days and a lower prevalence of distress-free days than did men (Almeida & Kessler, 1998). Nurses may have a high level of stress due to the demanding nature of their work, recent hospital cut backs, and the fact that they often must do shift hours, weekends, or work over traditional holidays. The nursing population was also asked to list the number of roles they fulfill, and their satisfaction and stress incurred with each of the roles.

Although the three studies undertaken in this thesis were similar in theme and used many of the same measures, they differed with respect to some of the demographic questions and scales employed. Slight changes were made to the third study at the advice

and request of the hospital's research department.  Each of the studies is written up

separately in manuscript form and therefore there is some repetition of information (e.g.,

materials section).

**Materials**

Materials for the three studies consisted of the questionnaires detailed below.

**Demographics and author-compiled items.**  Age, year of university (for the

students), and sex were requested of each participant. Students were asked to indicate

whether they were going to health services or counselling services.  Nurses were asked

about the areas in which they worked, the number of roles they fill, whether they work

full or part time, job satisfaction, job stress, the number of children they have, and

whether they are the primary caregivers for these children.

**Depression, Anxiety, and Stress Scale (DASS).**  The DASS (Lovibond &

Lovibond, 1995) is a 42-item self-report measure of depression, anxiety, and stress.  No

"gold standard" exists for the measurement of stress (Shaw, Dimsdale, & Patterson,

2000).  Existing measures include the Holmes and Rahe Life Events scale, first published

as the Social Readjustment Rating Questionnaire (SRRQ; Holmes & Rahe, 1967), the

Maslach Burnout Inventory (Maslach & Jackson, 1981), and the Ways of Coping Scale

(Folkman & Lazarus, 1986).  For the purposes of this thesis, a short measurement of

stress was chosen in order to reduce responder burden.  One advantage of the DASS over

other measures is that it reportedly "provides a better separation of the features of anxiety

and depression, relative to other existing measures" (Antony, Bieling, Cox, Enns, &

Swinson, 1998, p. 177).  According to Lovibond and Lovibond (1995) there is an absence

of overlapping items with the DASS scales as "no item was retained which loaded

substantially (greater than 0.25) on the other scales" (p. 342). However, there may still

be moderately high correlations among the subscales, which Lovibond and Lovibond

(1995) state "may reflect common causes of anxiety, depression, and stress" (p. 342)

rather than overlapping constructs. The DASS is considered to be an "excellent

instrument for measuring features of depression, hyper-arousal, and tension in clinical

and non-clinical groups" (Antony et al., 1998). When assessing the internal consistency

of the DASS, Antony et al. found Cronbach's alphas for the DASS Depression, Anxiety,

and Stress subscales to be .97, .92, and .95, respectively. For concurrent validity of the

DASS among clinical patient groups, Antony et al. found correlation coefficients of .85

between the anxiety subscale of the DASS and the Beck Anxiety Inventory (BAI; Beck &

Steer, 1990), and .77 between the depression subscale of the DASS and the Beck

Depression Inventory (BDI; Beck, Rush, Shaw, & Emery, 1979). These same

investigators found the stress subscale of the DASS to correlate .62 with the BDI, .64

with the BAI, and .59 with the State-Trait Anxiety Inventory –Trait version (STAI-T;

Spielberger, 1983). Test–retest reliability for the DASS within a clinical sample was

found to be .71 for depression, .79 for anxiety, and .81 for stress (T. A. Brown,

Korotitsch, Chorpita, & Barlow, 1997).

**Conner's Adult ADHD Rating Scale (self-report, long version).** The CAARS

(Conners, Erhardt, & Sparrow, 1999) is a 66-item scale that results in a set of scores

based on how often symptoms indicative of ADHD are endorsed. Four factors are

identified in the final scores: inattention/memory problems, hyperactivity/restlessness,

impulsivity/emotional lability, and problems with self-concept. In every case a higher

score is said to indicate more problems (Gallagher & Blader, 2001). The scale contains 3

DSM-IV ADHD symptoms subscales and an ADHD index, which is a measure of the

overall level of ADHD-related symptoms and is reportedly the best screen for identifying

those "at-risk" for ADHD (Conners et al., 1999). Thus, there are a total of eight scores

produced by the CAARS: inattention/memory problems; hyperactivity/restlessness;

impulsivity/emotional lability; problems with self-concept; DSM-IV inattentive

symptoms; DSM-IV hyperactive-impulsive symptoms; DSM-IV ADHD symptoms total;

and the ADHD index.  According to Conners et al. when interpreting the CAARS, it is

important to "examine the pattern of elevated scale scores in addition to considering

individual $T$-scores".  According to Conners et al., when "one $T$-score is above 65, then

the pattern is marginal" (p. 22) and the "greater the number of scales that show clinically

relevant elevations ($T$-scores above 65), the greater the likelihood that the CAARS scores

indicate a moderate to severe problem" (p. 22).  As Harrison, Edwards and Parker (2007)

point out, "the manual does not stipulate a specific cut-off score that may be taken to

indicate ADHD" but does suggest "that individuals obtaining T-scores on the ADHD

index of over 70 are likely to meet the diagnostic criteria for ADHD" (p. 581).  For the

purposes of this thesis, we examined critical values of both $T$ greater than 65 and $T$

greater than 70 on the ADHD index.

     According to Gallagher and Blader (2001), the CAARS is very useful for

discriminating between adults with ADHD and adults who do not have clinical concerns.

They state that the CAARS is psychometrically sound and has an advantage over a scale

like the Brown Attention Deficit Disorder Scale (T. E. Brown, 1996) because it has

"established reliability with adults and has been normed on a larger sample" (p. 153).

Erhardt et al. (1999) achieved an overall correct classification rate of 85% in ADHD and

non-ADHD adults ($N$ = 79) using discriminant function analysis with the subscale scores

of the CAARS.  Another study found sensitivity of 71% and specificity of 75% for the

ADHD index score (Conners et al. 1999).   Erhardt et al. (1999), reports internal

reliability of the CAARS factor scales as ranging between .86 and .92, and test-retest

reliabilities as ranging between .88 and .91.

**The Life Experiences Survey (LES).**  The LES (Sarason, Johnson, & Siegel,

1978) is a 60 item self-report measure that allows respondents to indicate events they

have experienced during the last year and to rate these either positively or negatively, and

to then quantify the degree to which they perceive these events as positive or negative.

The researchers who developed this scale felt that how one perceived an event (i.e., one's

subjective rating of it) was essential for determining the impact of that event (Sarason et

al, 1978).  The LES provides three scores: a positive change score, a negative change

score, and a total score.  In order to determine whether the LES was a methodological

improvement, researchers compared it with the life change score of the Recent Life

Changes Questionnaire (RCLQ; Holmes & Rahe, 1967), which is the most frequently

used life events measure in the literature (Shaw, Dimsdale, & Patterson, 2000).  They

found that the LES negative change scores were significantly more strongly related to

depression, social non-conformity, and discomfort scores than the RLCQ score (Sarason

et al., 1978; Shaw et al., 2000).  Negative change scores have been found to be

significantly related to: grade point average (-0.38); scores on the State-Trait Anxiety

Inventory (0.29 and 0.46 respectively); scores on the Beck Depression Inventory (0.24);

and scores from the Rotter's Internal-External Locus of Control Scale (0.32).  Test re-test

correlations were 0.63 between first and second administrations, and 0.64 between

second and third administrations for the total LES scale and 0.56 between first and

second administrations and 0.88 between second and third administrations for negative

change scores (Sarason et al., 1978). Although test-retest reliability for positive life

events was not as good (0.19 and 0.53, respectively) we were not particularly interested

in the positive life events scores in this study. The entire LES was administered to the

students. The nurses did not fill out this questionnaire due to concerns about responder

burden in a busy hospital situation.

**The Brown Attention Deficit Disorder Scale (BADDS).** The BADDS (T. E.

Brown, 1996) is a 40 item self-report scale that allows respondents to indicate difficulties

in the areas of organizing and activating to work, sustaining attention and concentration,

sustaining energy and effort, managing affective interference, and utilizing 'working

memory' and accessing recall (Whiteside, 2003). It was developed prior to the

publication of the DSM-IV concept of ADHD and focuses primarily on inattention rather

than hyperactivity and impulsivity (Rosler, Retz, Thome, Schneider, Stieglitz, & Falkai,

2006). According to the scoring sheet of the BADDS, scores from 44-54 indicate that

ADD is probable but not certain and scores from 55-120 indicate that ADD is highly

probable. As Harrison (2004) points out, Brown's dimensions "were initially developed

based on face validity rather than from a synthesis of the scientific literature or

empirically through factor or cluster analysis" (p. 9).

**Approach to Analysis**

Results from each study are provided in the individual study sections. A general

overview of the results from all three studies is presented in Chapter 5.

After summarizing sample characteristics, descriptives, and the testing of assumptions, multiple regression analyses were conducted for the total score on the DASS and the DASS subscales (depression, anxiety, and stress) and the score of the CAARS ADHD index.  Multiple regression analyses were then conducted for the independent variables and the other subscales of the CAARS in which the percentage of participants scoring above critical values was higher than expected. Independent samples t-tests were conducted on the means of the independent variables and the dependent variables to examine differences between the groups of participants and to determine whether observed differences were statistically significant.

**Forward to Chapter 2**

The research presented in Chapter 2 explored the relationship between the

Depression, Anxiety, and Stress Scale (DASS; Lovibond & Lovibond, 1995) and the

Conners' Adult ADHD Rating Scale (CAARS; Conners, Erdhardt, & Sparrow, 1999) in a

group of introductory psychology students at Queen's University, in Kingston, Ontario,

most of whom were in first year.  This research examined the question of whether scores

on the DASS would be correlated with scores on the CAARS, and whether people

scoring at the high end of the DASS would be likely to score above established critical

values on the CAARS.

Chapter 2 consists of a manuscript that is being submitted for publication.  Dr. Allyson

Harrison appears as co-author.

A copy of the measures used in this study can be found in Appendix B.

**Chapter 2: Introductory Psychology Students**

The main purpose of this study was to examine the relationship between depression, stress and anxiety and scores on an ADHD self-report instrument, the Conner's Adult ADHD Rating Scale (CAARS; Conners, Erdhardt, & Sparrow, 1999).

There is good reason to suspect that postsecondary students might endorse high levels of symptoms consistent with ADHD. Gouvier, Uddo-Crane, and Brown (1988) conducted a study to establish base rates for the reporting of cognitive and other symptoms in "normals" versus people with brain damage and discovered that no significant differences were found between brain damaged individuals and a control group of students from an undergraduate psychology course "on items assessing self-reported memory problems, problems becoming interested in things, frequent loss of temper, irritability, fatigue, or impatience" (p. 276). J. L. Wong, Regennitter, and Barrios (1994) conducted a study in which 81.8% of students in a control group of university student volunteers who were asked to respond honestly about their current health endorsed difficulties concentrating when reading, 63.6% endorsed becoming tired easily, and 62.5% endorsed being impatient. While J. L. Wong et al. were looking at "classic" symptoms of head injury, it must be noted that difficulties with concentrating and impatience are also symptoms associated with ADHD. Lewandowski, Lovett, Codding and Gordon (2008) found that "when using a typical ADHD symptom questionnaire, both ADHD and typical students endorse significant rates of symptoms" (p. 160). In fact, they found that at least 30% of a "nondisabled" group endorsed items reported by the majority of students with ADHD (Lewandowski, Lovett, Codding & Gordon, 2008). Thus, university students report symptoms similar to those found on ADHD checklists.

College life is known to be stressful. Indeed, many students, including those with ADHD (T. E. Brown, 2003), experience challenges in first year (Martin, Cayanus, Weber, & Goodboy, 2006; Rodgers & Tennison, 2009).  T. E. Brown (2003) states that some of the most difficult times for persons with ADHD are the first two years of college (due to multiple teachers and a wide range of task demands), and when moving out of home (due to loss of parental monitoring/support and having to manage one's own household routines).   However, while it may be true that an individual with ADHD may become overwhelmed by these situations, other students also find such changes to be stressful (Bayram & Bilgel, 2008; Howard, Schiraldi, Pineda, and Campanella, 2006). For many students it is the first time they are away from home; they are dealing with many changes and establishing their identities as adults.  This can be a difficult time emotionally and some students may become more depressed, anxious, or stressed than usual (Bayram & Bilgel, 2008; Howard et al., 2006; J. G. Wong, Cheung, Chan, Ma, & Tang, 2006).  It is possible that increased depression, anxiety, and stress may cause a host of cognitive symptoms that resemble ADHD symptoms.  University students are in a more academically challenging environment than high school and may experience more difficulties with concentration, stress, fatigue, etc. than in their previous situations for reasons other than ADHD.  Given that "ADHD often is not recognized until adolescence or early adulthood" (Barkley & Brown, 2008, p. 979), it is very important to establish to what extent ADHD symptoms are common in the university population in order to aid with accurate diagnosis.

The main purposes of this study were to examine the relationship between depression, anxiety, and stress to scores on an ADHD self-report instrument.  We also

examined whether factors such as perceived stress level, coping abilities, feelings of being overwhelmed, and the number of recent negative life experiences affected the symptoms reported on ADHD measures.

Our predictions were as follows:

1. *A higher number of non-diagnosed students than expected will score above critical values on subscales of the CAARS, particularly on the inattentive subscales of this measure.* This is based on research showing that students often report difficulty with concentrating, irritability, and/or memory (Gouvier et al., 1988; J. L. Wong et al., 1994).

2. *Scoring above the published critical values for suspected ADHD will be related positively to reported symptoms of depression, anxiety, and stress.* This is based on the fact that many symptoms of depression, anxiety, and stress as listed in the DSM-IV-TR (APA, 2000) are similar to symptoms of ADHD. Also, some studies have found those who are depressed experience more memory difficulties than do normally functioning individuals (Breslow, Kocsis, & Belkin, 1981; Sternberg & Jarvik, 1976) and that cognitive impairments are common in major depression and anxiety disorders (Casteneda, Tuulio-Henriksson, Marttunen, Suvisaari, & Lonnqvist, 2008).

**Method**

**Participants**

University undergraduate students (31 men, 53 women) enrolled in an introductory psychology course were recruited for the present study, and were offered

course credit for their participation.  In addition, a further incentive was provided of entry into a $100 dollar draw.

**Sample Characteristics – Demographics**

Of the total sample ($N = 84$), the mean age of the students was 19.83 ($SD = 3.02$) and ranged from 18.0 to 37.0 years old.  One female student did not include her age in months on the questionnaire (but did give years) but was retained as part of the sample as the rest of her data were complete, and age was not one of the primary variables being examined.  For the purpose of checking scores above critical values the entire sample of 84 students was used in order to compare the complete sample with a population estimate.  After checking scores on the CAARS scales, two male students were deleted from the sample due to having been previously diagnosed with ADHD, bringing the sample size available for regression analysis to $n = 82$. Interestingly, neither of these previously diagnosed students had scored above critical values on the ADHD index of the CAARS, although both of them had scored above critical values on other scales of the CAARS.  One of the students did not know with which type of ADHD he had been diagnosed; the other had been diagnosed with inattentive-type ADHD.  For the multiple regressions, only the students who had not been previously diagnosed with ADHD were included, as the purpose was to explore associations among depression, stress, anxiety, and ADHD symptoms among students who had no history of ADHD.

**Materials**

Students received a questionnaire package and a ballot for the draw. The questionnaire package consisted of: a demographic information section; questions relating to previous ADHD diagnosis; the DASS, a measure of depression, anxiety and

stress; the CAARS; and the Life Experiences Survey (LES). The rating scales may be viewed in Appendix B, and other materials may be viewed in Appendix C.

The DASS (Lovibond & Lovibond, 1995) is a 42-item scale that measures depression, anxiety, and stress. One advantage of the DASS over other measures is that it reportedly separates the symptoms of depression, anxiety, and stress, thereby purportedly reducing overlap of these constructs. The DASS is considered to be an "excellent instrument for measuring features of depression, hyper-arousal, and tension in clinical and non-clinical groups" (Antony, Cox, Enns, & Swinson, 1998).

The CAARS (Conners et. al, 1999) is a 66-item scale that results in a set of scores based on how highly one endorses behaviours associated with ADHD. This scale measures four main factors: inattention/memory problems, hyperactivity/restlessness, impulsivity/emotional lability, and problems with self-concept. In every case a higher score indicates more problems (Gallagher & Blader, 2001). The scale contains 3 DSM-IV ADHD symptoms subscales and an ADHD index. The ADHD index is a measure of the overall level of ADHD-related symptoms and is reportedly the best screen for identifying those "at-risk" for ADHD (Conners et. al, 1999). According to Conners et al., when interpreting the CAARS, it is important to "examine the pattern of elevated scale scores in addition to considering individual *T*-scores". Although the ADHD index "represents a measure of the overall level of ADHD-related symptoms" and is "the best screen for identifying those "at-risk" for ADHD" (Conners et. al, 1999, p. 23) it is also important to look at all the scales in conjunction. According to Conners et al., when "one *T*-score is above 65, then the pattern is marginal" (p. 22) and the "greater the number of

scales that show clinically relevant elevations (*T*-scores above 65), the greater the likelihood that the CAARS scores indicate a moderate to severe problem" (p. 22).

The Life Experiences Survey (Sarason, Johnson, & Siegel, 1978) is a 60 item self-report measure that allows respondents to indicate events they have experienced during the last year and to rate these as having either a positive or negative impact on their life. The researchers who developed this scale felt that how one perceived an event (i.e. one's subjective rating of it) was essential for determining the impact of that event upon one's functioning (Sarason et al., 1978). Events that students perceived as negative were summed to provide a LES negative change score for the year being measured.

In examining the correlations between the DASS and CAARS, we must be wary of *criterion contamination* (Meyer, et al., 2001), an important issue in the field of research psychology. Often correlations as large or larger than .50 are obtained when numerical values on a predictor and criterion are derived from the same source of information and are measuring conceptually similar constructs or the same construct (Meyer et al., 2001). This problem can be avoided, or at least reduced by removing identical items from the two measures. Hence, three practicing psychologists were asked to independently evaluate the DASS and the CAARS scales for overlapping items that could result in a spurious correlation. However, none of the three psychologists identified the same items, and in fact their general feedback was that they felt it was very difficult to ascertain whether or not the items would tap the same construct. Three lay-people were also given a list of items that the researcher identified as being possibly similar and were asked to rate them on a scale of 0 to 3 for similarity, with 0 being very different and 3 being exactly the same. Two out of three lay reviewers identified three

items by this criterion; all were from the stress scale of the DASS and consisted of the

questions 11, 27, and 39 on the stress portion of the DASS scale ("I found myself getting

upset rather easily, I found that I was very irritable, and I found myself getting agitated").

The identified items were removed from the DASS score for the purposes of the

regression (see appendix F for the verbatim instructions).   However, comparisons of the

regressions both with and without the identified items removed show virtually the same

results throughout the thesis.

**Procedure**

Students from the introductory psychology class were asked to sign up for allotted

time periods provided by the experimenter when they could come to a classroom in a

group setting.  Once presented with the counter-balanced questionnaires, all students

were asked to read the information sheet, which indicated they were completing a survey

examining the relationship between people's moods and their scores on an ADHD self-

report measure.  It was emphasized that participation was voluntary and that those who

wished were free to withdraw their data from the study at any time prior to submission,

without reason or consequence.  After completion of the survey, the students were

thanked for their participation and given a debriefing sheet.  The students received a 1-

mark credit in Psychology 100 and were entered in a draw for one hundred dollars.

## Results

After summarizing sample characteristics and descriptives and checking for out of

range variables and plausible means and standard deviations, scores on each of the eight

subscales of the CAARS were calculated for each participant.  It was determined whether

the obtained scores were above the critical value of a *T*-score of higher than 65 on each of

the scales on an individual basis (as age and sex affect whether the raw score translates to

a *T*-score over 65). These results including percentages are summarized in Table 2.1 and

Table 2.2.

**Testing of Assumptions**

Univariate descriptive statistics were inspected for accuracy of input by checking

for out-of-range values, plausible means and standard deviations, and univariate outliers

(Tabachnick & Fidell, 2007). We assessed univariate normality for each of the main

continuous independent measures and the outcome measures, the CAARS subscales, by

an examination of single-variable histograms and by dividing Skewness by the Standard

Error of Skewness and Kurtosis by the Standard Error of Kurtosis. Generally, if each of

these values is less than the absolute value of three, skew and kurtosis are not such that

they violate normality. For the continuous independent measures, the DASS score (with

and without overlapping variables removed) was slightly positively skewed and slightly

leptokurtic. The depression subscale of the DASS was moderately positively skewed and

moderately leptokurtic. The anxiety subscale of the DASS was very slightly positively

skewed. The stress subscale of the DASS was slightly positively skewed (and with

overlapping items removed was also very slightly leptokurtic). The Negative Life

Events scale was moderately negatively skewed and moderately leptokurtic. On the

CAARS (the dependent measure), only the hyperactivity/restlessness subscale was

slightly positively skewed. The variable means, standard deviations, skews and kurtosis

are shown in Appendix G along with their transformations. The means, standard

deviations and *T*-scores for the main independent and dependent variables are shown in

Table 2.3.

Table 2.1

*Numbers and Percentages of Psychology 100 Students Scoring Above Critical Values (T > 65) on Each CAARS Subscale*

| CAARS subscale | Number of all students (*N* = 84) | Percentage of all students (*N* = 84) | Number with ADHD students removed (*n* = 82) | Percentage with ADHD students removed (*n* = 82) |
|---|---|---|---|---|
| Inattention/memory problems | 10 | 11.9 | 9 | 10.9 |
| Hyperactivity/restlessness | 7 | 8.3 | 6 | 7.3 |
| Impulsivity/emotional lability | 6 | 7.1 | 6 | 7.3 |
| Problems with self-concept | 7 | 8.3 | 7 | 8.5 |
| DSM-IV inattentive symptoms | 19 | 22.6 | 17 | 20.7 |
| DSM-IV hyperactive-impulsive symptoms | 8 | 9.5 | 7 | 8.5 |
| DSM-IV ADHD symptoms total | 15 | 17.9 | 13 | 15.9 |
| ADHD index | 4 | 4.8 | 4 | 4.9 |
| Total students above critical values on at least one scale | 29 | 34.5 | 27 | 32.9 |

Table 2.2

*Percentage of Students Scoring Above Critical Values on One to Seven Subscales of the CAARS (N = 84)*

| Number of subscales | 1 | 2 | 3 | 4 | 5 | 6 | 7 | At least one subscale |
|---|---|---|---|---|---|---|---|---|
| Percentage scoring above *T*-Score of 65 | 10.7 | 10.7 | 5.9 | 1.2 | 3.6 | 0 | 2.4 | 34.5 |

*Note*. 23.8% of students scored above critical values on two or more scales.

Table 2.3

*Means and Standard Deviations for Continuous Independent Variables (DASS) and
Dependent Variables (CAARS) With Psychology 100 Students (n = 82)*

| Variable | Mean (Mean *T*-Score) | *SD* (*T*-Score *SD*) |
|---|---|---|
| Inattention/memory problems | 13.53 (53.46) | 6.53 (10.38) |
| Hyperactivity/restlessness | 13.56 (48.17) | 6.49 (9.55) |
| Impulsivity/emotional lability | 10.86 (48.95) | 5.83 (9.50) |
| Problems with self-concept | 6.73 (49.51) | 4.25 (9.90) |
| DSM-IV inattentive symptoms | 9.58 (56.87) | 5.11 (11.78) |
| DSM-IV hyperactive-impulsive symptoms | 8.28 (49.54) | 4.79 (10.82) |
| DSM-IV ADHD symptoms total | 17.85  (54.27) | 8.79 (11.60) |
| ADHD index | 12.07 (50.71) | 5.62 (9.77) |
| DASS | 25.56 | 17.75 |
| DASS[a] | 23.14 | 16.19 |
| Depression | 7.71 | 7.21 |
| Anxiety | 6.37 | 5.39 |
| Stress | 11.48 | 7.89 |
| Stress[a] | 9.06 | 6.13 |

[a]Overlapping items removed
*Note*. For DASS Normal Ranges are: Depression 0-9, Anxiety 0-7, and Stress 0-14.  All
of which are in the percentile range of 0-78 and with a z score of $< 0.5$.
*Note*. The mean *T*-score of the CAARS subscales is given in brackets.

Necessary transformations were undertaken before checking for outliers, as transformation can reduce the number of outliers and result in closer approximations to normality, linearity, and homoscedasticity among the variables, and increase the likelihood of multivariate normality (Tabachnick & Fidell, 2007).  Regressions were run both with the transformed and original data and if the results did not differ, only the results of the original data were reported.

The $z$ scores of the main independent and dependent variables were examined for outliers.  Tabachnick and Fidell (2007) define potential outliers as "cases with standardized scores in excess of 3.29" (p. 73).  Outliers were not present for any of the variables after transformation.  Mahalanobis distance, using the transformed variables, was computed for each case to check for multivariate outliers.  Tabachnick and Fidell (2007) state that a conservative probability estimate of $p < .001$ is appropriate with this procedure.  Using this approach no multivariate outliers were detected.

Some researchers feel that the above convention for assessing normality is not the preferred method, as very small and very large samples may have equal skews; but the smaller sample would appear to be less skewed due to being divided by a larger standard error (L. Fabrigar, personal communication, February 9, 2009).  Curran, West, and Finch (1996), referring to normal theory maximum likelihood estimation (which is less robust to violations of normality than is multiple regression), state, "further research is needed to better understand more precisely when nonnormality becomes problematic, but it seems clear that obtained univariate values approaching at least 2.0 and 7.0 for skewness and kurtoses are suspect" (p. 26).  None of the variables approached these values with this sample.

**Analyses**

Bivariate correlations are shown between the main independent variables and the dependent variables in Table 2.4. Bivariate correlations between the ancillary independent variables and the dependent variables are shown in Table 2.5. The ancillary variables are secondary variables that were not of direct concern but were included to provide additional information.

Although the DASS is a dimensional measure not a categorical measure, the manual does provide guidelines for severity ratings (Lovibond & Lovibond, 1995). The majority of the students scored in the normal range on the depression scale (73.2%), 11% scored in the mild range, 9.8% scored in the moderate range, 2.4% scored in the severe and 3.7% scored in the extremely severe range. For the anxiety scale 67.1% scored in the normal range, 7.3% in the mild range, 13.4% in the moderate range, 11% in the severe range, and 1.2% in the extremely severe range. For the stress scale, 72% of the students scored in the normal range, 13.4% in the mild range, 8.5% in the moderate range, 2.4% in the severe range, and 3.7% in the extremely severe range. Combined levels of depression, anxiety, and stress were significantly correlated with scores on the CAARS ADHD index (the bivariate correlation between the DASS total score and the ADHD index was .52, $p < .01$). Note, with overlapping items from the DASS removed, the correlation is .53, $p < .01$. The separate subscales of the DASS were also significantly correlated with the ADHD index (depression at .39, anxiety at .57, and stress at .43, $p < .01$ in all cases). The ADHD index was entered as a criterion variable into regression analysis with the untransformed independent variable of the total DASS score (with overlapping items removed to avoid spurious correlations). This yielded an $R$ of .53 and an $R^2$ of .28. The

Table 2.4

*Bivariate Correlations Between the Main Independent Variables (DASS and DASS subscales) and the Dependent Variables (CAARS subscales) (n = 82)*

| CAARS subscale | DASS[a] | Depression subscale | Anxiety subscale | Stress[a] subscale |
|---|---|---|---|---|
| Inattention/memory problems | .40** | .28* | .51** | .26* |
| Hyperactivity/restlessness | .16 | .05 | .22* | .18 |
| Impulsivity/emotional lability | .56** | .34** | .61** | .57** |
| Problems with self-concept | .56** | .59** | .51** | .35** |
| DSM-IV inattentive symptoms | .53** | .41** | .59** | .39** |
| DSM-IV hyperactive-impulsive symptoms | .30** | .12 | .36** | .33** |
| DSM-IV ADHD symptoms total | .47** | .30** | .53** | .40** |
| ADHD index | .53** | .39** | .57** | .43** |

[a]Overlapping items removed from DASS and stress subscale
*$p < .05$   **$p < .01$

Table 2.5

*Bivariate Correlations Between the Ancillary Independent Variables (Author Compiled Questions and Negative Change Score of the LES) and the Dependent Variables (CAARS Subscales) (n = 82)*

| CAARS subscale | Stress level | Coping level | Overwhelmed | Negative LES |
|---|---|---|---|---|
| Inattention/memory problems | .15 | -.33** | .06 | -.21 |
| Hyperactivity/restlessness | .02 | -.05 | -.18 | -.08 |
| Impulsivity/emotional lability | .24* | -.27* | .09 | -.32** |
| Problems with self-concept | .15 | -.29** | .15 | -.33** |
| DSM-IV inattentive symptoms total | .17 | -.28* | .02 | -.27* |
| DSM-IV hyperactive-impulsive symptoms | .14 | -.06 | -.09 | -.03 |
| DSM-IV ADHD symptoms total | .17 | -.20 | -.03 | -.18 |
| ADHD index | .15 | -.24* | .01 | -.34** |

*p < .05   **p < .01

$R^2$ adjusted was .27, and is significant at $p < .001$ indicating that the total DASS score

alone accounted for almost 27% of the variance on the ADHD index.  In rerunning the

regression with the square root transformations on the independent variable (due to the

DASS score being positively skewed), the $R^2$ adjusted is .30, accounting for 30% of the

variance, also significant at $p < .001$.  The results of the regression on the untransformed

variable can be seen in Table 2.6.

If one enters the three untransformed subscales of the DASS separately into a

multiple regression (with overlapping items removed) using the ADHD index as the

criterion resulted in a $R$ of .58 and the $R^2$ adjusted is .31, indicating that the scores from

these three domains account for 31% of the variance in the ADHD index score (see Table

2.7).  It appears from this as though anxiety is the only significant predictor of the ADHD

index.  However, multicollinearity among the predictor variables could be obscuring the

relationships.  Therefore, two additional multiple regressions were conducted in order to

assess this issue, separating the most highly correlated variables, anxiety and stress, from

each other (Fabrigar, personal communication, February 9, 2009), in order to get a more

accurate and comprehensive understanding of the contributions of the individual

variables.  Anxiety remains significant in these regressions, while stress achieves

significance once separated from the effects of anxiety ($p = .017$) and depression remains

non-significant (see Table 2.8).

Similar analyses were conducted for each of the main CAARS ADHD indices in

which a high percentage of students scored above critical values. Using multiple

regression analyses, it was found that almost 34% of the variance in the DSM-IV

inattentive symptoms scale is accounted for by levels of self-reported depression, anxiety,

Table 2.6

*Summary of Linear Regression for DASS Association With CAARS ADHD Index (n = 82)*

|                    | B   | SE B | Beta | t    | Sig.    |
|--------------------|-----|------|------|------|---------|
| DASS[a]            | .18 | .03  | .53  | 5.52 | < .001  |

$R^2$ adjusted = .27
[a]Overlapping items removed

Table 2.7

*Summary of Simultaneous Multiple Regression for Main Independent Variables Associations With CAARS ADHD Index (n = 82)*

| Variable | *B* | *SE B* | Beta | *t* | Sig. |
|---|---|---|---|---|---|
| Depression | .10 | .09 | .13 | 1.06 | .291 |
| Anxiety | .55 | .14 | .53 | 3.83 | < .001 |
| Stress[a] | -.03 | .13 | -.03 | -.22 | .826 |

$R^2$ adjusted = .31

*Note*. The negative beta may be due to multicollinearity.

[a]Overlapping items removed

Table 2.8

*Summary of Multiple Regression for Independent Variables Associations With CAARS ADHD Index With Anxiety and Stress Divided (n = 82)*

| Variable | *B* | *SE B* | Beta | *t* | Sig. |
|---|---|---|---|---|---|
| Depression | .09 | .09 | .12 | 1.06 | .292 |
| Anxiety | .53 | .11 | .51 | 4.68 | < .001 |
| | | | | | |
| Depression | .16 | .10 | .21 | 1.63 | .107 |
| Stress[a] | .28 | .12 | .31 | 2.43 | .017 |

[a]Overlapping items removed.

and stress ($R = .60$, $R^2 = .36$, Adjusted $R^2 = .34$). These DASS subscales also account for almost 26% of the variance on the DSM-IV ADHD symptoms total subscale ($R = .54$, $R^2 = .29$, Adjusted $R^2 = .26$) and almost 26% of the variance on the inattention/memory problems subscale ($R = .53$, $R^2 = .28$, Adjusted $R^2 = .26$), while total DASS scores account for 27%, 21% and 15% of the variance on the DSM-IV inattentive, DSM-IV ADHD symptoms total, and inattention/memory problems subscales, respectively (see Appendix H).

As the LES negative change score was significantly correlated with the DSM-IV inattentive symptoms subscale and the DASS, we checked for mediation effects and found that the DASS mediates the relationship between the LES negative change score and the DSM-IV inattentive symptoms subscale ($z = -3.65$, $p = .0002$) as illustrated in Figure 2.1.

The scores on questions about stress level, coping, feeling overwhelmed, and the LES negative change score were entered into a sequential multiple regression (after the depression, anxiety, and stress scores) to determine whether they accounted for any additional variance on the CAARS subscales examined above. As a group the DASS variables (Model 1: depression, anxiety, and stress) were significant, while the group of ancillary variables (Model 2: stress level, coping, feeling overwhelmed, and the LES negative change score) were found to contribute additional significant variance to the ADHD index ($R^2 = .46$, $\triangle R^2 = .13$, $p = .003$), the DSM-IV inattentive symptoms ($R^2 = .48$, $\triangle R^2 = .11$, $p = .006$), and the DSM-IV ADHD symptoms total subscales ($R^2 = .41$, $\triangle R^2 = .13$, $p = .006$; see Appendix H).
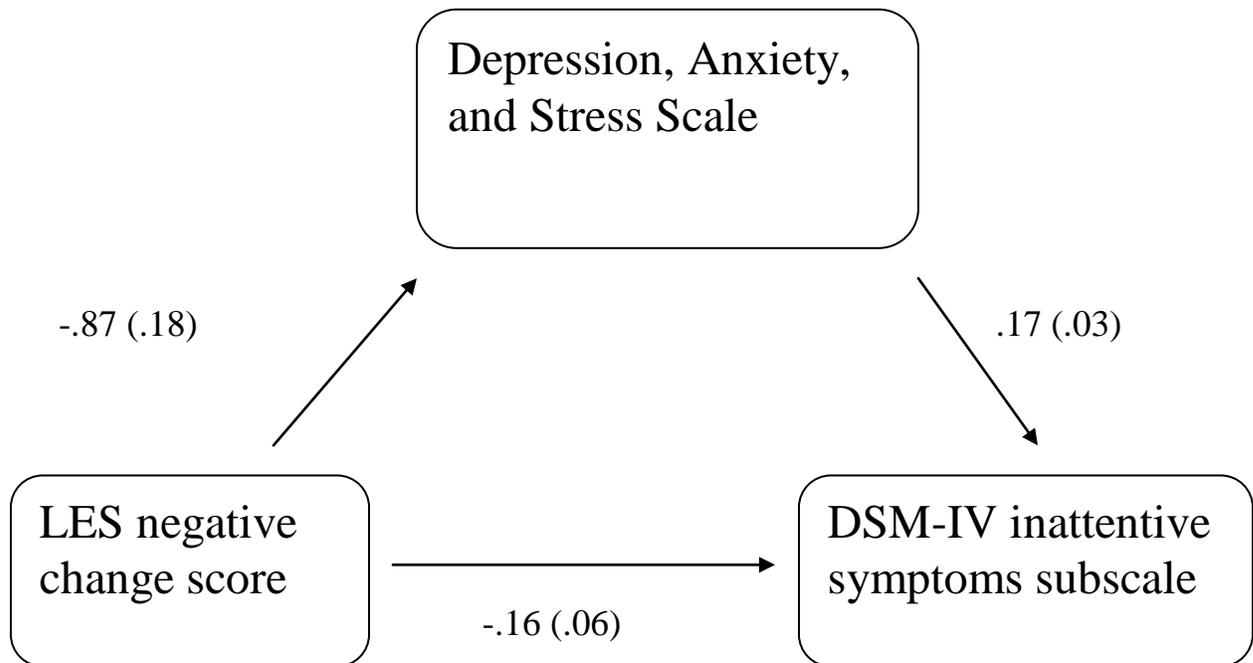
*Figure 2.1.* Illustration of the mediation model suggesting that the relationship between negative life events (as measured by the LES negative change score) and the DSM-IV inattentive symptoms subscale is mediated by the level of depression, anxiety, and stress experienced in response to the negative events.

**Discussion**

The ADHD index is reportedly one of the best indicators of ADHD risk (Conners et al., 1999).  For this group of students it performed fairly well. The percent of students scoring above critical values on this scale (5%) was not significantly different from the known occurrence in the general population (6%).  When looking at the students who scored in the top one-third on the DASS (depression, anxiety, and stress scale) significantly more of these students (11%) scored above the critical values for the ADHD index than is found for the population at large; z = 1.93, *p* < .05, one-tailed. If a critical value of *T* > 70 is considered, the percent of students scoring above critical value is no longer significant.  Specificity of the ADHD index is good at 95.1% and negative predictive value is 97.5%.  However, its ability to correctly identify those with ADHD was weak.  Neither of the two previously diagnosed students scored above critical values on the ADHD index.  Although anxiety originally appeared to be the only significant predictor of the ADHD index, this was likely due to multicollinearity between the predictor variables. When the most highly correlated variables were separated from each other, both anxiety and stress were seen to make a contribution to the variance on the ADHD index.

One of the most striking findings of this study was the fact that, even in a population of introductory psychology students with no previous ADHD diagnosis, there were a high percentage of scores above critical values on three of the subscales of the CAARS.  While the CAARS performed well for most of the scales overall, 22.6%, 17.9%, and 11.9% of the entire sample of students scored above a *T*-score of 65 on the DSM-IV inattentive symptoms subscale, the DSM-IV ADHD symptoms total, and the

inattention/restlessness subscales, respectively.  Even when the students who had been previously diagnosed with ADHD were eliminated from the sample, 20.7% still scored above critical values on the DSM-IV inattentive symptoms subscale, 15.9% scored above critical values on the DSM-IV ADHD symptoms total subscale, and 10.9% scored above critical values on the inattention/restlessness subscale.  For these three subscales of the CAARS, level of depression, anxiety, and stress accounted for a large portion of the variance observed (34% for DSM-IV inattentive symptoms and 26% for both DSM-IV ADHD symptoms total and inattention/restlessness).  Therefore, diagnosticians should be particularly careful when assigning a diagnosis of ADHD to individuals scoring high on any of these three subscales, especially if there is evidence that depression, stress or anxiety might be contributing to the reported symptoms.  This finding also underscores the need to investigate and rule out other causes for the reported symptoms. Indeed, DSM-IV-TR (APA, 2000) cautions against diagnosing ADHD if the symptoms can be better accounted for by another disorder.  Routinely screening for depression, anxiety, and stress when conducting ADHD assessments is strongly recommended to reduce false positive diagnoses.  However, it is also important for clinicians to keep in mind that the conditions of depression, anxiety, and stress are often on a continuum (not just the categorical division that exists within the DSM-IV-TR) and that although their clients may not reach criteria for a clinical diagnosis, they may still be experiencing enough symptoms to affect their scores on the CAARS.  That is, it is possible for a client to be showing some symptoms of depression, anxiety, and stress insufficient to actually be diagnosed with these disorders but which are still sufficient to cause them to experience

difficulties with attention, concentration, memory, and other symptoms of ADHD, particularly the inattentive variety.

One might argue that those who scored above the critical values on the CAARS subscales represent undiagnosed cases of ADHD. This, however, seems unlikely. DuPaul et al. (2001) points out that "some writers in the field have predicted a somewhat lowered prevalence rate in university settings and have estimated that 1% to 3% of the university population has ADHD" (Javorsky & Gussin, 1994 as cited in DuPaul et al., 2001; Richard, 1995 as cited in DuPaul et al., 2001). In DuPaul et al.'s study 2.9% of men and 3.9% of women from universities in the United States reported significant ADHD symptoms. Harrison (personal communication, 2007) reports that disability services at Queen's University has reported a stable rate of 1% of the student body self-identifying as having ADHD over the preceding five years. Hence, while it may be possible that some undiagnosed students were included in this undergraduate sample, it seems highly unlikely that 15-20% of the student population (higher than the population estimates for all adults) has this condition and yet remains undiagnosed.

Scores on most of the CAARS subscales did have significant bivariate correlations with the subscales of the DASS, although the hyperactivity/restlessness subscale was not significantly correlated with most of the subscales of the DASS. This suggests that the experience of higher than normal levels of depression, anxiety, and/or stress is associated with reporting higher than normal symptoms on the CAARS, especially the inattentive type of symptoms of ADHD, but do not tend to be associated with increased reporting of symptoms of hyperactivity. As a result the hyperactive variety of ADHD seems less vulnerable to diagnostic confusion.

**Limitations and Directions for Future Research**

A major limitation of this study is that while there are significant correlations between the DASS subscales and CAARS subscales, the experimental design does not allow us to infer causation.  In order to show causation, prospective studies in this area are necessary.  It is also important to be aware that causation is not necessary for prediction (Howell, 1997).  Another limitation is the fact that this group is not representative of the adult population in general.  Every participant was a student who was taking a first year psychology course. The majority of students (all but 7) were between the ages of 18 and 21 years. They probably were fairly new to university and may not yet have adjusted to the stresses inherent in university life.  Future research could examine symptom endorsement on the CAARS for adults in general, not just university students.  It is important to look at groups of people who are clinically depressed or anxious as the students in the present study were not people who had been diagnosed with these conditions but rather were a non-clinical sample of students, some of whom scored highly on these constructs (as well as the stress construct) as measured in a dimensional manner rather than a categorical manner.

**Forward to Chapter 3**

The research presented in Chapter 3 explored the relationship between the Depression, Anxiety and Stress Scale (DASS) and both the Conner's Adult ADHD Rating Scale (CAARS) and the Brown Attention Deficit Disorder Scales (BADDS) in a group of students going to the health and counselling services at a major Canadian university. Scores on the CAARS and the DASS of students going to health or counseling were compared to each other and to baseline measures obtained in the previous study with Psychology 100 students (Chapter 2). Some people scoring at the high end of the DASS were expected to score above established critical values on the CAARS and the BADDS.

Chapter 3 consists of a manuscript that is being submitted for publication. Dr. Allyson Harrison appears as co-author.

A copy of the measures used in this study can be found in Appendix C.

## Chapter 3 – Health and Counselling Services Students

According to Quinn (2003) there has been an increase in general awareness that ADHD may continue into adulthood, perhaps due to media coverage and best-selling books (e.g., Hallowell & Ratey, 1993).  Roy-Byrne et al. (1997) state that this "has resulted in a dramatic increase in the number of adults seeking treatment for presumed ADHD from primary-care physicians, psychiatrists, and educational psychologists" (p. 133).  When diagnosing ADHD, it is crucial to be able to differentiate the symptoms of this disorder from other causes of attention and concentration problems because symptoms of ADHD, especially the inattentive ones, are common to many disorders (Gordon & Barkley, 1999; Harrison, 2004; Schenk, 2002; Weinstein, Staffelbach, & Biaggio, 2000).  Misdiagnosis of ADHD may result in both inappropriate treatment (e.g., if a stimulant such as Ritalin is prescribed when the person does not actually have ADHD), and failure to recognize an underlying true condition that could improve if properly treated (Harrison, 2004).

Unfortunately, adult diagnosis can be very difficult.  For example, one criterion for diagnosis of ADHD is that the symptoms must be present prior to age seven (American Psychiatric Association, 2000).  This may be difficult to determine retrospectively as people do not always retain records of childhood behaviour and/or such records may be unavailable later in life.  Because there is no definitive test for ADHD, diagnosis often relies on checklists and self-report (McCann & Roy-Byrne, 2004).  These checklists have no anchors that allow one to objectively define frequency and severity, but rather rely on vague, subjective terms (e.g., how frequent is "frequently" or "often") (Harrison, 2004).

Two popular self-report checklists used to assist clinicians in identifying possible ADHD traits in adults are the Brown Attention Deficit Disorder Scale (BADDS; T. E. Brown, 1996) and the Conner's Adult ADHD Rating Scale (CAARS; Conners, Erdhardt, & Sparrow, 1999).  Although the literature regarding ADHD assessment cautions that self-report checklists should never be the only data on which a diagnosis of ADHD is made, McCann and Roy-Byrne (2004) report that "many adults have been told that they have ADHD based largely (and sometimes solely) on their responses to self-report indices of symptoms" (p. 181).  Research by Harrison (2004), revealed that many non-ADHD university students score high on the BAADS (Brown Attention-Activation Disorder Scale which is virtually identical to the BADDS), so many young adults report symptoms of ADHD, especially the inattentive type, increasing the likelihood of misdiagnosis.

Further research must be carried out on assessment instruments such as the BADDS and the CAARS to determine how specific their scales are to those with ADHD. Although research has found the CAARS to distinguish well between adults known to have ADHD and a non-clinical control group (Gallagher & Blader, 2001), little research has been conducted on whether this measure is able to distinguish between those who have ADHD and those with other reasons for having attention and/or memory problems. Suhr, Hammers, Dobbins-Buckland, Zimak, and Hughes (2008) recently examined this and found that the CAARS inattention/memory problems, DSM-IV inattentive symptoms, DSM-IV total ADHD symptoms, and the ADHD index subscales were endorsed by at least 20% of a group the researchers referred to as a "psychological symptom group" (p. 524).  This psychological symptom group consisted of individuals

who had no childhood impairment related to ADHD complaints, "evidenced current diagnoses of/treatment for a non-ADHD psychological condition", or "had not yet been diagnosed but met diagnostic criteria for a psychological disorder, usually major depressive disorder, at the time of their evaluation", and had passed a measure of non-credible performance (p. 524).

Researchers have found that it is not uncommon for university students to report difficulties similar to those found in ADHD. For example, Gouvier, Uddo-Crane, and Brown (1988) conducted a study to establish base rates for the occurrence of cognitive and other symptoms in "normals" versus people with brain damage and discovered no significant differences between brain damaged individuals and a control group of students from an undergraduate psychology course "on items assessing self-reported memory problems, problems becoming interested in things, frequent loss of temper, irritability, fatigue, or impatience" (p. 276). J. L. Wong, Regennitter, and Barrios (1994) conducted a study in which 81.8% of students in a base-rate group endorsed difficulties with concentrating when reading, 63.6% endorsed becoming tired easily, 46.6% reported trouble remembering things, and 62.5% endorsed being impatient. While J. L. Wong et al. were looking at "classic" symptoms of head injury, difficulties concentrating and impatience are symptoms associated with ADHD.

The symptoms of ADHD are ubiquitous, in the sense that many people experience them to some extent, and it is more a matter of degree (severity, duration, and intensity) than actual presence of these symptoms that would determine whether one is clinically impaired by these symptoms. Furthermore, many of the symptoms listed in these rating scales are present in a number of other disorders. For instance, individuals suffering from

depression or anxiety frequently experience difficulty with memory, agitation, or inability to concentrate (APA, 2000) and stress can affect memory and cognition (Lupien, et al., 2005; McEwen & Sapolsky, 1995; Newcomer et al., 1999).

College life is known to be stressful. Many students experience challenges in first year and beyond (Howard, Schiraldi, Pineda, & Campanella, 2006; Martin, Cayanus, Weber, & Goodboy, 2006; Rodgers & Tennison, 2009), including those with ADHD (T. E. Brown, 2003). An individual with ADHD may become overwhelmed by these situations; however, other students also find such changes to be stressful (Bayram & Bilgel, 2008; Howard, et al., 2006). Howard et al. (2006) present an epidemiologic assessment of the mental health of college students in the United States and reported that stress and depression among college students was on the rise. "Various indicators and by-products of stress have begun to emerge among college students at alarming rates. The prevalence of depression, anxiety disorders, suicidal tendencies and other stress related problems are increasing and statistics indicate that this trend is one that will not soon be reversed" (p. 92).

College can be a difficult time emotionally and students in general are at increased risk of becoming depressed, anxious, or stressed (Bayram & Bilgel, 2008; Howard, et al., 2006; J. G. Wong, Cheung, Chan, Ma, & Tang, 2006). Since depression, anxiety, and stress all produce cognitive and affective symptoms, students with these symptoms might be misdiagnosed as having ADHD based solely on their responses to ADHD checklists.

Also, university students are in a more academically challenging environment than high school and may experience more difficulties with concentration, stress, and

fatigue than in their previous situations, for reasons other than ADHD.  Students go to

health and counselling services for a variety of reasons (e.g., sexually transmitted

infection checks, tuberculosis testing, mental health, pap smears, upper respiratory

complaints, etc.; M. Condra, personal communication, June 23, 2009). Reasons for going

to counselling include adjustment issues, stress and anxiety, self-confidence, low mood,

relationships, cross-cultural issues, and eating/weight issues (M. Condra, personal

communication, June 23, 2009).  Given that students going to health or counselling

services are likely experiencing all the difficulties students in general may face, and

perhaps additional stressors (depending on their individual reasons for going), it is

important to examine how these difficulties may affect students' levels of concentration

and attention (abilities that are crucial to doing well in a university setting) in order to aid

with accurate diagnosis of conditions such as ADHD.

The purpose of this study was to examine scores returned by such students

(students attending the health or counselling facilities for a variety of services) on two

popular ADHD measurement scales. The results were compared to scores of students

from an introductory psychology course on measures of the DASS and the CAARS

obtained in a previous study.

Our predictions were as follows:

1.      *A higher number of non-diagnosed students than expected will score at*

*or above levels on the BADDS said to be diagnostic of ADHD.*  This is

based on previous research conducted at health and counselling

services showing that 21.2% of students attending health services and

62.5% attending counselling scored above the published critical values

for highly probable ADD on this measure (Harrison, 2004).

2.    *A higher number of non-diagnosed students than expected will score*

*within the much above average or very much above average range on*

*sub-scales of the CAARS, particularly on the inattentive subscales of*

*this measure.* This is based on the research of Gouvier et al., (1988)

and J. L. Wong et al. (1994) showing that student's in general report

difficulty with concentration, irritability, and memory problems.

3.    *Students going to health or counselling services will score higher on*

*measures of depression, stress, and anxiety than will students selected*

*from the Psychology 100 subject pool (tested in a previous study).*  This

is based on the supposition that some (although not all) of the students

going to health or counselling services are going there for a reason that

would presumably place them under more stress (on average) than first

year students participating in a for-credit study.

4.    *Scores on the depression, anxiety and stress subscales of the DASS will*

*be positively correlated with scores on both the BADDS and some of*

*the subscales of the CAARS, particularly the inattentive subscales.*

This is based on the fact that some symptoms of depression, anxiety

and stress, as listed in the DSM-IV-TR (APA, 2000) are similar to

symptoms of ADHD and therefore these symptoms may mimic those

of ADHD.  This research was exploratory in nature, so there were no

specific presumptions as to which variables would emerge as the best

predictors of high scores on the CAARS.

## Method

### Participants

Students ($N = 107$) attending appointments at the health or counselling services at

a major Canadian university were recruited to participate.  All students were asked by the

researcher to fill out a questionnaire package and were entered into a draw for $100.

Data regarding age, year of university, and sex were collected.

### Sample Characteristics – Demographics

Six of the students were missing substantial data on the primary measures and were

deleted from the sample, reducing the sample size to 101.  Three other students had been

previously diagnosed with ADHD.  They were retained for the purposes of comparing the

number of students scoring above critical values (of $T$–scores $> 65$) to the known

population percentages for ADHD using the hypothesis test of the population proportion.

Unless otherwise indicated, the reported analyses are based on the 98 remaining subjects,

after excluding those with incomplete data or prior diagnosis of ADHD.  Percentages of

students scoring above critical values on the CAARS subscales for the sample both

including and excluding students diagnosed with ADHD are provided in Table 3.1.  The

sample size for statistics involving the Life Experiences Survey was reduced due to

improper completion by six students.  For the 98 students: 25 (26%) were male, and the

remaining 70 (71%) were female and three (3%) did not identify their sex.  Most students

(89, 91%) were from health services and nine (9%) were from counselling services.  The

Table 3.1

*Numbers and Percentages of Health and Counselling Services Students Scoring Above Critical Values on Each CAARS Subscale (N=101, and N=98)*

| CAARS subscale | Number of all students ($N = 101$) | Percentage Of all students ($N = 101$) | Number with ADHD students removed ($n = 98$) | Percentage with ADHD students removed ($n = 98$) |
|---|---|---|---|---|
| Inattention/memory problems | 12 | 11.88 | 11 | 11.22 |
| Hyperactivity/restlessness | 5 | 4.95 | 5 | 5.10 |
| Impulsivity/emotional lability | 5 | 4.95 | 5 | 5.10 |
| Problems with self-concept | 12 | 11.88 | 11 | 11.22 |
| DSM-IV inattentive symptoms | 20 | 19.80 | 18 | 18.37 |
| DSM-IV hyperactive-impulsive symptoms | 10 | 9.9 | 10 | 10.20 |
| DSM-IV ADHD symptoms total | 15 | 14.85 | 14 | 14.29 |
| ADHD index | 7 | 6.93 | 7 | 7.14 |
| Total students above critical values on at least one scale | 31 | 30.69 | 30 | 30.61 |

mean age of the sample was 22.55 years (SD = 2.92, range 18.67 to 35.17). Some

students (*n* = 57) had completed the BADDS. Excluding students who were missing

substantial data or who were previously diagnosed with ADHD from further analysis

resulted in a sample size of 51 for the BADDS.

**Materials**

The students completed a 42-item measure of depression, anxiety, and stress

(DASS; Lovibond & Lovibond, 1995), a measure of ADHD symptomatology (the

Conners Adult ADHD rating Scale; CAARS; Conners et al., 1999), individual questions

on stress-level, coping, and feeling overwhelmed, and a measure of possibly stressful life

experiences (Life Experiences Survey; LES; Sarason, Johnson, & Siegel, 1978). A

portion of the students (*n* = 51) also completed the Brown Attention Deficit Disorder

Scale (BADDS; T. E. Brown, 1996), a 40-item self-report scale. The BADDS data

facilitated comparison with a previous study (Harrison, 2004) and the CAARS data

within this sample.

The Brown Attention Deficit Disorder Scale (BADDS; T. E. Brown, 1996) is a

40-item self-report scale that allows respondents to indicate difficulties in the areas of

organizing and activating to work, sustaining attention and concentration, sustaining

energy and effort, managing affective interference, and utilizing 'working memory' and

accessing recall (Whiteside, 2003). The BADDS was developed prior to the publication

of the DSM-IV concept of ADHD and focuses primarily on inattention rather than

hyperactivity and impulsivity (Rosler, Retz, Thome, Schneider, Stieglitz, & Falkai,

2006). According to the scoring sheet of the BADDS, scores from 44-54 indicate that

ADD is probable but not certain and scores from 55-120 indicate that ADD is highly

probable. Brown's dimensions "were initially developed based on face validity, rather than from a synthesis of the scientific literature or empirically through factor or cluster analysis" (Harrison, 2004, p. 9).

The Life Experiences Survey (LES; Sarason et al., 1978) is a 60-item self-report measure that allows respondents to indicate events they have experienced during the last year, to rate these as being either positive or negative, and to rate the impact of these events. Events perceived as negative were summed to provide what the researchers who developed the scale refer to as a negative change score, with the level of negative impact as a measurement of the level of change required over the year being measured (this does not necessarily mean that the students aren't experiencing fewer negative events than in preceding years but rather measures the number and impact of events during the year being measured). Students subjectively rated their current level of stress, coping, and feeling overwhelmed on scales of 1 to 10.

Questionnaires were counterbalanced to avoid answers to one questionnaire systematically influencing answers to the other questionnaires. The rating scales may be viewed in Appendix B, and other materials may be viewed in Appendix D.

In order to avoid spurious correlations, three items on the DASS that were identified as being the same as items on the CAARS, and therefore considered overlapping items, were removed from the DASS stress subscale.

**Procedure**

In this study, students going to health and counselling services were approached by the researcher and asked to participate in the study. It was emphasized that participation was voluntary and that those who wished were free to withdraw their data

from the study, without reason or consequence, at any time prior to submission (after

which it would not be identifiable).  The students were informed they would be entered

into a draw for $100 in appreciation of their participation.  Students were able to return

the completed surveys directly to the researcher, but were also provided with the option

of placing them in a locked box or returning them in a business reply envelope provided

by the researcher.

## Results

After summarizing sample characteristics and descriptives and the testing of

assumptions, multiple regression analyses were conducted on the three main independent

variables (depression, anxiety, and stress) and the ADHD index of the CAARS.  Multiple

regressions were conducted on the subscales of the CAARS in which a higher than

expected number of students (i.e. more than one would expect given the population

percentage) scored above critical values (i.e., the inattention/memory problems subscale,

the DSM-IV inattentive subscale, and the DSM-IV ADHD symptoms total subscale).

Different researchers estimate different prevalence rates of ADHD amongst adults,

ranging from 1 to 6% (Gallagher & Blader, 2001; Harrison, 2004, Weiss & Murray,

2003).  Students who scored above critical values on the CAARS subscales were

identified and percentages scoring above critical values were calculated and compared to

the highest expected population percentage of 6 percent.

**Sample Descriptives**

Similar to the findings of Harrison (2004) at the same university services, 21.6%

of the students completing the BADDS questionnaire ($n = 51$) scored above the critical

value for highly probable ADD (>55), while 29.4% scored above the critical value for

probable ADD recommended in the manual (> 50). These percentages are far higher than one would expect given population estimates ranging from 1-6% (Harrison, 2004; Weiss & Murray, 2003). The bivariate correlations between the BADDS questionnaire and the depression, anxiety, and stress subscales of the DASS were .61, .65, and .63, respectively ($p < .01$, $n = 51$). The correlation between the total BADDS score and the total DASS score was .69 ($p < .01$).

The CAARS has eight subscales and the number of students who had a $T$-score of 66 or greater was noted. Such scores are described in the CAARS manual as either "Much above average" or "Very much above average" and fall in the percentile range of .95 or greater (Conners et. al, 1999). The specific raw scores equal to a $T$-score of 66 for each of the subscales differs according to the particular scale, the sex of the subject, and the age of the subject. In the case of the sex non-specified person, the person was considered to being scoring above critical values if they were above the critical values for both females and males.

For the full sample of 101 students (i.e., including those diagnosed with ADHD) 30.7% scored above a $T$-score of 65 on at least one subscale, 19.8% scored above a $T$-score of 65 on two or more subscales, and 6.9% scored above a $T$-score of 65 on the ADHD index (5.9% scored above $T = 70$). Specificity of the ADHD index is good at 92.9% and negative predictive value is 96.8%. However, its ability to correctly identify those with ADHD was weak. None of the three previously diagnosed students scored above critical values on the ADHD index. Table 3.1 lists the numbers and percentages of students scoring above critical values on each of the CAARS subscales, including and

excluding students previously diagnosed with ADHD.  Percentages scoring above critical

values on one to seven subscales can be viewed in Table 3.2.

Using the hypothesis test of the population proportion ( $N = 101$) a higher

percentage of students than would be expected based on population estimates of the

prevalence of ADHD (of 6%) are scoring past critical values on the inattention/memory

problems, problems with self-concept, DSM-IV inattentive symptoms, and DSM ADHD

symptoms total scales but not on the hyperactive/restlessness, impulsivity/emotional

lability, DSM-IV hyperactive-impulsive symptoms, or ADHD index subscales.

Furthermore, a positive correlation of .58 ($p < .01$) was found between scores in the

ADHD index and scores on the DASS (depression, anxiety, and stress scale). It was

noteworthy that 18.8% of those who scored in the top one third on the DASS, and had

never been diagnosed with ADHD, also scored above the critical values of $T = 65$ for the

ADHD index, and 15.6% scored above $T = 70$.  In fact, six out of seven of the people

scoring above critical values on the ADHD index are within the top nine scorers on the

DASS.

**Testing of Assumptions**

Univariate descriptive statistics were inspected for accuracy of input by checking

for out-of-range values and plausible means and standard deviations (Tabachnick &

Fidell, 2007).  Univariate normality was assessed for each of the main continuous

independent measures and the outcome measures, the DASS subscales, the CAARS

subscales, including the ADHD index, and the BADDS by an examination of single-

variable histograms and by dividing Skewness by the Standard Error of Skewness, and

Kurtosis by the Standard Error of Kurtosis.  Generally, if each of these values is less than

Table 3.2

*Percentage of Students Scoring Above Critical Values on One to Seven Subscales of the CAARS (N = 101)*

| Number of subscales | 1 | 2 | 3 | 4 | 5 | 6 | 7 | At least one subscale |
|---|---|---|---|---|---|---|---|---|
| Percentage scoring above critical values | 10.89 | 6.93 | 4.95 | 1.98 | 0.99 | 1.98 | 2.97 | 30.69 |

*Note*. 19.80 percent scored above critical values on two or more scales.

the absolute value of three, skew and kurtosis are not such that they violate normality.

Most of the variables were either in the normal range or only very slightly skewed.  The

variables representing depression and anxiety were moderately positively skewed.

Variables that had a Skew/SE Skew greater than the absolute value of three or a

Kurtosis/SE Kurtosis greater than absolute value of three were transformed using a

square root transformation [Y' = SQRT (Y + .5)]. See Appendix G.  Variables were

transformed as necessary (Tabachnick & Fidell, 2007), after transformation none of the

variables had any outliers.  Means, standard deviations, and *T*-scores for the independent

and dependent variables are in Table 3.3.

Some researchers feel that the above convention for assessing normality is not the

preferred method as very small and very large samples may have equal skews but the

smaller sample would appear to be less skewed due to being divided by a larger standard

error (L. Fabrigar, personal communication, February 9, 2009).  Curran, West, and Finch

(1996), referring to normal theory maximum likelihood estimation (which is less robust

to violations of normality than is multiple regression), state that, "further research is

needed to better understand more precisely when nonnormality becomes problematic, but

it seems clear that obtained univariate values approaching at least 2.0 and 7.0 for

skewness and kurtoses are suspect" (p. 26).  None of the variables approached these

values with this sample.

**Analyses**

Depression, anxiety, and stress scores for the DASS were significantly correlated

with scores on the CAARS ADHD index.  Although the DASS is a dimensional measure

not a categorical measure, the manual does provide guidelines for severity ratings

Table 3.3

*Means and Standard Deviations for Continuous Independent Variables and Dependent Variables (n = 98 unless otherwise specified)*

| Variable | Mean (Mean *T*-score, *n* = 94) | SD (*T*-score *SD*) |
|---|---|---|
| BADDS (*n* = 51) | 37.97 | 24.58 |
| Inattention/memory problems | 11.31 (50.40) | 7.49 (11.57) |
| Hyperactivity/restlessness | 12.41 (47.57) | 6.36 (9.06) |
| Impulsivity/emotional lability | 9.17  (46.54) | 6.16 (9.92) |
| Problems with self-concept | 6.86 (49.49) | 4.49 (10.31) |
| DSM-IV inattentive symptoms | 7.86 (52.29) | 5.65 (12.86) |
| DSM-IV hyperactive-impulsive | 7.63 (47.99) | 4.76 (11.27) |
| DSM-IV ADHD symptoms total | 15.49 (50.77) | 9.38 (12.70) |
| ADHD index | 10.46 (48.41) | 5.99 (10.31) |
| DASS | 28.23 | 24.14 |
| DASS[a] | 25.93 | 22.20 |
| Depression | 8.28 | 9.47 |
| Anxiety | 7.97 | 8.32 |
| Stress | 11.97 | 9.49 |
| Stress[a] | 9.67 | 7.38 |

*Note*. For DASS Normal Ranges are:  Depression 0-9, Anxiety 0-7, and Stress 0-14.  All of which are in the percentile range of 0-78 and with a *z* score of < 0.5.  In this case Depression and Stress mean scores are in the normal range and the Anxiety mean score is in the mild range.

*Note*. *T*-scores are given in brackets for the CAARS subscales.  The sample size for the *T*-scores is reduced to 94 due to gender and/or age not being available for 4 students.

[a]Overlapping items removed

(Lovibond & Lovibond, 1995). The majority of the students scored in the normal range on the depression scale (64.3%), 16.3% scored in the mild range, 7.1% scored in the moderate range, and 6.1% scored in both the severe and the extremely severe range. For the anxiety scale 63.3% score in the normal range, 5.1% in the mild range, 14.3% in the moderate range, 7.1% in the severe range, and 10.2% in the extremely severe range. For the stress scale, 66.3% of the students score in the normal range, 14.3% in the mild range, 8.2% in the moderate range, 9.2% in the severe range, and 2% in the extremely severe range. The bivariate correlation between the DASS total score and the ADHD index was .58, $p < .01$ (with overlapping items from the DASS removed, the correlation is .58, $p < .01$). Separately, the subscales are significantly correlated with the ADHD index; depression at .53, $p < .01$, anxiety at .45, $p < .01$, and stress at .55, $p < .01$ (.55, $p < .01$ with overlapping variables removed). The bivariate correlations between the independent and dependent variables are shown in Table 3.4. Correlations between the ancillary and dependent variables are shown in Table 3.5.

Coping level acted as a "buffer" for ADHD symptomatology with all correlations being in the negative direction. Coping level was negatively correlated with all of the subscales of the CAARS except the hyperactivity/restlessness and DSM hyperactive/impulsive symptoms subscales (ranging from -.21, p< .05 for DSM ADHD symptoms total, to -.45, p< .01, for problems with self-concept). Scores on the feeling overwhelmed scale were correlated with all of the CAARS subscales except for the hyperactivity/restlessness and DSM hyperactive/impulsive symptoms subscales. The LES negative change score was negatively correlated with the inattention/memory problems, problems with self-concept, and ADHD index subscales. The LES negative

Table 3.4

*Bivariate Correlations Between the Main Independent Variables and the Dependent Variables (n = 98)*

| Variable | DASS | Depression | Anxiety | Stress |
|---|---|---|---|---|
| Inattention/memory problems | .55** | .51** | .45** | .49** |
| Hyperactivity/restlessness | .32** | .25* | .24* | .38** |
| Impulsivity/emotional lability | .51** | .35** | .43** | .59** |
| Problems with self-concept | .64** | .70** | .45** | .51** |
| DSM-IV inattentive symptoms | .55** | .46** | .47** | .53** |
| DSM-IV hyperactive-impulsive symptoms | .31** | .17 | .28** | .39** |
| DSM-IV ADHD symptoms total | .49** | .36** | .42** | .52** |
| ADHD index | .58** | .53** | .45** | .55** |
| BADDS | .69** | .61** | .65** | .63** |

Overlapping items removed from DASS and stress subscale for correlations with CAARS subscales
*$p < .05$   **$p < .01$

Table 3.5

*Bivariate Correlations Between the Ancillary Independent Variables and the Dependent Variables (n = 98 unless otherwise specified)*

| Variable | Stress level | Coping level | Overwhelmed | Negative LES (*n* = 92) |
|---|---|---|---|---|
| Inattention/memory problems | .15 | -.37** | .30** | -.28** |
| Hyperactivity/restlessness | .12 | <-.01 | .16 | -.13 |
| Impulsivity/emotional lability | .17 | -.24* | .33** | -.14 |
| Problems with self-concept | .38** | -.45** | .50** | -.36** |
| DSM-IV inattentive symptoms | .20 | -.31** | .32** | -.17 |
| DSM-IV hyperactive-impulsive symptoms | .12 | -.05 | .18 | -.02 |
| DSM-IV ADHD symptoms total | .18 | -.21* | .28** | -.12 |
| ADHD index | .23* | -.32** | .38** | -.24* |
| BADDS score (*n* = 51) | .32* | -.33* | .50** | -.25 (*n* = 46) |

*\*p < .05   \*\*p < .01*

change score was scored as a negative number, therefore, the more negatively perceived occurrences the student experienced, the more they report symptoms that load on these three subscales mentioned above.

The ADHD index was entered as a criterion variable into regression analysis with the untransformed independent variable of the total DASS Score (with overlapping items removed). This yielded an $R$. of .58 and an $R^2$ of .34. The adjusted $R^2$ was .33, and is significant at $p < .001$ indicating that the total DASS score accounted for 33% of the variance on the ADHD index (see Table 3.6). Results with transformations were similar. When the ADHD index was entered as a criterion variable into a multiple regression with the untransformed independent variables of the depression, anxiety, and stress subscales (with overlapping items removed) of the DASS, the depression and stress subscales emerged as having significant positive associations with the ADHD index score. The $R$ was .60 and the adjusted $R^2$ was .34 indicating that the three scores account for 34% of the variance in the ADHD index. Results are shown in Table 3.7. According to Tabachnick and Fidell (1989) in order to assess the importance of a variable, it is necessary to consider both the full and unique relationship between the independent variable and the dependent variable, as well as the correlations between the variables. Significant positive correlations were present among all three predictors, with the highest being .80 ($p < .01$) between anxiety and stress (.81, $p < .01$, with overlapping items removed from the stress scale). This suggests that there may be multicollinearity among these predictors, which may result in a loss of power or unstable regression coefficients (Howell, 1997).

Table 3.6

*Summary of Linear Regression for DASS Association With CAARS ADHD Index (n = 98)*

|  | *B* | *SE B* | Beta | *t* | Sig. |
|---|---|---|---|---|---|
| DASS[a] | .16 | .02 | .58 | 6.95 | < .001 |

$R^2$ adjusted = .33
[a]Overlapping items removed.

The fact that anxiety has a significant bivariate correlation with the ADHD index but does not achieve significance in the multiple regression containing all three predictor variables raises the possibility that the relationship between anxiety and the ADHD index is being obscured by the other predictor variables due to multicollinearity, particularly by stress as these two variables have a high bivariate correlation with each other, and stress is more highly correlated in this sample with the ADHD index than is anxiety.   Two additional multiple regressions were conducted in order to assess this issue, separating the highly correlated variables from each other, (i.e., one with just anxiety and depression, and one with depression and stress (Fabrigar, personal communication, February 9, 2009) in order to get a more accurate and comprehensive understanding of the contributions of the individual variables.  When anxiety and depression are entered as predictors of the ADHD index both are significant ($p < .001$ for depression and $p = .043$ for anxiety).  Similarly, when stress and depression are entered as predictors, both are significant ($p = .005$ for depression and $p = .001$ for stress).  It becomes apparent from these additional multiple regressions that anxiety is indeed an important predictor, but that it is, in effect, being obscured by stress due to the multicollinearity.  The results of these multiple regressions are shown in Table 3.8.

Multiple regressions were conducted to examine the effects of depression, anxiety, and stress on the following CAARS subscales: inattention/memory problems, problems with self-concept, DSM-IV inattentive symptoms, and DSM-IV ADHD symptoms total.  When entered separately the independent variables were found to account for 29%, 48%, 29% and 25% of the variance, respectively (while the total DASS

Table 3.7

*Summary of Simultaneous Multiple Regression for Main Independent Variables
Associations With CAARS ADHD Index (n = 98)*

| Variable | *B* | *SE B* | Beta | *t* | Sig. |
|----------|-----|--------|------|-----|------|
| Depression | .20 | .07 | .31 | 2.90 | .005 |
| Anxiety | -.04 | .10 | -.05 | -.37 | .711 |
| Stress[a] | .32 | .12 | .40 | 2.73 | .008 |

$R^2$ adjusted = .34
*Note*. The negative beta may be due to multicollinearity.
[a]Overlapping items removed.

Table 3.8

*Summary of Multiple Regression for Independent Variables Associations With CAARS ADHD Index With Anxiety and Stress Divided (n = 98)*

| Variable | *B* | *SE B* | Beta | *t* | Sig. |
| --- | --- | --- | --- | --- | --- |
| Depression | .25 | .07 | .40 | 3.77 | < .001 |
| Anxiety | .16 | .08 | .22 | 2.05 | .043 |
| | | | | | |
| Depression | .19 | .07 | .30 | 2.90 | .005 |
| Stress[a] | .29 | .09 | .36 | 3.45 | .001 |

[a]Overlapping items removed.

accounted for 30%, 40%, 29% and 23% of the variance). These regressions can be seen in Appendix H.

There might be mediation effects with some of the variables. For example, negative life experiences as measured by the LES negative change score might lead to higher DASS scores, which in turn would lead to higher CAARS scores. That is, the higher DASS scores would mediate the effect of the LES negative change score on the CAARS subscales. To test this three regression equations were run "first, regressing the mediator on the independent variable; second, regressing the dependent variable on the independent variable; and third, regressing the dependent variable on both the independent variable and on the mediator." (Baron & Kenny, 1986, p. 1177).

According to Baron and Kenny (1986) "to establish mediation, the following conditions must hold: First, the independent variable must affect the mediator in the first equation; second, the independent variable must be shown to affect the dependent variable in the second equation; and third, the mediator must affect the dependent variable in the third equation. If these conditions all hold in the predicted direction, then the effect of the independent variable on the dependent variable must be less in the third equation than in the second." (p. 1177). In this case the LES negative change score was not significantly correlated with the DSM-IV inattentive symptoms, or the DSM-IV ADHD symptoms total subscales. The relationships were examined for the inattention/memory problems and problems with self-concept subscales. The DASS does appear to mediate the relationship between the LES negative change score and inattention/memory problems subscale ($z = -3.07$, $p = .002$) as illustrated in Figure 3.1.
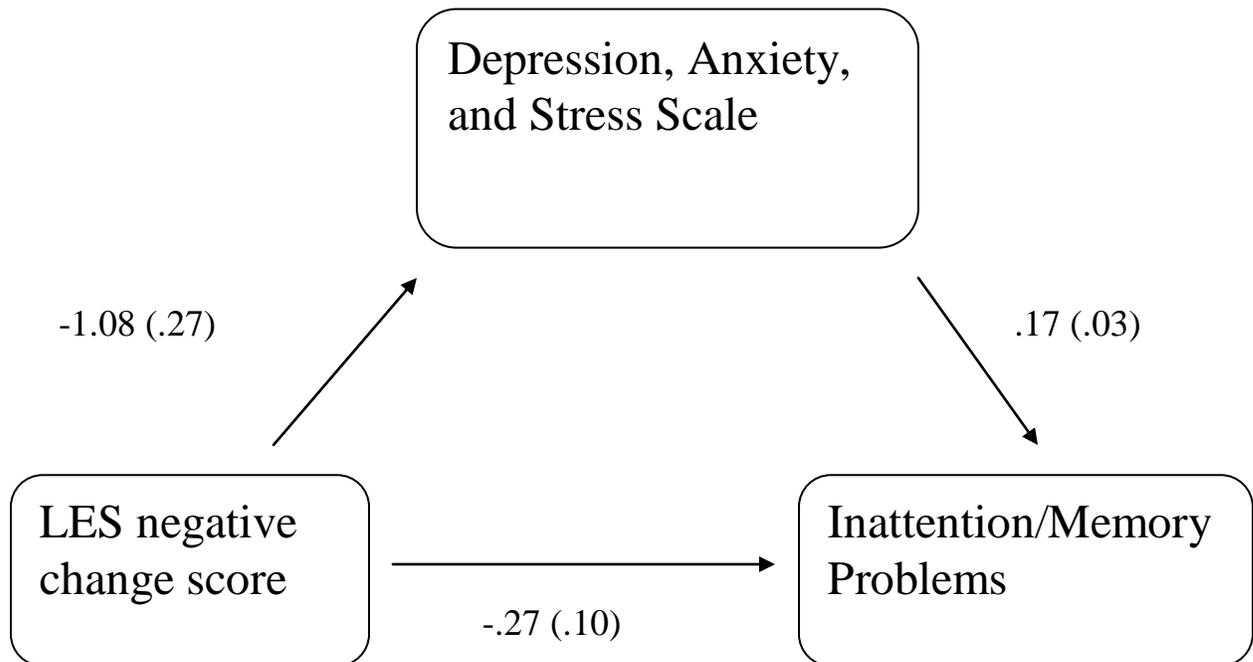
*Figure 3.1.* Illustration of the mediation model suggesting that the relationship between negative life events (as measured by the LES negative change score) and the inattention/memory problems subscale is mediated by the level of depression, anxiety, and stress experienced in response to the negative events. The same mediational pattern was found for the problems with self-concept subscale.

The same mediational pattern was found with the problems with self-concept subscale ($z$ = -3.22, $p$ = .001).

Ancillary variables do not account for any significant additional variance when entered into a sequential multiple regression (after depression, anxiety, and stress) on the CAARS DSM-IV inattentive symptoms, the DSM-IV ADHD symptoms total, the inattention/memory problems, and the problems with self-concept subscales. When comparing students from health and counselling services to introductory psychology students tested in a previous study (Alexander & Harrison, 2009a), the health and counselling students had slightly higher means on each of the DASS subscales, but these differences were not significant. In fact, when looking at all the subscales of the DASS (Lovibond & Lovibond, 1995) and all the subscales of the CAARS (Conners et. al, 1999) the students from health and counselling services and the students from the Psychology 100 subject pool differed significantly only on the means of the inattention/memory problems and DSM-IV inattentive symptoms subscales, with the introductory psychology students scoring higher than the health and counselling services students.  These differences no longer remained significant after a bonferroni correction for multiple comparisons was applied.

## Discussion

The purpose of this study was to determine how common the symptoms of ADHD are in a student group when measured using two widely employed ADHD self-report scales, and to investigate what factors are associated with higher scores on these measures in people who have not been diagnosed with ADHD.  The first thing apparent from the data is that when looking at the students at health and counselling services that

had never been previously diagnosed with ADHD, the CAARS (*n* = 98) is less likely to

return false positives for high probability of ADHD on the ADHD index (7.1%) than is

the BADDS (*n* = 51) total score (21.6%). The first prediction that students not previously

diagnosed with ADHD would score above critical values on the BADDS was supported.

With the BADDS, it seems highly unlikely that 21.6% of the student population going to

health and counselling services has ADHD, when the general population percentage is

estimated at various ranges from 1 to 6% (Harrison, 2004; Weiss and Murray, 2003).

Since the DASS and BADDS are highly positively correlated, high scores on stress,

depression, and anxiety may be partially responsible for the high scores on the BADDS

measure.

With the CAARS there are fewer false positives on the ADHD index when

looking at the entire sample (7.1%). However, as noted in the sample descriptives

section, when examining the top third of DASS scorers this percentage jumps to 18.8%.

This, along with the high correlations between the DASS and the CAARS ADHD index

suggests that when people are experiencing high levels of depression, anxiety, or stress

they are more likely to report high levels of ADHD symptoms. The ADHD index is the

scale considered to be the most important for differentiating between people who do or

do not have ADHD (Conners et. al, 1999). As mentioned above, of the three people in

the sample who had been previously diagnosed with ADHD, not one of them scored past

critical values on the ADHD index. The researchers are aware that merely scoring past

critical values on a subscale is not the same as having the disorder of ADHD and

therefore comparing the number of people scoring above the critical values to the

expected population percentage may not be the ideal comparison. There are clearly other

requirements such as age of onset, impairment in other areas, and in the case of the

CAARS, scoring above critical values on more than one subscale.  However, the

population prevalence of ADHD is useful as a rough comparison measure to get an idea

of the level of discrepancy between the percentages scoring above critical values on each

scale and the percentage of people who would actually be diagnosed with ADHD within

the population in general.  If clinicians are indeed sometimes using primarily self-report

checklists to diagnose adult ADHD as McCann and Roy-Byrne (2004) assert then these

percentages suggest that far more people would be diagnosed with ADHD than actually

have it if all of the DSM-IV criteria are not stringently applied.

An alternative approach would be to compare the number of people scoring above

the critical value on two or more subscales to the estimated population percentage.  Using

the entire sample including persons previously diagnosed with ADHD ($N = 101$), 19.8%

of the sample scored above critical values on two or more subscales of the CAARS.  This

illustrates the importance of not merely using such scales to diagnose ADHD.

The DSM-IV inattentive symptoms, DSM-IV ADHD symptoms total,

inattention/memory problems, and problems with self-concept subscales had the highest

percentages of students scoring above critical values, in descending order.  Therefore, the

second prediction that some students not previously diagnosed with ADHD would score

above critical values on some subscales of the CAARS was supported. This means that

clinicians should pay particular attention to students who are scoring above critical values

on these scales alone and consider the possibility that other factors (such as depression,

stress, or anxiety) might be influencing these scores.  The third prediction, that students

recruited from health and counselling services would score higher on measures of

depression, anxiety, and stress than would students selected from the Psychology 100

subject pool (and tested in a previous study) was not supported.  Differences between the

means of all the subscales were non-significant after a bonferroni correction.

The fourth prediction was that scores on the DASS subscales would be positively

correlated with scores on both the BADDS and some of the subscales of the CAARS,

particularly the inattentive subscales.  This prediction was supported.

As previously mentioned, Conners et al. (1999) consider the ADHD index the

best screen for ADHD risk but it is also important to look at the number of scales with $T$-

scores above 65.  In this study, only 6.9% ($N = 101$) scored above $T = 65$ on the ADHD

index (7.1% for $n = 98$, when those with previous diagnoses of ADHD were removed).

However, 30.7% of the students returned a $T$-score of 66 or greater on at least one scale

of the CAARS, and 19.8% returned such high scores on two or more scales.  That being

said, overall the ADHD index appeared to be a relatively good screener for students in

general, and only produced false positive identifications for the students who reported the

highest levels of depression, anxiety and stress. However, it failed to identify any of the

students previously diagnosed with ADHD.  The false positive identifications of students

with high DASS scores suggest one of three things.  Either high levels of stress, anxiety

and/or depression can cause students to experience symptoms indistinguishable from

ADHD; the levels of true ADHD symptoms result in high levels of depression, stress, and

anxiety; or there is a third causal variable unidentified in the present study.  For example,

it is possible that people are experiencing both mood difficulties and ADHD.  Indeed,

high levels of co-morbidity are reported to occur between ADHD and other psychiatric

diagnoses (Milberger, Biederman, Faraone, Murphy, & Tsuang, 1995). As Pennington

(2002) states "disorders are likely regions with fuzzy boundaries in continuous, multivariate space. What will likely distinguish disorders is the weighting of different risk factors, not a distinct set of risk factors, and the different epigenetic and developmental interactions that result from that particular weighting" (p 31).

Symptoms of other disorders can be mistaken for ADHD symptoms. This is supported by Rucklidge and Tannock (2000) who reported on a child who had first been seen at their research unit as a normal control (at eleven years old) but two years later presented with eight out of nine inattentive symptoms and five out of nine hyperactive/impulsive symptoms of ADHD. Due to the lack of a clear history of ADHD symptoms she was not diagnosed with ADHD at that time. Six months later the child (and her mother) still endorsed six out of nine inattentive symptoms and six out of nine hyperactive/impulsive symptoms. Since the child did not endorse any other psychiatric symptoms and exhibited significant impairment due to the ADHD symptoms, a trial of methylphenidate was conducted. At age fourteen, her behaviors had become worse and when she returned for reassessment it was discovered that for the previous two years she had been experiencing obsessions and compulsions. Rucklidge and Tannock (2000) point out that the inattentive symptoms were likely due to her worries and obsessions, while the hyperactive/impulsive symptoms were likely due to her leaving the classroom to avoid ritualizing in front of her classmates.

Another study, conducted by Chervin et al. (2006) focusing on children with sleep disordered breathing (SDB) found that 50% of the children ($N = 22$) previously diagnosed with ADHD who received an adenotonsillectomy, no longer qualified for ADHD diagnosis one year after their surgery. Although Chervin et al. (2006) do not

appear to question the original ADHD diagnosis in their paper, it is quite possible that some of these children were misdiagnosed with ADHD due to symptom overlap between SDB and ADHD. The above examples, as well as the results of this study, lend support to Harrison and Wilson's (2005) recommendation to educate clinicians about the possible confound and overlap of symptoms on ADHD checklists with other conditions, given that many physicians use self-report checklists as the sole method of diagnosing ADHD (McCann & Roy-Byrne, 2004). Additionally, Gordon et al. (2006) point out that it is possible for an individual to show many ADHD-type symptoms without significant impairment, or conversely, to show few ADHD symptoms and yet experience significant impairment. These authors assert that symptoms alone are not enough to understand a person's level of adjustment or their needs for service (Gordon et al., 2006).

While we are in agreement with Barkley and Brown (2008) that "simply having a mood disorder does not preclude a diagnosis of ADHD" (p. 981), our findings also lead us to believe that it is important when diagnosing ADHD to ascertain that the symptoms upon which one is basing this diagnosis are not due primarily to high levels of depression, anxiety, or stress. As McCann and Roy-Byrne (2004) point out, in a previous study (Milberger et. al, 1995) which addressed issues of comorbidity and overlapping symptoms, it was noteworthy that one in five of the ADHD cases depended on symptom overlap with comorbid depression for the ADHD diagnosis (i.e., when symptoms that were considered to overlap between depression and ADHD were removed from consideration for an ADHD diagnoses, one in five of the people no longer met the diagnostic criteria for ADHD). In keeping with the final DSM-IV criteria, clinicians must rule out that other causes could better account for the reported symptoms; the results

of this study strongly suggest that this latter criterion is especially important.  As Rosler

et al. (2006) point out, adult ADHD is a clinical diagnosis, and no instrument can replace

an intensive clinical examination by a clinician who possesses expertise in this area.

There are many possible explanations for the fact that the three individuals

previously diagnosed with ADHD did not score above the critical value for the ADHD

index.  They may have: a) been using medication to control their ADHD symptoms; b)

developed behavioural strategies (such as writing all appointments on a calendar) either

through treatment or through years of living with ADHD (we do not know when they

were diagnosed); or c) been within the percentage of people who are diagnosed with

ADHD as children but do not appear to meet full criteria in adulthood (Barkley, Fischer,

Smallish, & Fletcher, 2002; Gittelman, Mannuzza, Shenker, Bonagura, 1985; Mannuzza,

Klein, Bessler, Malloy, & LaPadula, 1998; Mannuzza, Klein, Bonagura, Malloy,

Giampino & Addalli, 1991; Troller, 1999; Weiss & Murray, 2003; Young, 2000). They

may have been false negatives in the present study. Alternatively, they may simply have

been misdiagnosed in the first place.

Other factors such as perceived stress level, coping abilities, feelings of being

overwhelmed, and the number of recent negative life experiences may affect scores on

the ADHD measures. This was partially supported, as illustrated in Table 3.5.  For

example, feelings of being overwhelmed was correlated the most highly with the total

BADDS score at .50, $p < .01$, whereas coping and stress level were correlated at -.33 and

.32, respectively, $p < .05$ for both measures.  The LES negative change score was not

significantly correlated with the score on the BADDS.  Regarding the CAARS all of

these ancillary variables had the highest correlations with the problems with self-concept

subscale. The students reported stress level was correlated with the problems with self-concept subscale at .38, $p < .01$, and with the ADHD index at .23, $p < .05$. In spite of their high correlations with some of the subscales, the perceived stress level, coping, feelings of being overwhelmed, and LES negative change score do not appear to make additional independent contributions above and beyond those accounted for by depression, anxiety, and stress.

**Limitations and Directions for Future Research**

This study is correlational in nature and in order to show causation, prospective studies in this area are necessary. For example, one could administer the DASS (Lovibond & Lovibond, 1995) and CAARS (Conners et. al, 1999) to a population before and after treatment with cognitive behavioural therapy and stress reduction methods to observe whether this had any influence on subsequent symptom endorsement on the CAARS. Other limitations are that the participants were a sample of convenience, that the findings are limited by the measures used, and that there was no validation of actual ADHD diagnoses.

Although, the current research did not examine individuals with clinically diagnosed cases of depression or anxiety, it did examine different levels of these constructs along a continuum in a dimensional rather than a categorical manner. This should provide useful additional information regarding the abilities of the CAARS with respect to differential diagnosis. Future studies are needed that compare clinically diagnosed examples of ADHD, depression, and anxiety disorders to compare symptom overlap, comorbidity, and differential diagnosis abilities of the CAARS between these conditions.

**Forward to Chapter 4**

  The research presented in Chapter 4 explored the relationship between the Depression, Anxiety, and Stress Scale (DASS; Lovibond & Lovibond, 1995) and the Conners' Adult ADHD Rating Scale (CAARS; Conners, Erhardt, & Sparrow, 1999) in a group of nurses working in an Ontario hospital. This research addressed the question of whether scores on the DASS would be correlated with scores on the CAARS and whether scoring at the high end of the DASS would be associated with scores above the established critical values on the CAARS in a sample of nurses.

Chapter 4 consists of a manuscript that is being submitted for publication.  Dr. Allyson Harrison appears as co-author.

A copy of the measures used in this study can be found in Appendix D.

**Chapter 4 – Nurses**

Previous studies using students as participants (Alexander & Harrison, 2009a,b) have shown that there are strong correlations between depression, anxiety, and stress as measured by the DASS (Depression, Anxiety and Stress Scale; Lovibond & Lovibond, 1995) and some subscales of the CAARS (Conners' Adult ADHD Rating Scale; Conners, Erhardt, & Sparrow, 1999). The CAARS is a measure of symptoms of Attention Deficit Hyperactivity disorder and it has been found that symptoms similar to those of ADHD are relatively common in adult and student populations (Murphy & Barkley, 1996; Weyandt, Linterman, & Rice, 1995). As depression, anxiety, and stress are conditions where symptoms overlap with those reported in ADHD such as difficulty concentrating, memory difficulties, and/or irritability, it was felt that nurses who report high levels of depression, anxiety, and stress would also score higher on scales used to measure ADHD symptoms.

In an effort to see whether working adults in high stress situations would tend to score above critical values on the CAARS, nurses at a local hospital were selected as participants for this study. Nursing is well known to be a profession with high levels of stress. Nurses are a professional group likely to report very high levels of workplace stress (Smith, Brice, Collins, Mathews & McNamara, 2000 as cited in McVicar, 2003). Gray-Toft and Anderson (1981) identified three major sources of stress for nurses: workload; not feeling prepared for patients and their families emotional demands; and death/dying. Other researchers have examined effort-reward imbalance (Bakker, Killmer, Siegrist, & Schaufeli, 2000) as well as conflict with colleagues, role ambiguity, and having performance closely monitored for mistakes (Stordeur, D'hoore, &

Vandenberghe, 2001) as sources of stress and anxiety for nurses. A survey of registered

professional nurses conducted in 2002 by the University of the State of New York

(USNY) found that Registered Nurses in nursing homes and inpatient hospital-based

settings reported the highest levels of both workload stress and stress-frequency with

almost two thirds of these RNs reporting experiencing great stress on a daily basis or

several days each week (USNY State Education Department, 2003). Only one-quarter of

the RNs said that they would "strongly recommend" nursing as a career to their friends.

"Stress" is among the top three reasons for leaving the profession, more frequently than

any other reason cited. A majority (58.6%) of Registered Nurses intending to leave the

profession within the next 12 months cited "stress" as a primary reason for leaving"

(USNY State Education Department, 2003). According to an article in BBC News, in a

survey of almost 2,000 nurses, Nursing Times magazine found that 70% of their

respondents said they suffered from physical or mental health problems linked to work-

related stress ("Stress Harms Nurses", 2007) and Dr. Peter Carter, general secretary of the

Royal College of Nursing has said, "nurses are under pressure, under valued and under

paid" ("Stress Harms Nurses", 2007).

Kovner et al. (2007) found that newly licensed RNs were very satisfied with their

jobs (mean satisfaction score of 5.2 out of 7) but 41.5% of them answered that they

would want another job if they were free to go into any type of job. Of the 610 nurses in

their sample who left their first position, almost 42% cited poor management as the most

common reason, while 20% cited stressful work (Kovner et al., 2007). Although newly

licensed RNs were generally pleased with their work groups, they reported inadequate

support from supervisors and difficult work.  They also reported having inadequate

supplies and equipment (Kovner et al., 2007).

Nurses have little difficulty coming up with a list of on the job stresses

(Trossman, 1999).  Examples are long hours, physically taxing work, having to be

hypervigilent to changes in the patient's condition, variable hours, being on call, having

to make critical decisions, dealing with emotional family members, a health care system

that is in an almost constant state of redesign, increasingly complex documentation

requirements, caring for children and aging parents, and tight staffing (Trossman, 1999).

Nurses were chosen as participants for this study because their jobs are considered

to be highly stressful due to a unique combination of high responsibility (people's lives)

and low control (must follow doctors orders and hospital policy).  As well, nurses tend to

be female and often have multiple roles (wife, mother, housekeeper, worker, student),

which may increase their experienced levels of stress, anxiety, or depression.  Shields

(2004) reports that women in particular are vulnerable to "stress proliferation", which

"refers to the development and spread of stress across all facets of a person's life" (p. 13).

Shields (2004) discusses how stress at work increases tension at home, which then leads

to further increases in problems at work.  Women are known to be more likely than men

to report stressors involving significant others, possibly due to being socialized to assume

more nurturing roles (Shields, 2004).  In a study examining sex differences in

psychological distress, women reported a higher prevalence of high distress days and a

lower prevalence of distress-free days than did men (Almeida & Kessler, 1998).  Nurses

experience a high level of stress due to the demanding nature of their work, hospital cut

backs, and the fact that their working hours are often shift hours, weekends, and traditional holidays.

This study explored the relationship between the scores on the Conners' Adult ADHD Rating Scale (CAARS; Conners, Erhardt, & Sparrow, 1999) and depression, anxiety, and stress levels of nurses at a local hospital as measured by the Depression, Anxiety and Stress Scales (DASS; Lovibond & Lovibond, 1995).

Predictions are as follows:

1. *Nurses would score highly on the depression, anxiety and stress scales (particularly the stress scales).* This is based on the Nurses Survey (USNY State Education Department, 2003), which found that stress was a particular problem for Registered Nurses.

2. *Nurses' scores on the measure of depression, anxiety, and stress would be correlated with scores on the CAARS subscales.* This is based on the fact that there appears to be overlap between symptoms of ADHD and those of mood or anxiety disorders. As well, correlations have been found between these measures on two previous studies (Alexander & Harrison, 2009a,b).

3. *A higher than expected percentage (based on known population percentages) of nurses would score above critical values on some of the CAARS subscales.* This is based on the assumption that nurses will score higher on the depression, anxiety and stress scales and that this, in turn, will be associated with them endorsing more symptoms of ADHD.

**Method**

**Participants**

This study included individual nurses recruited from a local Ontario hospital.  Nurses

were requested to fill out a questionnaire package in their mailbox and were entered into

a draw for $100.  Data regarding age, years working in the nursing profession, area of

work, sex, roles, and number of children were collected and may be found in the results

section.

**Materials**

The DASS (Lovibond & Lovibond, 1995) is a 42-item scale that measures

depression, anxiety, and stress.  One advantage of the DASS over other measures is that it

is reported to separate the symptoms of depression, anxiety, and stress, thereby

purportedly reducing overlap of these constructs.  The DASS is considered to be an

"excellent instrument for measuring features of depression, hyper-arousal, and tension in

clinical and non-clinical groups" (Antony, Cox, Enns, & Swinson, 1998).

The CAARS (Conners et. al, 1999) is a 66-item scale that produces scores

reflecting inattention/memory problems, hyperactivity/restlessness, impulsivity/emotional

lability, and problems with self-concept.  In every case a higher score indicates more

problems (Gallagher & Blader, 2001).  The scale also contains 3 DSM-IV ADHD

symptoms scales and an ADHD index.  The ADHD index is a measure of the overall

level of ADHD-related symptoms and is reportedly the best screen for identifying those

"at-risk" for ADHD (Conners et. al, 1999).  According to Conners et al. when

interpreting the CAARS, it is important to "examine the pattern of elevated scale scores

in addition to considering individual *T*-scores".  Although the ADHD index "represents a

measure of the overall level of ADHD-related symptoms" and is "the best screen for identifying those "at-risk" for ADHD" (Conners et. al, 1999, p. 23) it also is important to look at all the scales in conjunction. According to Conners et al., when "one *T*-score is above 65, then the pattern is marginal" (p. 22) and the "greater the number of scales that show clinically relevant elevations (*T*-scores above 65), the greater the likelihood that the CAARS scores indicate a moderate to severe problem" (p. 22).

**Procedure**

In this study nurses at a local hospital were asked to fill out a questionnaire that was placed in their mailbox and return it to a secure location (a locked box) once it was completed. It was emphasized that participation was voluntary and that those who wished were free to withdraw their data from the study, without reason or consequence, at any time prior to submission (after which it would not be identifiable). The nurses were informed they would be entered into a draw for $100 in appreciation of their participation. As in previous studies, the nurses were asked to complete the CAARS and the DASS. They were not asked to complete the Life Experiences Survey as done in similar previous studies due to responder burden.

<div align="center">

**Results**

</div>

**Sample Characteristics**

One hundred and eleven nurses completed the questionnaires. Of the 111 nurses three were missing substantial data on the CAARS, and one had filled it out in such a pattern as to indicate it was not taken seriously. Since these were primary measures, these four nurses were deleted from the sample, reducing the sample size to 107. None of the remaining nurses had been previously diagnosed with ADHD. For the remaining 107

nurses: the mean age for the sample was 41.1 years ($SD$ = 11.17, range 21 to 62),

although three of the nurses did not give their age; one of the nurses did not identify sex,

six of the nurses were male, and one hundred were female.  The great preponderance of

female respondents was likely due to the greater number of females that choose nursing

as a profession, as men represented only 5.8% of registered nurses employed in nursing

in Canada in 2007 (Canadian Nurses Association, 2009).  The average number of years

working in nursing was 17.7 (ranging from zero to forty), and the average number of

years working in their current area was 10.4 (ranging from zero to thirty-five).  Forty-

eight (44.9%) of the nurses worked in the intensive care unit, eleven (10.3%) worked in

cardiology, thirteen (12.1%) worked in coronary care, twenty-four (22.4%) worked in the

neonatal unit, and eleven (10.3%) worked in other areas.  Nurses self-reported fulfilling

an average of 6.46 roles (ranging from two to fifteen).  Mean satisfaction with their roles

was 8/10 ($n$ = 104) and mean stress related to their roles was 4.3/10 ($n$ = 104).  Ninety-

five of the nurses identified being a nurse as one of their roles, their mean satisfaction

with that particular role was 7.59 and their mean stress from that particular role was 5.58.

Ninety-nine of the nurses responded to the question of whether they had children; of

these thirty-one had no children, twelve had one child, thirty-two had two children,

eighteen had three children, five had four children, and one had five children. Of the

nurses who had children, forty-three of them identified themselves as the primary

caregiver.  Seven of the nurses identified themselves as single parents.

**Sample Descriptives**

Nurses' mean scores on the DASS subscales were all in the normal range. The

mean depression score was 5.77 the mean anxiety score was 4.45 and the mean stress

score was 9.79. These mean values are all slightly below a z score of 0 and a percentile

of 60. When compared to the combined students' scores in the two previous studies using

an independent samples t-test, the nurses' scores were significantly lower on depression,

anxiety, and the total DASS and just missed significance on the stress variable.

However, with a bonferroni correction the depression variable is no longer significant.

**Testing of Assumptions**

Univariate descriptive statistics were inspected for accuracy of input, and normality was

assessed by dividing Skewness by the Standard Error of Skewness, and Kurtosis by the

Standard Error of Kurtosis. The variable means, standard deviations, skews and kurtosis

are shown in Appendix G along with their transformations. The means, standard

deviations and *T*-scores for the main independent and dependent variables are shown in

Table 4.6. After transformations no outliers were detected. Using Curran, West, and

Finch's (1996) values for when nonnormality becomes problematic (referring to normal

theory maximum likelihood estimation, which is less robust to violations of normality

than is multiple regression), with this sample, depression is positively skewed at 2.ll and

anxiety is positively skewed at 2.61 and has a positive kurtosis at 8.31 (i.e., the

distribution is too peaked prior to transformation).

**Analyses**

Bivariate correlations between the DASS subscales and the CAARS subscales

were all significant at $p < .01$. The correlations ranged from .26 between depression and

hyperactivity to .76 between stress and the ADHD index. These bivariate correlations are

shown in Table 4.1. Bivariate correlations of ancillary variables are shown in Table 4.2

Table 4.1.

*Bivariate Correlations on the DASS Subscales and CAARS Subscales (N = 107)*

| CAARS subscales | Depression | Anxiety | Stress |
|---|---|---|---|
| Inattention/memory problems | .62** | .60** | .62** |
| Hyperactivity/restlessness | .26** | .37** | .37** |
| Impulsivity/emotional lability | .48** | .52** | .68** |
| Problems with self-concept | .75** | .67** | .64** |
| DSM-IV inattentive symptoms | .64** | .66** | .68** |
| DSM-IV Hyperactive-impulsive symptoms | .44** | .56** | .60** |
| DSM-IV ADHD symptoms total | .58** | .66** | .69** |
| ADHD index | .63** | .66** | .76** |

** Correlation is significant at the 0.01 level.

Table 4.2

*Bivariate Correlations Between the Ancillary Independent Variables and the Main
Dependent and Independent Variables (N = 107)*

| Variable | Stress level | Job stress | Coping level | Job coping level | Overwhelmed |
|---|---|---|---|---|---|
| Inattention/memory problems | .14 | .21* | -.25* | -.25** | .25* |
| Hyperactivity/restlessness (*n* = 106) | -.01 | .01 | -.21* | -.10 | .22* |
| Impulsivity/emotional lability | .26** | .20* | -.34** | -.30** | .36** |
| Problems with self-concept | .30** | .22* | -.39** | -.24* | .35** |
| DSM-IV inattentive symptoms | .17 | .17 | -.30** | -.29** | .31** |
| DSM-IV hyperactive-impulsive symptoms | .16 | .17 | -.30** | -.25** | .35** |
| DSM-IV ADHD symptoms total | .18 | .18 | -.32** | -.29** | .36** |
| ADHD index | .26** | .22* | -.33** | -.23* | .37** |
| Depression | .34** | .19* | -.41** | -.29** | .43** |
| Anxiety | .24* | .20* | -.28** | -.15 | .35** |
| Stress | .46** | .27** | -.33** | -.22* | .48** |
| Stress[a] | .46** | .27** | -.33** | -.22* | .48** |
| DASS | .38** | .24* | -.38** | -.24* | .46** |
| DASS[a] | .37** | .24* | -.38** | -.24* | .46** |

*p < .05   **p < .01
[a]Overlapping items removed.

and Table 4.3.   Note that number of roles fulfilled, number of children, aging parents, being a primary caregiver of children or parents, or being a single parent was not significantly related to any of the dependent or main independent variables (with the exception of one negative correlation ($r = -.20$, $p = .050$) between hyperactivity and number of children) and therefore are not included in the abovementioned tables. Additionally, the number of years nursing is significantly negatively correlated with both job stress ($r = -.21$, $p = .032$) and perceived stress level ($r = -.25$, $p = .010$), although the time worked in a specific area is not.

The CAARS has eight subscales and the number of nurses who scored above critical values on each of the scales was noted.  Critical value scores used were those that equaled a $T$- score of 66 or greater, which is defined in the CAARS manual as either "Much above average" or "Very much above average" falling at or above the 95th percentile.  The specific raw scores equal to a $T$-score of 66 for each of the subscales differ according to the particular scale, the sex of the subject, and the age of the subject. The numbers and percentages of nurses scoring above critical values indicative of ADHD on each of the 8 subscales of the CAARS are summarized in Table 4.4.  While table 4.5 shows the percentage of nurses scoring above critical values on one to seven subscales of the CAARS.  Table 4.6 lists the means and standard deviations for both the raw scores and $T$-scores (when appropriate) on the dependent and independent variables.

Although the DASS is a dimensional measure not a categorical measure, the manual does provide guidelines for severity ratings (Lovibond & Lovibond, 1995).  The majority of the nurses (80.4%) scored in the normal range on the depression scale, 6.5% scored in the mild range, 2.8% scored in the moderate range, and 4.7% scored in the

Table 4.3

*Bivariate Correlations Between the Stress/Satisfaction Variables and the Main Dependent and Independent Variables*

| Variable | Nursing role satisfaction (*n* = 95) | Nursing role stress (*n* = 95) | Role satisfaction (*n* = 104) | Role stress (*n*=104) |
|---|---|---|---|---|
| Inattention/memory problems | -.34** | .22* | -.39** | .11 |
| Hyperactivity/restlessness (*n* = 94, 103) | -.12 | .05 | -.14 | -.03 |
| Impulsivity/emotional lability | -.23* | .21* | -.42** | .17 |
| Problems with self-concept | -.25* | .19 | -.28** | .18 |
| DSM-IV inattentive symptoms | -.29** | .26* | -.37** | .16 |
| DSM-IV hyperactive-impulsive symptoms | -.11 | .23* | -.23** | .11 |
| DSM-IV ADHD symptoms total | -.21* | .27** | -.32** | .14 |
| ADHD index | -.25* | .26* | -.39** | .17 |
| Depression | -.26* | .11 | -.37** | .13 |
| Anxiety | -.07 | .17 | -.20* | .17 |
| Stress | -.19 | .25* | -.43** | .25* |
| Stress[a] | -.17 | .24* | -.42** | .25* |
| DASS | -.19 | .19 | -.38** | .20* |
| DASS[a] | -.18 | .18 | -.36** | .19 |

*p* < .05  **p* < .01
[a]Overlapping items removed.

Table 4.4

*Numbers and Percentages of Nurses Scoring Above Critical Values on Each CAARS Subscale (N = 107)*

|  | Number of all nurses | Percentage of all nurses |
|---|---|---|
| Inattention/memory problems | 4 | 3.7 |
| Hyperactivity/restlessness | 4 | 3.7 |
| Impulsivity/emotional lability | 4 | 3.7 |
| Problems with self-concept | 8 | 7.5 |
| DSM-IV inattentive symptoms | 7 | 6.5 |
| DSM-IV hyperactive-impulsive symptoms | 4 | 3.7 |
| DSM-IV ADHD symptoms total | 4 | 3.7 |
| ADHD index | 3 | 2.8 |
| Total nurses above critical values on at least one scale | 15 | 14 |

Table 4.5

*Percentage of Nurses Scoring Above Critical Values on One to Seven Subscales of the CAARS (N = 107)*

| Number of subscales | 1 | 2 | 3 | 4 | 5 | 6 | 7 | At least one subscale |
|---|---|---|---|---|---|---|---|---|
| Percentage scoring above critical values | 6.5 | 5.6 | 0 | 0 | <1 | 0 | <1 | 14 |

*Note*. 7.5% of nurses scored above critical values on two or more scales.

Table 4.6

*Means and Standard Deviations for Continuous Independent Variables and Dependent Variables With Nursing Data (N = 107 unless otherwise specified)*

| Variable | Mean (Mean *T*-Score, *n* = 103) | *SD* (*T*-score *SD*) |
|---|---|---|
| Inattention/memory problems | 7.74 (46.34) | 5.28 (8.47) |
| Hyperactivity/restlessness (*n* = 106, 102) | 10.30 (47.72) | 6.10 (8.44) |
| Impulsivity/emotional lability | 8.60 (46.47) | 5.11 (8.57) |
| Problems with self-concept | 5.61 (47.09) | 4.27 (9.97) |
| DSM-IV inattentive symptoms | 5.50 (45.64) | 4.20 (11.27) |
| DSM-IV hyperactive-impulsive symptoms | 6.45 (44.39) | 4.39 (10.48) |
| DSM ADHD symptoms total | 11.95 (44.51) | 7.95 (10.48) |
| ADHD index | 8.02 (45.88) | 5.22 (9.13) |
| DASS | 20.02 | 22.25 |
| DASS[a] | 18.05 | 20.49 |
| Depression | 5.77 | 9.03 |
| Anxiety | 4.45 | 6.65 |
| Stress | 9.79 | 8.54 |
| Stress[a] | 7.82 | 6.59 |

*Note*. For DASS subscales, normal ranges are:  depression 0-9, anxiety 0-7, and stress 0-14.  All of which are in the percentile range of 0-78 and with a *z* score of <0.5.
*Note*. *T*-scores are given in brackets for the CAARS subscales.  The sample size for the *T*-scores is reduced to 103 due to gender and/or age not being available for 4 nurses.
[a]Overlapping items removed.

severe and 5.6% scored in the extremely severe range. For the anxiety scale 79.4% scored

in the normal range, 4.7% in the mild range, 11.2% in the moderate range, none in the

severe range, and 4.7% in the extremely severe range. For the stress scale, 79.4% of the

nurses scored in the normal range, 6.5% in the mild range, 6.5% in the moderate range,

5.6% in the severe range, and 1.9% in the extremely severe range.

Regression analyses were conducted on the ADHD index and the two scales with

the highest percentages of nurses scoring above critical values. With the ADHD index,

stress emerges as the most important predictor.  However, multicollinearity amongst the

predictor variables could be obscuring the relationships between them and the dependent

variable.  Therefore, two additional multiple regressions were conducted in order to

assess this issue, separating the correlated variables from each other (Fabrigar, personal

communication, February 9, 2009), in order to get a more accurate and comprehensive

understanding of the contributions of the individual variables.  With this particular

sample, anxiety and depression are the most highly correlated at $r = .81$.  Stress remains

significant in these regressions; anxiety achieves significance once separated from the

effects of depression ($p = .018$), while depression does not achieve significance when

separated from the effects of anxiety ($p = .081$).  Results are shown in Table 4.7 and 4.8.

Although stress is not as highly correlated with depression and anxiety as they are with

each other, both anxiety and depression become significant when stress is removed from

the equation ($p = .001$ and $p = .023$, respectively). Regression analyses indicate that the

depression, anxiety, and stress scales (overlapping items removed), and the total DASS

account for 50% of the variance on the DSM-IV inattentive symptoms subscale of the

Table 4.7

*Summary of Simultaneous Multiple Regression for Main Independent Variables Associations With CAARS ADHD Index (N = 107)*

| Variable | *B* | *SE B* | Beta | *t* | Sig. |
|---|---|---|---|---|---|
| Depression | .03 | .07 | .06 | .51 | .611 |
| Anxiety | .15 | .09 | .20 | 1.68 | .095 |
| Stress[a] | .44 | .08 | .56 | 5.39 | < .001 |

Adjusted $R^2$ = .57
[a]Overlapping items removed.

Table 4.8

*Summary of Multiple Regression for Independent Variables Associations With CAARS ADHD Index With Anxiety, Depression, and Stress Divided (N = 107)*

| Variable | *B* | *SE B* | Beta | *t* | Sig. |
| --- | --- | --- | --- | --- | --- |
| Stress[a] | .46 | .08 | .57 | 5.99 | < .001 |
| Anxiety | .18 | .08 | .23 | 2.40 | .018 |
| | | | | | |
| Depression | .10 | .06 | .17 | 1.76 | .081 |
| Stress[a] | .49 | .08 | .62 | 6.43 | < .001 |
| | | | | | |
| Anxiety | .34 | .10 | .43 | 3.53 | .001 |
| Depression | .16 | .07 | .28 | 2.32 | .023 |

[a]Overlapping items removed.

CAARS and 56% of the variance on the problems with self-concept subscale.  Results of the regressions may be seen in Appendix H.

The following ancillary variables do not add any significant additional variance when entered into a sequential multiple regression after the depression, anxiety, and stress variables: coping, stress level, subjective feelings of being overwhelmed, job stress, role stress, ability to cope with job, and nursing stress variables.  For examples of some of the nurses' qualitative answers to the question concerning contributions to their level of job and/or life stress please see Table 4.9.

## Discussion

The prediction that nurses would score highly on the depression, anxiety, and stress scales was not supported.  Based on test norms, all of the mean scores for depression, anxiety, and stress were below a $z$ score of 0, below the 60th percentile, and within the normal range.  When comparing means on the depression, anxiety, and stress scales, nurses who participated in this study scored significantly lower than the two groups of students examined in previous studies (Alexander & Harrison, 2009a, b) on the depression, anxiety, and the total DASS variables, although they just missed significance on the stress variable.  However, with a bonferroni correction the depression variable is no longer significant. Nurses' scores were significantly lower than the previously mentioned students on all of the CAARS subscales other than the impulsivity/emotional lability subscale.  After a bonferroni correction these differences remained significant on the inattention/memory problems, hyperactivity/restlessness, DSM-IV inattentive symptoms, DSM-IV ADHD symptoms total, and ADHD index. The qualitative data collected in the present study suggests that there are many factors contributing to stress

Table 4.9

*Contributions to Nurses Levels of Job and/or Life Stress (N = 107)*

| Reasons nurses gave for increased stress | Number of nurses giving this reason | Percentage of nurses giving this reason | Examples |
|---|---|---|---|
| Employee characteristics | 9 | 8.4 | Living up to expectations for myself and of others |
| Work (heavy, increased, lack of control over) | 11 | 10.3 | No control of added workload Overworked |
| Lack of time | 5 | 4.7 | Zero time to do anything for myself |
| Work/life imbalance | 6 | 5.6 | Balancing work and family life, trying to give 100% to both |
| Employer or employment characteristics | 25 | 23.4 | Lack of communication between departments Politics and floating to other units |
| Staff or nursing shortage | 18 | 16.8 | Chronic lack of staff Increasing nurse-patient ratio |
| New/challenging/stressful job | 10 | 9.3 | Being a new grad and having a steep learning curve can be stressful |
| Shift work | 9 | 8.4 | Shift work |
| Level of illness of patients | 8 | 7.5 | We deal with life and death every day and see people go through the most horrible and painful things |

| | | | |
|---|---|---|---|
| Financial | 15 | 14.0 | Single income family-solely responsible for all money coming in |
| Health | 14 | 13.1 | |
|  Own health | 6 | 5.6 | Back injury |
|  Health of family | 8 | 7.5 | Husband disabled |
| Children | 22 | 20.6 | Teenagers involved in activities needing drives/support |
| Family issues (other than children and health issues) | 16 | 15.0 | Lack of support from family<br>Divorce |
| Other | 31 | 29.0 | Continuing education<br>Home renovations |
| Blank, no Stress, or n/a | 20 | 18.7 | I have a supportive, caring husband |

but that nurses, at least the ones who participated in this study, do not rate their stress

levels or feelings of being overwhelmed as highly as do the previously studied students.

Although one may have expected the nurses to rate their ability to cope more highly, as

they are older and presumably would have developed a wider repertoire of coping skills,

there are no significant differences between the nurses and the students on this variable.

The prediction that the nurse's scores on the measures of depression, anxiety, and

stress would be correlated with scores on the CAARS subscales was supported. The

bivariate correlations were higher than those of the students sampled in a previous study

(Alexander & Harrison, 2009a, b).

It is not surprising that none of the nurses had been previously diagnosed with

ADHD.  Nursing is a demanding profession that requires a high amount of focus and an

ability to multitask in order to fulfill the demands of the profession.  The nurses would

have to have been able to complete demanding course curricula in order to become

licensed in their profession.  This is not to say that people with ADHD are not able to

complete demanding course work, but rather that they may find it more challenging and

difficult than those who do not have the additional burden of coping with this disorder, or

that the particular talents they may have are suited to other types of professions, which

require different skill sets than those required by nursing.  However, it was thought that

nurses would score highly on some of the CAARS measures due to the effects of stress

caused by their working conditions after having graduated from nursing school.

Few of the nurses scored highly on the DASS measure and few scored above

critical values on the CAARS.  Fewer of the nurses scored above the CAARS criteria in

comparison with the two student groups studied previously (Alexander & Harrison,

2009a, b).  The prediction that a higher than expected number of nurses would score

above the critical values on the CAARS was not supported.  The scales with the highest

percentages scoring above critical values were the problems with self-concept and DSM-

IV inattentive symptoms subscales.  However, at 7.5 percent and 6.5 percent,

respectively, these numbers are not significantly different from the population

percentages ($z = 0.65$, n.s., and $z = 0.22$, n.s.).   One reason for this may be that the nurses

were self-selected, that is, they were given the option to participate in the study by having

the information placed in their mail box.  With this method of requesting participation,

nurses may have found it easier to refuse than if the researcher had been present and

explicitly asking for their participation.  As well, the draw for $100 was likely not as

large a motivating factor for the nurses as it would have been for the students, as the

former were all employed.  Nurses rated their nursing role stress at only 5.58/10 and their

job stress at 5.77/10 which seems quite modest in light of previous research on nursing

and stress ("Stress Harms Nurses", 2007; Trossman, 1999; USNY State Education

Department, 2003).  It may be that nurses who were experiencing a high level of mood

symptoms simply did not participate in the study, whereas, students who were

experiencing negative mood symptoms may have participated regardless in order to

obtain the half credit or in hopes of winning the draw.  Alternatively, it could be that

nurses in general are simply not as depressed, stressed, or anxious as students in general,

or that they have developed more finely honed coping mechanisms.  After all, the nurses

had already completed school and people who were easily stressed may have already

been "weeded out".  However, this last point is somewhat inconsistent with the findings

of the 2002 USNY Registered Nurses survey (USNY State Education Department, 2003)

as well as the nurses own self-reported rating of coping which was not significantly

different from the ratings of the students previously studied (Alexander & Harrison,

2009a, b). One final explanation is that the areas of the hospital chosen in which to

conduct the study were areas that were deemed to be likely high stress work areas (some

examples are the intensive care unit and the cardiac care unit). However, it could be that

nurses who are drawn to work in these particular areas are better at managing stress and

negative emotions, or that the work areas themselves are set up in such a way as to

decrease the levels of depression, anxiety, and stress experienced by the nurses (for

example even though the patients are usually more ill in these areas the nurse to patient

ratio is better than on the regular wards, and perhaps doctors are more available).

However, the USNY survey (USNY State Education Department, 2003) did find that

nurses rated the intensive care unit fourth out of twelve in terms of level of workload job

stress (receiving a rating of 4.0 out of a scale of 1.0 to 5.0, with 1.0 indicating low stress

and 5.0 indicating high stress) while the emergency department was rated first (with a

score of 4.19). Unfortunately, we were not able to access the emergency department of

the hospital for this study.

The mean age of the nurses (41.1) is significantly higher than the mean age of the

student groups (19.83 and 22.55) from previous studies (Alexander & Harrison, 2009a,

b). The nurses may experience less anxiety and depression and increased ability to deal

with stress because of their maturity.

Nurses with more experience reported less job and general stress. This finding

suggests that the more experienced you become in a job the less stressful it becomes, but

one might wonder why more nursing experience would affect general stress levels. This

may be due to the phenomenon noted by Shields (2004) of "stress proliferation" referring to the spread of stress from one life area to another; similar to what is sometimes commonly referred to as "taking the job home". However, the number of years the nurses had been working was not significantly correlated with their scores on the depression, anxiety, and stress scales. What did appear to affect their scores on the depression, anxiety, and stress scales were feeling overwhelmed, job stress ratings, general stress level ratings, ratings of ability to cope with their jobs, and ratings of ability to cope in general.

Although the nurses had relatively low depression, anxiety, and total DASS scores (when compared with the students scores in previous studies by Alexander & Harrison, 2009a, b) and there were only a small percentage of nurses scoring above critical values on the CAARS subscales, there were still strong correlations between these two measures, which does support the hypothesis that increased depression, anxiety, and stress are related to increased report of ADHD symptoms. Therefore, had there been a greater number of depressed, anxious, and stressed nurses participating in this study, we would likely have seen a greater percentage of them scoring above the critical values on the CAARS subscales.

**Limitations and Directions for Future Research**

One of the major limitations of this study is that it is unknown whether the nurses who chose to participate in this study are representative of nurses in general. Although we were able to access some nurses who were experiencing depression, stress, and anxiety, the large majority of nurses were within normal ranges. It is possible that nurses who chose not to participate did so because they felt too stressed, busy, or overwhelmed.

Although the nurses qualitatively identified stressors, it appeared that overall they were coping fairly well.  In fact, 18.7% of them either listed no stressors or expressed that there were aspects of their life that helped them deal with stress.  The sample was predominantly female and therefore any findings may not apply to males. Another limitation is that the design of the experiment does not allow us to infer causation.  Future research should focus on participants who are not only in high stress occupations but who are identified as having difficulty with depression, stress, and/or anxiety.  It is important to look at groups of people who are clinically depressed or anxious, although a small percentage of the nurses scored in the extremely severe ranges, it is unknown whether any of them would meet diagnostic criteria for these conditions.

**General Conclusions**

The purpose of this research was to examine the extent to which people are likely to score above critical values on measures of ADHD, as well as the extent to which symptoms related to depression, anxiety and stress mimic the symptoms of ADHD. Three groups of people: introductory psychology students, students going to health and counselling services, and nurses participated in the study. Two popular measures, the BADDS (T. E. Brown, 1996) and the CAARS (Conners, et al., 1999) were examined (the BADDS with the students attending health and counselling services and the CAARS with all three groups). We determined whether these groups scored above critical values on the subscales of the CAARS, and for the health and counselling students, on the BADDS as well. Results confirm that a higher than expected number of participants scored above critical values on commonly used measures of ADHD in comparison to the expected base rate for this disorder based on previous population statistics.

In all three studies it was found that some of the participants' scores on the depression, anxiety, and stress scales of the DASS were significantly correlated with the subscales of the CAARS. When multiple regression analyses were run on the CAARS subscales in which an unexpectedly high number of people scored above critical values suggestive of ADHD, it was found that the depression, anxiety, and stress subscales of the DASS accounted for a significant amount of variance on these CAARS subscales. Unfortunately, it was difficult to ascertain which of these three factors was the most likely to affect ADHD symptom reporting due to the multicollinearity among the three variables. Although a measure was chosen which was purported to separate the variables of depression, anxiety, and stress, there were still high correlations among these

variables.  On initial inspection of the regression equation for the ADHD index, it appeared as though anxiety was the only important variable for the introductory psychology group, while depression and stress were important contributors to variance for the health and counselling group, and stress was the most important predictor for the nursing group. However, when the highest correlated variables are separated and separate regressions were run it appears that all three variables are important predictors for the health and counselling and the nursing groups, and both anxiety and stress contribute to variance for the introductory psychology group. These differing results are likely due to multicollinearity among the independent variables, with the variables with the highest bivariate correlations within each sample pushing the other variables out of the equation. It may be that a high general level of distress, regardless of whether it is due to depression, anxiety, or stress, is the most important factor to consider and may be associated with elevated levels of experienced symptoms that are similar to those found in ADHD, especially the inattentive symptoms.

The BADDS was moderately correlated with the depression, anxiety, and stress measures, and over identified students at levels similar to those found by Harrison (2004) in a previous study.  The scales of the CAARS that appear to be particularly problematic, in terms of higher than expected numbers of participants scoring above critical values, are the DSM-IV inattentive symptoms subscale and the DSM-IV ADHD symptoms total subscale.  While depression, anxiety, and stress are not the only factors causing participants to score above critical values, these factors do account for a significant amount of the variance on these subscales.  The ADHD index subscale falsely identifies

only the highest scorers on the DASS. However, the ADHD index failed to identify the few participants in our samples who were previously diagnosed with ADHD.

Ancillary variables such as perceived stress level, coping ability, feelings of being overwhelmed, and negative life events were generally not found to be as important predictors of CAARS subscale scores as the depression, anxiety, and stress measures, although they did account for some additional variance with one of the groups (the introductory psychology students).

A large portion of the two student samples scored above *T*-Scores of 65 on two or more subscales of the CAARS. Although the CAARS manual cautions not to use its guidelines as "absolute rules", it does state that the pattern is "marginal" when one *T*-Score is above 65, and that "the greater the number of scales that show clinically relevant elevations (*T*-scores above 65) the greater the likelihood that the CAARS scores indicate a moderate to severe problem" (Conners, Erhardt, & Sparrow, 1999, p. 22). In this context, it should be noted that 34.5% of the psychology students and 30.7% of the health and counselling students scored above critical values on at least one subscale, and therefore would be considered to have a marginal pattern. Furthermore, 23.8% of the psychology students and 19.8% of the health and counselling service students were scoring above *T*-scores on two or more subscales of the CAARS, indicating increasing likelihood that they could be incorrectly identified as having a moderate to severe problem with ADHD.

The significant correlations between the DASS and CAARS subscales may exist, at least in part, because some items on these scales were asking essentially the same questions. However, items that were identified as being the same on the DASS and

CAARS were removed from the DASS scale in the present study (in order to prevent spurious correlations).

The purpose of this study was to determine whether symptoms associated with stress, depression, or anxiety might be misidentified as being caused by ADHD. The matter is not as simple as having individual clinicians looking at the two scales and taking out the items that appear to be the same. We found that both psychologists and laypeople differed in their opinions in this matter. They found it difficult to identify which items were tapping into the same constructs. Rather, specific subscales of the CAARS appear to be prone to having higher percentages of people scoring above critical values (e.g., DSM-IV inattentive symptoms subscale) whereas others appear to have fewer problems with false positives (e.g., ADHD index). This pattern is important to know when considering a diagnosis of ADHD.

A point that cannot be overemphasized is the importance of not relying solely on self-report scales as the predominant means of diagnosing ADHD (Gathje, Lewandowski, & Gordon, 2008). A clinician who based ADHD diagnosis entirely on the co-occurrence of two or more extreme scores on CAARS subscales ($T > 65$) would erroneously conclude that 24% of undergraduates in general, 20% of students seeking counselling help, and 8% of nurses were suffering from ADHD. If the true population rate of ADHD lies between 1 and 6%, reliance solely on the CAARS measure would lead to substantial overdiagnosis of ADHD, particularly in student populations.

Symptoms constitute only one of the criteria that need to be considered in assigning such a diagnosis (APA, 2000). Other criteria include childhood onset, clinically significant impairment, pervasiveness of symptoms (i.e., present across contexts), and

ruling out other potential causes. As Gathje et al. point out; the diagnosis of ADHD "can be made quite liberally or conservatively depending on whether an impairment criterion is considered and where impairment critical values are set" (p. 536). These other aspects pertinent to the diagnosis of ADHD are crucial for the clinician to consider.

Complicating the clinicians' decisions regarding diagnosis is that these conditions (ADHD, anxiety, depression) are frequently considered to be co-morbid (Barkley & Brown, 2008). Symptoms of one may be mimicking the other. It is presumably easier to tell if ADHD is mimicking signs of depression, anxiety, or stress because of key signs that would be missing if the person were not depressed or anxious, such as extreme sadness, suicidality, or panic. However, depression, anxiety, and stress, might more easily mimic ADHD and we need to be alert to key signs that this is the case. One indicator that ADHD is not the cause would be a sudden onset of inattentive symptoms at a later age. Although some researchers claim that some ADHD impairments "are not apparent until a child leaves home to go to college or later" (T. E. Brown, 2003), the sudden appearance of symptoms in an individual with high stress, depression, or anxiety should still be a warning for clinicians to examine the matter more closely. It is possible that the person is experiencing ADHD-like symptoms because of high levels of depression, anxiety, or stress and that once these mood difficulties are successfully treated the person will no longer exhibit the symptoms. ADHD is considered to be a neurologically based, lifelong disorder. However, if treatment of depression (or anxiety or stress) "clears up" the ADHD symptoms, one must question whether the ADHD diagnosis was accurate. Careful consideration of the temporal sequence of symptoms is one way to address the issue of co-morbidity versus a single disorder. Misdiagnosis can

be especially problematic in these cases as treatment for ADHD may not be appropriate or may even be potentially harmful if the true cause is something else (e.g., stimulants prescribed for an anxiety disorders).

A major difference that emerged among the three studies was that the nurses' mean scores on the depression, anxiety, and stress subscales were not as high as those of the students; they were significantly lower on the anxiety and total DASS, and approached significance on the depression and stress scales.  Similarly, they were not as likely to score above critical values on the CAARS subscales.  That being said, it is important to note that all means for the groups on the DASS subscales were in the normal range, with the exception of the health and counselling group who had a mean score in the mild range for anxiety.  Although we chose populations we felt might be under more stress than the general population, we did not study groups with clinical diagnoses.  Had that been done it seems likely that the percentages of participants scoring above critical values on the CAARS and the BADDS would have been even greater, given the high correlation found between scores on the DASS and ADHD self-report scales.

Taken as a whole, the three studies illustrate that it is important for clinicians to be cautious about diagnosing ADHD by use of rating scales alone.  The rating scales are a useful and important aid for ADHD diagnosis but cannot replace clinical judgment and the careful consideration of other possible reasons for a client's presenting symptoms.

**References**

Accardo, P., & Blondis, T. A. (2001). What's all the fuss about Ritalin? *The Journal of Pediatrics, 138,* 6-9. doi:10.1067/mpd.2001.111505

Alexander, S. J. & Harrison, A. (2009a).  Cognitive responses to stress, depression and anxiety and their relationship to ADHD (Attention Deficit Hyperactivity Disorder) symptoms in first year psychology students.  Manuscript in preparation, Queen's University in Ontario.

Alexander, S. J. & Harrison, A. (2009b).  Cognitive responses to stress, depression, and anxiety and their relationship to ADHD (Attention Deficit Hyperactivity Disorder) symptoms in students utilizing health and counselling services. Manuscript in preparation, Queen's University in Ontario.

Almeida, D. M. & Kessler, R. C. (1998).  Everyday stressors and gender differences in daily distress.  *Journal of Personality and Social Psychology, 75,* 670-680. doi:10.1037/0022-3514.75.3.670

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders (DSM-IV-TR)* (4th Ed). Washington, DC: American Psychiatric Association.

Antony, M., Bieling, P., Cox, B., Enns, M., & Swinson, R. (1998).  Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales (DASS) in clinical groups and a community sample.  *Psychological Assessment, 10*, 176-181. doi:10.1037/1040-3590.10.2.176

Babcock, Q., & Byrne, T. (2000). Student perceptions of methylphenidate abuse at a

public liberal arts college. *Journal of American College Health, 49,* 143-145.

Retrieved from http://www.acha.org/info_resources/journal_intro.cfm

Bakker, A. B., Killmer, C. H., Siegrist, J., & Schaufeli, W. B. (2000). Effort-reward

imbalance and burnout among nurses. *Journal of Advanced Nursing, 31,* 884-

891. doi:10.1046/j.1365-2648.2000.01361.x

Barkley, R. A., & Brown, T. E. (2008). Unrecognized attention-deficit/hyperactivity

disorder in adults presenting with other psychiatric disorders. *CNS Spectrums, 13,*

977-984. Retrieved from http://www.cnsspectrums.com/aspx/articledetail.

aspx?articleid=1890

Barkley, R. A., Fischer, M., Smallish, L., & Fletcher, K. (2002). The persistence of

attention-deficit/hyperactivity disorder into young adulthood as a function of

reporting source and definition of disorder. *Journal of Abnormal Psychology, 111,*

279-289. doi:10.1037/0021-843X.111.2.279

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in

social psychological research: Conceptual, strategic, and statistical considerations.

*Journal of Personality and Social Psychology, 51,* 1173-1182. doi:10.1037/0022-

3514.51.6.1173

Bayram, N., & Bilgel, N. (2008). The prevalence and socio-demographic correlations of

depression, anxiety and stress among a group of university students. *Social

Psychiatry and Psychiatric Epidemiology, 43*, 667-672. doi:10.1007/s00127-008-

0345-x

Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy of depression: A treatment manual.* New York: Guilford Press.

Beck, A. T., & Steer, R. A. (1990). *Beck Anxiety Inventory manual.* San Antonio, TX: Psychological Corporation.

Breslow, R., Kocsis, J., & Belkin, B. (1981). Contribution of the depressive perspective to memory function in depression. *American Journal of Psychiatry, 138,* 227-230. Retrieved from http://ajp.psychiatryonline.org/archive/

Brown, T. A, Korotitsch, W., Chorpita, B.F., & Barlow, D.H. (1997). Psychometric properties of the Depression Anxiety Stress Scales (DASS) in clinical samples. *Behaviour Research and Therapy, 35,* 70-89. doi:10.1016/S0005-7967(96)00068-X

Brown, T. E. (1996). *Brown Attention Deficit Disorders Scales (manual).* San Antonio, C.A. Psychological Corporation.

Brown, T. E. (2003, September). Workshop: Advanced assessment and treatment of complicated attention deficit disorders. Ottawa, Ontario: Canadian Psychological Association.

Canadian Nurses Association (2009). *2007 Workforce profile of registered nurses in Canada.* Retrieved from http://www.cna-aiic.ca/CNA/nursing/statistics/ 2002highlights /default_e.aspx

Carlezon, W. A. Jr., Mague, S. D., & Andersen, S. L. (2003). Enduring behavioral effects of early exposure to methylphenidate in rats. *Biological Psychiatry, 54*, 1338-1344. doi:10.1016/j.biopsych.2003.08.020

Center for Addiction and Mental Health. *Ontario Student Drug Use Survey, 1977-2005,*

    Toronto: Canada. Retrieved from http://www.camh.net/Research/osdus.html

Chervin, R. D., Ruzicka, D. L., Giordani, B. J., Weatherly, R. A., Dillon, J. E., Hodges,

    E. K., Marcus, C. L., & Guire, K. E. (2006). Sleep-disordered breathing,

    behavior, and cognition in children before and after adenotonsillectomy.

    *Pediatrics: Official Journal of the American Academy of Pediatrics, 117,* 769-

    778. doi:10.1542/peds.2005-1837

Conners, C., Erhardt, D., & Sparrow, E. (1999). *Conners' Adult ADHD Rating Scales*

    *(CAARS) Technical Manual.* North Tonawanda, NY: Multihealth Systems, Inc.

Curran, P. J., West, S. G., & Finch, J., F. (1996). The robustness of test statistics to

    nonnormality and specification error in confirmatory factor analysis.

    *Psychological Methods, 1,* 16-29. doi:10.1037/1082-989X.1.1.16

DeSantis, A., Webb, E., & Noar, S. (2008). Illicit use of prescription ADHD

    medications on a college campus: a multimethodological approach. *Journal of*

    *American College Health, 57,* 315-324. doi:10.3200/JACH.57.3.315-324

DuPaul, G. J., Schaughency, E. A., Weyandt, L. L., Tripp, G., Kiesner, J., Ota, K., &

    Stanish, H. (2001). Self-report of ADHD symptoms in university students: Cross-

    gender and cross-national prevalence. *Journal of Learning Disabilities, 34,* 370-

    379. doi:10.1177/002221940103400412

Erhardt, D., Epstein, J., Conners, C., Parker, J., & Sitarenios, G. (1999). Self-ratings of

    ADHD symptoms in adults II: Reliability, validity, and diagnostic sensitivity.

    *Journal of Attention Disorders, 3,* 153-158. doi:10.1177/108705479900300303

Gallagher, R. & Blader, J. (2001). The diagnosis and neuropsychological assessment of

      adult attention deficit/hyperactivity disorder: Scientific study and practical

      guidelines. *Annals New York Academy of Sciences, 931,* 148-171.

      doi:10.1111/j.1749-6632.2001.tb05778.x

Gathje, R. A., Lewandowski, L. J. & Gordon, M. (2008). The role of impairment in the

      diagnosis of ADHD. *Journal of Attention Disorders, 11,* 529-537.

      doi:10.1177/1087054707314028

Gittelman, R., Mannuzza, S., Shenker, R., & Bonagura, N. (1985). Hyperactive boys

      almost grown up: I. Psychiatric status. *Archives of General Psychiatry, 42,* 937-

      947. Retrieved from http://archpsyc.ama-assn.org/

Gordon, M., Antshel, K., Faraone, S., Barkley, R., Lewandowski, L., Hudziak, J. J.,

      Biederman, J. & Cunningham, C. (2006). Symptoms versus impairment: The

      case for respecting DSM-IV's Criterion D. *Journal of Attention Disorders, 9,* 465-

      474. doi:10.1177/1087054705283881

Gordon, M. & Barkley, R. (1999). Is all inattention ADD/ADHD? *The ADHD Report, 7,*

      1-8.

Gordon, M., Barkley, R. & Murphy, K. (1997). ADHD on trial. *The ADHD Report, 5,* 1-

      4.

Gouvier, W., Uddo-Crane, M., & Brown, L. (1988). Base rates of post-concussional

      symptoms. *Archives of Clinical Neuropsychology, 3,* 273-278.

      doi:10.1093/arclin/3.3.273

Gray-Toft, P., Anderson, J. G. (1981).  Stress among hospital nursing staff:  Its causes

and effects.  *Social Science and Medicine, 15,* 639-647. doi:10.1016/0271-

7123(81)90087-0

Harrison, A. (2004).  An investigation of reported symptoms of ADHD in a university

population.  *The ADHD Report, 12,* 8-11. doi:10.1521/adhd.12.6.8.55256

Harrison, A. & Wilson, J. (2005). Inattention and dissociation: Overlapping constructs?

*ADHD Report, 13,* 9-11. doi:10.1521/adhd.2005.13.3.9

Health Canada (2007).  Mental health: Coping with stress. Retrieved from http://www.hc-

sc.gc.ca/hl-vs/iyh-vsv/life-vie/stress-eng.php

Holmes, T.H., & Rahe, R. H. (1967). The social readjustment rating scale. *Journal of*

*Psychosomatic Research, 11,* 213-218. doi:10.1016/0022-3999(67)90010-4

Howard, D., Schiraldi, G., Pineda, A. & Campanella, R. (2006).  Stress and mental health

among college students: Overview and promising prevention interventions. In M.

V. Landow (Ed.), *Stress and Mental Health of College Students* (pp. 91-124).

New York: Nova Science Publishers.

Howell, D.  (1997). *Statistical methods for psychology.*  Belmont, CA:  Duxbury Press.

Jerome, L. (2003).  ADHD and driving safety. [Letter to the editor]. *Canadian Medical*

*Association Journal, 169,* 16. Retrieved from http://www.cmaj.ca/

Kovner, C. T., Brewer, C. S., Fairchild, S., Poornima, S., Kim, H., & Djukic, M. (2007).

Newly licensed RNs' characteristics, work attitudes, and intentions to work.

*American Journal of Nursing, 107,* 58-70.

doi:10.1097/01.NAJ.0000287512.31006.66

Lamberg, L. (2003). ADHD often undiagnosed in adults: Appropriate treatment may

   benefit work, family, social life. *Journal of the American Medical Association,*

   *290,* 1565-1567. doi:10.1001/jama.209.12.1565

Lazarus, R. S. & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer

   Publishing Company.

Lewandowski, L. J., Lovett, B. J., Codding, R. S. & Gordon, M. (2008). Symptoms of

   ADHD and academic concerns in college students with and without ADHD

   diagnosis. *Journal of Attention Disorders, 12,* 156-161.

   doi:10.1177/1087054707310882

Lovibond, P., & Lovibond, S. (1995). The structure of negative emotional states:

   Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck

   Depression and Anxiety Inventories. *Behaviour, Research and Therapy, 33,* 335-

   343. doi:10.1016/0005-7967(94)00075-U

Lowe, T. L., Cohen, D. J., Detlor, J., Kremenitzer, M. W., & Shaywitz, B. A. (1982).

   Stimulant medications precipitate Tourette's syndrome. *Journal of the American*

   *Medical Association, 247,* 1729-1731. Retrieved from http://jama.ama-assn.org/

Mannuzza, S., Klein, R. G., Bessler, A., Malloy, P., & LaPadula, M. (1998). Adult

   psychiatric status of hyperactive boys grown up. *American Journal of Psychiatry,*

   *155,* 493-498. Retrieved from http://ajp.psychiatryonline.org/cgi/content

   /full/155/4/493

Mannuzza, S., Klein, R. G., Bonagura, N., Malloy, P., Giampino, T. L., & Addalli, K. A.

   (1991). Hyperactive boys almost grown up: V. Replication of psychiatric status.

*Archives of General Psychiatry, 48,* 77-83. Retrieved from http://archpsyc.ama-assn.org/

Martin, M. M., Cayanus, J. L., Weber, K., & Goodboy, A. K. (2006).  In M. V. Landow (Ed.), *Stress and Mental Health of College Students* (pp. 149-169).  New York: Nova Science Publishers.

Maslach, C., & Jackson, S. E. (1981). *Maslach Burnout Inventory.*  Palo Alto, CA: Consulting Psychologists Press.

McCabe, S. E., Knight, J. R., Teter, C. J., & Wechsler, H. (2005). Non-medical use of prescription stimulants among US college students: Prevalence and correlates from a national survey.  *Addiction, 99,* 96-106. doi:10.1111/j.1360-0443.2004.00944.x

McCann, B., & Roy-Byrne, P. (2004). Screening and diagnostic utility of self-report attention deficit hyperactivity disorder scales in adults.  *Comprehensive Psychiatry, 46,* 175-183. doi:10.1016/j.comppsych.2004.02.006

McEwen, B. S., & Sapolsky, R. M. (1995). Stress and cognitive function.  *Current Opinion in Neurobiology, 5,* 205-216. doi:10.1016/0959-4388(95)80028-X

McVicar, A. (2003). Workplace stress in nursing: a literature review.  *Journal of Advanced Nursing, 44,* 633-642. doi:10.1046/j.0309-2402.2003.02853.x

Meyer, G. J., Finn, S. E., Eyde, L. D., Kay, G. G., Moreland, K. L., Dies, R. R., Eisman, E. J., Kauiszyn, T. W., & Reed, G. M. (2001). Psychological testing and psychological assessment: A review of evidence and issues.  *American Psychologist, 56,* 128-165. doi:10.1037//0003-066X.56.2.128

Milberger, S., Biederman, J., Faraone, S. V., Murphy, J., & Tsuang, M. (1995). Attention deficit hyperactivity disorder and comorbid disorders: Issues of overlapping symptoms. *The American Journal of Psychiatry, 152,* 1793-1799. Retrieved from http://ajp.psychiatryonline.org/archive/

Murphy, K. & Barkley, R. A. (1996). Prevalence of ADHD in adult licensed drivers: Implications for clinical diagnosis. *Journal of Attention Disorders, 1,* 147-161. doi:10.1177/108705479600100303

Newcomer, J. W., Selke, G., Melson, A. K., Hershey, T., Craft, S., Richards, K., & Alderson, A. L. (1999). Decreased memory performance in healthy humans induced by stress-level cortisol treatment. *Archives of General Psychiatry, 56,* 527-533. doi:10.1001/archpsyc.56.6.527

Pennington, B. (2002). *The development of psychopathology: Nature and nurture.* New York: Guilford Press.

Quinn, C. (2003). Detection of malingering in assessment of adult ADHD. *Archives of Clinical Neuropsychology, 18,* 379-395. doi:10.1093/arclin/18.4.379

Rodgers, L. S., & Tennison, L. R. (2009). A preliminary assessment of adjustment disorder among first-year college students. *Archives of Psychiatric Nursing, 23,* 220-230. doi:10.1016/j.apnu.2008.05.007

Rosler, M., Retz, W., Thome, J., Schneider, M., Stieglitz, R. D., & Falkai, P. (2006). Psychopathological rating scales for diagnostic use in adults with attention-deficit/hyperactivity disorder (ADHD). *European Archives of Psychiatry and Clinical Neuroscience, 256,* 3-11. doi:10.1007/s00406-006-1001-7

Rucklidge, J. & Tannock, R. (2000).  Apparent adolescent onset of ADHD – beware!

    [Letter to the editor].  *Journal of the American Academy of Child and Adolescent*

    *Psychiatry, 39,* 1075-1076. Retrieved from http://journals.lww.com/jaacap

    /pages/default.aspx

Sarason, I., Johnson, J., & Siegel, J. (1978).  Assessing the impact of life changes:

    development of the life experiences survey.  *Journal of Consulting and Clinical*

    *Psychology, 46,* 932-946. doi:10.1037/0022-006X.46.5.932

Schenk, P. (2002).  Dissociative identity disorder (DID) masked by ADHD symptoms.

    *The ADHD Report, 10,* 1-5.

Selye, H. (1974).  *Stress without distress*. Toronto: McClelland & Stewart.

Shaffer, D. (1994).  Attention deficit hyperactivity disorder in adults.  *The American*

    *Journal of Psychiatry, 151*, 633-638. Retrieved from http://ajp.psychiatryonline

    .org/archive/

Shaw, W. S., Dimsdale, J. E., & Patterson, T. L. (2000).  Stress and life events measures.

    In A. J. Rush, H. A. Pincus, M. B. First, D. Blacker, J. Endicott, S. J. Keith, K. A.

    Phillips, N. D. Ryan, G. R. Smith Jr., M. T. Tsuang, T. A. Widiger, & D. A. Zarin

    (Task Force), *Handbook of Psychiatric Measures* (pp. 221-237).  Washington,

    DC: American Psychiatric Association.

Shields, M. (2004).  Stress, health and the benefit of social support.  *Health Reports, 15,*

    9-32. Retrieved from http://www.statcan.gc.ca

Spielberger, C. D. (1983). *Manual for the State-Trait Anxiety Inventory STAI (Form Y).*

    Palo Alto, CA: Consulting Psychologists Press.

Statistics Canada. (2002). Table 105-1100 - Mental Health and Well-being profile,

Canadian Community Health Survey (CCHS), by age group and sex, Canada and

provinces, occasional, CANSIM (database). Retrieved from

http://www.statcan.gc.ca

Sternberg, D. E., & Jarvik M. E. (1976).  Memory functions in depression; Improvement

with antidepressant medication. *Archives of General Psychiatry, 33,* 219-224.

Retrieved from http://archpsyc.ama-assn.org/

Stordeur, S., D'hoore, W., & Vanderberghe, C. (2001).  Leadership, organizational stress,

and emotional exhaustion among hospital nursing staff. *Journal of Advanced

Nursing, 35,* 533-542. doi: 10.1046/j.1365-2648.2001.01885.x

Stress "harms nurses' sex lives". (2007, May). *BBC News.* Retrieved from

http://news.bbc.co.uk/2/hi/health/6691017.stm

Suhr, J., Hammers, D., Dobbins-Buckland, K., Zimak, E., & Hughes, C. (2008). The

relationship of malingering test failure to self-reported symptoms and

neuropsychological findings in adults referred for ADHD evaluation. *Archives of

Clinical Neuropsycholgoy, 23,* 521-530. doi:10.1016/j.acn.2008.05.003

Tabachnick, B., & Fidell, L. (1989).  *Using multivariate statistics.*   New York:

Harper Collins.

Tabachnick, B., & Fidell, L. (2007). *Using multivariate statistics (fifth ed.).*  Boston:

Pearson Education Inc.

Tannock, R. (1998).  Attention deficit hyperactivity disorder: advances in cognitive,

neurobiological, and genetic research. *Journal of Child Psychology and

Psychiatry and Allied Disciplines, 39,* 65-99. doi:10.1017/S0021963097001777

Troller, J. (1999). Attention deficit hyperactivity disorder in adults: Conceptual and

clinical issues. *The Medical Journal of Australia, 171,* 421-425. Retrieved from

http://www.mja.com.au/index.html

USNY (The University of the State of New York) State Education Department. (2003).

Research Report. *Registered Nurses in New York State, 2002. Volume II:*

*Organizational Climate Factors, Organization Commitment, and the Culture of*

*Retention.* Retrieved from http://www.op.nysed.gov/registered-nurses-2002-

volume2.pdf

Weinstein, D., Staffelbach, D., & Biaggio, M. (2000). Attention-deficit hyperactivity

disorder and posttraumatic stress disorder: Differential diagnosis in childhood

sexual abuse. *Clinical Psychology Review, 20,* 359-378. doi:10.1016/S0272-

7358(98)00107-X

Weiss, M. & Murray, C. (2003). Assessment and management of attention-deficit

hyperactivity disorder in adults. *Canadian Medical Association Journal, 168,*

715-722. Retrieved from http://www.cmaj.ca/

Weyandt, L. L., Linterman, I., & Rice, J. A. (1995). Reported prevalence of attentional

difficulties in a general sample of college students. *Journal of Psychopathology*

*and Behavioral Assessment, 17,* 293-303. doi:10.1007/BF02229304

Whiteside, A. (2003). The Brown attention deficit disorder scales. *Journal of*

*Occupational Psychology, Employment and Disability, 5,* 29-31. Retrieved from

http://dwp.gov.uk/docs/no2-sum-03-test-review-1.pdf

Wong, J. G., Cheung, E. P., Chan, K. K., Ma, K. K., & Tang, S. W. (2006). Web-based

survey of depression, anxiety and stress in first-year tertiary education students in

Hong Kong. *Australian and New Zealand Journal of Psychiatry, 40,* 777-782. doi:10.1111/j.1440-1614.2006.01883.x

Wong, J. L., Regennitter, R.P., & Barrios, F. (1994). Base rate and simulated symptoms of mild head injury among normals. *Archives of Clinical Neuropsychology, 9,* 411-425. doi:10.1093/arclin/9.5.411

Wright, J. (2002). Canadians and stress: A special report. Retrieved from http://www.ipsos-na.com/news/pressrelease.cfm?id=1620

Young, S. (2000). ADHD children grown up: an empirical review. *Counselling Psychology Quarterly, 13,* 191-200. doi:10.1080/095150700411728

Young, S., Toone, B. & Tyson, C. (2003). Comorbidity and psychosocial profile of adults with attention deficit hyperactivity disorder. *Personality and Individual Differences, 35,* 743-755. doi:10.1016/S0191-8869(02)00267-2

**Appendix A – Symptoms and Criteria for ADHD (APA, 2000)**

**Diagnostic Criteria for Attention-Deficit/Hyperactivity Disorder**

**A.** Either (1) or (2):

> (1) six (or more) of the following symptoms of **inattention** have persisted for at least six months to a degree that is maladaptive and inconsistent with developmental level:

*Inattention*
- (a)  often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities
- (b) often has difficulty sustaining attention in tasks or play activities
- (c) often does not seem to listen when spoken to directly
- (d) often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions)
- (e) often has difficulty organizing tasks and activities
- (f) often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)
- (g) often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books, or tools)
- (h) is often easily distracted by extraneous stimuli
- (i) is often forgetful in daily activities

> (2) six or more) of the following symptoms of **hyperactivity/impulsivity** have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

*Hyperactivity*

- (a) often fidgets with hands or feet or squirms in seat
- (b) often leaves seat in classroom or in other situations in which remaining seated is expected
- (c) often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feelings of restlessness)
- (d) often has difficulty playing or engaging in leisure activities quietly
- (e) is often "on the go" or often acts as if "driven by a motor"
- (f) often talks excessively

*Impulsivity*

    (g) often blurts out answers before questions have been completed
    (h) often has difficulty awaiting turn
    (i)  often interrupts or intrudes on others (e.g., butts into conversations or games)

**B.** Some hyperactive-impulsive or inattentive symptoms that caused impairment were present before age 7 years.

**C.** Some impairment from the symptoms is present in two or more settings (e.g., at school [or work] and at home).

**D.** There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.

**E.** The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder and are not better accounted for by another mental disorder (e.g., Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

### Attention-Deficit/Hyperactivity Disorder Not Otherwise Specified

This category is for disorders with prominent symptoms of inattention or hyperactivity-impulsivity that do not meet criteria for Attention-Deficit/Hyperactivity Disorder: Examples include

1. Individuals whose symptoms and impairment meet the criteria for Attention-Deficit/Hyperactivity Disorder, Predominantly Inattentive Type but whose age at onset is 7 years or after

2. Individuals with clinically significant impairment who present with inattention and whose symptom pattern does not meet the full criteria for the disorder but have a behavioral pattern marked by sluggishness, daydreaming, and hypoactivity

**Appendix B**

**Rating Scales:  DASS and LES with scoring instructions**

## DASS (Depression, Anxiety and Stress Scale; Lovibond & Lovibond, 1995)

Please read each statement and circle a number 0, 1, 2 or 3, which indicates how much the statement applied to you *over the past week*.  There are no right or wrong answers. Do not spend too much time on any statement.

*The rating scale is as follows:*

    0   Did not apply to me at all
    1   Applied to me to some degree, or some of the time
    2   Applied to me to a considerable degree, or a good part of time
    3   Applied to me very much, or most of the time

| | | | | | |
|---|---|---|---|---|---|
| 1 | I found myself getting upset by quite trivial things | 0 | 1 | 2 | 3 |
| 2 | I was aware of dryness of my mouth | 0 | 1 | 2 | 3 |
| 3 | I couldn't seem to experience any positive feeling at all | 0 | 1 | 2 | 3 |
| 4 | I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion) | 0 | 1 | 2 | 3 |
| 5 | I just couldn't seem to get going | 0 | 1 | 2 | 3 |
| 6 | I tended to over-react to situations | 0 | 1 | 2 | 3 |
| 7 | I had a feeling of shakiness (e.g., legs going to give way) | 0 | 1 | 2 | 3 |
| 8 | I found it difficult to relax | 0 | 1 | 2 | 3 |
| 9 | I found myself in situations that made me so anxious I was most relieved when they ended | 0 | 1 | 2 | 3 |
| 10 | I felt that I had nothing to look forward to | 0 | 1 | 2 | 3 |
| 11 | I found myself getting upset rather easily | 0 | 1 | 2 | 3 |
| 12 | I felt that I was using a lot of nervous energy | 0 | 1 | 2 | 3 |
| 13 | I felt sad and depressed | 0 | 1 | 2 | 3 |
| 14 | I found myself getting impatient when I was delayed in any way (e.g., lifts, traffic lights, being kept waiting) | 0 | 1 | 2 | 3 |
| 15 | I had a feeling of faintness | 0 | 1 | 2 | 3 |

16 I felt that I had lost interest in just about everything       0 1 2 3

17 I felt that I wasn't worth much as a person                    0 1 2 3

18 I felt that I was rather touchy                                0 1 2 3

19 I perspired noticeably (e.g., hands sweaty) in the absence of high
   temperatures or physical exertion                             0 1 2 3

20 I felt scared without any good reason                          0 1 2 3

21 I felt that life wasn't worthwhile                             0 1 2 3

22 I found it hard to wind down                                   0 1 2 3

23 I had difficulty in swallowing                                 0 1 2 3

24 I couldn't seem to get any enjoyment out of the things I did   0 1 2 3

25 I was aware of the action of my heart in the absence of physical
   exertion (e.g., sense of heart rate increase, heart missing a beat)   0 1 2 3

26 I felt down-hearted and blue                                   0 1 2 3

27 I found that I was very irritable                              0 1 2 3

28 I felt I was close to panic                                    0 1 2 3

29 I found it hard to calm down after something upset me          0 1 2 3

30 I feared that I would be "thrown" by some trivial but unfamiliar task   0 1 2 3

31 I was unable to become enthusiastic about anything            0 1 2 3

32 I found it difficult to tolerate interruptions to what I was doing   0 1 2 3

33 I was in a state of nervous tension                            0 1 2 3

34 I felt I was pretty worthless                                  0 1 2 3

35 I was intolerant of doing anything that kept me from getting on with
   what I was doing                                               0 1 2 3

36 I felt terrified                                               0 1 2 3

37 I could see nothing in the future to be hopeful about          0 1 2 3

| | | |
|---|---|---|
| 38 | I felt that life was meaningless | 0  1  2  3 |
| 39 | I found myself getting agitated | 0  1  2  3 |
| 40 | I was worried about situations in which I might panic and make a fool of myself | 0  1  2  3 |
| 41 | I experienced trembling (e.g., in the hands) | 0  1  2  3 |
| 42 | I found it difficult to work up the initiative to do things | 0  1  2  3 |

## The Life Experiences Survey (Sarason, Johnson, & Siegel, 1978)

**Listed below are a number of events which sometimes bring about change in the lives of those who experience them and which necessitate social readjustment. Please check those events which you have experienced in the past year. Be sure that all check marks are directly across from the items they correspond to.**

**Also, for each item checked below, please indicate the extent to which you viewed the event as having either a positive or negative impact on your life at the time the event occurred. That is, indicate the type and extent of impact that the event had. A rating of -3 would indicate an extremely negative impact. A rating of 0 suggests no impact either positive or negative. A rating of +3 would indicate an extremely positive impact.**

| Event | Yes | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
|---|---|---|---|---|---|---|---|---|
| 1.Marriage | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 2. Detention in jail or comparable institution | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 3. Death of a spouse/partner | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 4. Major change in sleeping habits (much more or much less sleep) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 5. Death of a close family member | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| a. mother | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| b. father | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| c. brother | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| d. sister | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| e. child | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| f. grandmother | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| g. grandfather | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| h. other (specify)_____ | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 6. Major change in eating habits (much more or much less food intake) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 7. Foreclosure on a mortgage or loan | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 8. Death of a close friend | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 9. Outstanding personal achievement | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 10. Minor law violation (i.e., traffic tickets, disturbing the peace, etc) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 11. *Male:* wife/girlfriend's pregnancy | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 12. *Female:* Pregnancy | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 13. Changed work situation (different work responsibility, major change in working conditions, working hours, etc.) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 14. New job | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 15. Serious illness or injury of close family member: | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| a. father | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |

| | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
|---|---|---|---|---|---|---|---|---|
| b. mother | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| c. sister | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| d. brother | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| e. grandfather | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| f. grandmother | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| g. spouse | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| h. other (specify)_____ | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 16. Sexual difficulties | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 17. Trouble with employer (in danger of losing job, being suspended, demoted, etc.) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 18. Trouble with in-laws | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 19. Major change in financial status (a lot better off or a lot worse off) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 20. Major change in closeness of family members (increased or decreased closeness) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 21. Gaining a new family member (through birth, adoption, family member moving in, etc.) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 22. Change of residence | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 23. Marital separation from mate (due to conflict) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 24. Major change in church activities | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 25. Marital reconciliation with mate | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 26. Major change in number of arguments with spouse (a lot more or a lot less arguments) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 27. *Married male:* Change in wife's work outside the home (beginning work, ceasing work, changing to a new job, etc.) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 28. *Married female:* Change in husband's work (loss of job, beginning new job, retirement, etc.) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 29. Major change in usual type and/or amount of recreation | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 30. Borrowing more than 10,000 (buying home, business, etc.) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 31. Borrowing less than 10,000 (buying car, TV, getting school loan, etc.) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 32. Being fired from job | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 33. *Male:* Wife/girlfriend having abortion | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 34. *Female:* Having abortion | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 35. Major personal illness or injury | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| 36. Major change in social activities, e.g. , parties, movies, visiting (increased or decreased participation) | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |

| | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
|---|---|---|---|---|---|---|---|---|
| **37. Major change in living conditions of family (building new home, remodeling, deterioration of home, neighborhood, etc.)** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **38. Divorce** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **39. Serious injury or illness of close friend** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **40. Retirement from work** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **41. Son or daughter leaving home (due to marriage, college, etc.)** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **42. Ending of formal schooling** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **43. Separation from spouse (due to work, travel, etc.)** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **44. Engagement** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **45. Breaking up with boyfriend/girlfriend** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **46. Leaving home for the first time** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **47. Reconciliation with boyfriend/girlfriend** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| *Other recent experiences which have had an impact on your life. List and rate.* | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **48. _____** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **49._____** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **50._____** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **51. Beginning a new school experience at a higher academic level (college, graduate school, professional school, etc.)** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **52. Changing to a new school at same academic level (undergraduate, graduate, etc.)** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **53. Academic probation** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **54. Being dismissed from dormitory or other residence** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **55. Failing an important exam** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **56. Changing a major** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **57. Failing a course** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **58. Dropping a course** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **59. Joining a fraternity/sorority** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |
| **60. Financial problems concerning school (in danger of not having sufficient money to continue)** | | -3 | -2 | -1 | 0 | +1 | +2 | +3 |

**Appendix C -  Psychology 100 Study**


**INFORMATION SHEET FOR PARTICIPANTS**


This study is being conducted by Sandy Alexander under the supervision of Dr. Brian Butler and is sponsored by the Queen's Department of Psychology.

This study is being conducted to examine relationships between people's moods and their scores on an ADHD (attention deficit hyperactivity disorder) self-report measure.  You will be asked to fill out a questionnaire package that asks you about stress, anxiety, depression, and ADHD symptoms.  The estimated time for completion of the questionnaires is approximately 30 minutes.  There are no right or wrong answers to any questions in the study.  We simply ask that you respond frankly.  **Please answer EVERY question.  But please do NOT fill in your name or birth date on any of the Questionnaires.**

All data from this study will be completely anonymous and confidential.  **PLEASE DO NOT WRITE OR PLACE YOUR NAME ANYWHERE ON THE QUESTION BOOKLET.**
There are no known physical, psychological, economic, or social risks associated with this study.  Your participation in this study is completely voluntary and you may withdraw from this study at any time prior to submission of the survey without any reason or consequences.  Once data is submitted it will not be possible to identify any individual's data, as there will be no identifying characteristics.

The only information we will have about you is your answers to the questionnaire.  There will be no identifying items such as your name or birth date collected.  Your confidentiality is guaranteed and your answers will not be connected to your name in any publication.

At the end of the study you will be given a debriefing sheet explaining in more detail the purpose of the study, some key references, and helpful information.

Your participation is greatly appreciated.  If you would like further information about the study, or have additional questions or concerns, please contact Sandy Alexander (4sja@qlink.queensu.ca), Brian Butler (533-6002), or the Head of the Department of Psychology at Queen's University (533-2492), or the Chair of the Queen's University General Research Ethics Board.

In exchange for your participation, your name will be entered into a draw for a single prize of $100. Please be sure to fill out the attached ballot to enter you into this draw.  I will be contacting the winner at the end of the study.

**PARTICIPANT CONSENT FORM**

I, _____(Please print name), have read the letter of information for this study.

I understand that I will be participating in the study, "cognitive responses to stress, depression and anxiety and their relationship to ADHD symptoms".  I have been informed that my involvement consists of filling out a number of questionnaires that will take approximately 30 minutes to complete.

I am aware that I may contact Sandy Alexander (4sja@qlink.queensu.ca), Dr. Brian Butler, or the Head of the Department of Psychology, Queen's University (533-2492) or the Queen's General Research Ethics Board, c/o Queen's University Research Services (533-6081) with any question or concerns.

I understand that participation is voluntary and that I can withdraw from the study without reason or consequence.

I understand that any information I provide will remain confidential and that my name will not be indicated anywhere on the question booklet.


_____          _____
Signature                                                      Date

Age: _____ years and _____ months old.

Gender: (circle one) **Male** **Female**

What year are you currently in (circle one): **1** **2** **3** **4** **Other**

Have you ever been diagnosed with ADHD (Attention Deficit Hyperactivity Disorder)?

(circle one) **YES** **NO**

If so, what type of ADHD? (check one)

**Inattentive**___ **Hyperactive**____ **Combination**____ **Don't Know**_____

Has anyone ever told you that they suspect you may have ADHD? (circle) **YES** **NO**

If so who?_____

Please rate the following questions from 1 to 10 at the level that they have been for you recently:

1. What has been your level of stress? (1 is extremely low, 10 is extremely high)

(circle) **1** **2** **3** **4** **5** **6** **7** **8** **9** **10**

2. How well have you been able to cope (1 means very poorly, 10 means very well)?

(circle) **1** **2** **3** **4** **5** **6** **7** **8** **9** **10**

3. How overwhelmed do you feel by the level of stress in your life (1 means easily handled, 10 means extremely overwhelmed)?

(circle) **1** **2** **3** **4** **5** **6** **7** **8** **9** **10**

Please fill out the questionnaires on the following pages. Please make sure you fill out both the **FRONT** and **BACK** of the questionnaires (where appropriate). Please **DO NOT PUT YOUR NAME** or any other identifying information on the questionnaires. Thank you very much.

**DEBRIEFING FORM**: Cognitive responses to stress, depression and anxiety and their relationship to ADHD (attention deficit hyperactivity disorder) symptoms.

Literature reviews have indicated that some symptoms of stress, depression and anxiety are similar to symptoms of ADHD.  The purpose of this study is to identify whether cognitive responses to stress, depression or anxiety can mimic ADHD symptoms in a young adult population to the extent that the person would appear to have ADHD when, in fact, they do not.  This thesis is exploring the possibility that certain variables connected with stress, depression and anxiety can misrepresent as ADHD symptoms.

Potential benefits of this study are that increased knowledge about symptoms may aid in developing appropriate ADHD self-report measures.  Increased knowledge about how other conditions may have similar or shared symptoms with ADHD may aid in proper diagnosis of ADHD and other conditions.

Due to the anonymous nature of data storage and analysis, once data is submitted it will not be possible to identify any individual's data.  Therefore, there is no way of evaluating and reporting your specific results back to you.  The only information we will have about you is your answers to the questionnaire.  There will be no identifying items such as your name or birth date collected and your ballot for the draw will be collected in a separate box. Your confidentiality is guaranteed and your answers will not be connected to your name in any publication.

**PLEASE DO NOT DISCUSS THIS STUDY WITH OTHER STUDENTS WHO MAY WISH TO PARTICIPATE.**

Your participation is greatly appreciated.  In the event that you have any concerns or questions about this research, please feel free to contact Dr. Brian Butler (533-6002).  If you feel your concerns have not been adequately met, you may contact the Head of the Department of Psychology, Queen's University (533-2492) or the Queen's University General Research Ethics Board, c/o Queen's University Research Services (533-6081).

If you are interested in this area of research, you may wish to read the following references:
> Gordon, M. and Barkley, R. (1999).  Is all inattention ADD/ADHD?  The ADHD Report, 7, 1-8.

> Harrison, A. (2004).  An investigation of reported symptoms of ADHD in a university population.  The ADHD Report, 12, 8-11.

If you are concerned about your own symptoms or think you may have Attention Deficit Hyperactivity disorder, or if you feel you need to talk to anyone regarding any psychological discomfort that has arisen from filling out these questionnaires you may contact Queen's Counseling Service at 533-2893.  The Queen's Health, Counseling and Disability Services website address is:  http://www.queensu-hcds.org/

## Appendix D – Health and Counselling Services Study

**INFORMATION/CONSENT SHEET FOR PARTICIPANTS**

This study is being conducted by Sandy Alexander under the supervision of Dr. Brian Butler and Dr. Allyson Harrison and is sponsored by the Queen's Department of Psychology.

This study is being conducted to examine relationships between the people's moods and their scores on an ADHD (attention deficit hyperactivity disorder) self-report measure.  You will be asked to fill out a questionnaire package that asks you about stress, anxiety, depression, and ADHD symptoms.  The estimated time for completion of the questionnaires is approximately 40 minutes.  **Please answer EVERY question.  But please do NOT fill in your name or birth date on the CAARS Self-Report Questionnaire.**

All data from this study will be completely anonymous and confidential.  **PLEASE DO NOT WRITE OR PLACE YOUR NAME ANYWHERE ON THE QUESTION BOOKLET.**
There are no known physical, psychological, economic, or social risks associated with this study.  Your participation in this study is completely voluntary and you may withdraw from this study at any time prior to submission of the survey without any reason or consequences.  Once data is submitted it will not be possible to identify any individual's data, as there will be no identifying characteristics.
The only information we will have about you is your answers to the questionnaire.  There will be no identifying items such as your name or birth date collected.  Your confidentiality is guaranteed and your answers will not be connected to your name in any publication.

Your participation is greatly appreciated.  If you would like further information about the study, or have additional questions or concerns, please contact Sandy Alexander (4sja@qlink.queensu.ca), Brian Butler (533-6002), or the Head of the Department of Psychology at Queen's University (533-2492), or the Chair of the Queen's University General Research Ethics Board.

In exchange for your participation, your name will be entered into a draw for a single prize of $100. Please be sure to fill out the attached ballot to enter you into this draw.  I will be contacting the winner at the end of the study.

I, _____(Please print name), have read the above letter of information for this study.

I understand that participation is voluntary and that I can withdraw from the study without reason or consequence.

I understand that any information I provide will remain confidential and that my name will not be indicated anywhere on the question booklet.


_____        _____
Participants Signature                                Date

Age: _____ years and _____ months old.

Gender: (circle one)        **Male**        **Female**

What year are you currently in (circle one): **1**    **2**    **3**    **4**    **Other**

Which service are you using at HCDS (check one)?
**Health Services**____        **Counseling**___        **Psychiatric Services**_____

Have you ever been diagnosed with ADHD (Attention Deficit Hyperactivity Disorder)?

(circle one)        **YES**        **NO**

If so, what type of ADHD?   (check one)

**Inattentive**___        **Hyperactive**____        **Combination**____        **Don't Know**_____

Has anyone ever told you that they suspect you may have ADHD? (circle) **YES**    **NO**

If so who?_____

Please rate the following questions from 1 to 10 at the level that they have been for you recently:

4. What has been your level of stress? (1 is extremely low, 10 is extremely high)

(circle) **1**    **2**    **3**    **4**    **5**    **6**    **7**    **8**    **9**    **10**

5. How well have you been able to cope (1 means very poorly, 10 means very well)?

(circle) **1**    **2**    **3**    **4**    **5**    **6**    **7**    **8**    **9**    **10**

6. How overwhelmed do you feel by the level of stress in your life (1 means easily handled, 10 means extremely overwhelmed)?

(circle) **1**    **2**    **3**    **4**    **5**    **6**    **7**    **8**    **9**    **10**

Please fill out the questionnaires on the following pages.  Please make sure you fill out both the **FRONT** and **BACK** of the questionnaires (where appropriate).  Please **DO NOT PUT YOUR NAME** or any other identifying information on the questionnaires. Thank you very much.

**DEBRIEFING FORM**: Cognitive responses to stress, depression and anxiety and their relationship to ADHD (attention deficit hyperactivity disorder) symptoms. Part 1.

Literature reviews have indicated that some symptoms of stress, depression and anxiety are similar to symptoms of ADHD. The purpose of this study is to identify whether cognitive responses to stress, depression or anxiety can mimic ADHD symptoms in a young adult population to the extent that the person would appear to have ADHD when, in fact, they do not. This thesis is exploring the possibility that certain variables connected with stress, depression and anxiety can misrepresent as ADHD symptoms.

Potential benefits of this study are that increased knowledge about symptoms may aid in developing appropriate ADHD self-report measures. Increased knowledge about how other conditions may have similar or shared symptoms with ADHD may aid in proper diagnosis of ADHD and other conditions.

**PLEASE DO NOT DISCUSS THIS STUDY WITH OTHER STUDENTS WHO MAY WISH TO PARTICIPATE.**

Your participation is greatly appreciated. In the event that you have any concerns or questions about this research, please feel free to contact Sandy Alexander (4sja@qlink.queensu.ca) or Dr. Brian Butler (533-6002). If you feel your concerns have not been adequately met, you may contact the Head of the Department of Psychology, Queen's University (533-2492) or the Queen's University General Research Ethics Board, c/o Queen's University Research Services (533-6081).

If you are interested in this area of research, you may wish to read the following references:

Gordon, M. and Barkley, R. (1999). Is all inattention ADD/ADHD? The ADHD Report, 7, 1-8.

Harrison, A. (2004). An investigation of reported symptoms of ADHD in a university population. The ADHD Report, 12, 8-11.

If you are concerned about your own symptoms or think you may have Attention Deficit Hyperactivity disorder, or if you feel you need to talk to anyone regarding any psychological discomfort that has arisen from filling out these questionnaires you may contact Queen's Counseling Service at 533-2893. The Queen's Health, Counseling and Disability Services website address is: http://www.queensu-hcds.org/

**Appendix E – Nursing Study**

**INFORMATION SHEET FOR PARTICIPANTS**

My name is Sandy Alexander and I am conducting a study under the supervision of Dr. Brian Butler and Dr. Allyson Harrison, which is sponsored by the Queen's Department of Psychology.

This study is being conducted to examine relationships between people's moods and their scores on an ADHD (attention deficit hyperactivity disorder) self-report measure. You will be asked to fill out a questionnaire package that asks you about stress, anxiety, depression, and ADHD symptoms. The estimated time for completion of the questionnaires is approximately 10 to 15 minutes. There are no right or wrong answers to any questions in the study. We simply ask that you respond honestly. **Please note that by completing the questionnaires and returning them, you are providing your consent to participate in this research study.**

All data from this study will be completely anonymous and confidential. **PLEASE DO NOT WRITE OR PLACE YOUR NAME ANYWHERE ON THE QUESTIONNAIRE BOOKLET.**

There are no known physical, psychological, economic, or social risks associated with this study. Your participation in this study is <u>completely voluntary</u> and you may withdraw from this study at any time prior to submission of the questionnaire without any reason or consequences. Once data is submitted it will not be possible to identify any individual's data, as there will be no identifying characteristics. The only information we will have about you is your answers to the questionnaire. Your confidentiality is guaranteed and your answers will not be connected to your name in any publication.
After you complete the questionnaire there is a debriefing sheet explaining in more detail the purpose of the study, some key references, and helpful information.

**PLEASE DO NOT DISCUSS THIS STUDY WITH OTHER NURSES WHO MAY WISH TO PARTICIPATE.**

 Your participation is greatly appreciated. If you would like further information about the study, or have additional questions or concerns, please contact Sandy Alexander (4sja@qlink.queensu.ca), Lenora Duhn (549-6666 ext. 6761), Dr. Brian Butler (533-6002), or the Head of the Department of Psychology at Queen's University (533-2492), or the Chair of the Queen's University General Research Ethics Board.

In recognition of your participation, your name will be entered into a draw for a single prize of $100. This draw will include participants from all study phases. Please be sure to fill out the attached ballot to enter you into this draw. I will be contacting the winner at the end of the study.

**Once you have finished filling out the forms, please deposit the completed questionnaires into the indicated slot on the locked box labeled Sandy's Study or mail it in the enclosed postage paid envelope.**
**If you wish to be part of the draw for $100, please put your ballot in the locked box labeled Sandy's Study.**

Age:        _____ years

Gender:  (circle one)          **Male**          **Female**

How many years have you been nursing?_____

Which area of nursing do you work in? _____

How long have you worked in this particular area? _____

Do you work part-time or full-time? (circle)      PART-TIME          FULL-TIME

   If part-time, do you have another job? (circle)          YES      NO

Have you ever been diagnosed with ADHD (Attention Deficit Hyperactivity Disorder)?

   (circle one)          **YES**          **NO**

   If yes, what type of ADHD?   (check one)

**Inattentive**___          **Hyperactive**____          **Combination**____          **Don't Know**_____

Has anyone ever told you that they suspect you may have ADHD? (circle)  **YES**      **NO**

   If "yes", who (do not write the name; write their role e.g. "mother")?_____

Please rate the following questions from 1 to 10 at the level that they have been for you recently:
   1.   What has been your level of stress in general? (1 is extremely low, 10 is extremely high)

   (circle)  **1**          **2**          **3**          **4**          **5**          **6**          **7**          **8**          **9**          **10**

   2.  How well have you been able to cope with stress in general?(1 is very poorly, 10 is very well)

   (circle)  **1**          **2**          **3**          **4**          **5**          **6**          **7**          **8**          **9**          **10**

   3.  What has been your level of job stress?  (1 is extremely low, 10 is extremely high)

   (circle)  **1**          **2**          **3**          **4**          **5**          **6**          **7**          **8**          **9**          **10**

   4.  How well have you been able to cope with job stress? (1 is very poorly, 10 is very well)

   (circle)  **1**          **2**          **3**          **4**          **5**          **6**          **7**          **8**          **9**          **10**

5.  How overwhelmed do you feel by the level of stress in your life? (1 is not overwhelmed at all, 10 is extremely overwhelmed)

(circle)  **1**          **2**      **3**      **4**      **5**      **6**      **7**      **8**      **9**      **10**

6.  How many children do you have? (if 0 then skip to question 8) _____

7.  Are you their primary caregiver?  (circle)          YES          NO

8.  a) Do you have aging parents? (circle)          YES          NO

   b) Are you their primary caregiver? (circle)          YES          NO

9.  Are you a single parent? (circle)          YES          NO

10. In the blank space below, please briefly tell us what you think has contributed to your level of job and/or life stress?




Please list below **ALL** the roles you fulfill (e.g. nurse, parent, spouse, sibling, friend, volunteer, etc.).  Next to each role rate your satisfaction with that role from 1 to 10 (**with 1 being very low satisfaction and 10 being very high satisfaction**) and rate the level of stress that the role causes you (**with 1 being very low stress and 10 being very high stress**).  If there is not enough room on this page you may list additional roles on the back of this page.

| **ROLE** | **SATISFACTION**<br>1 is very low<br>10 is very high | **STRESS**<br>1 is very low<br>10 is very high |
|---|---|---|
| *Example: pet owner* | *7* | *3* |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

Please fill out the questionnaire on the following pages.

***THANK YOU VERY MUCH!***

## Cognitive responses to stress, depression and anxiety and their relationship to ADHD (attention deficit hyperactivity disorder) symptoms

**DEBRIEFING FORM**: Please read this sheet **after** you have completed the questionnaire.  You may keep this form if you wish.

Literature reviews have indicated that some symptoms of stress, depression and anxiety are similar to symptoms of ADHD.   The purpose of this study is to identify whether cognitive responses to stress, depression or anxiety can mimic ADHD symptoms in a nursing population to the extent that the person would appear to have ADHD when, in fact, they do not.  This thesis is exploring the possibility that certain variables connected with stress, depression and anxiety can misrepresent as ADHD symptoms.

Potential benefits of this study are identifying the level of stress that nurse's experience and how this affects cognition.  Other benefits are that increased knowledge about symptoms may aid in developing appropriate ADHD self-report measures.  Increased knowledge about how other conditions may have similar or shared symptoms with ADHD could aid in proper diagnosis of ADHD and other conditions.

Your ballot for the draw will not be associated with any of your responses and your data will be stored anonymously.   Due to the anonymous nature of data storage and analysis, we are unable to report specific results to individual participants.

**PLEASE DO NOT DISCUSS THIS STUDY WITH OTHER NURSES WHO MAY WISH TO PARTICIPATE.**

Your participation is greatly appreciated.  In the event that you have any concerns or questions about this research, please feel free to contact Sandy Alexander (4sja@qlink.queensu.ca), Lenora Duhn (549-6666 ext. 6761), or Dr. Brian Butler (533-6002).  If you feel your concerns have not been adequately met, you may contact the Head of the Department of Psychology, Queen's University (533-2492) or the Queen's University General Research Ethics Board, c/o Queen's University Research Services (533-6081).

If you are interested in this area of research, you may wish to read the following references:

Gordon, M. and Barkley, R. (1999).  Is all inattention ADD/ADHD?  The ADHD Report, 7, 1-8.

Harrison, A. (2004).  An investigation of reported symptoms of ADHD in a university population.  The ADHD Report, 12, 8-11.

If you are concerned about your own symptoms or think you may have Attention Deficit Hyperactivity disorder, or if you feel you need to talk to someone regarding any psychological discomfort that has arisen from filling out this questionnaire we encourage you to contact your Employee Assistance Program at 1-800-387-4765 for assistance.

**Appendix F**

**Instructions to Raters – Psychologists**

Please read the following questionnaires and indicate which items on the DASS questionnaire you think are asking fundamentally the SAME question as an item on the CAARS questionnaire.  We would like to keep questions that are similar but that are looking at different facets of a construct, but we would also like to eliminate questions that are asking the SAME thing.

If you think there are two questions that are so similar that they are basically the same, please indicate which ones by writing the numbers down at the bottom of this page.  Thank you for your help.

**Instructions to Raters - Laypersons**

**Please read each of the following items and the choices below them and indicate which choices you think are asking fundamentally the SAME question as the item.  We would like to keep items that are similar but that are looking at different facets of a construct, but we would also like to eliminate items that are asking the SAME thing.**

**Please compare the choices to the item above them and rate the choices on a scale of 0 to 3.  If you think the choice is different from the item rate it a 0, if you think the item is similar but not quite the same rate it 1 or 2 depending on how similar you think it is, if you think the choice is so similar to the item that they are basically the same, rate it a 3.   Just write the number after the "choice" sentence.  Thank you for your help.**

**Appendix G:  Means, SD's, and Evaluation of Skew and Kurtosis for all groups.**

*Means, Standard Deviations, and Evaluation of Univariate Skew and Kurtosis for Continuous Independent Variables and Dependent Variables with Psychology 100 Students (n = 82 unless otherwise specified)*

| Variable | Mean | *SD* | Skew/*SE* Skew | Kurtosis/*SE* Kurtosis |
|---|---|---|---|---|
| CAARS | 68.97 | 28.54 | 1.35 | 0.16 |
| Inattention | 13.53 | 6.53 | 2.09 | -0.51 |
| Hyperactivity (Square Root Transformation) | 13.56 | 6.49 | 3.08 (0.96) | 0.47 (-0.30) |
| Impulsivity | 10.86 | 5.83 | 2.55 | 0.70 |
| Self-concept | 6.73 | 4.25 | 2.14 | -0.52 |
| DSM IV Inattentive | 9.58 | 5.11 | 1.15 | -0.56 |
| DSM IV Hyperactive | 8.28 | 4.79 | 2.19 | -0.74 |
| DSM IV ADHD Symptoms | 17.85 | 8.79 | 1.58 | -0.09 |
| ADHD Index | 12.07 | 5.62 | 1.76 | 0.76 |
| DASS (SRT) | 25.56 | 17.75 | 5.22 (1.30) | 4.09 (0.75) |
| DASS[a] (SRT) | 23.14 | 16.19 | 5.30 (1.48) | 4.19 (0.71) |
| Depression (SRT) | 7.71 | 7.21 | 7.09 (2.44) | 8.59 (1.12) |
| Anxiety (SRT) | 6.37 | 5.39 | 3.75 (0.91) | 0.97 (-1.37) |

[a]Overlapping items removed

Table 2.3 (continued)

| Variable | Mean | *SD* | Skew/*SE* Skew | Kurtosis/*SE* Kurtosis |
|---|---|---|---|---|
| Stress (SRT) | 11.48 | 7.89 | 4.42 (0.96) | 2.80 (0.06) |
| Stress[a] (SRT) | 9.06 | 6.13 | 4.72 (1.36) | 3.44 (0.30) |
| Stress Level | 6.52 | 1.75 | -1.75 | -1.10 |
| Coping | 6.56 | 1.95 | -1.81 | -0.48 |
| Overwhelm | 5.29 | 2.06 | 0.47 | -1.34 |
| Negative Life Events (SRT) | -10.32 | 8.84 | -6.23 (1.62) | 6.96 (0.57) |

*Note*. Square Root Transformation used:  $Y' = SQRT(Y + .5)$

For the negative life events, score was multiplied by negative one and then given a square root transformation.

[a]Overlapping items removed

*HCS Group:  Means, Standard Deviations, and Evaluation of Univariate Skew and Kurtosis for Continuous Independent Variables and Dependent Variables (n = 98 unless otherwise specified)*

| Variable | Mean | SD | Skew/SE Skew | Kurtosis/SE Kurtosis |
|---|---|---|---|---|
| BADDS (*n* = 51) | 37.97 | 24.58 | 2.82 | -0.01 |
| Inattention (SRT) | 11.31 | 7.49 | 3.90 (0.70) | 0.86 (-0.38) |
| Hyperactivity | 12.41 | 6.36 | 1.83 | -1.16 |
| Impulsivity (SRT) | 9.17 | 6.16 | 4.28 (1.34) | 2.39 (-0.86) |
| Self-concept | 6.86 | 4.49 | 2.02 | -0.92 |
| DSM-IV Inattentive (SRT) | 7.86 | 5.65 | 4.05 (0.89) | 1.28 (-0.83) |
| DSM-IV Hyperactive | 7.63 | 4.76 | 2.38 | -0.89 |
| DSM-IV ADHD Symptoms | 15.49 | 9.38 | 3.08 | -0.03 |
| ADHD index | 10.46 | 5.99 | 2.57 | -0.32 |
| DASS (SRT) | 28.23 | 24.14 | 4.92 (1.75) | 1.72 (-1.00) |

Table 3.3 (continued)

| Variable | Mean | *SD* | Skew/*SE* Skew | Kurtosis/*SE* Kurtosis |
|---|---|---|---|---|
| DASS[a] (SRT) | 25.93 | 22.20 | 4.99 (1.82) | 1.79 (-0.95) |
| Depression (SRT) | 8.28 | 9.47 | 6.82 (2.65) | 5.41 (-0.44) |
| Anxiety (SRT) | 7.97 | 8.32 | 6.42 (2.77) | 4.51 (-0.31) |
| Stress (SRT) | 11.97 | 9.49 | 3.84 (0.57) | 0.33 (-1.29) |
| Stress[a] (SRT) | 9.67 | 7.38 | 3.64 (0.49) | 0.46 (-1.23) |

*Note*. Square Root Transformation (SRT) used:  Y' =  SQRT (Y + .5)
[a]Overlapping items removed

*Means, Standard Deviations, and Evaluation of Univariate Skew and Kurtosis for Continuous Independent Variables and Dependent Variables with Nursing Data (N = 107 unless otherwise specified)*

| Variable | Mean | SD | Skew/SE Skew | Kurtosis/SE Kurtosis |
|---|---|---|---|---|
| Inattention (Square Root Transformation) | 7.74 | 5.28 | 4.48 (-0.25) | 3.62 (0.34) |
| Hyperactivity ($n = 106$) (SRT) | 10.30 | 6.10 | 3.58 (0.80) | 1.18 (-0.94) |
| Impulsivity | 8.60 | 5.11 | 2.70 | 0.50 |
| Self-Concept (SRT) | 5.61 | 4.27 | 5.07 (1.72) | 2.11 (-0.36) |
| DSM-IV Inattentive (SRT) | 5.50 | 4.20 | 4.78 (0.61) | 4.96 (-0.25) |
| DSM-IV Hyperactive (SRT) | 6.45 | 4.39 | 3.82 (0.48) | 1.39 (-0.82) |
| DSM-IV ADHD Symptoms (SRT) | 11.95 | 7.95 | 4.62 (0.75) | 3.66 (-0.30) |
| ADHD Index (SRT) | 8.02 | 5.22 | 3.56 (-0.02) | 1.18 (-0.48) |
| DASS (Log Transformation) | 20.02 | 22.25 | 8.38 (-1.63) | 8.52 (0.21) |
| DASS[a] (LT) | 18.05 | 20.49 | 8.53 (-1.20) | 8.67 (0.16) |
| Depression (LT) | 5.77 | 9.03 | 9.02 (2.45) | 7.98 (1.56) |
| Anxiety (LT) | 4.45 | 6.65 | 11.17 (1.91) | 17.95 (1.81) |
| Stress (SRT) | 9.79 | 8.54 | 6.14 (1.84) | 4.39 (-0.11) |

| | | | | |
|---|---|---|---|---|
| Stress[a] | 7.82 | 6.59 | 8.53 | 8.67 |
| (SRT) | | | (1.79) | (-0.10) |

*Note*. SRT = Square Root Transformation used: Y'= SQRT (Y + .5).
LT = Log Transformation: Y'= LN (Y + 1)
[a]Overlapping items removed

**Appendix H – Multiple Regressions**

**Multiple Regressions for Introductory Psychology Students**

*Summary of Simultaneous Multiple Regression for Main Independent Variables Associations With CAARS DSM-IV Inattentive Symptoms (n = 82)*

| Variable | B | SE B | Beta | t | Sig. |
|----------|-----|------|------|------|--------|
| Depression | .12 | .08 | .17 | 1.49 | .140 |
| Anxiety | .56 | .13 | .59 | 4.41 | < .001 |
| Stress[a] | -.16 | .12 | -.14 | -.97 | .337 |

$R^2$ adjusted = .34
*Note*. The negative beta may be due to multicollinearity.
[a]Overlapping items removed

*Summary of Linear Regression for DASS Association With CAARS DSM-IV Inattentive Symptoms (n = 82)*

| | B | SE B | Beta | t | Sig. |
|--------|-----|------|------|------|--------|
| DASS[a] | .17 | .03 | .53 | 5.56 | < .001 |

$R^2$ adjusted = .27
[a]Overlapping items removed

*Summary of Simultaneous Multiple Regression for Main Independent Variables Associations With CAARS DSM-IV ADHD Symptoms Total (n = 82)*

| Variable | B | SE B | Beta | t | Sig. |
|---|---|---|---|---|---|
| Depression | .01 | .15 | .01 | .07 | .944 |
| Anxiety | .80 | .23 | .49 | 3.47 | .001 |
| Stress[a] | .07 | .22 | .05 | .33 | .744 |

$R^2$ adjusted = .26
[a]Overlapping items removed

*Summary of Linear Regression for DASS Association With CAARS DSM-IV ADHD Symptoms Total (n = 82)*

|  | B | SE B | Beta | t | Sig. |
|---|---|---|---|---|---|
| DASS[a] | .26 | .05 | .47 | 4.76 | <.001 |

$R^2$ adjusted = .21
[a]Overlapping items removed

*Summary of Simultaneous Multiple Regression for Main Independent Variables Associations With CAARS Inattention/Memory Problems (n = 82)*

| Variable | *B* | *SE B* | Beta | *t* | Sig. |
|---|---|---|---|---|---|
| Depression | .06 | .11 | .07 | .57 | .568 |
| Anxiety | .78 | .17 | .64 | 4.50 | < .001 |
| Stress[a] | -.24 | .16 | -.23 | -1.51 | .136 |

$R^2$ adjusted = .26
*Note*. The negative beta may be due to multicollinearity.
[a]Overlapping items removed

*Summary of Linear Regression for DASS Association With CAARS Inattention/Memory Problems (n = 82)*

| | *B* | *SE B* | Beta | *t* | Sig. |
|---|---|---|---|---|---|
| DASS[a] | .16 | .04 | .40 | 3.93 | < .001 |

$R^2$ adjusted = .15
[a]Overlapping items removed

*Summary of Sequential Multiple Regression on ADHD Index for Independent Variables (Model 1: Depression, Anxiety, and Stress) and Ancillary Variables (Model 2: Stress Level, Coping, Feeling Overwhelmed, and Negative Life Events) (n = 82)*

| Variable | $R$ | $R^2$ | Adjusted $R^2$ | $R^2$ Change | $F$ Change | Sig. $F$ Change |
|---|---|---|---|---|---|---|
| Model 1 | .58 | .34 | .31 | .34 | 13.11 | < .001 |
| Model 2 | .68 | .46 | .41 | .13 | 4.35 | .003 |

*Summary of Sequential Multiple Regression on DSM-IV Inattentive Symptoms for Independent Variables (Model 1: Depression, Anxiety, and Stress) and Ancillary Variables (Model 2: Stress Level, Coping, Feeling Overwhelmed, and Negative Life Events) (n = 82)*

| Variable | $R$ | $R^2$ | Adjusted $R^2$ | $R^2$ Change | $F$ Change | Sig. $F$ Change |
|---|---|---|---|---|---|---|
| Model 1 | .60 | .36 | .34 | .36 | 14.80 | < .001 |
| Model 2 | .69 | .48 | .43 | .11 | 3.99 | .006 |

*Summary of Sequential Multiple Regression on DSM-IV ADHD Symptoms Total for Independent Variables (Model 1: Depression, Anxiety, and Stress) and Ancillary Variables (Model 2: Stress Level, Coping, Feeling Overwhelmed, and Negative Life Events) (n = 82)*

| Variable | $R$ | $R^2$ | Adjusted $R^2$ | $R^2$ Change | $F$ Change | Sig. $F$ Change |
|---|---|---|---|---|---|---|
| Model 1 | .54 | .29 | .26 | .29 | 10.44 | < .001 |
| Model 2 | .64 | .41 | .41 | .13 | 3.98 | .006 |

**Multiple Regressions for Health and Counselling Services Students**

*Summary of Simultaneous Multiple Regression for Main Independent Variables Associations With CAARS Inattention/Memory Problems (n = 98)*

| Variable | *B* | *SE B* | Beta | *t* | Sig. |
|---|---|---|---|---|---|
| Depression | .26 | .09 | .33 | 2.96 | .004 |
| Anxiety | .07 | .13 | .08 | .51 | .610 |
| Stress[a] | .23 | .15 | .23 | 1.48 | .141 |

$R^2$ adjusted = .29
[a]Overlapping items removed.

*Summary of Linear Regression for DASS Association With CAARS Inattention/Memory Problems (n = 98)*

| | *B* | *SE B* | Beta | *t* | Sig. |
|---|---|---|---|---|---|
| DASS[a] | .19 | .03 | .55 | 6.49 | < .001 |

$R^2$ adjusted = .30
[a]Overlapping items removed

*Summary of Simultaneous Multiple Regression for Main Independent Variables Associations With CAARS Problems With Self-Concept (n = 98)*

| Variable | $B$ | $SE\ B$ | Beta | $t$ | Sig. |
|---|---|---|---|---|---|
| Depression | .30 | .05 | .64 | 6.71 | < .001 |
| Anxiety | -.02 | .07 | -.04 | -.34 | .735 |
| Stress[a] | .09 | .08 | .14 | 1.11 | .271 |

$R^2$ adjusted = .48
*Note.* The negative beta may be due to multicollinearity.
[a]Overlapping items removed

*Summary of Linear Regression for DASS Association With CAARS Problems With Self-Concept (n = 98)*

| | $B$ | $SE\ B$ | Beta | $t$ | Sig. |
|---|---|---|---|---|---|
| DASS[a] | .13 | .02 | .64 | 8.08 | < .001 |

$R^2$ adjusted = .40
[a]Overlapping items removed

*Summary of Simultaneous Multiple Regression for Main Independent Variables Associations With CAARS DSM-IV Inattentive Symptoms (n = 98)*

| Variable | B | SE B | Beta | t | Sig. |
|----------|-----|------|------|------|------|
| Depression | .12 | .07 | .21 | 1.85 | .068 |
| Anxiety | .04 | .10 | .06 | .38 | .703 |
| Stress[a] | .27 | .12 | .36 | 2.35 | .021 |

$R^2$ adjusted = .29
[a]Overlapping items removed

*Summary of Linear Regression for DASS Association With CAARS DSM-IV Inattentive Symptoms (n = 98)*

|  | B | SE B | Beta | t | Sig. |
|----------|-----|------|------|------|------|
| DASS[a] | .14 | .02 | .55 | 6.43 | < .001 |

$R^2$ adjusted = .29
[a]Overlapping items removed

*Summary of Simultaneous Multiple Regression for Main Independent Variables Associations With CAARS DSM-IV ADHD Symptoms Total (n = 98)*

| Variable | B | SE B | Beta | t | Sig. |
|---|---|---|---|---|---|
| Depression | .07 | .11 | .07 | .59 | .557 |
| Anxiety | -.01 | .17 | -.004 | -.03 | .978 |
| Stress[a] | .61 | .20 | .480 | 3.07 | .003 |

$R^2$ adjusted = .25
*Note*. The negative beta may be due to multicollinearity.
[a]Overlapping items removed

*Summary of Linear Regression for DASS Association With CAARS DSM-IV ADHD Symptoms Total (n = 98)*

| | B | SE B | Beta | t | Sig. |
|---|---|---|---|---|---|
| DASS[a] | .21 | .04 | .49 | 5.45 | < .001 |

$R^2$ adjusted = .23
[a]Overlapping items removed

**Multiple Regressions for Nurses**

*Summary of Simultaneous Multiple Regression for Main Independent Variables Associations With CAARS Problems With Self-Concept (N = 107)*

| Variable | *B* | *SE B* | Beta | *t* | Sig. |
|---|---|---|---|---|---|
| Depression | .25 | .06 | .54 | 4.60 | < .001 |
| Anxiety | .09 | .08 | .15 | 1.24 | .217 |
| Stress[a] | .08 | .07 | .12 | 1.19 | .239 |

Adjusted $R^2$ = .56
*Note.* With transformed variables anxiety also achieves significance.
[a]Overlapping items removed.

*Summary of Linear Regression for DASS Association With CAARS Problems With Self-Concept (N = 107)*

| | *B* | *SE B* | Beta | *t* | Sig. |
|---|---|---|---|---|---|
| DASS[a] | .16 | .01 | .75 | 11.54 | < .001 |

$R^2$ adjusted = .56
[a]Overlapping items removed

*Summary of Simultaneous Multiple Regression for Main Independent Variables Associations With CAARS DSM-IV Inattentive Symptoms (N = 107)*

| Variable | *B* | *SE B* | Beta | *t* | Sig. |
|---|---|---|---|---|---|
| Depression | .08 | .06 | .17 | 1.37 | .173 |
| Anxiety | .17 | .08 | .27 | 2.17 | .033 |
| Stress[a] | .22 | .07 | .34 | 3.08 | .003 |

Adjusted $R^2$ = .50
*Note*. With transformations stress remains the most significant variable, however, depression becomes significant ($p$ = .047) and anxiety becomes n.s.
[a]Overlapping items removed.


*Summary of Linear Regression for DASS Association With CAARS DSM-IV Inattentive Symptoms (N = 107)*

| | *B* | *SE B* | Beta | *t* | Sig. |
|---|---|---|---|---|---|
| DASS[a] | .15 | .01 | .71 | 10.39 | < .001 |

$R^2$ adjusted = .50
[a]Overlapping items removed