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Test Anxiety Measurement Among Adolescents: Multi-Informant Anxiety Assessment and School-Based Stress

by

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ABSTRACT

This study set out to determine whether the four-factor construct of Test Anxiety (TA), derived from student self-ratings, could be applied in a multi-informant assessment system, including students, parents and teachers. A sample of Canadian adolescent junior and senior high students served as participants, thereby testing the four-factor model on a new group of students. Confirmatory Factor Analyses demonstrated adequate fit for the four-factor model across all informants with a reduced item version of the German Test Anxiety Inventory (TAI-G). Demographic variables associated with sex, age, grade, and significantly elevated TA were subsequently analyzed, supporting previously established demographic patterns within the four-factor model of TA. This study also set out to investigate the relationships between school-based stress and TA. Subsequent correlational and multiple regression analyses demonstrated consistent relationships between general school stress and TA, thereby supporting the utility of the Transactional Model of Stress and Coping as a general framework for understanding TA. Furthermore, these findings help identify important school stress variables that contribute to the development of TA, thereby providing direction toward the development of appropriate and efficacious intervention.

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DEDICATION

This project is dedicated to my parents, Brian and Millie Harpell, and my grandfather, Victor Harpell. Through countless stories, teachings, and modelling, they have imparted me with the important virtues of tenacity and courage which have been essential to attaining academic, personal, family and career-related successes.

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Test Anxiety and School Stress

Test Anxiety (TA) impacts over 30% (Hill, 1984; Nottelmann & Hill, 1977; Shaked, 1996) of school-aged children and adolescents. Moreover, data associated with TA prevalence indicates that the rate of TA among school-aged children is substantially higher now than indicated by early studies. Kondas (1967) reported a test anxiety prevalence rate of 10%, whereas more recent studies suggested a prevalence rate of 25% to over 30% among school-aged samples (Hill, 1984; Methia, 2004). Studies exploring TA among specific demographic groups suggest that the prevalence rate for minority (Turner, Beidel, Hughies, & Turner, 1993) and learning disabled students (Lufi, Okasha, & Cohen, 2004) might even exceed 40%. TA has been linked with avoidance motivation and generally low motivation (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986; Swanson & Howell, 1996), maladaptive self-evaluation and poor concentration (Swanson & Howell, 1996), maladaptive attributions associated with learned helplessness (Cassady, 2004), and maladaptive emotional coping (Folkman et al., 1986; Rohrle, Linkenheil, & Graf, 1990). High levels of TA are also linked with poor academic performance (Bedell & Marlowe, 1995; King, Ollendick, & Prins, 2000), grade retention (Beidel & Turner, 1988; Hembree, 1988), and leaving school prior to graduation (Tobias, 1979). A meta-analysis combining the results of 562 TA studies reported an inverse relationship between TA and student self-esteem, whereas direct associations were supported for TA and fears of negative evaluation, defensiveness, and general anxious symptomatology (Hembree, 1988). Furthermore, there is a well established inverse

relationship between significantly high levels of TA and student testing performance (Hancock, 2001; Hembree, 1988; Everson, Millsap, & Rodriguez, 1991). Considering the many problems associated with TA, understanding the precipitating factors underlying this condition and developing effective assessment and identification procedures should direct research in this field.

Currently, a four-factor model represents the construct of TA: Worry (i.e., fear of failure), Emotionality (i.e., physiological symptoms), Cognitive Interference (i.e., intrusive thoughts that interfere with concentration), and Lack of Confidence (i.e., low self-efficacy for testing; Hodapp, 1991). These factors have been derived through factor analyses of TA scales such as the German Test Anxiety Index (TAI-G; Hodapp, 1991). Research indicates that rising prevalence rates of TA correspond to greater general pressures experienced by students in the last two decades (Kruger, Wandle, & Struzziero, 2007). For example, one significant contributor to TA appears to be ongoing educational reform initiatives (Kruger et al., 2007). In the United States, this is mainly represented by the federal initiative known as the *No Child Left Behind Act* (NCLBA, 2001). One component of this act mandates regular standardized achievement testing in order to hold schools accountable for fostering consistent annual gains in academic achievement among children. This form of assessment is referred to as *high stakes testing* because students, as well as teachers, face possible sanctions (e.g., retention for students, job loss, or mandated supervision for teachers) for failure to meet performance expectations. Other aspects of the NCLBA (2001) include higher emphasis on academic learning, as opposed to non-academic learning, and meeting greater academic achievement standards.

Similar initiatives exist in Canada, where the decision to administer standardized tests falls within the domain of the individual provinces and territories. Currently, only the territories of Nunavut and the Northwest Territories choose not to administer any standardized assessments (Cornell, 2008). The Yukon territory, as well as the provinces of Alberta, Ontario, Nova Scotia, Prince Edward Island, and Newfoundland administer annual standardized assessments for Grades 3, 6, and 9. Although there is variation with regard to whether math, language arts, or both are administered at each of these grade levels, the assessments are designed to measure acquired skills in these subjects among students as a group, but also to provide feedback with regard to individual academic skills acquisition. Saskatchewan tested writing among grades 5, 8, and 11 in 2008. Although Manitoba does not utilize standardized assessment procedures, a traditional, non-standardized, classroom-based assessment of math and language arts skills is administered to grades 3, 7, and 8. Due to large populations of French-speaking students in Quebec and New Brunswick, standardized testing is different according to the language sector of students. In Quebec, math and language arts skills are assessed among grade 6 students in the French and English sectors. There is also an option for students to determine their proficiency in speaking French by taking tests designed to gauge this skill. Compared to the rest of Canada, New Brunswick has a very comprehensive standardized assessment agenda. In the English sector, readiness skills are examined in primary; literacy in grades 2, 4, and 7; English skills in grade 9; and math in grades 5 and 8. In the French sector, readiness skills are tested in pre-primary and primary; language

arts in grades 2 and 8; math in grades 5 and 8; and science in grade 5. Efforts to add further standardized assessment in New Brunswick are underway.

In order to understand the link between TA and precipitating factors, it is necessary to understand that TA, as well as all other anxiety disorders, is considered a stress-related condition (Zeidner, 1998). Therefore, stress leads to anxiety, and TA is no exception. The Transactional Model of Stress and Coping (TMSC; Lazarus & Folkman, 1984) explains how the general emotion of anxiety emerges from stress, particularly when one perceives that his or her personal coping resources may not provide adequate support toward dealing with the presenting stress. This perceived mismatch between a presenting task (e.g., test) and ability to deal with that task is considered stressful and can lead to anxiety. According to the TMSC, in order to understand anxiety (e.g., TA), it is important to identify precipitating stressors. Testing is only one stressor experienced in school settings that contributes to TA. There are many examples of school-related stressors that may contribute to feelings of TA. The link between TA and other school stressors, however, has never been investigated.

Factor analysis research conducted by Helms and Gable (1989) has led to the development of a seven-factor model of stressors specifically found in the school environment. The model is subdivided into two broad categories: sources of school stress and manifestations of school stress. Sources of school stress include academic stress, teacher interactions, peer interactions, and academic self-concept. Manifestations of school stress include emotional stress, behavioral stress, and physiological stress. This model is consistent with trends in behavioral research in that it acknowledges that

behavioral responses develop as a result of multiple contributing variables (Bronfenbrenner, 1979; Henggeler & Borduin, 1990). Therefore, assessment of these conditions must include a comprehensive multi-systemic analysis of contributing factors, as well as the collection of information from individuals (e.g., parents and teachers) who have observed the interplay between the disordered individual(s) and the various transactions within the school environment.

Statement of the Problem

Currently, TA is assessed through self-rating scales that measure anxieties related only to test-related stress. This approach to assessment remains despite current trends in the broad field of assessment to examine the emergence of disorders as a function of multi-systemic factors, as well as from the perspective of various informants (e.g., parents, teachers). Although the Helms and Gable (1989) model of school-based stress focused exclusively on the school environment, it outlined multiple systems (e.g. teacher interactions, academic stress, peer interactions, academic self-concept) within the school setting where school-based stress and manifestations are most likely to emerge. As such, this model can be applied to a multi-systemic study examining the relationships between various school-based stressors and the development of student TA. Since anxiety is a stress-related condition, it is very possible that school stressors, other than testing alone, play a major role in the development of worry, emotionality, cognitive interference and lack of confidence associated with TA. Currently, however, the four-factor construct of TA is based exclusively on data collected from students through self-rating scales. As such, the existing standardized self-rating scales cannot be compared to rating scales

administered to other sources of information (e.g., parent or teacher), as no such procedure has been developed for TA. This is unfortunate, as multi-informant (e.g., parent-student-teacher) assessment is considered standard practice among practitioners gauging anxiety in general (Jensen, Rubio-Stipec, Canino, Bird, Dulcan, Schwab-Stone et al., 1999; Kazdin, 1986; Kendal & Flanery-Schroeder, 1998; Ollindick, 1986). One problem associated with reliance on self-rating scales is self-preservation bias, or a tendency to report symptoms in a manner that is socially desirable (Kendall & Flannery-Schroeder, 1998). There are also associated memory problems that may lead to inaccurate rating. Therefore, multi-informant assessment of anxiety disorders has become the norm.

Purpose of the Study

The purpose of this study is twofold. First, this study sets out to replicate the four-factor model of TA, derived from the TAI-G, with parent and teacher data. Currently, the four-factor model is based solely on student self-reports. Such a replication across alternative informants would allow for the use of the TAI-G within a multi-informant assessment system including students, parents, and teachers. A sample of Canadian adolescent junior and senior high students, one of each student's parents and one of each student's teachers will serve as participants. This sample represents the first Canadian sample tested by the TAI-G, as well as the first multi-informant sample tested by any measure of TA. Demographic variables including sex, age, grade, and significantly elevated TA will be subsequently analyzed. The results of these analyses may help bring the assessment of TA in line with more current multi-informant

assessment practices in the general field of anxiety measurement. Secondly, this study sets out to investigate the relationships between school-based stress and TA. This may provide support for the utility of the TMSC (i.e., stressful transactions are associated with anxiety) as a general framework for understanding anxiety, and more specifically, TA. Furthermore, it may help identify and prioritize important school stressors that play the greatest role in the development of TA, thereby providing direction toward the development of appropriate and efficacious intervention.

Chapter Two: Literature Review

Introduction

The following chapter presents the definitions and theories of stress and stress disorders, including the history, construct development, prevalence, and epidemiological data associated with anxiety and depression. The review identifies the school setting as the greatest source of stress during adolescence, with special attention placed on test anxiety (TA). The history of the construct development of TA is outlined, as well as an overview of TA's place within the broad spectrum of anxiety disorders and the Transactional Model of Stress and Coping (TMSC). In addition, this chapter reviews theories regarding the etiology and theoretical conceptualization of TA and stress and their interrelationship. Issues with respect to the assessment of TA are proposed, staging the purpose of the current study. This review concludes with pertinent questions and hypotheses to be tested by way of the study.

Stress: Definition and Theory

It is widely agreed that stress is an adaptive response, the function of which is to maximize survival in threatening situations. This evolutionary perspective is commonly known as the *fight-flight reaction*, or the *Acute Stress Response* (Cannon, 1929). This response occurs among all vertebrates when potential danger is perceived. The process begins when novel stimuli (e.g., a cracking branch disrupting silence) contribute to atypical processing via the hypothalamus to the brain stem (Corr, 2006). The result of atypical information processing is increased noradrenergic activity, contributing to a hyper-aroused state of consciousness and disruption of physiological homeostasis. At

this point, cognitive factors also become very important, as full attention is applied to the process of assessing the level of threat posed by the novel stimulus. If it is determined that the stimulus presents potential threat, the sympathetic division of the autonomic nervous system is activated, as well as other biological processes associated with hormone release (e.g., adrenaline and cortisol; Thase & Howlannd, 1995). The effect on physiology can be profound (e.g. acceleration of heart and lung action, inhibition of stomach and intestinal action, constriction of blood vessels, release of muscle enhancing nutrients, dilation of blood vessels responsible for muscles, inhibition of tear and salivation production, relaxation of bladder). These changes all serve one adaptive purpose: to enhance one's ability to either escape from the threat or defend oneself against the impending threat (i.e., fight or flight). This model explains the physiological changes that result from perceived environmental threat. It does not, however, explain why there is variation between people with regard to perceptions of these environmental stimuli. In order to explain why one person will interpret an environmental stimulus as threatening (i.e., triggering the stress response) whereas another perceives that same stimulus as merely challenging or unthreatening, it is necessary to understand the cognitive dynamics underlying the Acute Stress Response.

The transactional model of stress and coping. Zeidner (1998), a leading researcher in the field of stress, draws upon the Transactional Model of Stress and Coping (TMSC; Lazarus, 1991b; Lazarus & Folkman, 1984) in order to explain the interacting environmental and cognitive dynamics associated with stress. According to the TMSC, stress is conceptualized to derive from transactions between people and

environmental events when one's ability to meet demands and/or maintain health and welfare are jeopardized. Appraisal, a cognitive mechanism, of stressful stimuli is central to the TMSC. Appraisal is consistent with the Acute Stress Model in that a novel stimulus orients attention in order to facilitate the process of establishing the level of threat associated with that stimulus. With the Acute Stress Model, however, there is more focus on physiological and neurobiological events while the cognitive factors associated with appraisal are not elaborated.

According to the TMSC, appraisal first focuses on the scale of the environmental stressor (i.e., primary appraisal) and then on evaluating one's available resources to cope with the environmental stressor (i.e., secondary appraisal; Antonovsky & Kats, 1967; Cohen 1984; Lazarus & Cohen, 1977). In other words, the level of threat is first established, followed by a determination of what one is able to do about it. According to the TMSC, the magnitude of stress experienced during a stressful event depends upon the outcome of the cognitive appraisal process (Zeidner, 1998). When the outcome is favourable (i.e., conclude that there are sufficient resources to cope with the stressor), the acute stress response may be minimal. When the outcome is not favourable (i.e., conclude that there are not sufficient resources to cope with the stressor), the acute stress response may be very intense.

The acute stress response evolved to serve the very important adaptive function of maximizing the chance of survival in the face of natural threats to well being (Cannon, 1929). It can, however, prove maladaptive in modern society in which people are rarely faced with natural situations that threaten life and require an immediate decision to fight

or flee. Unfortunately, the acute stress response continues to be very sensitive and is constantly activated by numerous mild to moderate stressors in society (Nesse & Williams, 1997). Although not typically life-threatening, these stressors can occur repeatedly and with sufficient intensity to trigger continuous activation of the acute stress response. The adaptive engagement of the acute stress response manifests as a short-lived shift from cognitive and physiological homeostasis during sudden life-threatening circumstances, thereby increasing the chance of winning a fight or escaping threat successfully. In modern day society, the acute stress response can be frequent and unnaturally prolonged because applying the fight or flight coping strategies is neither practical (e.g., stuck in traffic every day going to work) nor socially acceptable (e.g., attacking a co-worker). As such, many alternative coping strategies have evolved to help reduce symptoms associated with stress.

Coping strategies. Stress can be physiologically and psychologically disruptive, thereby motivating an individual to apply strategies to re-establish homeostasis. This process is referred to as *coping* (Lazarus & Folkman, 1984). There are various ways to cope with stress. The most common way to classify coping strategies is the Lazarus and Folkman (1984) model (Walker, et al., 2007). Lazarus and Folkman (1984) conceptualized two main categories of coping: emotional coping and problem-focused coping. Emotion-focused coping (e.g., seeking social support) aims to minimize disturbing emotions associated with stress. This form of coping typically manifests as avoidance of the problem, trying to forget the problem exists, or reliance on others to deal with the problem. Problem-focused coping applies conscious efforts to deal with the

stressor (e.g., time management). According to Lazarus and Folkman (1984), the point of emotion-focused coping is to deal with stress-related emotions, whereas problem-focused strategies aim to deal with the stressor. Depending upon the controllability of one's situation, either form of coping may serve to be adaptive or maladaptive. Studies examining potential health implications as a function of coping style indicated that problem-focused coping strategies facilitate better physical and mental health when the stressor is perceived as controllable (Walker, Payne, Smith, & Jarrett, 2007). Emotion-focused coping, however, is most adaptive among individuals facing situations in which they have very little control over the outcome (e.g., prison, terminal illness; Baum & Singer, 1987; Van Harreveld, Pligt, Claassen, & Dijk, 2007). In situations for which changing the outcome is beyond control, application of problem-focused coping strategies would simply lead to failure, likely exacerbating the associated stress response.

Coping strategies are considered adaptive when they lead to re-establishment of physiological and psychological homeostasis (Walker et al., 2007). Coping strategies are considered maladaptive when they fail to diminish stress in the long-term (e.g., drug and alcohol abuse). Some of Freud's defense mechanisms are also examples of maladaptive, emotion-focused, coping strategies (e.g. repression, reaction formation, denial; Doyle-Portillo, 2009). When maladaptive coping strategies are continuously applied, the acute stress response is prolonged and serves to counteract its original adaptive purpose. Over time, stress and maladaptive coping can lead to disordered functioning in physical and/or psychological well being (Esterling, Antoni, Kumar, & Schneiderman, 1990; Gallacher,

Yarnell, Sweetman, Elwood, & Stansfield, 1999; Julius, Harburg, Cottington, & Johnson, 1986; Pennebaker, 1995; Suls, Wan, & Costa, 1995).

Physical disorders associated with stress. Prolonged activation of the acute stress response is associated with many unhealthy physical manifestations. The physiological changes associated with the acute stress response can actually cause harm to the body when they occur repeatedly and over long periods of time. Some mild to moderate symptoms include muscular strain, insomnia, poor appetite, sexual dysfunction, gastro-intestinal problems, heart palpitations, difficulty fighting common cold, and increased rate of upper respiratory-tract infections (Jones, 2003; O'Leary, 1990). More serious conditions include high blood pressure (Steptoe, Roy, Evans, & Snashall, 1995), heart disease, and hypertension (Gallacher et al., 1999; Julius et al., 1986; Kivimaki, Leino-Arjas, Luukkonen, Riihimäki, Vahtera, Kirjonen , 2002; Suls et al., 1995). Perhaps the most serious physical health repercussion associated with prolonged stress is suppressed immune response (Esterling et al., 1990; Miller, Cohen, & Ritchey, 2002; O'Leary, 1990). During the course of chronic stress, the delicate balance of the immune system is disrupted. Some immune cells become overactive, disrupting the ability of other cells to function as they would during non-stressful periods. This facilitates the development of numerous physical ailments, as the body's natural defense resources are jeopardized (e.g., viral infection, inflammation). Due to the fact that physical stress disorders develop gradually, they tend to present more during adulthood compared to childhood and adolescence (Loeber & Farrington, 2000).

Although there are numerous conditions of mental health that are exacerbated by the acute stress response (e.g., tic disorder, schizophrenia), there are two main psychological disorders which can be directly linked to stress: Depression and Anxiety (Jaser, Langrock, Keller, Merchant, Benson, & Reeslund, 2005). These two conditions (i.e., Anxiety Disorder and Major Depressive Disorder) have a high comorbidity of approximately 60% (Kaufman & Charney, 2000), considerably higher than chance (i.e., 2% or less). The association between stress, depression and anxiety is best understood by examining their theoretical underpinnings.

Depression: Definition and Theory

Depression is a term that is used very commonly to describe chronic feelings of sadness. Clinically significant depression is a psychological disorder characterized by chronic low mood, low self-esteem, and loss of desire to partake in and/or enjoy activities that are typically found to be enjoyable (American Psychiatric Association, 2000). In the late 1960s, psychologist Martin Seligman and his colleagues were performing Pavlonian-style classical conditioning experiments with dogs to study the relationship between fear and learning (Overmier & Seligman, 1967; Seligman & Maier, 1967). It was hypothesized that after administration of a mild shock, the dogs would cope by making an effort to escape to a safe no-shock area. He used shuttle boxes which were divided into two sections (i.e., shock side and no-shock side) by a low fence. In the preliminary learning phase, however, Seligman wanted to condition the dogs to fear a presented tone through association with a mild shock. In order to achieve this, the dogs were repeatedly exposed to the tone followed by mild shock learning trials, without being allowed to

escape. After the learning phase, Seligman removed the restraint, assuming that the conditioned dogs would escape to the other side of the shuttle box upon presentation of the tone. To the surprise of the research team, the dogs did nothing but lay down and take the shock. There were no further attempts at coping with the applied stressor. Seligman theorized that the dogs learned that all efforts to cope with the stressor during the conditioning trials were futile. When all efforts to cope yielded no result, the dogs decided to cease all further attempts to escape the shock. Seligman recognized parallels between this behavior and the behavior of people who are depressed. Thus, the theory of Learned Helplessness was born, providing a theoretical model explaining depression. According to the Learned Helplessness model, people who become depressed have made many futile efforts to cope with life-stressors, resulting in a cessation of all further efforts. The concept of Learned Helplessness fits well within the TMSC framework, because individuals who have made many futile efforts to cope are more likely to develop an appraisal outcome bias that their personal coping resources are insufficient toward impending challenges. Students with learning disabilities, for example, are known to demonstrate learned helplessness behavior early in school that can persist throughout the extent of their academic career (Arnold, 1996).

Subsequent research, however, demonstrated that not everyone who repeatedly applies futile coping strategies in the face of stress develops a sense of helplessness (Cole & Coyne, 1977; Hiroto & Seligman, 1975). In fact, about one third of Seligman's 150 dogs also did not demonstrate Learned Helplessness behavior after the conditioning trials. Seligman resolved this problem by borrowing from Attribution Theory and refining the

Learned Helplessness theory of depression. Attribution Theory posits that people attribute the cause of negative events to either an Optimistic (external, unstable, and specific) or Pessimistic (internal, stable, and global) attribution style. In other words, the Optimistic attribution style was considered an adaptive strategy to deal with negative life events because it placed blame on factors other than the self (external), occurring rarely (unstable), and as a result of an isolated feature within the individual (specific). The Pessimistic attribution style was considered a maladaptive strategy to deal with negative life events because it placed blame on the self (internal), occurring consistently (stable), and as a result of the general nature of the individual (global). People with a Pessimistic attribution style are most likely to develop Learned Helplessness and Depression (Peterson, Maier, & Seligman, 1993). When depressive symptoms and maladaptive coping behaviors persist over time, the symptoms can reach the level of disorder.

Overview of Depressive Disorders

The *Diagnostic and Statistical Manual of Mental Disorders IV* (*DSM-IV-TR*, American Psychiatric Association, 2000) is the most commonly used classification system for many categories of mental disorder and outlines numerous diagnostic categories of disorders related to depression. The depressive disorders are grouped under a category in the *DSM-IV TR* called *Mood Disorders*. Included in this category are Major Depressive Disorder, Dysthymic Disorder, Bipolar Disorder, and Cyclothymic Disorder. Major Depressive Disorder is associated with at least five symptoms associated with an extreme decline in mood, loss of interest in activities, weight loss, insomnia, hypersomnia, observably slow/agitated behavior, fatigue, sense of worthlessness and/or

guilt, reduced ability to think and concentrate, and suicidal ideology. Dysthymic Disorder is a milder, yet more enduring type of depression that lasts at least 2 years for adults and 1 year for children. People with Dysthymic Disorder present with stable depressive symptomatology that appear to be a part of their personality. Individuals diagnosed with Bipolar Disorder present extreme mood swings between Depressive Disorder symptomatology and euphoric symptomatology associated with Mania (i.e., excessive self-esteem, reduced need for sleep, excessive talking, continuous thoughts and rambling, high distractibility, increase activity, participation in high risk activities). Between these emotional extremes, there are periods of normalcy. Cyclothymic Disorder describes a set of symptoms that are milder, yet more stable than the symptoms associated with Bipolar Disorder. Over a period of 2 years, individuals with Cyclothymic Disorder will experience many manic symptoms, but not severe enough to diagnose manic episodes, as well as mild depressive symptoms.

Anxiety: Definition and Theory

Anxiety is an emotion characterized by physiological and psychological components that interact, creating a sense of uneasiness, apprehension, and worry (Zeidner, 1998). Moderate, short-term, anxiety has evolved as an adaptive reaction to environmental stress, and it actually facilitates performance in many stressful situations (Suldo, Shaunessy, & Hardesty, 2008). For example, at work or school, moderate anxiety can serve to motivate an individual to apply coping mechanisms (e.g., peer support, studying). This effect, known as the Yerkes-Dodson Law (Yerkes & Dodson, 1908) has been well documented. Graphically, this effect is presented as a curvilinear,

inverted U-shaped curve which increases and then decreases with rising levels of anxiety. When anxiety becomes excessive, the associated symptoms can actually be detrimental to performance.

The acute stress response model does well to explain the basic underlying physiological processes that set the stage for an anxiety response. It does not, however, explain why anxiety occurs rather than some other response (e.g., aggression, anger), nor does it explain why some people seem to be resilient to high levels of prolonged stress whereas others struggle greatly under mild pressure. These processes are best understood through a more comprehensive description of how stressful environmental and cognitive factors interact and contribute specifically to anxious symptomatology as opposed to other emotional responses (e.g., aggression). The sequence of precipitating events leading to anxiety is explained by the TMSC.

The TMSC holds that emotional responses to the acute stress response are categorized according to various themes (e.g., challenge, threat) that emerge following the cognitive appraisal of personal resources available to cope with impending stressors (Lazarus & Folkman, 1984). The particular themes chosen by different individuals are based on personal meaning and past experiences. In other words, when efforts to cope with specific challenges are found to be inadequate (e.g., studied for a test, but failed anyway), this can lead to decreased confidence in one's ability to cope with similar challenges in the future. The anticipation of possibly diminishing one's sense of self-esteem (i.e., evaluation of self-worth) through repeated, yet inadequate, coping underlies the emotion of anxiety. The TMSC's concepts of anxiety and depression are similar in

that they both occur as a result of perceived past failure toward coping with presented stressors. Depressed individuals dwell on past failure and feel that efforts to overcome challenges are futile. Anxious individuals continue to apply efforts to cope, but lack confidence toward the effectiveness of their efforts. When excessive anxiety and maladaptive coping behaviors persist over time, the associated psychological symptoms can reach the level of disorder. The *DSM-IV-TR* (American Psychiatric Association, 2000) outlined numerous diagnostic categories for anxiety disorders.

Overview of Anxiety Disorders

Drawing upon the *DSM-IV-TR* (American Psychiatric Association, 2000) classification scheme, a number of Anxiety Disorders are possible. The principal categories include Panic Disorder, Agoraphobia, Obsessive-Compulsive Disorder, Post-Traumatic Stress Disorder, Acute Stress Disorder, Social Phobia, Specific Phobias, and Generalized Anxiety Disorder. Panic Disorder is characterized by panic attacks, repeated and unexpected feelings of intense fear. Agoraphobia is associated with avoidance of situations from which escape would be difficult should a panic attack occur. Symptoms of Obsessive-Compulsive Disorder are associated with recurrent, unwanted thoughts (obsessions) or rituals (compulsions). Acute Stress Disorder occurs when an individual who has experienced a distressing event and, for a period of less than 4 weeks, consequently suffers anxiety symptoms, re-experiencing of the event, and avoidance of things associated with the distressing experience. Post Traumatic Stress Disorder begins in the same manner as Acute Stress Disorder; however, the symptoms last for a period extending beyond 4 weeks. Social Phobia can be described as fear and subsequent

avoidance of social situations, especially when the situation involves interaction with unfamiliar people. Specific Phobias are severe, irrational fears of things that are not normally associated with any danger (e.g. triskaidekaphobia, fear of the number 13). Finally, Generalized Anxiety Disorder can be described as intense, disproportionate concern about mundane activities, lasting at least 6 months.

The *DSM-IV-TR* includes other disorders specific to children and adolescents and are thought to be rooted in anxiety. Reactive Attachment Disorder (RAD) is characterized by a disturbed and developmentally inappropriate social interaction, demonstrated prior to age 5. RAD is thought to develop as a result of an extreme lack of parental nurturance in provision of essential physical, emotional, and stable attachment needs. Separation Anxiety Disorder is the most common DSM anxiety disorder among children. It is diagnosed when a child (i.e., early onset prior to age 6) or adolescent (i.e., up to age 18) demonstrates extreme anxiety in the face of anticipated separation from home or attachment figure. This anxiety is continuous, characterized by ongoing worry and distress (e.g., nightmares) that separation might occur and manifests behaviorally as refusal and/or reluctance toward leaving these comfort zones. Finally, Selective Mutism is characterized by failure to speak in specific social situations. This diagnosis is almost always given in addition to another anxiety disorder, typically Social Anxiety Disorder. Selective Mutism symptoms must last for a period of at least 1 month and must not be due to communication disorder or lack of knowledge of the language of context.

Depression and anxiety: Prevalence, epidemiology, and comorbidity. The prevalence of Major Depression among adolescent children ranges between 5% and 20%

(Lewinsohn et al., 2000; Melnyk et al., 2003; Saluja, Iachan, Scheidt, Overpeck, Sun, & Giedd, 2004). Major Depression is very uncommon among young children and pre-adolescents (i.e., approximately 3%). It increases significantly (i.e., approximately 14%), however, during the teen years (Lewinsohn et al., 1998), emerging as a risk factor between 13 and 15 years of age (Allgood-Merten, Lewinsohn, & Hops, 1990; Angold, Costello, & Worthman, 1998; Angold, Weissman, John, Wickramaratne, & Prusoff, 1990; Wichstrom, 1999; Hankin et al., 1998). Epidemiological research for Major Depression demonstrates that gender is the most consistent risk factor (Nolen-Hoeksema, 1991), with a female to male ratio of approximately 2:1 (Pelissolo & Lepine, 2001) or even 3:1 (Culbertson, 1997) in the general population. Gender ratios vary as a function of nationality from 1.6:1 in Puerto Rico (Canino et al., 1987) to 2.7:1 in the United States (Dryman & Eaton, 1991), but overall, the studies clearly indicate that being female represents a higher risk factor for Major Depression than being male. Other risk factors associated with Major Depression are typically problems of adulthood. For example, there is increased risk of Major Depression following divorce, separation, and unemployment (Pelissolo & Lepine, 2001). The data suggests that sex and age warrant special consideration when gauging prevalence data for child and adolescent Major Depression.

Anxiety-based disorders are the most common class of disorders among adults, with a prevalence rate of approximately 28.8% (Kessler, Berglund, Demler, Jin, Merikangas, & Walters, 2005). Studies reporting prevalence rates of *DSM-IV* Anxiety Disorders for adolescents (i.e., over age 12) suggest that diagnosis of any *DSM-IV*

anxiety disorder occurs between 5.04% (Ford et al., 2003) and 9.9% (Costello et al., 2003) of the population. Another review of prevalence research conducted by Bernstein, Borchardt, and Perwien (1996) concluded that at least 8% to 12% of youth suffer from anxious symptomatology to the extent that it impedes daily life functioning. A recent empirical review (Cartwright-Hatton, McNicol, & Doubleday, 2006) of 11 studies reporting *DSM-III-R* and *DSM-IV* prevalence data outlined the most common diagnosis among preadolescent children (i.e., age 12 and under). The study reported that Separation Anxiety Disorder is the most common diagnosis among this age category, with reported prevalence rates ranging between 0.5% (Lavigne et al., 1996) and 20.2% (Sugawara, Kitamira, Toda, 1999). Prevalence rates for Overanxious Disorder/Generalized Anxiety Disorder range between 0.16% (Ford, Goodman, & Meltzer, 2003) and 11.1% (Boyle et al., 1993). Rates for Obsessive Compulsive Disorder ranged from 0.03% (Ford et al., 2003) to 2.6% (Sugawara et al., 1999), although for Social Anxiety Disorder, the rates were very low, ranging from 0.08% (Almqvist, Puura, Kumpulainen, Tuompo-Johansson, Henttonen, Huikko et al., 1999) to 0.9% (Sugawara et al., 1999). Most studies reported low prevalence rates for Specific Phobias among this age population, with less than 1% of children suffering from this condition (Cartwright-Hatton et al., 2006). The review concludes that less than 0.5% of this age category suffers from Panic Disorder and Agoraphobia (Costello et al., 2003; Ford et al., 2003).

Studies reporting prevalence rates of *DSM-IV* Anxiety Disorders for adolescents (i.e. over age 12) suggest that diagnosis of any *DSM-IV* anxiety disorder occurs between 5.04% (Ford et al., 2003) and 9.9% (Costello et al., 2003) of the population. Prevalence

rates for specific diagnostic categories were reported in one study (Ford et al., 2003). This study suggested that Separation Anxiety Disorder is also the most prevalent (0.97%) among 13 to 15 year olds, followed by Specific Phobia (0.68%), Obsessive Compulsive Disorder (0.63%), Panic Disorder (0.47%), Social Phobia (0.38%), Posttraumatic Stress Disorder (0.27%), Agoraphobia (0.22%), and General Anxiety Disorder (0.18%; Ford et al., 2003).

Anxiety Disorders and Major Depression have a high rate of comorbidity, with estimates as high as 60% (Cameron, 2007; Kaufman & Charney, 2000; Kessler et al., 2005). Due to their high comorbidity, it would be expected that epidemiological data for child and adolescent anxiety disorders would demonstrate some similar patterns to those of depression. Although this is true, there are also some very important differences which warrant attention. Again, being female places one at a substantially higher risk for developing an anxiety disorder. The National Comorbidity Survey (Kessler et al., 1994), conducted in the USA, yielded a lifetime prevalence rate of 19.2% for men and 30.5% for women. Lewinsohn, Gotlib, Lewinsohn, Seeley, and Allen (1998) surveyed 1700 adolescents to determine the prevalence of at least one current anxiety disorder. Sex differences in this study were examined through controlling potential confounding factors such as environmental stress, social support, family environment, and self-esteem. The results still demonstrated that prevalence for anxiety disorders is greater among females compared to males. Retrospective inquiry determined that the sex differences emerged by age 6 at a ratio of 2:1, girls to boys. This differs from depression, for which sex differences emerge between the ages of 13 and 15 years of age. The average age of onset

did not differ significantly between girls (8.0 years) and boys (8.5 years), but girls experienced their first diagnosis at a higher rate compared to boys. A study of *DSM-IV* Anxiety Disorders among children and adolescents (Angold & Costello, 1995) demonstrated that the overall prevalence of an anxiety disorder was highest among the 9 to 10 year olds (4.6%) and lowest for 12 year olds (0.9%). This increased again after the age of 12, mainly because of an increase in female Social Phobia and Generalized Anxiety Disorder across males and females. Very little is known about the prevalence of anxiety disorders among children and adolescents as a function of racial and ethnic affiliation. This is because the preponderance of studies designed to gauge epidemiological patterns of anxiety among children and adolescents draw upon primarily Caucasian samples (Bernstein & Victor, 2008).

The data demonstrates that anxiety disorders are by far the most common class of psychiatric disorders (28.8%), whereas mood disorders rank high as well (20.8%) (Kessler, Berglund, Demler, Jin, Merikangas & Walters, 2005). Following the TMSC, anxiety and mood disorders are rooted in excessive stress. As such, these statistics suggest that almost half of psychiatric diagnoses are precipitated by excessive stress and maladaptive coping. Although prevalence and epidemiological statistics vary as a function of demographic variables (e.g., age and gender), research clearly indicates that stress-related psychological disorders pervade the general population. In younger populations, anxiety disorders appear to present the greatest cause for concern, with a median age at onset of 11, whereas mood disorders has an average median age at onset of 30 (Kessler et al., 2005). Remaining consistent with the TMSC, for which anxiety and

depressive symptomatology is precipitated by stress, prevalence and epidemiological statistics suggest that a significant percentage of youths are struggling to cope with stress in day to day life, contributing to compromised psychological well-being.

Stress and Coping Among Children and Adolescents

The proliferation of studies aiming to investigate stress among youths reflects an emerging concern in the field of child and adolescent development. These studies demonstrate that high stress levels are becoming more prevalent among adolescents (Felton, Liu, Parsons & Geslani, 1998; Ge et al., 1994; Rudolph & Hammen, 1999; Seiffge-Krenke, 2000). Furthermore, studies examining stress related to the transition from childhood to adolescence as a function of age and gender demonstrate that young adolescent females are particularly vulnerable to the negative effects of stress (Compas et al., 1993; Rudolph & Hammen, 1999). Young teenage girls experience a greater number of stressors, and they respond to these stressors with fewer adaptive coping strategies (Grant et al., 2006; Hankin & Abramson, 2001; Nolen-Hoeksema, 1987). Although not as extreme as females, adolescent males also demonstrate excessive stress and maladaptive coping. Whereas these problems emerge during the early teen years for females, they tend to emerge during the mid to late teen years for males (Jose & Brown, 2008; Seiffge-Krenke, 2000). As such, the demographic variables of age and gender are given particular attention in studies investigating stress among adolescent youth.

Considering the association between prolonged stress and mental health disorders (i.e., Anxiety and Depressive Disorders), the development and utilization of effective coping strategies during adolescence becomes especially important. Unfortunately,

studies indicate that this period is characterized by heightened stress levels (Ge & Conger, 1994; Larson & Ham, 1993) and maladaptive coping such as resignation, rumination, aggression, emotional ventilation, and avoidance (Donaldson, Prinstein, Danovsky, & Spirito, 2000; Hampel & Petermann, 2005; Seiffge-Krenke, 2000). Such maladaptive coping patterns exhibited by adolescent girls place them at higher risk than males of developing stress-related disorders such as anxiety and depression (Compas, Orosan, & Grant, 1993; Hampel & Petermann, 2006; Nolen-Hoeksema, 1987). Following the theoretical direction of the TMSC, excessive stress precipitates the use of coping strategies and may lead to psychological disorder when coping is maladaptive. Since research suggests that adolescence represents a period of heightened stress, maladaptive coping, and subsequent internalizing disorders, it is important to understand what underlying stressors precipitate these experiences during the adolescent years.

Adolescent stressors. When attempting to identify factors that contribute to psychological disorders, it is common for researchers to seek multi-systemic variables (e.g. school, peers, family; Bronfenbrenner, 1979; Harpell & Andrews, 2006). In an effort to identify multi-systemic factors underlying adolescent stress, Burnett and Fanshawe (1997) reviewed 11 different scales, mainly developed between 1981 and 1991 and all designed to gauge adolescent stress. They concluded that the scales could be grouped as three broad categories assessing problems related to school, self, and relationships. In a subsequent analysis, Burnett and Fanshawe (1997) then applied confirmatory factor analysis to 35 items from Kohn and Frazer's (1986) American-based Academic Stress Scale and then added 33 more items based on Strutynski's (1985) study

outlining common stressors among 2336 Australian High School students. This procedure yielded nine subscales of stressors, all categorized according to the school, self, and relationships domains. The School Domain consisted of Teaching Methods, Student-Teacher Relationships, School Workload, and School Environment. The Self Domain consisted of Feeling Vulnerable, Personal Organization, Achieving Independence, and Anxiety about the Future. The Relationships Domain consisted only of Relationships with Parents, leading the researchers to note that this domain seemed under-represented. Nevertheless, the study seemed to present a broad framework of the categories associated with adolescent stressors and provided some preliminary understanding of specific stressors within each of these domains.

Evidently there are many types of stressors that present particular challenges to youths during the adolescent years. In order to determine which of these stressors are most likely to lead to maladaptive coping and possibly psychological disorders, it is important to determine which of these factors are perceived as most stressful. Of all the factors that contribute to stress during adolescence, studies clearly demonstrate that the most common occurring stressors are associated with school experiences (Helms & Gable, 1989; Puskar, Lamb, & Bartolovic, 1993; Spirito, Stark, Grace, & Stamoulis, 1991). School environments are rife with stress-provoking antecedents (e.g., tests, teacher conflict, peer pressure), perceived by students to be personally threatening (Chandler, 1981; Kruger et. al., 2007; Schultz, 1980). As such, extensive research efforts have aimed to develop the construct of School Stress and identify the underlying sources and manifestations specifically associated with stress in schools.

School-Based Stress

Definition and construct development. Helms and Gable (1989) conducted research to develop the construct of school stress, resulting in a seven-factor model, which is represented in the School Situation Survey (SSS; Helms & Gable, 1989), designed to gauge school-related stress. The model includes two broad domains: Sources of Stress (i.e., Academic Stress, Teacher Interactions, Peer Interactions, and Academic Self-Concept) and Manifestations of Stress (i.e., Emotional, Behavioral, and Physiological). These are considered core sources of, and reactions to, school stress among students between grades 4 through 12.

According to Helms and Gable (1989), academic stress is one important source of school-based stress. Ironically, one major contributor to academic stress in modern day schools appears to be related to ongoing educational reform initiatives (Kruger et al., 2007). In the United States, the most recent manifestation of this movement is a federal initiative known as the *No Child Left Behind Act* (2001). One component of this act mandates regular standardized achievement testing in order to hold schools accountable for fostering consistent annual gains in academic achievement among children (CITE). Other manifestations of this act include higher emphasis on academics compared to non-academic learning, meeting greater academic achievement standards, and regular monitoring through standardized testing. This form of testing is known as *high-stakes testing* because poor performance can lead to sanctions (e.g., retention for students, job loss, or mandated supervision for teachers). Similar provincial initiatives exist in Canada. For example, in Nova Scotia, standardized testing in early grade 6 has been used

since 2004 to monitor student progress in Language Arts (Nova Scotia Department of Education, 2005). The Department of Education in Nova Scotia plans to expand this initiative to include other grade levels and subjects. This is considered a major source of stress among students (CITE). A review of specific academic stressors revealed that written tests represent the greatest source of school stress among youth (Romano, 1997; Ryan-Wenger, Sharrer, & Campbell, 2005; Skybo & Buck, 2007; Taxis, Rew, Jackson, & Kouzekanani, 2004). As a result of educational reform initiatives, especially those associated with increased testing in North America, it is possible that students are experiencing more academic stress now than at any other point in recent history.

According to Helms and Gable (1989), another source of school-based stress is negative teacher-student interactions. Teachers report numerous role-related factors that indirectly lead to stressful interactions with students. These include extended working hours, increased paperwork, verbal abuse from students, general lack of support from administration, and poor resources (Smith, 2007). Another factor stems from the increasing requirement to address student special needs in the classroom (i.e., inclusion). In the United States, the percentage of students with disabilities receiving their education in predominantly inclusive classrooms rose from 31.46% in the 1989/90 school year to 45.35% in 1995/96 (U.S. Department of Education, 1998). In Canada, 12 to 15% of the Canadian school-aged population is considered to be exceptional (Winzer, 2008). Moreover, these numbers are on the rise. For example, from 1998 to 2004, the proportion of special needs students in Ontario schools more than doubled (Urquhart, 2005), and in Alberta, there was a 64% increase in the identification of students with

severe disabilities and a 140% increase in students with mild/moderate disabilities compared to a general increase in the school population of 5% from 1998 to 2003 (Pyryt, 2003). Consequently, teachers are charged with multiple and sometimes competing responsibilities (Wisniewski & Gargiulo, 1997).

Another growing problem contributing to negative student-teacher interactions are student conduct problems (CP) in school facilities (Smith, 2007). Mash and Barkley (1998) use the broad term CP to describe a condition that is characterized by a variety of severely disruptive behaviors (e.g., oppositional defiance, fighting, drug use). CP has a high prevalence rate, with estimations between 2% and 10% (Costello, 1990). All of these factors contribute to negative teacher-student interactions and can be perceived as stressful by both students and teachers.

Helms and Gable (1989) also considered student-peer interactions to be a potential source of student stress. Folkman and Lazarus (1985) identified social support seeking as an important and adaptive coping strategy to help ameliorate the physiological and psychological imbalances caused by stress. Unfortunately, adolescents between the ages of 11 and 15 demonstrate low levels of social support seeking, opting instead to use maladaptive strategies such as resignation, rumination, aggression, and avoidance (Roecker, Dubow, & Donaldson, 1996). It seems logical that students experiencing high levels of stressful student-peer interactions may not be able to access social support systems, thereby increasing the likelihood that maladaptive coping strategies and psychological symptomatology will occur.

Helms and Gable (1989) also identified low academic self-concept as another potential source of school stress. This is the student's appraisal of self-worth, self-esteem, and self-concept in relation to his or her ability to meet academic outcomes in school (Bong & Skaalvik, 2003; DiPerna & Elliott, 1999; MacMillan, Gresham, & Bocian, 1998). Self-worth theory holds that people are driven to develop a healthy sense of self (Covington, 1992, 1998; Eccles & Wigfield, 2002). In the school environment, a healthy sense of self hinges on a healthy academic self-concept. Students who are challenged by academics, however, may have low academic self-concepts, contributing to stress. Studies have demonstrated this relationship among students struggling with learning disabilities (Grolnick & Ryan, 1990; Kistner, Haskett, White, & Robbins, 1987; Priel & Lesham, 1990). Considering that approximately 5.5% of the childhood population demonstrates at least one learning disability (National Center for Education Statistics, 2007), stress associated with academic self-concept may be particularly problematic for a significant portion of the school age population.

The Helms and Gable (1989) model of school stress also referred to Manifestations of Stress in schools. These include the emotional (e.g., frustration, anger), behavioral (e.g., fighting, back talk) and physiological (e.g., stomachaches) responses to stress in general, school-related stress being no exception. Such reactions are considered normal responses to stressful situations, but become maladaptive when prolonged stress triggers them over long periods of time. These reactions vary as a function of one's developmental stage. Young children between the ages of 6 and 8 tend to demonstrate such reactions as denial, stubbornness, anger, frustration, headaches, stomachaches, and

nail biting (Jewish Family Services, 2004). Pre-teens, between 9 and 12 years of age, typically demonstrate social withdrawal, helplessness, anger, aggression (verbal and physical) headaches, stomachaches, and praise seeking. Teens between the ages of 13 to 17 typically demonstrate such manifestations as anger, fighting, destruction of property, yelling, drug and alcohol abuse, withdrawal from activities, skipping school, and poor eating. Since the school setting is considered the major source of stress among adolescents (Compas et al., 1989; Romano, 1997), it is important to determine the extent of excessive stress reactions among adolescents within school environments.

School stress: Prevalence, epidemiology and comorbidity. Most children spend the majority of their time during the day in school settings. As such, school-related stress contributes to the greatest portion of stress experienced by most children (Allen & Green, 1988; Barrett & Heubeck, 2000). School-related challenges such as exams, grades, and school socialization are perceived as excessively stressful by at least one third of students (Haugland, Wold, & Torsheim, 2003; Sieber, Ruggia, Magaton, & Palla, 1999). In a study by Lohman and Jarvis (2000), all adolescents girls and almost all adolescent boys (96%) reported school to be the greatest source of stress in their lives. Consistent results were revealed in a study comparing British and American teens (West et al., 1982) and adolescents in Singapore (Isralowitz & Hong, 1990). Prior to adolescence, family issues seem to be most stressful for children (Compas et al., 1989). By age 14, however, school and peer experiences emerge as the most stressful aspects of life. Murberg and Bru (2007) suggested that this is due, in part, to the fact that teens have to spend so much time in school where academic (e.g., worry about grades) and social

challenges (e.g., peer conflict and acceptance) are faced daily. A review of specific school-based stressors demonstrates that written tests represent the greatest source of school stress among children (Ryan-Wenger et al., 2005; Romano, 1997; Skybo & Buck, 2007; Taxis et al., 2004). The transition from elementary school to junior high also presents a major source of stress to adolescents due to changes associated with workload, scheduling, and assessment of skills (Boekaerts, Seegaers, & Van den Goor, 1993). School-related stress among adolescents has also been linked to stressors related to enrollment in larger schools, variety in course options, and government initiatives to increase academic standards (Elias, 1989; Elkind, 1984). Considering the Helms and Gable (1989) model, these statistics are very concerning because prolonged and excessive school-related stress is specifically linked with various physiological/physical, behavioral and emotional/psychological manifestations. A review of research associated with manifestations of school stress highlights the scope and severity of these problems.

In regard to the impact of school stress on physical well being, studies have been conducted analyzing data from the World Health Organization cross-national survey, Health Behavior in School-Aged Children (HBSC; Currie, 1998). This study measured school stress and somatic symptoms among mid-teen-aged students. The results yielded a positive and linear relationship between levels of school stress and somatic symptomatology such as headache, stomachache, backache, dizziness, low mood, irritability, nervousness, and sleep difficulties (Haugland, Wold, & Torsheim, 2003; Natvig, Albrektsen, Anderssen, & Qvarnstrom, 1999). Likewise, Hurrelmann, Engel, Holler, and Nordlohne (1988) reported a direct association between health complaints

(e.g., headaches, nervousness) and school stress (i.e., high failure) among high school students.

School stress is also linked to increased maladaptive behavior. The Partnership Attitude Tracking Study of over 6500 adolescents by the Partnership for a Drug-Free America (2007) demonstrated that 73% of teens abuse drugs primarily to cope with stressors associated with school. In another study (Barrett & Heubeck, 2000), school hassles (i.e., distressing experiences) among third and fourth graders were assessed through the Good and Bad Things about School measure (Heubeck & Allan, 1995) and conduct problems were gauged through use of items from the Youth Self-Report (Achenbach, 1991). The results revealed that hassles associated with the school setting were positively related to conduct problems. Teacher-student hassles demonstrated an especially strong link to conduct problems among students. These associations have also been demonstrated among adolescent and adult populations (DuBois et al., 1994; Kanner et al., 1987; Rowlison & Felner, 1988; Ruffin, 1993).

Studies exploring the relationship between school stress and psychological well being yield similar relationships. One study by Wagner and Compas (1990) assessed stress with the Adolescent Perceived Events Scale and psychological symptomatology with the Symptom Checklist-90-Revised (Derogatis, 1983) for high school students. The results yielded main effects for negative academic events on psychological symptoms among high school students. The study, however, relied on the Global Severity Index to represent a general category of psychological symptomatology. This score is obtained by computing the average rating score of all 90 items, thereby sharing no conclusions in

regard to specific subscales such as anxiety and somatization. Barrett and Heubeck (2000), however, demonstrated a positive relationship between school hassles and student anxiety. School hassles were assessed through the Good and Bad Things about School measure (Heubeck & Allan, 1995), whereas anxiety was assessed through the Revised Children's Manifest Anxiety Scale (Reynolds & Richmond, 1978). In this study, school hassles associated with negative peer interactions were more likely to demonstrate a positive relationship with anxiety compared to other hassles within the school environment.

Considering that school stress represents the major source of stress among children and adolescents (Armacost, 1989; Barrett & Heubeck, 2000; Green, 1988; McGuire, Mitie, & Newman, 1987; Omizo, Omizo & Suzuki, 1988; Sheridan & Smith, 1987; Stark et al., 1989), and that anxiety disorders are the most prevalent class of psychological disorders among adolescents (Bernstein, Borchardt, & Perwien, 1996; Kessler et al., 2005), research investigating the possible relationship between specific school stressors and anxious symptomatology is severely lacking. A review of specific school-based stressors revealed that written tests represent the greatest source of school stress among children (Romano, 1997; Ryan-Wenger et al., 2005; Skybo & Buck, 2007; Taxis et al., 2004). With consideration of prevalence and epidemiological data associated with school-related stress and general anxious symptomatology among children, as well as research indicating that school testing is perceived as particularly stressful among school children, the construct of Test Anxiety (TA) deserves special attention in research.

Test Anxiety: Definition, History, and Construct Development

Test Anxiety is a construct that consists of interacting phenomenological, physiological, and behavioral responses that occur prior to, during, and following a test (Zeidner, 1998). Typically, the test-anxious person perceives that he or she falls short in intellect or preparedness to successfully complete an evaluation. As noted by Zeidner (1998), in order to understand the etiology of TA, it is important to review the TA in light of the TMSC (Lazarus & Folkman, 1984).

In linking TA with the TMSC (Lazarus & Folkman, 1984), Zeidner (1998) held that variation in people's appraisals of evaluative situations contributes to differences in test-anxious reactions. Specifically, in evaluative situations, people high in TA are thought to demonstrate more appraisals of threat, whereas those low in TA view the same situations as challenging. As a result, the test-anxious individual is preoccupied with task-irrelevant, or failure-focused thoughts, whereas low test-anxious individuals are task-focused. Sarason and Sarason's (1990) outline of key cognitive characteristics associated with anxiety included the appraisal of threat, negative outcome focus, obsessions of inadequacy that intrude on task-oriented thought processes, and the expectation that failure will contribute to loss of self-esteem and/or will be scrutinized by others. These cognitions are thought to serve a counterproductive role during evaluative situations. Excessive worrying about failure and the ignition of physiological symptoms (e.g., rapid heart beat; Liebert & Morris, 1967), ultimately compound to diminish one's ability to focus on a task (Sarason, 1984), encode information (Mueller, 1979), retrieve important information (Mueller, Elser, & Rollack, 1993) and ultimately, perform

adequately on tests. Such studies have emphasized the importance of developing and understanding the construct of TA.

Sarason and Mandler's (1952) early research demonstrated a link between anxiety and poor test performance. This was followed by the development of the Test Anxiety Scale for Children (TASC; Sarason et al., 1960) which measured TA among children as a unitary construct. The TASC has been researched extensively for half a century, focusing on factor composition, sex differences, and validity (Ferrando, Varea, & Lorenzo, 1999). This research suggested that TA is actually a multidimensional construct, usually involving several factors. With regard to demographic variables, conclusions relating to gender effects yielded considerable concordance among researchers, with studies demonstrating greater prevalence of TA total scores across females compared to males (Ferrando, Dolores, & Lorenzo, 1999; Phillips, 1978). A meta-analytic study by Hembree (1988) focusing on predictive validity of the TASC demonstrated significant inverse relationships between TA and academic performance categories as well as intelligence. There seemed to be a lack of concordance among researchers, however, with regard to specifics associated with number of factors and names of factors (Feld & Lewis, 1967; Guida & Ludlow, 1989; Rhine & Spaner, 1983).

Early research following the development of the TASC investigated the multidimensional structure of TA. Subsequently, the construct of TA was divided into two fundamental components: Worry and Emotionality (Liebert & Morris, 1967). Worry represented the cognitive concerns relating to failure and consequences of failure, whereas Emotionality represented the physiological symptomatology associated with

anxiety (e.g., heart racing). Drawing upon this framework, Spielberger (1980) developed the Test Anxiety Inventory (TAI), which became a widely used and popular method of identifying TA for children, as well as for adults. The construct of TA, however, continued to expand.

Several studies supported the inclusion of Cognitive Obstruction or Cognitive Interference (McKeachie, 1984; Swanson & Howell, 1996; Tyron, 1980; Wine, 1971). Sarason (1984) agreed, claiming that both worry (i.e., preoccupation with failure, negative self-talk) and cognitive interference (i.e., disruptive/blocking thoughts) could more accurately describe the cognitive domain of TA. As a result, this factor was represented in Sarason's (1984) Reactions to Tests (RTT) scales, developed through factor analysis on a sample of undergraduate students. In an effort to further develop the construct of TA, Carver and Scheier (1984) proposed that Lack of Confidence should be included in the TA framework. Eventually, these contributions led to the development of a commonly utilized and accepted measure of TA in recent research: the German Test Anxiety Index (TAI-G; Hodapp, 1991, 1995).

Ensuing research seeking to validate the psychometric properties of the TAI-G in German and American populations demonstrated high reliability and validity across the various sub-domains (Hodapp, 1991, 1995; Hodapp & Benson, 1997; Keith, Hodapp, Schermeller-Engel, & Moosbrugger, 2003; Musch & Broder, 1999). Overall, the research supported that the components of TA include Worry, Emotionality, Interference, and Lack of Confidence (Hodapp, 1991, 1995), with Worry consistently demonstrating a greater negative impact on test performance compared to the other factors (Deffenbacher,

1980; Hembree, 1988; Liebert & Morris, 1967). Worry is a cognitive state characterized by a lack of confidence in one's ability to perform well and a fear that this inadequacy will be staged for others to witness and evaluate. Dwelling on these thoughts is held to be the most detrimental to performance during evaluative situations (i.e., testing). It is hypothesized that worry contributes to cognitive interference, interrupting testing during the preparation stage as well as concentration and recall during testing (Deffenbacher, 1980; Hembree, 1988; Liebert & Morris, 1967).

Researchers continued to suggest that TA is even more multidimensional, consisting of more than four factors. For example, other possible dimensions include Social Derogation (i.e., fear of social humility; Friedman & Bendas-Jacob, 1997) and consideration of the Yerkes-Dodson Law (1908), in which mild physiological and mental arousal is known to actually facilitate test performance (Alpert & Haber, 1960). A recently developed measure of TA, the Test Anxiety Inventory for Children & Adolescents (TAICA; Lowe, Lee, Witteborg, Prichard, Luhr, Cullinan et al., 2007) includes four debilitating factors (i.e., Cognitive Obstruction/Inattention, Physiological Hyperarousal, Social Humiliation, and Worry), a facilitating factor (i.e., Yerkes-Dodson Law), and a lie scale. Although researchers continue to refine the construct of TA, there appears to be agreement that Worry, Cognitive Interference, Emotionality, and Lack of Confidence represent core features of TA. Despite adequate concordance among researchers associated with the construct of TA, opinions vary with regard to where TA fits within the general classification of anxiety disorders.

Test anxiety within the context of anxiety disorders. Test Anxiety is not recognized as an official *DSM-IV-TR* diagnosis, but the debilitating symptomatology associated with TA is well documented. TA is characterized by worry, tension, test-irrelevant thinking, and physiological symptoms that impede one's performance in a testing situation, including regular evaluation of skills (Gierl & Rogers, 1996; Hancock, 2001; Hembree, 1988; Sarason, 1981; Sena, Lowe, & Lee, 2007) and standardized achievement test performance (Everson, Millsap, & Rodriguez, 1991). In a study by Cassady (2004), the cognitive components associated with TA (i.e., worry and test-irrelevant thinking) were positively related to poor study skills, poor note taking, and poor test performance. Individuals reporting high TA also reported higher learned helplessness attributions upon reflecting on their performance (CITE). Students suffering with test-anxious symptomatology even struggle prior to evaluation, during the learning phase of new material (Chapell et al., 2005). This may be linked to factors such as decreased motivation, compromised concentration, and low self-appraisals, which have all been associated with higher levels of TA (Swanson & Howell, 1996). Other risk factors associated with high TA include grade retention (Hembree, 1988), school drop out (Tobias, 1979) and comorbidity with clinically significant DSM disorder classification (King, Mietz, Tinney, & Ollendick, 1995). For example, Beidel and Turner (1988) demonstrated that 60% of test-anxious students with average intelligence between the ages of 8 and 12 met *DSM-III* criteria for an anxiety disorder, mainly social phobia and overanxious disorder. These findings are particularly concerning due to the well-established correlation between anxiety and stress disorders with depression (King,

Ollendick, & Gullone, 1991; King et al., 1995; Strauss, Last, Hersen, & Kazdin, 1988), as well as adolescent suicide (Rosenberg, Smith, Davidson, & Conn, 1987; Spirito, Brown, Overholser, & Fritz, 1989). TA among children and adolescents is clearly associated with clinically significant disorders that are recognized by the *DSM-IV-TR* classification schema. Despite this, it is not clear whether severe TA would be best represented as a sub-type within an already existing *DSM*-based anxiety disorder, or if it should be represented by a separate category on its own.

The classification of Test Anxiety within the *DSM* schema designated for anxiety disorders has been the focus of much debate, although very little research has been directed toward resolving the issue (Beidel & Turner, 1988; McDonald, 2001; Hall, 2005). Most experts suggested that TA is best categorized as a subtype of Social Phobia (Beidel & Turner, 1988; McDonald, 2001). The rationale stems from comparisons of research directed toward investigating the fundamental properties of TA as a construct with *DSM* criteria of Social Phobia. The *DSM-IV* (American Psychiatric Association, 1994) defines *Social Phobia* as fear and subsequent avoidance of social situations, especially when the situation involves social scrutiny and interaction with unfamiliar people. The *DSM-IV* distinguishes specific and general subtypes of Social Anxiety, to which the extent of pervasiveness is central to diagnosis. The general subtype is designated to individuals with widespread social fears, whereas the specific subtype is reserved for individuals whose social anxiety occurs in fairly circumscribed social situations. Similarly, a key component of TA is also fear of negative evaluation by others (Beidel & Turner, 1998; Zatz & Chassin, 1985). As such, it has been suggested that TA

is a specific subtype (i.e., not the general subtype) of Social Phobia, which manifests when skills or knowledge is subject to evaluation by others (Beidel & Turner, 1988; McDonald, 2001). However, this issue remains debatable. One empirical evaluation of the relationship between TA and Social Phobia among undergraduate students demonstrated similar characteristics between the two groups (e.g., avoidance and fear), but the TA symptomatology was simply not severe enough to warrant classification as a specific subtype of Social Phobia (Hall, 2005). This researcher concluded that TA should be classified as a separate condition. Before TA finds its place within the *DSM* classification scheme, more research must be directed toward the resolution of this issue.

Epidemiology of test anxiety. The extant literature aimed at gauging TA prevalence among the general population of school-aged children yields several defendable conclusions. To summarize, TA is a widespread condition that seems to be on the rise and tends to manifest more or less commonly as a function of various demographics represented in schools. Studies aiming to determine TA prevalence in schools suggested that over 30% of school-aged children suffer from TA symptomatology (Hill, 1984; Shaked, 1996). Compared to early studies that yielded prevalence rates between 10% (Kondas, 1967) and 20% (Eysenck & Rachman, 1965), the more recent data seems to suggest that the prevalence of TA has risen over the last 4 decades.

Clear conclusions regarding the prevalence of TA as a function of demographic variables are difficult to establish. One's gender, however, seems to impact prevalence rates in a consistent manner across multiple studies. The results indicated that females

are more likely to report significant TA compared to males (Ferrando et al., 1999; Gierl & Rogers, 1996; Hembree, 1988; Seipp & Schwarzer, 1996; Wren & Benson, 2004; Zeidner & Schleyer, 1999). The most compelling of these studies was the meta-analytic research by Seipp and Schwarzer (1996), in which females reported higher TA symptomatology across 11 of 12 countries (i.e., China was the exception). Zeidner (1998) suggested that females are more emotionally sensitive, and therefore fear negative consequences in response to evaluation.

Race is another important demographic variable. Meta-analytic research (Hembree, 1988) suggested that minorities (i.e., African American and Hispanic) reported higher TA symptoms compared to Caucasians. The prevalence rate for minorities is estimated to be around 40% (Turner, 1993). Although this is higher compared to Caucasians (i.e., over 30%), the difference is not statistically significant across all studies (Hall, 2005). It is also important to consider variation in levels of TA across age. The developmental course of TA appears to increase slowly in the early school years, then levels off and eventually decreases in later school years. Studies vary, however, in regard to exactly when this occurs. Hembree (1998) suggested that a sharp increase occurs at grades 3 to 5, stabilizes in secondary school, and decreases in college. Manly and Rosemire (1972) suggested that TA prevalence is highest at the junior high level compared to senior high. Perhaps most importantly, negative behavioral and cognitive effects associated with untreated TA (e.g., poor motivation, negative self-evaluation, poor concentration, test performance, grade retention rates, and school drop

out) are thought to get worse over time (Hill & Horton, 1986), contributing to more serious mental health diagnoses (Beidel & Turner, 1988; Swanson & Howell, 1996).

Comorbidity with test anxiety. TA is known to be comorbid with *DSM*-based anxiety disorders, as well as other sub-clinical conditions. Beidel and Turner (1988) determined that 60% of TA individuals also met *DSM-III* criteria for an anxiety disorder, including Social Phobia, Overanxious Disorder, Simple Phobia, and Separation Anxiety Disorder. Students with learning disorders are also at a high risk for developing TA. Hancock (2007) suggested that students with learning disorders are more likely to be threatened by evaluation of learning. Although it is logical to assume that students with learning problems in general would be more likely to worry about evaluation of school achievement skills, the TA symptoms that are generated compound with problems associated with cognitive processing problems, thereby contributing to performance problems of a greater magnitude than predicted by the learning disability alone (Swanson & Howell, 1996). Heiman and Preiel (2003) demonstrated that students with learning disorders have more concentration difficulties in evaluative situations compared to non-learning disordered peers. Sena, Lowe, and Lee (2007) determined that students with learning disorders demonstrated high cognitive obstruction/inattention and worry scores. The result can be a continuous cycle of TA symptomatology due to ongoing negative experiences associated with evaluation of learning and expected failure (Phillips, Pitcher, Worshan, & Miller, 1980). As such, students with learning disabilities not only have to battle information processing challenges; they also have to battle anxiety while engaging in testing.

TA has also been linked with avoidance motivation and generally low motivation (Folkman et al., 1986; Swanson & Howell, 1996), maladaptive self-evaluation and poor concentration (Swanson & Howell, 1996), maladaptive attributions associated with learned helplessness (Cassady, 2004), and maladaptive emotional coping (Folkman et al., 1986; Rohrle, Linkenheil, & Graf, 1990). High levels of TA are linked with poor academic performance (Bedell & Marlowe, 1995; King et al., 2000), grade retention (Beidel & Turner, 1988; Hembree, 1988), and leaving school prior to graduation (Tobias, 1979). A meta-analysis combining the results of 562 TA studies reported an inverse relationship between TA and student self-esteem, whereas direct associations were supported for TA and fears of negative evaluation, defensiveness, and general anxious symptomatology (Hembree, 1988). Furthermore, and perhaps most pertinent, there is a well-established inverse relationship between significantly high levels of TA and student testing performance (Everson et al., 1991; Hancock, 2001; Hembree, 1988).

Due to the fact that most of the relationships outlined above were based upon correlational analyses, it is difficult to draw conclusions regarding causality. What can be concluded from the extant literature is that TA is comorbid with a variety of *DSM*-based clinical disorders, as well as many sub-clinical conditions, all requiring intervention (e.g., classroom adaptations, psychological intervention, medical treatment). As such, assessment and identification of TA is of paramount importance toward the facilitation of appropriate and comprehensive supports.

The assessment of test anxiety. The development of instruments currently used in the evaluation of TA has relied exclusively on self-reports (Zeidner, 1998). Zeidner

(1998) cited a number of reasons for this trend. For one, self-raters are thought to be more capable than outside observers to report on their internalizing symptomatology. In support of this argument, research has established that children tend to report more internalizing symptoms than parents (Angold et al., 1987; Edelbrock et al., 1986). From this, it is suggested that children may better be able to gauge internal distress (e.g., symptoms of anxiety) than outside observers. Conversely, research has also suggested that outside observers may over-report or under-report anxious symptoms as a function of a number of variables. For example, mothers under high stress are found to rate higher child behavior problems than those with low stress levels (Briggs-Gowan, Carter, & Schwab-Stone, 1996; Vernhulst & van der Ende, 1992). Parent and child gender may also impact rating patterns, although the findings have been inconsistent. Higher concordance has been found between boys and parents compared to girls and parents (Angold et al., 1987; Verhulst & van der Ende, 1992). On the other hand, Herjanic, Herjanic, Brown, and Wheatte (1975) demonstrated higher concordance ratings between parents and daughters. Due to the inconsistent research findings pertaining to concordance patterns, little has been established in regard to how demographics might bias the direction and compromise the validity of informant reports of anxiety. Other reasons for using self-rating scales, according to Zeidner (1998), relate to the fact that they have been psychometrically sound, have been cost-efficient to reproduce, and time-efficient to administer. From the perspective of a practitioner, these are obviously desirable qualities for any assessment instrument.

A self-reporting approach is not, however, standard in the broad scheme of anxiety measurement. Typically, anxious symptomatology is assessed within a multi-informant assessment framework, whereby self-reports are compared to observations made by parents, teachers, and other sources (Jensen et al., 1999; Kazdin, 1986; Kendal & Flanery-Schroeder, 1998; Ollindick, 1986) and normally obtained by way of structured or semi-structured interviews. This allows clinicians to understand the impact anxious symptomatology has in various settings and from various viewpoints. Such an approach has developed as a result of experimental evidence that suggests that anxious symptomatology is poorly gauged by those who suffer with anxious symptoms. For example, youths demonstrating elevated levels of anxiety are thought to have more self-presentation concerns which may lead to a tendency to respond in accordance with how they feel they will be judged (Dadds, Perrin, & Yule, 1998; Kendall & Flannery-Schroeder, 1998). Furthermore, Vasey and MacLeod (2001) suggested that anxious symptomatology can compromise cognitive processes related to memory, and as such, may have an impact on tasks for which accuracy is important. These factors could easily impact a child's ability to provide accurate ratings of his or her own symptomatology thereby, raising concern in regard to the exclusive use of self-report inventories of TA. Based on this research, self-rating scales for anxiety would be least effective at gauging the symptomatology of those suffering the most from anxiety. As such, expanding the sources of information for assessment purposes appears highly appropriate.

As noted above, there is ample evidence to suggest that relying exclusively on one informant's data is likely not ideal, although the use of a multi-informant approach also

presents challenges. Anxious children's reports are thought to be influenced by self-preservation concerns (Dadds et al., 1998; Kendall & Flannery-Schroeder, 1998) and problems with memory retrieval (Vasey & MacLeod, 2001). Furthermore, parent stress/mental state (Briggs-Gowan et al., 1996; Vernhulst & van der Ende, 1992) and parent gender (Angold et al., 1987; Herjanic et al., 1975; Verhulst & van der Ende, 1992), among other factors, may serve to bias ratings of anxious symptoms and lead to discordance among informants. When this occurs, it is often difficult to know which informants to consider most seriously. This is a very common occurrence. In fact, conflicting reports in the assessment of anxiety is the norm, as studies clearly indicate: Parent-child agreement regarding child behavioral and emotional symptomatology is very low. This is true for diagnostic agreement by interview (semi or structured; Angold et al., 1987; Eldebrock et al., 1986; Grills & Ollendick, 2003; Herjanic & Reich, 1982; Kashani et al., 1985; Rapee, Barrett, Dadds, & Evans, 1994; Reich, Herjanic, Welner, & Grandhy, 1982) and when using rating scales (Achenbach et al., 1987; Krain & Kendall, 2000; Stranger & Lewis, 1993). With continuous measures, correlations range from $r = .15$ to .35, whereas for diagnostic/interview methods, they range from $k = .10$ to .40. This trend is demonstrated to be particularly low for childhood anxiety (parent-child; Choudhury, Pimentel, & Kendall, 2003; DiBartolo, Albano, Barlow, Heimberg , 1998; Grills & Ollendick, 2002; Rubio-Stipek et al., 1994). From the evidence presented, it is clear that whether one draws from one source or several, challenges will ensue.

Despite the problem of determining which informant's reports reflect the situation most accurately when using a multiple-source method of data collection, it is still likely a

better method than relying on one data source. The value of using a multi-informant approach lies in how it allows practitioners to further investigate situations for which great discrepancies between informants exist. Without discordance, the additional reports are simply redundant, contributing no new information to the practitioner. Multiple sources are used to provide data either on independent variables (risk factors or predictors), or dependent variables (outcomes), or both. This approach is applied by a number of popular behavioral assessment instruments. For example, the Behavior Assessment System for Children, Second Edition, applies a triangulation technique (i.e., parent, teacher, and self-rating) to collect data about a child's behavior (Kamphaus & Reynolds, 2005). This is considered to be an effective way to attain a broader and more balanced understanding of the child's behavior (e.g., anxiety, depression, conduct problems, etc.), compared to the self-rating assessment alone. In the realm of anxiety assessment, this is thought to help decrease the likelihood that internalizing symptoms go unrecognized, or in other words, to reduce the chance of false negatives during the phase of identification. As such, a multi-informant approach may facilitate early identification and intervention, as well as impede the potentially escalating course and generalizability of anxious symptomatology.

Issues with respect to the assessment of test anxiety. One concerning issue with respect to the assessment of TA is that the standardized measurement of this construct relies exclusively upon self-report instruments, or instruments which measure a broad range of behaviors (e.g. BASC-II). This is contrary to the standard clinical practice of collecting data from multiple sources when seeking to understand the extent

of childhood anxiety symptoms (Jensen et al., 1999; Kazdin, 1986; Kendal & Flanery-Schroeder, 1998; Ollindick, 1986). Typically, a multi-informant assessment includes reports from parents and teachers, as well as self-reports from children. This allows practitioners to understand the impact anxious symptomatology has in various settings, as well as how it is perceived from various viewpoints. This is important because research demonstrates that the mere presence of anxiety is known to have a biasing impact on self-rated response patterns. For example, youths demonstrating elevated levels of anxiety are thought to have more self-presentation concerns, which may lead to a tendency to respond in accordance with how they feel they will be judged (Dadds et al., 1998; Kendall & Flannery-Schroeder, 1998). Furthermore, Vasey and MacLeod (2001) suggested that anxious symptomatology can compromise cognitive processes related to memory, and as such, may have an impact on tasks where accuracy is important. As noted, such factors impact a child's ability to provide accurate ratings of his or her own symptomatology. Therefore, self-rated assessment of anxious symptomatology does not seem ideal.

The multi-informant assessment procedure was developed to help counterbalance the potential biases associated with anxiety that may confound self-rater response patterns. With current assessment procedures for TA, practitioners have only the ability to compare accounts and observations of multiple informants by way of comparing self-report scales and reports from parents and teachers through interviews. The BASC-2 (Reynolds & Kamphaus, 2004) measures TA across multiple informants, but the instrument's constructs were not derived through factor analysis and do not account for

the factor subcomponents supported in research (i.e., Worry, Emotionality, Interference, and Lack of Confidence (Hodapp, 1991, 1995) and is a broad measure. There is no specialized procedure to compare ratings of TA across multiple informants using a standardized assessment approach common to all parties. As such, there appears to be some merit in examining the utility of a multi-informant approach to the assessment of TA. Prior to engaging in such a task, however, efforts must be undertaken to account for potential changes to the TA factor components that were identified solely through analyses of self-rated reports. Any changes in these core factors would threaten the currently accepted model of TA within the context of a multi-informant assessment system. This issue defines the preliminary question associated with the task of extending TA scales toward inclusion of multiple raters: Can the current four-factor model of TA be validated across all informants? Construct validity seeks agreement between a theoretical concept and a specific measuring device or procedure (Carmines & Zeller, 1979). The validation of the theoretical construct of TA, and its core subcomponents, has been based solely on the assessment of TA symptomatology from the perspectives of those experiencing symptoms. Since the construct of TA is based only on self-reports, the chance that the magnitude of symptoms will be over-reported or under-reported is increased. As such, it must not be assumed that a multi-informant assessment system of TA would be accurately represented by the same factor components as those derived from self-rating scales.

Nature of the Problem and Purpose of the Study

There has never been a comprehensive study of how stressful school events relate to levels of TA. Remaining consistent with the TMSC, such an evaluation is critical to fully understanding the origins of symptomatic manifestations of TA among adolescent students. The scientifically derived model of school stress proposed by Helms and Gable (1989) offers a concise list of some very important potential sources (i.e., academic stress, student-teacher interactions, student-peer interactions, academic self-concept) and manifestations (i.e., emotional, behavioral, physiological) of school stress that may relate in some way to the development of TA among students.

With regard to academic stress, increases in reported rates of TA in schools has risen with the implementation of more testing (Casbarro, 2005). This is very concerning, as educational reform initiatives may actually be having the paradoxical effect of impeding testing performance in an era when so much is dependent upon meeting an expected achievement standard. The TMSC would predict that high academic stress would precipitate student anxiety. Considering the high levels of test-related academic stress, a positive linear relationship with TA seems very likely. This relationship, however, has never been investigated through research.

Stressful student-teacher interactions could also impact student TA. Although no studies demonstrate direct relationships between teacher stress and student stress, research clearly supports that teacher expectations impact student achievement, behavior, and self-esteem (Brophy & Good, 1986; Conway, 1989; Fuchs, Fuchs, & Norris, 1994; Kornblau & Keogh, 1980), all factors which are clearly linked to student anxiety. It is

conceivable that students who experience negative interactions with their teachers would perceive that these teachers have lower expectations with regard to academic testing performance. As such, the TMSC would predict that negative student-teacher interactions would lead to higher levels of student TA.

It is also possible that stressful Student-Peer Interactions impact levels of TA. Folkman and Lazarus (1985) conducted a study of coping strategies at various phases of exam anxiety (i.e., anticipatory, waiting, and outcome). It was determined that students seek social supports to help with preparation and emotional comfort. This is considered an important coping strategy to offset the negative symptomatology of anxiety, and particularly TA in schools (Zeidner, 1998). It is possible that students experiencing elevated levels of stress (e.g., evaluative stress) may not be able to access school-based support systems (i.e., friends) to assist in the coping process. Anxiety research has not established what, if any, impact social stressors have on the reported degree of TA.

School stress associated with poor academic concept may also contribute to TA among adolescents. Studies exploring TA among students with learning disabilities have demonstrated some of the highest rates of TA symptoms, exceeding 40% (Lufi et al., 2004). There are also established links between TA and maladaptive self-evaluation (Swanson & Howell, 1996), maladaptive attributions associated with learned helplessness (Cassady, 2004), and maladaptive emotional coping (Folkman et al., 1986; Rohrle et al.,1990). A meta-analysis combining the results of 562 TA studies reported an inverse relationship between TA and student self-esteem, whereas direct associations were supported for TA and fears of negative evaluation, defensiveness, and general anxious

symptomatology (Hembree, 1988). It is very possible that TA levels would vary as a function of academic self-concept.

As noted above, the construct of TA has been well-linked to various emotional, behavioral, and physiological responses (Zeidner, 1998). What is not known, however, is the degree by which manifestations of general school stress impact upon ratings of TA. Furthermore, it would be interesting to determine whether any variation exists between specific categories of emotional, behavioral, and physiological responses to general school stress and the reported levels of TA.

Whether school stress plays a role in the development of TA is a question of significant and practical importance, emphasized by its implications for the development of early intervention and management strategies. Focusing on stressful experiences that are common among adolescents and demonstrating how these experiences relate to TA may facilitate the development of practical intervention by school personnel. This approach can help identify specific environmental targets of interest in the development of functional behavior plans and school environments that are conducive to successful test preparation and test taking among adolescents.

The current study also sets out to examine the construct validity of TA by testing the four-factor model across a group of adolescents, as well as across multiple raters. Previous research has demonstrated a four-factor structure for the construct of TA using the TAI-G in a sample of university students (Hodapp, 1991, 1995). As such, this study will examine the factor structure of TA using the TAI-G within a sample of students from grades 7 through 12. The factor structure will also be examined across multiple raters

(i.e., students, teachers, parents) of student TA. If a multi-informant rating system is to be applied to school-aged children using the TAI-G, it will be important to determine whether or not the four-factor structure is maintained within a sample of students from grades 7 through 12, as well as across multiple raters. This will provide some evidence for or against TA construct validity beyond the university student self-rated TAI-G and across alternative informants (i.e., parent, teacher). In addition, this study intends to examine sex differences with respect to TA in order to confirm or disconfirm previously reported gender findings of test anxiety. Moreover, age differences across the student group with respect to TA and its factors will also be examined as past research examining age has been inconclusive relative to age-specific ratings of test anxiety. Finally, the type and degree of various school-based stressors and manifestations of school stress and their relationship to TA will be investigated. This will provide important information with respect to the impact of school stress on TA.

Questions Addressed

1. Is the factor structure of the English version of the TAI-G, child self-report, maintained within a student sample from grades 7 through 12, as well as across parent and teacher ratings of grade 7 through 12 students' TA?
2. a) Do TAI-G subscale and Total scores differ as a function of demographic variables (i.e., age, sex, grade)?

   b) Do TAI-G subscale and Total scores differ as a function of type of Informant (i.e., student, parent, teacher)?

3. What is the frequency of students scoring significantly elevated levels of TA (i.e., one standard deviation or more above the mean) across all informant samples (i.e., students, parents, teachers)?
4. Does TA within the significantly elevated TA group (i.e., as identified by TAI-G student, parent, and teacher reports) vary as a function of demographic variables (i.e., age and/or sex)?
5. Do student rated TAI-G subscale and Total scores demonstrate relationships with SSS subscales?
6. Do teacher and parent rated TAI-G subscale and Total scores demonstrate relationships with SSS subscales?

Hypotheses

1) It is predicted that the factor structure identified for the TAI-G student self-report among university students (Hodapp & Benson, 1996) will be maintained for students from grades 7 through 12 and across TAI-G ratings of student TA by their parents and teachers. Studies aiming to determine TA prevalence in schools suggest that over 30% of school age children suffer from significant TA symptomatology (Hill, 1984; Shaked, 1996). This is comparable to lifetime prevalence data for any anxiety disorder among young adults (i.e., 28.8% for adults 18 to 29 years of age; Kessler et al., 2005).

2) a) It is predicted that TAI-G subtest and Total score ratings will differ as a function of demographic variables (i.e., age, sex, grade). Studies clearly indicate that being female places one at a substantially higher risk for developing an anxiety disorder

(Kessler et al., 1994; Lewinsohn et al., 1998). This is also true for TA (Ferrando et al., 1999; Gierl & Rogers, 1996; Hembree, 1988; Seipp & Schwarzer, 1996; Wren & Benson, 2004; Zeidner & Schleyer, 1999). It is predicted that females will endorse symptoms of TA to a higher degree than males. Studies vary, however, with regard to conclusions about how age impacts ratings of TA (Hembree; 1998; Manly & Rosemire, 1972). As such, it is only predicted that TA will vary as a function of age. Since students of comparable ages will be grouped with students of comparable grades, it is predicted that grade level will impact TA ratings in a manner that is consistent with age.

b) It is predicted that parents and teachers will endorse higher levels of student TA than the student self-reports of TA. Experimental evidence suggests that anxious symptomatology is under-rated by those who suffer with anxious symptoms. Youths demonstrating elevated levels of anxiety are thought to have more self-presentation concerns, which may lead to a tendency to respond in accordance with how they feel they will be judged (Dadds et al., 1998; Kendall & Flannery-Schroeder, 1998).

3) It is predicted that the frequency of participants scoring significantly elevated TA (i.e., one standard deviation or more above the mean) will fall within 10% to 30% of the student sample. Studies aiming to determine TA prevalence in schools have suggested that between 10% and 30% of school-aged children suffer from significant TA symptomatology (Eysenck & Rachman, 1965; Hill, 1984; Kondas, 1967; Shaked, 1996).

4) TA within the high-TA group will differ as a function of age and sex demographics across all informants (i.e., students, parents, and teachers). As noted in Hypothesis 2, being female places one in a significantly higher risk category for developing TA. Research is less consistent with regard to the relationship between age and TA. As such, it is predicted that females will demonstrate a higher prevalence of significantly elevated TA. TA will also vary as a function of age.

5) It is predicted that student-rated TAI-G subscale and Total scores will demonstrate relationships with SSS subscales. Consistent with the Transactional Model of Stress and Coping (Lazarus & Folkman, 1984), stressful experiences precipitate anxious symptomatology. Considering that school stress represents the major source of stress among children and adolescents (Armacost, 1989; Barrett & Heubeck, 2000; Green, 1988; McGuire et al., 1987; Omizo, Omizo & Suzuki, 1988; Sheridan & Smith, 1987; Stark et al., 1989;) and that written tests represent the greatest source of school stress among children (Romano, 1997; Ryan-Wenger et al., 2005; Skybo & Buck, 2007; Taxis et al., 2004), it is expected that a positive linear relationship will be established between TA and SSS subscales.

6) For the reasons outlined in Hypothesis 5, positive linear relationships will be established between parent and teacher rated TAI-G subscales and Total scores and the subscales of the SSS.

Chapter Three: Method

Introduction

The following chapter outlines the research design of this study, the data source, participants, measures, and data analysis procedures used to address the specific research questions stated in Chapter 2. After presenting the research design, a detailed description of participants will be outlined. Following this, a description of psychometric instruments will be presented, including psychometric properties. Finally, the chapter will close with a discussion regarding data analysis procedures applied to investigate each research question outlined in Chapter 2.

Research Design

The design of this study is primarily cross-sectional (i.e., participants were not followed across time). Confirmatory Factor Analyses (CFA) was applied to determine whether the four-factor structure identified for the TAI-G, student self-reports, would be maintained for the Canadian adolescent sample, as well as parent and teacher informants. CFAs were also applied to examine alternative models of TA within a multi-informant framework. These models were all determined by previous literature (Hodapp & Benson, 1997). Correlational analysis was applied to determine the strength and variation of relationships between the informant (i.e, students, parents, teachers) and the various subscales and total scores on the TAI-G and the SSS. Correlational analyses were also applied to gauge relationships between these ratings with demographic variables (i.e., age, sex, grade). The design also applied MANOVA analyses to determine whether TAI-G and SSS scores were subject to variation as a function of sex and grade level, as well as

repeated measures analysis of variance to determine whether TAI-G scores were subject to variation as a function of age and informant (i.e., student, parent, teacher). The use of repeated measures analysis of variance was deemed appropriate because the three informants rated TA for a particular student and the three versions of the TAI-G were considered parallel forms of the TAI-G and, therefore, not independent. Multiple regression analyses were conducted on the student samples designating all SSS subscales, sex and age as predictors, and all TAI-G subscales and Total score as criterion variables. Multiple regression analyses were also conducted on the parent and teacher data, designating all SSS subscales, sex, and age as predictors, and only TAI-G Total scores as criterion variables.

Sample. Participants for the study were grades 7 through 12 students from the Cape Breton-Victoria Regional School Board, Cape Breton Island, Nova Scotia. Participants were randomly selected from a volunteer pool. When possible, the study also included one of each student's legal guardians, and one of their teachers. The final analysis was conducted with the participation of 270 students (38.4%), 267 parents (37.9%), and 167 teachers (23.7%). Demographic characteristics of the student sample were determined for sex, age, and grade. This analysis revealed that slightly more females (i.e., approximately 57.4%) than males (i.e., approximately 42.6%) took part in the study. The age range for students fell between 12 (7.2%) and 19 (1.1%). Participating schools included 10 junior high schools (i.e., grades 7 to 9) and 5 high schools (i.e., grades 9 to 12). As such, representation was slightly more than twice that for younger/junior high (i.e., approximately 68.3%) students compared to older/senior

high (i.e., approximately 31.7%) students (See Table 1). Demographic characteristics of age and sex were not determined for parents and teachers.

Measures. Student TA was assessed using the English version of the German Test Anxiety Inventory (TAI-G; Hodapp & Benson, 1997; see Appendix A). Studies have suggested that this instrument is psychometrically sound. Confirmatory factor analysis (Hodapp & Benson, 1997) supported the Lieber and Morris (1967) dimensions of TA (i.e., Worry and Emotionality), as well as Sarason's (1984) Interference, and Carver and Scheier's (1984) Lack of Confidence among a sample of university students. The original Test Anxiety Index (TAI; Spielberger, 1977, 1980) drew upon a normative sample of students from grades 8 through 12, as well as college-aged students. The TAI-G is purported to have strong psychometric properties among college-aged students, as well as mixed samples consisting of college-aged and adolescent students, with each of the four factors (i.e., Worry, Emotionality, Interference, and Lack of Confidence) demonstrating reliability and validity among German and American populations (Hodapp, 1991, 1995; Hodapp & Benson, 1997; Keith et al., 2003; Musch & Broder, 1999; Stober, 2004). Studies analyzing criterion validity consistently report that the Worry factor bears the strongest negative relationship with testing performance compared to other factors (Deffenbacher, 1980; Morris & Liebert, 1969; Seipp, 1991; Zeidner, 1998). Total scores and subscales demonstrate alpha coefficients, ranging from .79 to .94, providing adequate evidence of internal consistency (Hodapp, 1991). Studies have not, however, been conducted with adolescent English-speaking Canadian students. As such, the TAI-G was examined to determine if the four-factor structure would hold

among English-speaking Canadian students from grades 7 through 12 and across multiple raters of student TA (i.e., students, parents, and teachers). The wording of each item of the TAI-G self-report was slightly altered by the researcher to develop the parent and teacher versions. For example, instead of "I worry," the item will state "your child worries," or "this student worries" (see Appendices B and C). Permission to make these alterations has been granted by the author, Dr. Volker Hodapp, through email correspondence.

For the current study, Table 4 presents descriptive statistics (i.e. number of participants, raw score means, standard deviations, ranges) for each of the TAI-G subscales (i.e., Worry, Emotionality, Lack of Confidence, and Interference) as well as the TAI-G total score for each of the three samples (i.e., students, parents, and teachers). To assess the normality of the scales, skewness and kurtosis values were computed. Skewness and kurtosis values between the values of -2 and +2 are considered acceptable (Bachman, 2004). All of the skewness and kurtosis values were well within the acceptable range for all TAI-G scales for all samples. Almost all of the values were between -1 and +1, with just a few of them with absolute values greater than 1.0. Cronbach's alpha internal consistency reliabilities for the TAI-G scales are presented in Table 4. Reliabilities should be above .70 to be considered acceptable (Cronbach, 1951). All reliabilities for all TAI-G scales for all three samples were above .70.

Student stress was assessed using the School Situation Survey (Helms & Gable, 1989), a 34-item self-report measure designed for students in grades 4 through 12 and, therefore, has undergone normative procedures for use with junior high and high school

students. Seven scales comprise this instrument. Four of the scales assess sources of school stress (i.e., teacher interactions, academic stress, peer interactions, and academic self-concept), whereas the others measure manifestations of school stress (i.e. emotional, behavioral, and physiological manifestations). Within the domain of Sources of Stress, Helms and Gable (1989) define teacher interactions as students' subjective perceptions of the attitudes teachers have developed towards them. Academic stress gauges students' feelings towards their academic performance. Peer interactions gauges student-peer relationships and perceptions of the feelings peers have developed towards them. The subscale academic self-concept is designed to assess personal feelings of self-worth, self-esteem, and self-concept with regard to student academic efficacy. Within the domain of Manifestations of Stress, Helms and Gable (1989) define emotional manifestations as a measure of feelings (e.g. shyness, fear). This differs from the traditional definition typically assigned to the concept of emotionality within TA research, where physiological symptoms are the focus. Helms and Gable (1989) include a specific category within this domain, physiological manifestations, which account for such symptoms (e.g. nausea, rapid heart beat). The final subscale within the Manifestations domain is behavioural manifestations, assessing overt actions or reactions towards others (e.g. striking out, demonstrating disrespect).

As outlined in the manual, this instrument demonstrates adequate psychometric properties supporting its dimensional structure, as well as yielding evidence for reliability, validity, and internal consistency (Helms & Gable, 1989). In terms of internal consistency, alpha coefficients for the subscales range from .68 to .80. Test-retest

reliability coefficients obtained over a 3-week period ranged from .61 to .71. As noted by Phelps (1995), it is important to point out that the SSS is a measure of emotion that is subject to variability over time. As such, these correlations can be considered supportive of test-retest stability. In terms of validity, the manual reports factor analytic findings supporting the seven-scale structure of the measure. Convergent validity was assessed with the State-trait Anxiety Inventory for Children, yielding low to moderate coefficients which ranged from .10 to .71 (Coladarci, 1995).

For the current study, Table 4 presents descriptive statistics for each of the SSS subscales for the student sample. As for the TAI-G scales, skewness and kurtosis values were computed to test for the normality of the SSS distributions. All of the skewness and kurtosis values were well within the acceptable range for all SSS subscales. Again, almost all of the values were between -1 and +1, with just a few of them with absolute values greater than 1.0. Cronbach's alpha internal consistency reliabilities for the SSS subscales are presented in Table 5. Almost all reliabilities for the SSS subscales were above .70 with the exceptions of Behavioral Stress (α = .62) and Physiological Stress (α = .63), which were slightly lower.

Procedure. Upon being granted permission from the school administration of the Cape Breton-Victoria Regional School Board, the principals of all junior high and secondary level schools were asked to participate in the study. In order to inform the teaching staff of all cooperating schools, a short description of the study, including time required and their contributions was given at each school's monthly staff meeting by the principals. The right to decline participation was made clear. Student and parent consent

forms were then distributed through school mail or hand delivered through a research assistant (see Appendices D and E). All participating teachers returned consent forms to the researcher via school mail or research assistant.

Once permission from parents, students, and teachers was obtained, one student from each class was randomly selected for participation. The homes of participating students and their parents were contacted via phone by the researcher and two research assistants. The student scales and the parent scales were administered over the telephone after a session of practice trials during which all research assistants and the researcher agreed upon a specific framework within which to make introductions and administer the scales via telephone. Using telephone correspondence was a necessary condition required by the school board. The requirement ensured that any disruption of student time during school hours was eliminated. The teacher scales were also administered by telephone. In order to achieve this, schools were called and messages were left for teachers to call back during spare time. This was also necessary in order to reduce disruption of teacher time during work hours. One consequence of this requirement was some loss of participants. A number of teachers did not return calls. Some loss of student and parent participants was also suffered. Ultimately, however, there were sufficient numbers of participants to conduct the study.

To protect the privacy of participants, student, parent and teacher names were recorded on consent forms only. These names were used for contact purposes only. All student consent forms were assigned numbers. Each student number was used for matched parents and teachers. Each data set (i.e., teacher, parent, student surveys)

obtained from group members (i.e., student, teacher, parent) were organized and grouped according to this number. Once contact was established with participants and data was collected, consent forms, with identifying information, were separated from the data and stored securely in a locked cabinet. The identifying data was then only used in a drawing for one of eight prizes of $50.00, designed to compensate participants for their participation. Schools were also offered in-servicing to staff and students about school stress and anxiety upon completion of the project.

Chapter Four: Results

Introduction

The following chapter of results begins by outlining the characteristics of the sample. The results of CFA analyses investigating Hypothesis 1 were then outlined followed by a description of descriptive statistics (i.e., N, M, SD, and Range) and reliabilities (i.e., Cronbach's alpha). Hypotheses 2 through 6 are then presented, which outline relationships between sex, age/grade, and informant (i.e., student, parent, teacher) with TAI-G and SSS subscales, as well as predictions of TAI-G subscales from SSS subscales and demographic variables.

Sample Characteristics

The results of this study were based on a sample of 270 junior and senior high students (i.e., grades 7 through 12) from the Cape Breton-Victoria Regional School Board on Cape Breton Island, Nova Scotia. Demographic information for the student sample is presented in Table 1. The student sample included slightly more females (57.4%) than males and more junior high (68.3%) than high school students. One of each student's legal guardians and one of each of their teachers were also asked to participate. This process yielded 267 parents and 167 teachers toward the overall number of 704 student, parent, and teacher participants.

Hypotheses and Findings

Hypothesis 1. Hypothesis 1 predicted: The factor structure identified for the TAI-G, student self-report, would be maintained for students from grades 7 through 12 and across TAI-G ratings of student TA by their parents and teachers. Previous analyses

Table 1

Demographic Characteristics of the Students

	Frequency	*Percent*
Sex ($N = 251$)		
Male	107	42.6
Female	144	57.4
Age ($N = 264$)		
12	19	7.2
13	49	18.6
14	58	22.0
15	59	22.3
16	33	12.5
17	18	6.8
18	25	9.5
19	3	1.1
Grade ($N = 262$)		
7	54	20.6
8	50	19.1
9	75	28.6
10	33	12.6
11	21	8.0
12	29	11.1

Table 1 *(Continued).*

Demographic Characteristics of the Students

	Frequency	Percent
Level ($N = 262$)		
Junior high school	179	68.3
High school	83	31.7

conducted among college-aged students (Hodapp & Benson, 1997) supported the four-factor structure of the TAI-G (i.e., Worry, Emotionality, Interference, and Lack of Confidence). Confirmatory Factor Analyses (CFAs) using Lisrel 8.8 were applied to the junior high and high school students in the current sample to determine whether the 30-item four-factor model could be replicated among a younger, school-age sample. The CFA procedure specified a model with four latent factors and each survey item loading on its respective factor. This procedure was repeated across parent and teacher TAI-G ratings of student TA in order to test the consistency of the four-factor structure within a multi-informant assessment framework. Table 2 presents the standardized factor loadings for the 30-item 4-factor solutions for each sample. As also indicated by the model-fit statistics in Table 2, the student sample provided the best fit, followed by the parent sample, and finally the teacher sample. The slightly poorer fit in the teacher sample was also evidenced in less agreement in the factor loadings for this third sample. Nevertheless, the four-factor structure was reasonable in all three samples.

Table 2

Standardized Factor Loadings for 30-Item 4-Factor Solutions for Student, Parent, and Teacher Samples

	Student				Parent				Teacher			
	W	E	LC	I	W	E	LC	I	W	E	LC	I
TAI-G 2	.25				.34				.74			
TAI-G 4	.24				.27				.55			
TAI-G 6	.31				.56				.14			
TAI-G 9	.69				.65				.66			
TAI-G 10	.50				.58				.45			
TAI-G 14	.30				.21				.64			
TAI-G 17	.70				.74				.56			
TAI-G 21	.60				.62				.77			
TAI-G 23	.55				.47				.24			
TAI-G 27	.69				.53				.60			
TAI-G 3		.50				.57				.59		
TAI-G 7		.49				.68				.47		
TAI-G 12		.45				.65				.53		
TAI-G 16		.56				.56				.38		
TAI-G 18		.51				.68				.54		
TAI-G 22		.52				.41				.23		
TAI-G 25		.46				.55				.50		
TAI-G 28		.51				.53				.35		

Table 2 *(Continued).*

Standardized Factor Loadings for 30-Item 4-Factor Solutions for Student, Parent, and Teacher Samples

	Student				Parent				Teacher			
	W	E	LC	I	W	E	LC	I	W	E	LC	I
TAI-G 1			.60				.63				.80	
TAI-G 8			.60				.61				.80	
TAI-G 13			.57				.52				.72	
TAI-G 20			.54				.58				.66	
TAI-G 26			.58				.58				.71	
TAI-G 29			.55				.56				.83	
TAI-G 5				.70				.74				.76
TAI-G 11				.67				.77				.70
TAI-G 15				.66				.70				.65
TAI-G 19				.61				.66				.58
TAI-G 24				.68				.71				.66
TAI-G 30				.39				.47				.34

Note. W = Worry, E = Emotionality, LC = Lack of Confidence, and I = Interference

Table 3 depicts the results of CFAs applied to examine the four-factor structure of the 30-item TAI-G. CFAs were also applied to examine alternative models of TA, including a four-factor 17-item version of the TAI-G (Hodapp & Benson, 1997; see Appendix F) and other reduced factor models (e.g., Worry and Emotion; Worry,

Emotion, and Distraction). Good model fit was determined when the RMSEA was smaller than .08 and the CFI was larger than .95, although values of at least .90 can be considered acceptable (Browne & Cudeck, 1993; Hu & Bentler, 1999; Wen, Hau, & Marsh, 2004). Although not considered one of the more commonly used fit indices, GFIs were also included and considered acceptable when values of at least .90 were obtained (Byrne, 2001; Shevlin & Miles, 1999). As depicted in Table 3, the RMSEA criteria was met for the student sample when CFA tested the four-factor model on the 30-item TAI-G results (RMSEA = .068); however, this criteria was not met for the parent and teacher samples (parents: RMSEA = .093; teachers: RMSEA = .110). The CFIs for the TAI-G for each sample ranged from .91 to .92, failing to meet the recommended criteria of .95 for a good fit, but still within the acceptable range. CFAs were also applied to alternative (i.e., reduced item and reduced factor) versions of the TAI-G in order to test model fit. Fit indices for these CFAs are also presented in Table 3. This analysis revealed that a 17-item four- factor TAI-G model, also developed by Hodapp and Benson (1997), yielded the best-fitting model overall, meeting the suggested the RMSEA ($\leq .08$) and CFI ($\geq .95$) criteria across all three samples. Since the 30-item four-factor version of the TAI-G is the focus of this study and had CFIs for all participants within an acceptable range, the primary focus of subsequent analyses were based upon this version of the TAI-G.

Table 3

Overall Model Fit Indices for Test Anxiety Models across Student, Parent, and Teacher Ratings

	χ^2	*df*	*p*	χ^2/df	*GFI*	*CFI*	*RMSEA*
Two factors: Worry & emotion (18 items)							
Students	384.43	134	.00	2.87	.84	.88	.095
Parents	531.18	134	.00	3.96	.77	.85	.130
Teachers	548.30	134	.00	4.09	.69	.81	.150
Three factors: Worry, emotion, & lack of confidence (24 items)							
Students	585.23	249	.00	2.35	.83	.90	.079
Parents	813.99	249	.00	3.27	.76	.88	.110
Teachers	788.17	249	.00	3.16	.69	.89	.120
Four factors: Worry, emotion, interference, & lack of confidence (30 items)							
Students	794.15	399	.00	1.99	.82	.92	.068
Parents	1081.83	399	.00	2.71	.75	.91	.093
Teachers	1130.90	399	.00	2.83	.68	.92	.110
Two factors: Worry & emotion (9 items)							
Students	67.32	26	.00	2.59	.95	.95	.075
Parents	112.83	26	.00	4.34	.91	.92	.110
Teachers	81.92	26	.00	3.15	.90	.93	.120

Table 3 *(Continued).*

Overall Model Fit Indices for Test Anxiety Models across Student, Parent, and Teacher Ratings

	χ^2	*df*	*p*	χ^2/df	*GFI*	*CFI*	*RMSEA*
Three factors: Worry, emotion, & distraction (12 items)							
Students	99.84	51	.00	1.96	.94	.96	.062
Parents	166.46	51	.00	3.26	.90	.94	.095
Teachers	125.44	51	.00	2.46	.88	.94	.098
Four factors: Worry, emotion, distraction, & lack of confidence (17 items)							
Students	168.62	113	.00	1.49	.93	.97	.042
Parents	271.56	113	.00	2.40	.89	.95	.073
Teachers	227.21	113	.00	2.01	.86	.96	.080

Note. Only subjects with complete data were used. Sample sizes are as follows: Students ($N = 260$), Parents ($N = 263$), Teachers ($N = 162$).

Descriptive statistics. Drawing upon the results of the TAI-G (30-item four-factor), subscale scores were calculated for each factor (i.e., Worry, Emotionality, Lack of Confidence, and Interference), as well as the Total Score. This was achieved by reverse scoring the necessary items and calculating the sum of items representing each *subscale* and Total Score. Table 4 presents descriptive statistics for each of these TAI-G scales across all three informant samples (i.e., students, parents, teachers). This process was repeated with students only on the School Situation Survey (SSS). Descriptive

Table 4

Descriptive Statistics for TAI-G and SSS Scales

	N	*M*	*SD*	*Range*
TAI-G (student ratings)				
Worry	263	26.93	5.48	13 – 40
Emotionality	261	14.55	4.51	8 – 32
Lack of confidence	263	10.99	3.76	6 – 23
Interference	262	11.54	4.05	6 – 24
Total	260	63.99	12.20	33 – 108
TAI-G (parent ratings)				
Worry	267	26.75	5.71	13 – 40
Emotionality	264	14.27	4.99	8 – 30
Lack of confidence	265	10.74	3.82	6 – 24
Interference	266	11.40	4.34	6 – 24
Total	263	63.23	13.36	35 – 102
TAI-G (teacher ratings)				
Worry	167	25.96	6.36	10 – 53
Emotionality	165	12.72	3.92	8 – 28
Lack of confidence	166	12.60	4.70	6 – 23
Interference	166	9.85	3.92	6 – 22
Total	165	61.25	12.07	36 – 97

Table 4 *(continued).*

Descriptive Statistics for TAI-G and SSS Scales

	N	*M*	*SD*	*Range*
School situation survey (student ratings)				
Sources of stress				
Teacher interactions	262	11.70	3.98	6 – 26
Academic stress	262	9.04	3.08	3 – 15
Peer interactions	262	9.90	3.40	6 – 22
Academic self-concept	262	8.56	3.01	4 – 18
Manifestations of stress				
Emotional stress	262	11.63	3.68	6 – 24
Behavioral stress	260	9.65	2.77	6 – 19
Physiological stress	261	6.24	2.54	3 – 15

statistics for this measure are also presented in Table 4. Internal consistency reliabilities were calculated for each scale using Cronbach's alpha (Cronbach, 1951).

Internal consistency reliability. In order to determine internal consistency, Cronbach's alpha (Cronbach, 1951) was calculated for the items of each subscale and Total score across all three informant samples. Table 5 presents the results of these analyses. All TAI-G subscales across all informant samples exceeded the criteria for acceptable reliability of .70 (Cronbach, 1951). Also presented in Table 5 are reliabilities

Table 5

Internal Consistency (Standardized Alpha) for TAI-G and SSS Scales

	N	*Number of items*	*Reliability*
TAI-G (student ratings)			
Worry	263	10	.77
Emotionality	261	8	.80
Lack of confidence	263	6	.84
Interference	262	6	.84
Total	260	30	.86
TAI-G (parent ratings)			
Worry	265	10	.78
Emotionality	264	8	.86
Lack of confidence	265	6	.83
Interference	266	6	.86
Total	263	30	.89
TAI-G (teacher ratings)			
Worry	163	10	.73
Emotionality	165	8	.84
Lack of confidence	166	6	.92
Interference	166	6	.88
Total	162	30	.84

Table 5 *(Continued).*

Internal Consistency (Standardized Alpha) for TAI-G and SSS Scales

	N	*Number of items*	*Reliability*
School Situation Survey (student ratings)			
Sources of stress			
Teacher interactions	262	6	.72
Academic stress	262	3	.77
Peer interactions	262	6	.71
Academic self-concept	262	4	.78
Manifestations of stress			
Emotional stress	262	6	.77
Behavioral stress	260	6	.62
Physiological stress	261	3	.63

for the seven SSS subscales, five of which yielded adequate reliability above .70. The exceptions were the subscales of Behavioral Stress (α = .62) and Physiological Stress (α = .63).

Since the 17-item four-factor model yielded the best model fit across all informants, internal consistency of item analysis along with correlational analysis between all of the scales for both the TAI-G and SSS was conducted. Furthermore, analysis of effects of age and sex, and regression analysis relative to the SSS and the TAI-G was applied to this model in order to compare the results between both of the

models. Results from these analyses are reported at the end of this chapter and further discussed at the end of the Discussion chapter.

Hypotheses 2a and 2b. The analysis of demographic variables was divided into two hypotheses: Hypothesis 2a and 2b. Hypothesis 2a predicted: TAI-G ratings would differ as a function of demographic variables (i.e., sex, grade level, age). Specifically, it was predicted that females would endorse symptoms of TA to a higher degree than males. Due to the fact that demographic research has failed to demonstrate any consistent relationship between age and ratings of anxious symptomatology, it was broadly predicted that TA would vary as a function of age. Since students of comparable ages were grouped with students of comparable grades, it was predicted that grade level would impact TA ratings in a manner that is consistent with age. Hypothesis 2b predicted: Parents and teachers would endorse higher levels of student TA than the student self-reports of TA. Comparisons were conducted to examine differences in the subscales as a function of type of informant. These analyses were followed by correlational analyses between TAI-G and SSS subscales with sex, age, and grade level for the student sample (see Table 12), as well as TAI-G subscales with sex and age for all three informants (see Table 13).

Two-Way Multivariate Analyses of Variance (MANOVAs) were used to examine sex differences, grade level differences, and the sex × grade level interaction on TAI-G scale scores for the student, parent, and teacher samples, as well as on the SSS scales for the student sample. The main effects of sex will be discussed in the next

section. The sections that follow will discuss the main effects of grade level and the sex × grade level interactions.

Main effects of sex. The multivariate tests from the MANOVA results (see Table 6) indicated a significant main effect of sex for the TAI-G student sample, Wilks' Lambda = 0.92, $F(4, 232) = 4.69$, $p = .001$, $\eta_p^2 = .075$, indicating a medium effect overall (Cohen, 1988; Levine & Hullett, 2002). The data yielded significantly higher scores for females compared to males on Worry ($p = .001$, $\eta_p^2 = .045$, a small effect), Emotionality ($p < .01$, $\eta_p^2 = .040$, a small effect), and the TAI-G Total Score ($p = .01$, $\eta_p^2 = .028$, a small effect). There was a significant main effect of sex for the TAI-G parent sample, Wilks' Lambda = 0.94, $F(4, 229) = 3.55$, $p < .01$, $\eta_p^2 = .058$, indicating a medium effect overall. The data yielded significantly higher scores for females compared to males on Worry ($p < .01$, $\eta_p^2 = .034$, a small effect), Emotionality ($p < .05$, $\eta_p^2 = .017$, a small effect), and the TAI-G Total Score ($p = .051$, $\eta_p^2 = .016$, a small effect). There was a significant main effect of sex for the TAI-G teacher sample, Wilks' Lambda = 0.92, $F(4, 146) = 3.06$, $p < .01$, $\eta_p^2 = .077$, indicating a medium effect overall. The data yielded significantly higher scores for females on Worry ($p < .05$, $\eta_p^2 = .033$, a small effect) and significantly higher scores for males on Interference ($p < .05$, $\eta_p^2 = .030$, a small effect). There was a significant main effect of sex for the SSS student sample, Wilks' Lambda = 0.84, $F(7, 229) = 6.36$, $p < .001$, $\eta_p^2 = .163$, indicating a large effect overall. The data yielded significantly higher scores for females on Academic Stress ($p < .001$, $\eta_p^2 = .056$, a medium effect), Emotional Stress ($p < .05$, $\eta_p^2 = .018$, a small effect), and Physiological Stress ($p = .001$, $\eta_p^2 = .043$,

Table 6

Sex Means for the TAI-G and SSS Scales

	Males	Females
	M (SD)	*M (SD)*
TAI-G (student ratings)		
Worry***	25.63 (5.53)	27.82 (5.47)
Emotionality**	13.40 (3.86)	15.32 (4.75)
Lack of confidence	10.58 (3.69)	11.14 (3.74)
Interference	11.55 (3.95)	11.47 (4.11)
Total**	61.16 (11.48)	65.75 (12.51)
TAI-G (parent ratings)		
Worry**	25.81 (5.44)	27.58 (5.96)
Emotionality*	13.68 (4.82)	14.82 (5.17)
Lack of confidence	10.36 (3.88)	11.02 (3.83)
Interference	11.57 (4.47)	11.28 (4.23)
Total*	61.42 (13.97)	64.69 (13.04)
TAI-G (teacher ratings)		
Worry*	24.96 (6.29)	27.40 (6.19)
Emotionality	12.22 (3.84)	13.27 (4.04)
Lack of confidence	12.84 (4.98)	12.22 (4.45)
Interference*	10.32 (4.18)	9.10 (3.21)
Total	60.34 (11.53)	62.00 (12.24)

Table 6 *(Continued).*

Sex Means for the TAI-G and SSS Scales

	Males	Females
	M (SD)	*M (SD)*
School situation survey (student ratings)		
Sources of stress		
Teacher interactions	11.87 (4.07)	11.46 (3.92)
Academic stress***	8.08 (3.06)	9.76 (2.98)
Peer interactions	9.96 (3.46)	9.71 (3.20)
Academic self-concept	8.26 (3.00)	8.75 (2.94)
Manifestations of stress		
Emotional stress*	10.99 (3.14)	12.18 (4.06)
Behavioral stress***	10.43 (2.95)	9.00 (2.47)
Physiological stress***	5.55 (2.25)	6.66 (2.63)

Note. Sample sizes are as follows: TAI-G student ratings on males ($N = 104$), females ($N = 135$); TAI-G parent ratings on males ($N = 103$), females ($N = 133$); TAI-G teacher ratings on males ($N = 76$), females ($N = 77$); SSS student ratings on males ($N = 103$), females ($N = 136$).

*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

a small effect). Males scored significantly higher than females on the Behavioral Stress scale ($p < .001$, $\eta_p^2 = .085$, a medium effect).

Main effects of grade level. MANOVA results for the main effects of level on the TAI-G scales are reported in Table 7 for the student, parent, and teacher samples, as well as on the SSS scales for the student sample. The multivariate tests from the MANOVA results indicated a significant main effect of level for the TAI-G student sample, Wilks' Lambda = 0.96, $F(4, 232) = 2.43$, $p < .05$, $\eta_p^2 = .040$, indicating a small effect overall. The TAI-G analysis yielded significantly higher scores for juniors compared to seniors on Worry ($p < .05$, $\eta_p^2 = .027$, a small effect). There was not a significant main effect of level for the TAI-G parent sample, Wilks' Lambda = 0.99, $F(4, 229) = 0.56$, $p > .05$, $\eta_p^2 = .010$, indicating a small effect overall. There was also no significant main effect of level for the TAI-G teacher sample, Wilks' Lambda = 0.97, $F(4, 146) = 1.23$, $p > .05$, $\eta_p^2 = .033$. There was a significant main effect of level for the SSS student sample, Wilks' Lambda = 0.94, $F(7, 229) = 2.17$, $p < .05$, $\eta_p^2 = .062$, indicating a medium effect overall. The SSS analysis yielded significantly higher scores on Behavioral Stress ($p < .05$, $\eta_p^2 = .027$, a small effect) for seniors compared to juniors.

Sex × Grade Level Interactions. There was no significant sex × level interaction for any of the MANOVAs. The multivariate test results were as follows: The TAI-G student sample, Wilks' Lambda = 0.98, $F(4, 232) = 0.88$, $p > .05$; the TAI-G parent sample, Wilks' Lambda = 0.97, $F(4,229) = 2.00$, $p > .05$; the TAI-G teacher sample,

Table 7

Grade Level Means for the TAI-G and SSS Scales

	Juniors	Seniors
	M (SD)	*M (SD)*
TAI-G (student ratings)		
Worry*	27.42 (5.22)	25.79 (6.13)
Emotionality	14.42 (4.47)	14.60 (4.51)
Lack of confidence	10.70 (3.70)	11.28 (3.75)
Interference	11.47 (4.09)	11.56 (3.96)
Total	64.02 (12.35)	63.23 (12.15)
TAI-G (parent ratings)		
Worry	27.01 (5.67)	26.41 (6.05)
Emotionality	14.20 (4.81)	14.57 (5.50)
Lack of confidence	10.64 (3.76)	10.91 (4.07)
Interference	11.46 (4.38)	11.30 (4.24)
Total	63.30 (13.01)	63.19 (14.55)
TAI-G (teacher ratings)		
Worry	26.16 (6.63)	26.24 (5.89)
Emotionality	12.54 (4.18)	13.10 (3.57)
Lack of confidence	11.99 (4.52)	13.41 (4.94)
Interference	9.34 (3.74)	10.31 (3.76)
Total	60.02 (12.07)	63.07 (11.42)

Table 7 *(Continued).*

Grade Level Means for the TAI-G and SSS Scales

	Juniors	Seniors
	M (SD)	*M (SD)*
School situation survey (student ratings)		
Sources of stress		
Teacher interactions	11.50 (4.28)	11.91 (3.32)
Academic stress	8.99 (3.18)	9.11 (3.03)
Peer interactions	9.57 (3.33)	10.33 (3.22)
Academic self-concept	8.28 (2.99)	9.05 (2.88)
Manifestations of stress		
Emotional stress	11.32 (3.63)	12.35 (3.86)
Behavioral stress*	9.38 (2.76)	10.09 (2.76)
Physiological stress	5.99 (2.45)	6.56 (2.65)

Note. Sample sizes are as follows: TAI-G student ratings on juniors ($N = 158$), seniors ($N = 81$); TAI-G parent ratings on juniors ($N = 157$), seniors ($N = 79$); TAI-G teacher ratings on juniors ($N = 95$), seniors ($N = 58$); SSS student ratings on juniors ($N = 159$), seniors ($N = 80$).

*$p < .05$.

Wilks' Lambda = 1.00, $F(4, 146) = 0.04$, $p > .05$; the SSS student sample, Wilks' Lambda = 0.96, $F(7, 229) = 1.18$, $p > .05$.

Age comparisons. One-way ANOVAs comparing 12, 15, and 18-year-olds were conducted on the TAI-G scales as rated by students, parents, and teachers (see Table 8). These groupings represent participant age comparisons between the youngest, those in the middle, and the oldest. One-way ANOVAs were first conducted for the student self-rated TAI-G subscales and Total scores. The overall ANOVAs yielded a significant difference only for the Emotionality subscale. Post-hoc comparisons between specific groups were then conducted for Emotionality. The analysis yielded significantly higher Emotionality scores for the 12-year-old students ($M = 16.89$, $SD = 4.24$) as compared to the 15-year-old students ($M = 13.90$, $SD = 3.94$; $p < .05$; comparison automatically adjusted by Bonferroni). No other comparisons showed significant differences between any age groups for the student ratings.

One-way ANOVA comparisons were then conducted for the parent-rated TAI-G subscales and Total score comparisons as well as the teacher-rated scales. The comparisons yielded no significant differences between any age categories for any of the TAI-G subscales or Total TAI-G scale for either the parent or teacher ratings.

Informant comparisons. A repeated measures analysis of variance (ANOVA) was conducted to compare TAI-G scores across students, parents, and teachers (see Table 9). A repeated measures analysis was necessary because the different informants each rated the *same* student hence, each student had a student (self) rating, a teacher rating,

Table 8

One-Way ANOVA Comparisons between Age Groups on Scales

	12 year olds	*15 year olds*	*18 year olds*	
	M (SD)	*M (SD)*	*M (SD)*	*F(df)*
TAI-G (student ratings)				
Worry	28.89 (4.84)	27.36 (5.50)	26.52 (6.90)	0.93(2,100)
Emotionality	16.89 (4.24)	13.90 (3.94)	15.72 (4.72)	4.28(2,99)*
Lack of confidence	10.89 (4.07)	10.31 (3.78)	12.32 (4.05)	2.35(2,100)
Interference	11.84 (3.92)	11.10 (3.75)	12.44 (3.58)	1.18(2,99)
Total	68.53 (12.80)	62.44 (11.40)	67.00 (12.72)	2.44(2,98)
TAI-G (parent ratings)				
Worry	28.26 (5.46)	26.36 (5.46)	26.84 (6.37)	0.81(2,100)
Emotionality	14.53 (3.86)	13.52 (4.50)	14.76 (5.15)	0.80(2,99)
Lack of confidence	11.58 (3.48)	10.00 (3.67)	10.92 (4.19)	1.44(2,99)
Interference	10.42 (3.48)	10.98 (4.58)	11.28 (4.67)	0.21(2,100)
Total	64.79 (10.35)	61.07 (13.10)	63.80 (14.72)	0.76(2,98)
TAI-G (teacher ratings)				
Worry	24.22 (7.96)	26.28 (6.31)	26.33 (4.27)	0.39(2,64)
Emotionality	11.88 (3.60)	13.30 (4.75)	14.22 (3.77)	0.81(2,63)
Lack of confidence	10.25 (4.33)	12.73 (5.12)	14.61 (5.48)	2.08(2,63)
Interference	8.33 (3.24)	10.05 (4.22)	11.39 (3.31)	1.91(2,64)
Total	56.13 (9.54)	62.35 (12.96)	66.56 (12.03)	1.93(2,63)

Table 8 *(Continued).*

Note. Sample sizes were as follows: for the student and parent ratings, 12 year olds (N = 19), 15 year olds (N = 57 to 59), 18 year olds (N = 25); for the teacher ratings, 12 year olds (N = 8 to 9), 15 year olds (N = 40), 18 year olds (N = 18).

*$p < .05$.

Table 9

Means, Standard Deviations, and Repeated Measures Analysis of Variance (ANOVA) Comparing TAI-G Scales across Informant

Scale		*Student*	*Parent*	*Teacher*	*ANOVA*
	N	*M (SD)*	*M (SD)*	*M (SD)*	*F*
Wor	166	26.89 (5.32)	26.51 (5.66)	25.95 (6.38)	1.32(2, 330)
Emo	160	14.29 (4.15)	14.11 (4.74)	12.74 (3.96)	8.50(1.9, 302.6)***
Lack	163	10.67 (3.67)	10.43 (3.84)	12.65 (4.71)	19.24(1.9, 306.2)***
Inter	164	11.34 (3.88)	11.32 (4.30)	9.88 (3.93)	9.81(2, 326)***
Total	159	63.26 (12.08)	62.45 (13.46)	61.51 (12.05)	1.04(2, 316)

Note. Wor = Worry, Emo = Emotionality, Lack = Lack of Confidence, Inter = Interference.

***$p < .001$.

and a parent rating. As mentioned earlier, all TAI-G scales were assessed to be sufficiently normally distributed according to their skewness and kurtosis values; hence the variables were appropriate for use in the ANOVA. Mauchly's test of sphericity, which needs to be assessed for the within-subjects ANOVA, was also tested for each of

the ANOVAs. Sphericity was not violated for Worry, Interference, or Total Score. It was violated for Emotionality and Lack of Confidence. When sphericity is violated, the degrees of freedom need to be modified by using a correction factor such as the Greenhouse-Geisser Epsilon. This correction was *applied* to the results for Emotionality and Lack of Confidence. However, it should also be noted that the Greenhouse-Geisser results were *exactly* the same as the results when sphericity is assumed.

The repeated measures ANOVA yielded significant differences between informants on subscales Emotionality, Lack of Confidence, and Interference (all *ps* < .001). Results are presented in Table 9. Post-hoc comparisons were conducted to determine the direction of effects among informants. All *p*-values for post-hoc comparisons were corrected in SPSS by the Bonferroni adjustment for multiple comparisons. The Bonferroni correction divides the significance level by the number of comparisons because making multiple comparisons increases the probability of obtaining significant results just by chance; e.g., if one sets the alpha level to .05 and runs 20 comparisons, one of those comparisons (5% error rate) will be significant just by chance (Abdi, 2007).

Post-hoc analysis for student Emotionality revealed that student and parent ratings were not significantly different from one another ($p > .05$), but both were significantly higher than the ratings of teachers (*ps* < .01). This pattern of results was replicated for the Lack of Confidence scale, with higher parent and student ratings compared to teachers (ps < *.001)*, but no significant differences between parents and students themselves ($p > .05$). This pattern was, again, replicated for the Interference scale, such

that the student and parent ratings yielded significantly higher scores than teacher ratings ($ps < .01$), but student and parent ratings were not significantly discrepant ($p > .05$).

Table 12 outlines the results of Pearson Product Moment correlational analyses between TAI-G and SSS subscales with sex, age, and grade level for the student sample. Table 13 outlines results of correlations between TAI-G subscales, sex, and age for all three informant samples (i.e. students, parents, and teachers). Grade data are not reported in Table 13, as the results correspond with those of age.

Hypothesis 3. Hypothesis 3 predicted: The frequency of participants scoring high TA would fall within 10% to 30% of the student sample, consistent with previous research studying TA prevalence. For all informant samples (i.e., students, parents, and teachers) the number of students identified as having significantly elevated TA symptomatology (i.e., those scoring at least one standard deviation above the mean on the TAI-G total score) was computed. For the student self-ratings, the Total Score cut-off for high TA was 63.99 + 12.20 = 76.19. For the parent ratings of student TA, the Total Score cut-off for high TA was 63.23 + 13.36 = 75.59. For the teacher ratings of student TA, the Total Score cut-off for high TA was 61.25 + 12.07 = 73.32. Table 10 depicts the frequency and percentage of students scoring significantly above average TA symptomatology on the TAI-G total score across students, parents and teachers. Student ratings of themselves yielded significantly elevated TA symptomatology at a rate of 13.5%. Parents scored significantly elevated TA among their children at a rate of 16.3%, whereas teachers identified significantly elevated scores among their students at a rate of 15.2%.

Table 10

Frequencies and Percentages of Students Scoring 1 Standard Deviation above the Mean on TAI-G Total Scores for each Type of Informant Rating

	Frequency	*Percent*
Students scoring 1 SD above mean (student ratings)		
No	225	86.5
Yes	35	13.5
Total	260	100.0
Students scoring 1 SD above mean (parent ratings)		
No	220	83.7
Yes	43	16.3
Total	263	100.0
Students scoring 1 SD above mean (teacher ratings)		
No	140	84.8
Yes	25	15.2
Total	165	100.0

Hypothesis 4. Hypothesis 4 predicted: TA within the high TA group would differ as a function of age and sex demographics across all informants (i.e., students, parents, and teachers). Specifically, it was predicted that females would demonstrate a higher prevalence of significantly elevated TA. TA would also vary as a function of age, but no specific relationship was predicted. Pearson Product Moment Correlations were computed between TAI-G total score with Age and Sex within the High TA groups for students, parents, and teacher ratings. There were no significant correlations between TAI-G total score with Age or Sex for any of the High TA subsamples for student, parent, or teacher reports.

Hypothesis 5. Hypothesis 5 predicted: Student rated TAI-G subscale and Total scores would demonstrate relationships with SSS subscales, sex, and age. In other words, it is predicted that each of the TAI-G subscales as well as the TAI-G total score can be predicted by a linear combination of the SSS subscales, sex, and age. Specifically, it is expected that a positive linear relationship would be established between TA and the SSS subscales. Pearson correlations were first computed to examine the zero-order correlations between TAI-G scales and SSS scales. Controlling for sex and age, multiple regression analyses were conducted on the student sample designating all SSS subscales, sex and age as predictors, and all TAI-G subscales and total score as criterion variables.

If one were only interested in examining whether TAI-G scores differed across age groups or sex, ANOVAs could be used to compare the TAI-G scores across various age groups or between the two genders. However, examining whether TAI-G scores differ by (or, in other words, are related to) SSS scores, correlations are the more

appropriate analysis given that the scale scores are all continuously measured. ANOVA would require cutting the SSS scores into two groups, which would cause an unnecessary loss of information. Multiple linear regression is also a powerful tool that allows for the prediction of an outcome variable from multiple predictors simultaneously. In this manner, all of the SSS subscales can be entered as predictors at the same time, and age and gender can be entered as control variables simultaneously as well.

Correlations

Pearson Product Moment Correlation coefficients between all TAI-G and all SSS scales were computed for the student ratings (see Table 11). This analysis yielded significant positive linear relationships between most of the TAI-G scales and most SSS scales. For practical purposes, only the exceptions will be noted. There was no significant relationship between Worry and Teacher Interactions or Peer Interactions. The analysis did reveal a significant negative correlation between Worry and Behavioral Stress ($r = -.13, p < .05$). There was no significant relationship determined between Emotionality and Behavioral Stress, nor between the TAI-G total score and Behavioral Stress.

Table 12 presents the results of correlational analysis investigating relationships between student-rated scales with sex, age, and grade level. In this analysis males were coded 0 and females coded 1. As such, positive correlations specify higher female scores, whereas negative correlations specify higher male scores. Results for sex established a significant correlation with Worry, Emotionality, TAI-G Total Score, Academic Stress, Behavioral Manifestations of School Stress, and Physiological

Table 11

Correlations between all TAI-G and SSS Subscales (Student Ratings Only)

Subtests & Total Scores	*1*	*2*	*3*	*4*	*5*	*6*
1. Worry	--					
2. Emotionality	.45***	--				
3. Lack of confidence	.03	.25***	--			
4. Interference	.15*	.42***	.44***	--		
5. Teacher interactions	.03	.17**	.34***	.41***	--	
6. Academic stress	.61***	.52***	.31***	.28***	.21**	--
7. Peer interactions	-.01	.16*	.30***	.25***	.30***	.08
8. Academic self-concept	.15*	.19**	.52***	.50***	.36***	.32***
9. Emotional stress	.29***	.51***	.29***	.35***	.38***	.48***

Table 11 *(Continued).*

Correlations between all TAI-G and SSS Subscales (Student Ratings Only)

Subtests & Total Scores	*1*	*2*	*3*	*4*	*5*	*6*
10. Behavioral stress	-.13*	.03	.16*	.28***	.51***	-.08
11. Physiological stress	.26***	.48***	.22***	.28***	.24***	.44***
12. TAI-G total score	.68***	.79***	.56***	.69***	.32***	.65***

Subtests & Total Scores	*7*	*8*	*9*	*10*	*11*
7. Peer interactions	--				
8. Academic self-concept	.17**	--			
9. Emotional stress	.28***	.19**	--		
10. Behavioral stress	.19**	.14*	.17**	--	
11. Physiological stress	.28***	.16*	.56***	.08	--

Table 11 *(Continued).*

Correlations between all TAI-G and SSS Subscales (Student Ratings Only)					
12. TAI-G total score	.23***	.46***	.52***	.10	.46***

Note. Sample sizes ranged from $N = 258$ to 263. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 12

Correlations between TAI-G and SSS Subscales with Sex, Age, and Grade Level (Student Ratings Only)

	Sex	*Age*	*Grade level*
1. Worry	.20**	-.13*	-.14*
2. Emotionality	.21**	-.05	-.04
3. Lack of confidence	.08	.01	.02
4. Interference	-.01	-.00	-.00
5. Teacher interactions	-.06	.00	-.02
6. Academic stress	.26***	-.06	-.06
7. Peer interactions	-.04	.02	.04
8. Academic self-concept	.08	.12*	.14*
9. Emotional stress	.16*	.06	.07

Table 12 (*Continued*)

Correlations between TAI-G and SSS Subscales with Sex, Age, and Grade Level (Student Ratings Only)

	Sex	*Age*	*Grade level*
10. Behavioral stress	-.26***	.12	.09
11. Physiological stress	.22**	.04	.06
12. TAI-G total score	.18**	-.08	-.07

Note. Sex is coded a 0 = Male and 1 = Female so that positive correlations indicate higher scores for females and negative correlations indicate higher scores for males. Sample sizes ranged from $N = 241$ to 263.

* $p < .05$. ** $p < .01$. *** $p < .001$.

($r = -.13, p < .05$) and higher Academic Self-Concept scores among older students ($r = .12, p < .05$). Results for grade level were congruent with the patterns of significant correlations established for age.

A correlational analysis exploring relationships between TAI-G scales with sex and age variables was explored across all three informants (see Table 13). This analysis revealed that only one relationship, between sex and Worry, was significant across the student, parent, and teacher samples. Specifically, females yielded higher levels of Worry according to all three informants. Student and parent samples reported significantly higher TAI-G total scores for females. The student sample reported

Table 13

Correlations between TAI-G Scales with Sex and Age for the Student, Parent, and Teacher Ratings

	Sex	*Age*
Student ratings		
Worry	.20**	-.13*
Emotionality	.21**	-.05
Lack of confidence	.08	.01
Interference	-.01	-.00
TAI-G total score	.18**	-.08
Parent ratings		
Worry	.14*	-.06
Emotionality	.11	.00
Lack of confidence	.09	-.01
Interference	-.03	-.01
TAI-G total score	.13*	-.03
Teacher ratings		
Worry	.17*	.01
Emotionality	.12	.10
Lack of confidence	-.07	.20**
Interference	-.17*	.14
TAI-G total score	.06	.15

Table 13 (*Continued*)

Note. Sex is coded a 0 = Male and 1 = Female so that positive correlations indicate higher scores for females and negative correlations indicate higher scores for males. Student sample sizes ranged from $N = 241$ to 263. Parent sample sizes ranged from $N = 244$ to 261. Teacher sample sizes ranged from $N = 155$ to 167.

* $p < .05$. ** $p < .01$.

significantly higher Emotionality scores for females. Younger student participants in the student sample also reported significantly higher Worry scores compared to the older students. Teachers reported significantly higher Interference scores for males, as well as significantly higher Lack of Confidence scores among older students.

Regressions. Multiple linear regression analyses were conducted on the student sample designating all seven SSS subscales, sex, and age as predictor variables and TAI-G subscales and the TAI-G total score as criterion variables. Separate regressions were computed for each TAI-G. For example, the first regression used the TAI-G Worry subscale as the criterion variable. The seven SSS subscales, sex, and age were entered as the predictor variables. The next regression used a different TAI-G subscale as the criterion variable. Each regression used the same predictors. In later multiple regression analyses examining the parent and teacher samples, only the TAI-G total scores served as criterion variables with the same set of predictors.

Before computing regressions, variables were tested to be sure that the assumptions for regression analyses were met. First, as noted previously, all variables were tested for normality; all skewness and kurtosis values for all variables were well within the acceptable range. Reliabilities of all scales were also previously mentioned. Only the behavioral and physiological stress scales showed reliability values that were inadequate. Because these scale reliabilities, as well as the other scale reliabilities were inadequate, adjusted R-squared values are provided in addition to the non-adjusted R-squared values for each regression. The assumption of a linear relationship between independent and dependent variables and the assumption of homoscedasticity were tested by plotting the relationship between the studentized residuals and the standardized predicted value of the dependent variable for each regression. For each regression, the residuals were randomly distributed in no noticeable patterns on either side of zero, indicating that there were no violations of linearity or homoscedasticity.

The first multiple regression was conducted examining student TAI-G Worry subscale scores as a function of the seven SSS subscales, sex, and age (see Table 14). The overall model was significant, $F(9, 231) = 19.04, p < .001$, accounting for 42.6% of the variance in Worry (adjusted R-squared value was 40.3%). The analysis identified Academic stress ($p < .001$) and age ($p < .05$) as significant predictor variables, with higher Academic Stress and younger student age predicting higher Worry scores. Hypothesis 5 was supported in this analysis by demonstrating that higher academic stress was predictive of higher worry. This pattern remained even when controlling for sex and age. Thus, one can also say that Worry scores *differ* as a function of academic stress

Table 14

Regression Analysis for Predicting the TAI-G Worry Subscale from SSS Controlling for Sex and Age (Student Ratings Only)

	B	*SE B*	*β*	R^2
Teacher interactions	-0.13	0.09	-.09	.426
Academic stress	1.06	0.11	.59***	
Peer interactions	-0.07	0.09	-.04	
Academic self-concept	0.03	0.11	.01	
Emotional stress	0.10	0.10	.07	
Behavioral stress	-0.02	0.12	-.01	
Physiological stress	0.08	0.14	.04	
Age	-0.34	0.16	-.11*	
Sex	0.23	0.61	.02	

Note. The constant for the model = 22.61. Sex was coded as 0 = Male and 1 = Female.

*$p < .05$. ***$p < .001$.

scores—students with higher academic stress scores will have higher worry scores and students with lower academic stress scores will have lower worry scores.

A second multiple regression was conducted examining student TAI-G Emotionality subscale scores as a function of SSS scales, sex, and age (see Table 15). The overall model was significant, $F(9, 229) = 23.53$, $p < .001$, accounting for 48.0% of the variance in Emotionality (adjusted R-squared value was 46.0%). The analysis

Table 15

Regression Analysis for Predicting the TAI-G Emotionality Subscale from SSS Controlling for Sex and Age (Student Ratings Only)

	B	*SE B*	*β*	R^2
Teacher interactions	-0.05	0.07	-.04	.480
Academic stress	0.46	0.09	.32***	
Peer interactions	0.00	0.07	.00	
Academic self-concept	0.04	0.08	.03	
Emotional stress	0.30	0.08	.25***	
Behavioral stress	0.02	0.09	.01	
Physiological stress	0.50	0.11	.28***	
Age	-0.17	0.12	-.07	
Sex	0.21	0.47	.02	

Note. The constant for the model = 6.10. Sex was coded as 0 = Male and 1 = Female.

***$p < .001$.

identified Academic Stress ($p < .001$), Emotional Stress ($p < .001$), and Physiological Stress ($p < .001$) as significant predictor variables, with higher stress scores predicting higher Emotionality scores. Hypothesis 5 was supported by this analysis by demonstrating that higher academic, emotional, or physiological stress was predictive of higher emotionality. These patterns remained even when controlling for sex and age.

A third multiple regression was conducted examining student TAI-G Lack of Confidence subscale scores as a function of SSS scales, sex, and age (see Table 16). The

Table 16

Regression Analysis for Predicting the TAI-G Lack of Confidence Subscale from SSS Controlling for Sex and Age (Student Ratings Only)

	B	*SE B*	*β*	R^2
Teacher interactions	0.06	0.06	.06	.356
Academic stress	0.09	0.08	.08	
Peer interactions	0.18	0.06	.16**	
Academic self-concept	0.56	0.08	.45***	
Emotional stress	0.09	0.07	.09	
Behavioral stress	0.02	0.09	.01	
Physiological stress	-0.01	0.10	-.00	
Age	-0.06	0.12	-.03	
Sex	0.19	0.43	.02	

Note. The constant for the model = 2.45. Sex was coded as 0 = Male and 1 = Female.

**$p < .01$. ***$p < .001$.

overall model was significant, $F(9, 231) = 14.22, p < .001$, accounting for 35.6% of the variance (adjusted R-squared value was 33.1%). The analysis identified Peer Interactions ($p < .01$) and Academic Self-Concept ($p < .001$) as significant predictor variables, with higher Peer Interactions or Academic Self-Concept scores predicting higher Lack of Confidence scores. Hypothesis 5 was supported by this analysis by demonstrating that higher peer interaction or academic self-concept scores were predictive of higher levels of lack of confidence. These patterns remained even when controlling for sex and age.

A fourth multiple regression was conducted examining student TAI-G Interference subscale scores as a function of SSS scales, sex, and age (see Table 17). The overall model was significant, $F(9, 230) = 17.69, p < .001$, accounting for 40.9% of the variance (adjusted R-squared value was 38.6%). The analysis identified Academic Self-Concept ($p < .001$) and Behavioral Stress ($p < .05$) as significant predictor variables, with higher Academic Self-Concept or Behavioral Stress scores predicting higher Interference scores. It should also be reported that the predictor variable, Physiological Stress, approached significance ($p = .053$). Hypothesis 5 was supported by this analysis by demonstrating that higher academic self-concept or behavioral stress scores were predictive of higher Interference. These patterns remained even when controlling for sex and age.

A final multiple regression was conducted for the student ratings examining student TAI-G total subscale scores as a function of SSS scales, sex and age (see Table 18). The overall model was significant, $F(9, 228) = 44.37, p < .001$, accounting for

Table 17

Regression Analysis for Predicting the TAI-G Interference Subscale from SSS Controlling for Sex and Age (Student Ratings Only)

	B	*SE B*	*β*	R^2
Teacher interactions	0.12	0.07	.12	.409
Academic stress	0.11	0.08	.09	
Peer interactions	0.07	0.07	.06	
Academic self-concept	0.52	0.08	.39***	
Emotional stress	0.12	0.07	.11	
Behavioral stress	0.20	0.09	.14*	
Physiological stress	0.20	0.10	.13	
Age	-0.21	0.12	-.09	
Sex	-0.49	0.45	-.06	

Note. The constant for the model = 2.69. Sex was coded as 0 = Male and 1 = Female.

*$p < .05$. ***$p < .001$.

Table 18

Regression Analysis for Predicting the TAI-G Total Score from SSS Controlling for Sex and Age (Student Ratings Only)

	B	*SE B*	*β*	R^2
Teacher interactions	0.01	0.16	.00	.637
Academic stress	1.72	0.20	.44***	
Peer interactions	0.18	0.16	.05	
Academic self-concept	1.15	0.19	.28***	
Emotional stress	0.61	0.18	.18**	
Behavioral stress	0.24	0.22	.05	
Physiological stress	0.80	0.25	.16**	
Age	-0.78	0.29	-.11**	
Sex	0.03	1.08	.00	

Note. The constant for the model = 33.54. Sex was coded as 0 = Male and 1 = Female.

**$p < .01$. ***$p < .001$.

63.7% of the variance (adjusted R-squared value was 62.2%). The analysis identified Academic Stress ($p < .001$), Academic Self-Concept ($p < .001$), Emotional Stress ($p < .01$), Physiological Stress ($p < .01$) and age ($p < .01$) as significant predictor variables, with higher SSS scores on those scales and younger age predicting higher TAI-G total scores. Hypothesis 5 was supported by this analysis by demonstrating that higher scores on these variables and younger age were predictive of higher TAI-G total scores. These patterns remained even when controlling for sex and age.

Hypothesis 6. Hypothesis 6 predicted: Parent and teacher rated TAI-G Total scores would demonstrate relationships with the SSS, age, and sex. Specifically, it was predicted that a positive linear relationship would be established between parent and teacher rated TAI-G subscales and Total scores and the subscales of the SSS. Multiple linear regression analyses, just like the ones described for the student ratings, were performed to test this hypothesis. The only difference here was that either *parent* or *teacher* TAI-G total score ratings were used as the dependent variables—so the informant changed for the dependent variable, and only the total scores were used, rather than using each TAI-G subscale as well.

Parent total scores. A multiple regression was conducted examining parent-rated TAI-G total scores as a function of SSS scales (as rated by students), sex, and age (see Table 19). The overall model was significant, $F(9, 225) = 7.46, p < .001$, accounting for 23.0% of the variance (Adjusted R-squared value was 19.9%). The analysis revealed Academic Self-Concept ($p < .05$) and Physiological Stress ($p < .001$) as significant predictor variables. Hypothesis 6 was supported in this analysis by demonstrating that

Table 19

Regression Analysis for Predicting the TAI-G Total Score from SSS Controlling for Sex and Age (Parent Ratings of TAI-G Total Score)

	B	*SE B*	*β*	R^2
Teacher interactions	0.30	0.26	.09	.230
Academic stress	0.46	0.32	.11	
Peer interactions	0.06	0.27	.01	
Academic self-concept	0.75	0.30	.16*	
Emotional stress	-0.12	0.29	-.03	
Behavioral stress	-0.81	0.35	-.17	
Physiological stress	1.83	0.40	.34***	
Age	-0.36	0.46	-.05	
Sex	-0.72	1.73	-.03	

Note. The constant for the model = 52.95. Sex was coded as 0 = Male and 1 = Female.

**$p < .01$. ***$p < .001$.

higher academic self-concept or physiological stress scores were predictive of higher parent-rated TAI-G scores. These patterns remained even when controlling for sex and age.

Teacher total scores. A multiple regression was conducted examining teacher-rated TAI-G total scores as a function of SSS scales (as rated by students), sex, and age (see Table 20). The overall model was not significant, $F(9, 144) = 1.36, p > .05$, accounting for only 7.8% of the variance (Adjusted R-squared value was only 2.1%). The analysis identified only age as a significant predictor variable ($p < .05$), with older age predicting higher TAI-G teacher-rated total scores. Therefore, Hypothesis 6 was not supported when predicting teacher-rated TAI-G total scores from student-rated SSS scores when controlling for sex and age.

Table 20

Regression Analysis for Predicting the TAI-G Total Score from SSS Controlling for Sex and Age (Teacher Ratings of TAI-G Total Score)

	B	*SE B*	*β*	R^2
Teacher interactions	-0.25	0.31	-.08	.078
Academic stress	0.12	0.38	.03	
Peer interactions	0.03	0.33	.01	
Academic self-concept	0.39	0.36	.10	
Emotional stress	0.54	0.35	.16	
Behavioral stress	-0.21	0.42	-.05	
Physiological stress	-0.24	0.48	-.05	
Age	1.24	0.57	.18*	
Sex	0.08	2.08	.00	

Note. The constant for the model = 37.9. Sex was coded as 0 = Male and 1 = Female.

$^{**}p < .01$. $^{***}p < .001$.

Analysis of the 17-item TAI-G

Although the major focus of this project investigated TA identified by the 30-item TAI-G, and this version of the TAI-G had CFIs for all participants within acceptable range, CFAs were also applied to alternative (i.e., reduced item and reduced factor) versions of the TAI-G in order to test model fit. This analysis revealed that a 17-item four-factor TAI-G model, also developed by Hodapp and Benson (1997), yielded the best-fitting model overall, meeting the suggested RMSEA ($\leq .08$) and CFI ($\geq .95$) criteria

across all three samples. As such, it was deemed important to conduct preliminary analyses of the hypotheses using the 17-item TAI-G results; thereby, establishing a direction for future research applying this alternative instrument within the context of multi-informant assessment of TA. This process included similar analyses applied to the 30-item TAI-G results. Specifically, the procedures included descriptive statistics, analysis of internal consistency, correlational analyses identifying relationships between TAI-G and SSS subscales, correlational analyses investigating relationships as a function of major demographic variables (i.e., age and sex), and multiple linear regression analyses on the student sample designating all seven SSS subscales, sex, and age as predictor variables and TAI-G subscales and the TAI-G total score as criterion variables. Since these results were considered exploratory, all of the statistical procedures applied to the 30-item TAI-G data set were not duplicated in this analysis. For example, multiple linear regression analyses were not applied to the parent and teacher data sets. The major conclusion drawn from these analyses supports future research toward investigation of the hypotheses in a more comprehensive manner, such as by duplicating the statistical procedures applied to the 30-item TAI-G data and application of the procedures to more recent measures of TA.

Descriptive statistics. Drawing upon the results of the TAI-G (17-item four-factor), subscale scores were calculated for each factor (i.e., Worry, Emotionality, Lack of Confidence, and Interference), as well as the Total Score. This was achieved by reverse scoring the necessary items and calculating the sum of items representing each *subscale* and Total Score. Table 21 presents descriptive statistics for each of these TAI-

Table 21

Descriptive Statistics for TAI-G and SSS Scales

	N	*M*	*SD*	*Range*
TAI-G (student sample)				
Worry	263	10.50	3.09	4 – 16
Emotionality	263	9.84	3.09	5 – 20
Lack of confidence	263	9.11	3.15	5 – 19
Interference	262	6.07	2.30	3 – 12
Total	262	35.51	7.82	17 – 63
TAI-G (parent sample)				
Worry	267	10.10	3.05	4 – 16
Emotionality	264	9.58	3.41	5 – 20
Lack of confidence	265	8.87	3.19	5 – 20
Interference	266	5.84	2.37	3 – 12
Total	263	34.44	8.61	17 – 59
TAI-G (teacher sample)				
Worry	165	9.95	2.96	4 – 16
Emotionality	165	8.70	2.92	5 – 18
Lack of confidence	166	10.52	3.90	5 – 19
Interference	167	5.05	2.16	3 – 12
Total	164	34.34	8.22	17 – 55

Table 21 (*Continued*)

Descriptive Statistics for TAI-G and SSS Scales

	N	*M*	*SD*	*Range*
School situation survey (student sample)				
Sources of stress				
Teacher interactions	262	11.70	3.98	6 – 26
Academic stress	262	9.04	3.08	3 – 15
Peer interactions	262	9.90	3.40	6 – 22
Academic self-concept	262	8.56	3.01	4 – 18
Manifestations of stress				
Emotional stress	262	11.63	3.68	6 – 24
Behavioral stress	260	9.65	2.77	6 – 19
Physiological stress	261	6.24	2.54	3 – 15

G scales across all three informant samples (i.e. students, parents, teachers). This process was repeated with students only on the School Situation Survey (SSS). Descriptive statistics for this measure are also presented in Table 21.

Internal consistency reliability. In order to determine internal consistency, Cronbach's alpha (Cronbach, 1951) was calculated for the items of each subscale and Total score across all three informant samples. Table 22 presents the results of these analyses. Almost all TAI-G subscales across all informant samples exceeded the criteria for

Table 22

Internal Consistency (Standardized Alpha) for TAI-G Scales

	N	*Number of items*	*Reliability*
TAI-G (student sample)			
Worry	263	4	.72
Emotionality	263	5	.69
Lack of confidence	263	5	.82
Interference	262	3	.79
Total	262	17	.81
TAI-G (parent sample)			
Worry	266	4	.72
Emotionality	264	5	.80
Lack of confidence	265	5	.80
Interference	266	3	.85
Total	263	17	.85
TAI-G (teacher sample)			
Worry	165	4	.80
Emotionality	165	5	.79
Lack of confidence	166	5	.91
Interference	167	3	.88
Total	164	17	.86

Table 22 *(Continued).*

School situation survey (student sample)			
Sources of stress			
Teacher interactions	262	6	.72
Academic stress	262	3	.77
Peer interactions	262	6	.71
Academic self-concept	262	4	.78
Manifestations of stress			
Emotional stress	262	6	.77
Behavioral stress	260	6	.62
Physiological stress	261	3	.63

acceptable reliability of .70 (Cronbach, 1951). The only exception was the subscale of Emotionality (α = .69) for the student sample. Also presented in Table 22 are reliabilities for the seven SSS subscales, five of which yielded adequate reliability above .70. The exceptions were the subscales of Behavioral Stress (α = .62) and Physiological Stress (α = .63). Other than the difference noted between the Emotionality subscales of the student TAI-G findings (i.e., 17-item α = .69 vs 30-item α = .80) , the results overall were highly consistent with those obtained from the 30-item analysis.

Correlations. Pearson Product Moment Correlation coefficients between all TAI-G and all SSS scales were computed for the student ratings (see Table 23). In this

Table 23

Correlations between all TAI-G and SSS Subscales for the Student Sample

Subtests & Total Scores	*1*	*2*	*3*	*4*	*5*	*6*
1. Worry	--					
2. Emotionality	.41***	--				
3. Lack of confidence	.14*	.20**	--			
4. Interference	.15*	.33***	.38***	--		
5. Teacher interactions	.09	.12	.33***	.34***	--	
6. Academic stress	.59***	.52***	.30***	.22***	.21**	--
7. Peer interactions	.05	.08	.27***	.20**	.30***	.08
8. Academic self-concept	.23***	.18**	.49***	.44***	.36***	.32***
9. Emotional stress	.27***	.49***	.29***	.30***	.38***	.48***

Table 23 *(Continued).*

Correlations between all TAI-G and SSS Subscales for the Student Sample

Subtests & Total Scores	*1*	*2*	*3*	*4*	*5*	*6*
10. Behavioral stress	-.05*	-.00	.15*	.26***	.51***	-.08
11. Physiological stress	.26***	.46***	.21**	.24***	.24***	.44***
12. TAI-G total score	.70***	.73***	.65***	.64***	.31***	.62***

Subtests & Total Scores	*7*	*8*	*9*	*10*	*11*
7. Peer interactions	--				
8. Academic self-concept	.17**	--			
9. Emotional stress	.28***	.19**	--		
10. Behavioral stress	.19**	.14*	.17**	--	
11. Physiological stress	.28***	.16*	.56***	.08	--
12. TAI-G total score	.22***	.49***	.50***	.11	.44***

Note. Sample sizes ranged from $N = 258$ to 263.

* $p < .05$. ** $p < .01$. *** $p < .001$.

analysis, males were coded 0 and females coded 1. As such, positive correlations specify higher female scores, whereas negative correlations specify higher male scores. This analysis yielded significant positive linear relationships between most of the TAI-G scales and most SSS scales. For practical purposes, only the exceptions will be noted. There was no significant relationship between Worry and Teacher Interactions or Peer Interactions. The analysis did reveal a significant negative correlation between Worry and Behavioral Stress ($r = -.05, p < .05$). There was no significant relationship determined between Emotionality and Teacher Interactions, Peer Interactions, or Behavioral Stress. There was no significant relationship determined between Academic Stress and Peer Interactions. There was no significant relationship between Behavioral Stress and Physiological Stress or TAI-G Total Score.

Table 24 presents the results of correlational analysis investigating relationships between student-rated scales with sex and age. Results for sex established a significant correlation with Worry, Emotionality, TAI-G Total Score, Academic Stress, Emotional Stress, Behavioral Manifestations of School Stress, and Physiological Manifestations of School Stress. These relationships are characterized by higher scores for females on the factors of Worry ($r = .13, p < .05$), Emotionality ($r = .18, p < .01$), TAI-G Total Score ($r = .16, p < .05$), Academic Stress ($r = .26, p < .001$), Emotional Stress ($r = .16, p < .05$), and Physiological Manifestations of School Stress ($r = .22, p < .01$) and higher scores for males on Behavioral Manifestations of School Stress ($r = -.26, p < .001$). The results for Age established a significant correlation with Academic Self-Concept. This relationship was characterized by higher Academic Self-Concept scores among older students ($r =$

Table 24

Correlations between TAI-G and SSS Subscales with Sex and Age for the Student Sample

	Sex	*Age*
1. Worry	.13*	-.10
2. Emotionality	.18**	-.02
3. Lack of confidence	.09	.01
4. Interference	-.02	.01
5. Teacher interactions	-.06	.00
6. Academic stress	.26***	-.06
7. Peer interactions	-.04	.02
8. Academic self-concept	.08	.12*
9. Emotional stress	.16*	.06

Table 24 *(Continued).*

Correlations between TAI-G and SSS Subscales with Sex and Age for the Student Sample

	Sex	*Age*
10. Behavioral stress	-.26***	.12
11. Physiological stress	.22**	.04
12. TAI-G total score	.16*	-.04

Note. Sex is coded a 0 = Male and 1 = Female so that positive correlations indicate higher scores for females and negative correlations indicate higher scores for males. Sample sizes range from $N = 243$ to 263.

* $p < .05$. ** $p < .01$. *** $p < .001$.

.12, $p < .05$). Results for grade level were congruent with the patterns of significant correlations established for age.

Regressions. Multiple linear regression analyses were conducted on the student sample designating all seven SSS subscales, sex, and age as predictor variables, and TAI-G subscales and the TAI-G total score as criterion variables. Separate regressions were computed for each subscale of the TAI-G. The first multiple regression was conducted by examining student TAI-G Worry subscale scores as a function of the seven SSS subscales, sex, and age (see Table 25). The analysis identified Academic stress ($p <$ .001) as a significant predictor variable, with higher Academic Stress predicting higher

Table 25

Regression Analysis for Predicting the TAI-G Worry Subscale from SSS Controlling for Sex and Age

	B	*SE B*	*β*	R^2
Teacher interactions	-0.05	0.05	-.06	.389
Academic stress	0.58	0.06	.58***	
Peer interactions	-0.01	0.05	-.01	
Academic self-concept	0.08	0.06	.08	
Emotional stress	0.02	0.06	.02	
Behavioral stress	0.02	0.07	.02	
Physiological stress	0.05	0.08	.04	
Age	-0.13	0.09	-.07	
Sex	-0.19	0.35	-.03	

Note. The constant for the model = 6.48. Sex was coded as 0 = Male and 1 = Female.

***$p < .001$.

Worry scores. Hypothesis 5 was supported in this analysis by demonstrating that higher academic stress was predictive of higher worry. This pattern remained even when controlling for sex and age. Thus, one can also say that Worry scores *differ* as a function of academic stress scores—students with higher academic stress scores will have higher worry scores and students with lower academic stress scores will have lower worry scores.

A second multiple regression was conducted examining student TAI-G Emotionality subscale scores as a function of SSS scales, sex, and age (see Table 26). The analysis identified Academic Stress ($p < .001$), Emotional Stress ($p < .001$), and Physiological Stress ($p < .001$) as significant predictor variables, with higher stress scores predicting higher Emotionality scores. Hypothesis 5 was supported by this analysis by demonstrating that higher academic, emotional, or physiological stress was predictive of higher emotionality. These patterns remained even when controlling for sex and age.

A third multiple regression was conducted examining student TAI-G Lack of Confidence subscale scores as a function of SSS scales, sex, and age (see Table 27). The analysis identified Peer Interactions ($p < .05$) and Academic Self-Concept ($p < .001$) as significant predictor variables, with higher Peer Interactions or Academic Self-Concept scores predicting higher Lack of Confidence scores. Hypothesis 5 was supported by this analysis by demonstrating that higher peer interaction or academic self-concept scores were predictive of higher levels of lack of confidence. These patterns remained even when controlling for sex and age.

Table 26

Regression Analysis for Predicting the TAI-G Emotionality Subscale from SSS Controlling for Sex and Age

	B	*SE B*	*β*	R^2
Teacher interactions	-0.06	0.05	-.08	.463
Academic stress	0.32	0.06	.32***	
Peer interactions	-0.08	0.05	-.08	
Academic self-concept	0.05	0.06	.04	
Emotional stress	0.23	0.05	.27***	
Behavioral stress	0.00	0.07	.00	
Physiological stress	0.34	0.08	.28***	
Age	-0.07	0.09	-.04	
Sex	-0.11	0.33	-.02	

Note. The constant for the model = 4.31. Sex was coded as 0 = Male and 1 = Female.

***$p < .001$.

Table 27

Regression Analysis for Predicting the TAI-G Lack of Confidence Subscale from SSS Controlling for Sex and Age

	B	*SE B*	*β*	R^2
Teacher interactions	0.07	0.06	.09	.319
Academic stress	0.07	0.07	.07	
Peer interactions	0.13	0.06	.14*	
Academic self-concept	0.44	0.06	.41***	
Emotional stress	0.08	0.06	.09	
Behavioral stress	0.00	0.08	.00	
Physiological stress	0.00	0.09	.00	
Age	-0.05	0.10	-.03	
Sex	0.26	0.37	.04	

Note. The constant for the model = 2.34. Sex was coded as 0 = Male and 1 = Female.

*$p < .05$. ***$p < .001$.

A fourth multiple regression was conducted examining student TAI-G Interference subscale scores as a function of SSS scales, sex, and age (see Table 28). The analysis identified Academic Self-Concept ($p < .001$) and Behavior Stress ($p < .05$) as significant predictor variables, with higher Academic Self-Concept and Behavioral Stress scores predicting higher Interference scores. Hypothesis 5 was supported by this analysis by demonstrating that higher academic self-concept or behavioral stress scores were predictive of higher Interference. These patterns remained even when controlling for sex and age.

A final multiple regression was conducted for the student ratings examining student TAI-G total subscale scores as a function of SSS scales, sex, and age (see Table 29). The analysis identified Academic Stress ($p < .001$), Academic Self-Concept ($p < .001$), Emotional Stress ($p < .01$), and Physiological Stress ($p < .01$) as significant predictor variables, with higher SSS scores on those scales and younger age predicting higher TAI-G total scores. Hypothesis 5 was supported by this analysis by demonstrating that higher scores on these variables and younger age were predictive of higher TAI-G total scores. These patterns remained even when controlling for sex and age.

Table 28

Regression Analysis for Predicting the TAI-G Interference Subscale from SSS Controlling for Sex and Age

	B	*SE B*	*β*	R^2
Teacher interactions	0.03	0.04	.06	.318
Academic stress	0.04	0.05	.05	
Peer interactions	0.01	0.04	.02	
Academic self-concept	0.28	0.05	.37***	
Emotional stress	0.07	0.04	.11	
Behavioral stress	0.13	0.06	.16*	
Physiological stress	0.11	0.06	.12	
Age	-0.10	0.07	-.08	
Sex	-0.30	0.27	-.07	

Note. The constant for the model = 1.70. Sex was coded as 0 = Male and 1 = Female.

*$p < .05$. ***$p < .001$.

Table 29

Regression Analysis for Predicting the TAI-G Total Score from SSS Controlling for Sex and Age

	B	*SE B*	*β*	R^2
Teacher interactions	-0.01	0.11	-.00	.608
Academic stress	1.00	0.13	.40***	
Peer interactions	0.06	0.11	.02	
Academic self-concept	0.85	0.12	.32***	
Emotional stress	0.38	0.12	.18**	
Behavioral stress	0.15	0.14	.05	
Physiological stress	0.50	0.16	.16**	
Age	-0.35	0.19	-.08	
Sex	-0.34	0.71	-.02	

Note. The constant for the model = 14.85. Sex was coded as 0 = Male and 1 = Female.

*$p < .05$. **$p < .01$. ***$p < .001$.

Chapter Five: Discussion

Introduction

The following chapter provides a summary of the most significant findings from the study and then presents and discusses the results from the study with respect to each of the research questions and their related hypotheses. The chapter concludes with information about the limitations of the study and directions for future research.

Overview of Significant Findings and Implications

Construct validity. The current study set out to develop and evaluate a multi-informant assessment procedure for the assessment of TA. A multi-informant system is considered preferable to procedures that rely solely on self-rating scales, primarily because it provides a means of controlling for confounding factors and biases associated with anxiety measurement (e.g., self-preservation bias and memory problems). The four-factor model (i.e., Worry, Emotionality, Cognitive Interference, and Lack of Confidence) upon which TA is derived, however, is based solely upon student self-rating scales. Therefore, the first step toward developing a multi-informant assessment system for TA was to substantiate the construct validity of the TAI-G across newly introduced TA raters (i.e., parents and teachers), as well as the newly tested English-speaking Canadian sample of adolescents. This study established that the four-factor model of TA is best applied to the sample within a multi-informant system of assessment, using a reduced item version of the TAI-G. Future research should aim to corroborate these findings and develop normative data for student TA across multiple raters.

Internal consistency. In order to determine internal consistency, Cronbach's alpha (Cronbach, 1951) was calculated for the items of each subscale and Total scores across all three informant samples. All TAI-G subscales across all informant samples exceeded the criteria for acceptable reliability of .70 (Cronbach, 1951), remaining consistent with the alpha coefficients reported by the author for which Total scores and subscales range from .79 to .94. (Hodapp, 1991). With regard to the SSS, reliabilities were calculated for the seven SSS subscales, five of which yielded adequate reliability above .70. The exceptions were the subscales of Behavioral Stress ($\alpha = .62$) and Physiological Stress ($\alpha = .63$). This is consistent with the internal consistencies reported in the manual, where alpha coefficients for the subscales range from .68 to .80 (Helms & Gable, 1989).

Demographic variables.

Sex. In addition, this study set out to investigate demographic variables (i.e. sex, age, grade level, significantly elevated symptoms) considered relevant to student, parent, and teacher endorsement of TA symptomatology. The results of the self-rated TAI-G in this study provide partial support for female susceptibility for TA with regard to two of the four factors (i.e. Worry & Emotionality), consistent with findings from research that utilized the traditional two-factor model of TA (Liebert & Morris, 1967). Analyses of sex effects across all informants revealed concordance between students and parents with respect to their identification of test anxiety symptoms for both males and females. This student-parent concordance may suggest that parents are able to accurately gauge differences between males and females with regard to TA symptoms. Therefore, clinical

decisions and insights regarding gender that are drawn from concordant parent and student data would likely be well founded. Equally important, however, are discordant reports. For example, this study contributes the unique, and unexpected, finding associated with teacher endorsement of male susceptibility to symptoms of Cognitive Interference. This is interesting because teachers provide the only analysis of TA symptoms that is based on first-hand observation, as well as a perspective that has never been studied in the field of TA. The possibility that males are more prone than females to developing Cognitive Interference represents a major shift from the traditional association between females and anxiety in general. Such discordant information is also very important in clinical practice, as it can be used as a pointer towards possible informant biases such as self-preservation, avoidance, inaccurate rating, and clinical resistance on the part of the informant. As such, the practitioner can use these points of discordant data to direct further examination and analyses of the issues during consultation. Therefore, concordant and discordant data points can be presented to all informants and used as mechanisms to generate discussion, thereby facilitating better understanding of the experience, manifestation, and impact of TA for all informants.

This study failed to find sex differences within the group with significantly elevated TA. This was consistent across all informants. Such a result suggests that males and females may not be as different with regard to the development of significant TA as previously thought. Furthermore, if student sex does not render one more susceptible to developing significantly elevated TA, the research emphasis placed upon sex as a demographic indicator of TA should be further evaluated.

Age and grade. Results associated with age and grade level provided substantiation of the four-factor model of TA across a sample of Canadian-speaking teens at the junior and senior high levels of school. Previous research substantiating the four-factor model was conducted on mixed age groups of American and German samples in different educational environments. Therefore, this study substantiates the use of the TAI-G among English-speaking Canadian teens. The results of the student self-rated TAI-G analysis revealed that the youngest students demonstrated higher Emotionality compared to those in their mid-teens. The oldest teens, however, demonstrated higher Lack of Confidence compared to students in their mid-teens. For both factors (i.e., Emotionality and Lack of Confidence), 12-year-old and 18-year-old students demonstrated no significant differences. The results seem to suggest that early adolescence, as well as late adolescence represent periods that may render students particularly susceptible to developing Emotionality and Lack of Confidence. This may correspond to major life transitions that take place during these periods (e.g., onset of adolescence, higher academic demands, decisions about career, etc.). In terms of educational level comparisons, main effects were only noted within the student self-rating scales, with significantly higher TAI-G Worry scores for junior high students compared to senior high students and significantly higher SSS Behavioral Manifestations reported for senior high students compared to junior high students. The results appear to corroborate a study by Manly and Rosemire (1972) that suggested that TA prevalence is highest at the junior high level compared to senior high. The current study suggests that

this is particularly true for the factor of Worry, but behavioral problems associated with school stress may actually get worse in high school.

The findings from this study are similar to the results of past studies that indicated that students respond to school stress from an early age, and these stress effects seem to wax and wane throughout their academic careers. When considering age and grade demographics, past research has typically addressed the development of TA as a function of temporal factors. In terms of this study, it might be best to consider age and grade effects on TA with respect to the dynamic nature of temporal factors within the TMSC. Theoretically, the TMSC holds that anxious responses occur as a result of precipitating stressors. Therefore, this study suggests that one very important requirement to understanding the development of TA is that of becoming very familiar with individual student and school dynamics, particularly aspects of student and school culture that may arouse stress at various times during student development. It is very likely that these stressors would vary from region to region (e.g., American school vs. Canadian schools), and this variation may help explain the failure in research to establish clear and consistent relationships between TA and temporal variables (e.g., age and grade).

Test Anxiety and School Stress

Due to the importance this study places upon the TMSC as a governing theory, the identification of precipitating variables associated with TA was of paramount importance. Since the TMSC holds that anxious symptomatology is precipitated by stress, the type and degree of various school-based stressors (i.e., SSS), and their relationship to TA (i.e., TAI-G), were investigated . The findings from this study revealed

many positive linear relationships between school stress and TA, providing considerable support for using the TMSC as a governing model. Furthermore, the analyses provided strong support of a direct association between school stress and TA. Only a few exceptions were noted, but even these exceptions provided important information. For example, although the findings show clear evidence linking school stress with TA, the data suggests that stress associated with Teacher Interactions and Peer Interactions do not relate to Worry. This is noteworthy because Worry is considered the most important variable with regard to its influence on actual test performance (Deffenbacher, 1980; Hembree, 1988; Liebert & Morris, 1967; Mueller, 1992). Therefore, when practitioners target this important factor for support, the best use of resources might be directed toward ameliorating other sources of school stress, such as academic stress and stress associated with poor academic self-concept. Also noteworthy was the negative correlation between Worry and Behavioral Manifestations of School Stress. This finding suggests that students who demonstrate Worry symptoms toward testing do not demonstrate behavioral problems in response to school stress and visa versa. The finding seems to suggest a lack of concern for academics and consequences of behavior when there is low Worry and high Behavioral Manifestations. It was suggested that this pattern may represent students who are developing Learned Helplessness (Seligman & Maier, 1967). As such, this pattern may serve as an indicator that low Worry scores may not always mean that a student is going to perform well on tests. This suggestion, however, requires further study.

The results from this study yielded further support for the use of the TMSC as a model for understanding TA, the association between school stress and the development of TA, as well as a wealth of information for practitioners interested in identifying specific school stressors that underlie the various TA factors. As such, this study contributes new insight into the development of TA by suggesting that academic stress is the most important school-based stressor related to Worry, the TA factor that impacts most on actual testing performance. Furthermore, the findings suggested that academic stress is also the most important school stressor associated with Emotionality, one of the original two TA factors (Liebert & Morris, 1967). Following these findings, it would seem appropriate to direct resources toward decreasing academic stress when attempting to ameliorate symptoms associated with Worry and Emotionality.

Another interesting point derived from these findings is that the traditional two-factor model of TA (i.e., Worry & Emotionality) seems to be associated mainly with one major school stressor, academic stress. The more recently developed four-factor model, which extends the traditional model to include Lack of Confidence and Cognitive Interference, seems to be linked to a more diverse range of school stressors. Lack of Confidence was predicted by school stress associated with peer interactions and poor academic self-concept. Therefore, when targeting Lack of Confidence, it would seem most appropriate to direct resources toward developing adaptive peer interactions (e.g., peer support groups) and enhancing academic self-concept (e.g., cognitive therapy). Cognitive Interference was predicted by stress associated with poor academic self-concept. As such, it would seem most appropriate to direct resources toward enhancing

academic self-concept when making efforts to reduce Cognitive Interference during testing. All of these relationships remained when controlling for sex and age. Overall, the results highlight the importance of assessing all the factors of TA and all the potential school-related stressors prior to developing supportive interventions toward ameliorating TA. Moreover, these results suggest that efficacious treatment of TA may hinge upon a combination of specialized interventions that would likely vary from student to student, depending upon what factors of TA present significant concerns. At a minimum, this study points toward a need to target various school stressors when developing interventions to support elevated symptoms of TA.

This study also investigated whether or not the identified school stressors as well as age and sex could predict the general construct of TA in a consistent manner across multiple raters. The findings indicated that the parent and student reports yielded concordant data, suggesting that Academic Self-Concept predicts the TAI-G Total Score. This pattern remained after controlling for sex and age. This is important because previous analyses of the student-rated TAI-G subscales revealed that academic stress predicted two very important TA factors, Worry and Emotionality. When considering the broad construct of TA by way of the TAI-G Total Score, however, it would appear that parents and students alike endorse that school stress associated with academic self-concept is the primary predictor. Also implicated as an important predictor was Physical Manifestations. Manifestations of school stress within this model are symptoms of stress, as are the various factors of TA. It is interesting to note, however, that Physical Manifestations of School Stress predict the broad symptoms of the construct of TA,

suggesting that the physical symptoms of school stress somehow best represent the consolidated symptoms of TA. Of the four TA factors, this is best represented by the Emotionality factor (i.e., physiological symptoms). The data is interesting because research has typically established Worry as having the most important relationship to actual testing performance. This study, however, suggests that Emotionality/Physical Manifestations may best represent the construct as a whole. Therefore, this study builds upon previous research by demonstrating that Worry and Emotionality represent two very important factors in the construct of TA. A different contribution, however, is that although Worry is well established as having a strong link to actual test performance, Emotionality may best represent the general four-factor construct of TA. Although this pattern was not established in the Teacher ratings, the consistent result across students and parents lends credibility to this claim.

Discussion of the Results Relative to Questions and Hypotheses of the Study

Question One. Is the factor structure of the English version of the TAI-G, child self-report, maintained within a student sample from grades 7 through 12, as well as across parent and teacher ratings of grade 7 through 12 student TA?

Hypothesis One. The factor structure identified for the TAI-G, student self-report, will be maintained for students from grades 7 through 12 and across TAI-G ratings of student TA by their parents and teachers.

Discussion of results for Question and Hypothesis One. The results of this analysis suggested that the 30-item TAI-G may not best represent the four-factor model of TA when used on a specified sample of English-speaking Canadian junior and senior

high students, nor when given to parents and teachers to provide assessment of TA levels for those students. All four factors were, however, replicated across these samples when a CFA analysis was applied to a reduced (i.e., 17-item) version of the TAI-G. This is finding is significant because it is the first time that there has been evidence supporting the theoretical and scientifically established foundation of TA within a multi-informant assessment system. The findings strongly indicate the validity of using the 17-item version of the TAI-G within a multi-informant assessment system for school aged children. Moreover, the results provide strong evidence for the utility of multi-informant assessment of TA among English-speaking Canadian junior and senior high students without compromising the theoretical and scientifically established (i.e. four-factor model) foundation upon which the TAI-G was based. These findings are very encouraging, as more confidence can be placed in the possibility of conducting TA assessment using a multi-informant method, which is less subject to potential biases (e.g., self-preservation bias, impact of anxiety on memory of symptoms) associated with reliance on self-rating scales (Dadds et al., 1998; Kendall & Flannery-Schroeder, 1998; Vasey & MacLeod, 2001). Furthermore, the multi-informant assessment system can be potentially utilized as a mechanism to enhance the assessment of TA by establishing points of cross-rater concordance and discordance. Points of concordance, in many cases, can be considered as a way to substantiate student self-ratings, whereas points of discordance can be thought of as indicators for further inquiry and investigation. For example, when students fail to endorse symptoms despite endorsement by parents and teachers, it may be an indicator that the self-preservation bias is impacting student

ratings. Without cross-rater perspectives, it is more difficult to check for biases that may confound results when obtained from one rater.

Questions Two A and B.

Question Two A. Do TAI-G subscale and Total Scores differ as a function of demographic variables (i.e., age, sex, grade)?

Question Two B. Do TAI-G subscale and Total Scores differ as a function of type of Informant (i.e., student, parent, teacher)?

Hypotheses Two A and B.

Hypothesis Two A. TAI-G ratings will differ as a function of demographic variables (i.e., age, sex, grade)?

Hypothesis Two B. TAI-G ratings will differ as a function of type of informant (i.e., student, parent, teacher).

Discussion of results for Questions and Hypotheses Two A and Two B. For the most part, the TAI-G results relative to sex comparisons were consistent with the extant literature, which typically indicates that being female is a risk factor for TA. This pattern was demonstrated, however, on only two of four factors of the TAI-G: Worry and Emotionality, as well as the TAI-G Total Score. This suggests that the Liebert and Morris (1967) two-factor model of TA (i.e., Worry and Emotionality) would cast females as being susceptible to TA. Later models, with added factors of Cognitive Obstruction/Interference (McKeachie, 1984; Swanson & Howell, 1996; Tyron, 1980; Wine, 1971) and Lack of Confidence (Carver & Scheier, 1984), would cast females as being susceptible to TA with regard to traditional factors only (i.e., Worry and

Emotionality). Findings from this study indicate that females do not appear to differ from males on Cognitive Obstruction/ Interference nor on Lack of Confidence. Future research should examine these patterns further in order to determine more clearly the extent to which females are predisposed to TA in comparison to males.

The parent sample yielded results that were consistent with those of the students (i.e., females demonstrated higher Worry and Emotionality compared to males). As for the teacher sample, however, females were only found to score higher on the Worry scale, whereas higher scores were obtained for males on the Cognitive Interference scale. These results suggest that parent-student reports are more congruent with each other compared to teacher-students and teacher-parent reports. Teachers, however, may be in a better position to gauge Cognitive Interference compared to parents and students alike. Although it is not possible to observe intrusive thoughts, teachers might be more able to observe the behavioral manifestations of distractible thoughts during testing and conclude that males experience this to a greater degree than females. Alternatively, males may have more difficulty reporting cognitive interference accurately and parents may not be able to accurately gauge symptoms due to their absence during testing. Such discrepancies underscore the clinical importance of utilizing multi-informant assessment systems for TA. One example of the practical value of the multi-informant approach is demonstrated in the example of a student who fails to endorse Worry, despite parent and teacher endorsement of this factor. Given this scenario, a practitioner would have to seriously consider the possibility that self-preservation bias or some other confounding effect is influencing the student report. If the information was solely based upon a self-

rating scale, the Worry factor would likely be disregarded by the practitioner. In order to understand how anxiety impacts in various environments, all perspectives must be given careful consideration in thorough clinical assessment.

Sex differences were also investigated on the SSS data. The analysis revealed that females reported significantly higher levels of academic stress (i.e., situations that relate to academic performance), as well as higher manifestations of school stress with respect to Emotional manifestations (e.g., feelings of worry, fear, shyness, and loneliness) and Physiological manifestations (e.g,. nausea, racing heart beat). Males scored significantly higher than females on the Behavioral manifestations scale (e.g. striking out, being hurtful and/or disrespectful toward others). These results suggest that males and females experience and/or perceive fairly even levels of school-based stress, differing only with regard to academic stress. There are, however, more differences with regard to how males and females respond to stress at school, as indicated by results associated with the Manifestations of School Stress factors. Specifically, females reported higher levels of internalizing symptomatology (i.e., Physiological manifestations) and Emotional symptomatology (e.g. crying, anger), whereas males reported higher levels of externalizing symptomatology (i.e. Behavioral manifestations). These results may have implications for strategies aimed at preventing and addressing school stress. There may be a need to find ways to reduce academic pressure for students, particularly female adolescents. Furthermore, due to elevated Emotional and Physiological Manifestations of School Stress compared to males, it would seem appropriate that intervention for females emphasize therapies targeting symptoms related to Emotional and Physiological

Manifestations of School Stress. For males, it is particularly important to be aware that overt behavior (i.e., Behavioral Manifestations) problems demonstrated at school may be due to school stress. Therefore, males demonstrating excessive behavior problems may be best served through interventions such as collaborative problem solving (Greene, 2001). Punitive measures, such as detention and suspension, may actually serve to reinforce and/or exacerbate symptoms of stress and anxiety toward school-based stressors by allowing students, particularly males, to avoid/escape the source of fear/stress (i.e., school stress).

This study also examined performance variation as a function of educational level (junior high vs. senior high) on the TAI-G across student, parent, and teacher samples and the SSS on the student sample. Main effects were only noted within the student samples, with significantly higher TAI-G Worry scores for junior high students compared to senior high students, and significantly higher SSS Behavioral Manifestations reported for senior high students compared to junior high students. These results suggest that test-related Worry, compared to the other factors, should be given particular attention, and that it should likely be attended to from an early age. Studies do suggest that TA increases slowly in the early school years, then levels off and eventually decreases in later school years. Studies vary, however, with regard to exactly when this occurs. Hembree (1998) suggested that a sharp increase occurs at grades 3 to 5, stabilizes in secondary school, and decreases in college. The data in the current study suggests that junior high students experience failure focused thoughts (i.e., Worry) to a greater degree than high school students when it comes to testing. This finding appears to corroborate a

study by Manly and Rosemire (1972), which suggested that TA prevalence is highest at the junior high level compared to senior high.

With regard to the SSS, student reports indicated that Behavioral Manifestations may be particularly problematic at the high school level. Studies indicate that negative behavioral and cognitive effects associated with untreated TA (e.g., poor motivation, negative self-evaluation, poor concentration, test performance, grade retention rates, school drop out) are thought to get worse over time (Hill & Horton, 1986), contributing to more serious mental health diagnoses (Beidel & Turner, 1988; Swanson & Howell, 1996). This suggests that significantly elevated Behavioral Manifestations of stress may result from untreated school stressors (e.g., Test-related anxiety) which has persisted since early in the course of a student's school career. If this is true, a projection can be made that these students are at a higher risk for developing more serious mental health diagnoses as they get older. These results suggest a need for early screening of and intervention for various school stressors, such as stress related to testing, particularly failure-focused thoughts towards testing (i.e., Worry) and monitoring of Behavioral Manifestations, beginning as early as the elementary years.

Results associated with age comparisons on the TAI-G showed higher endorsement for Emotionality among the youngest participants (i.e., 12 years of age) compared to those in the middle of the age range (i.e., 15 years of age), but comparisons between the youngest and the oldest (i.e., 12 years of age and 18 years of age) did not yield a significant difference. The results suggest that the Emotionality (i.e., physiological symptoms) factor of TA is perceived by students to be most severe during

early adolescence. Again, this partially corroborates some previous research findings associated with the developmental course of TA (Hembree, 1998; Manly & Rosemire, 1972). For example, in a study by Manly and Rosemire (1972), TA prevalence was found to be highest at the junior high level compared to senior high. Age patterns associated with the parent and teacher ratings for each of the TAI-G scales were mostly unremarkable, demonstrating only one significant finding, with higher teacher-rated Interference scores for 18-year-olds compared to 12-year-olds. This suggests that teachers perceive older adolescents to be more prone to the negative effects of distracting and interfering thoughts during testing. Ultimately, the findings demonstrate very little variation across factors associated with age when parent and teacher reports are analyzed. This relative consistency across parents and teachers can be interpreted as a positive feature of a multi-informant assessment system of TA

TAI-G factor scores also varied as a function of Informant. With Emotionality, Lack of Confidence, and Interference, student and parent ratings were not significantly different from one another. For all of these factors, however, the student and parent ratings were significantly higher than the teacher ratings. In this case, it could be argued that students and parents are in more agreement with respect to the symptomatology associated with these three factors. Since parents and students demonstrated more concordance across TA factors compared to teacher reports, it appears likely that students and parents are better reporters of TA symptomatology in three of four factor categories. It must be noted, however, that all parties demonstrated concordance with regard to reporting student Worry. Again, Worry is considered the most robust of the four factors,

and it is important that all informants gauged this factor concordantly. Knowing that all informants, on average, recognize and endorse Worry in a consistent manner will enhance analyses of discordant reports. For example, when a student fails to endorse Worry, despite teacher and parent endorsement, a practitioner may interpret the lack of endorsement by the student as under-reporting.

Question Three. What is the frequency of students scoring high levels of TA (i.e., one standard deviation or more above the mean) across all informant samples?

Hypothesis Three. The frequency of participants scoring high TA (i.e., one standard deviation or more above the mean) will fall within 10% to 25% of the student sample, consistent with previous research studying TA prevalence.

Discussion of results for Question and Hypothesis Three. This study investigated the prevalence of significantly elevated TA (i.e., one standard deviation or higher above the mean (Chapell et al., 2005) within the sample compared to general prevalence findings with regard to TA. Early research findings reported high TA prevalence rates at around 10% (Kondas, 1967), whereas more recent rates approach 30% (Hill, 1984; Nottelmann & Hill, 1977; Methia, 2004). As such, it has been suggested that TA is on the rise, implicating the need for educational reform initiatives associated with increased high-stakes testing (Kruger et al., 2007). This study yielded fairly consistent prevalence rates of 13.5% to 16.3% across all three informants, suggesting a lower prevalence of significant TA for this sample compared to recent research findings. This is likely partially due to the fact that this study utilizes a Canadian sample, whereas most other studies use American samples for which educational reform initiatives and

implementation of high-stakes testing has taken place to a greater degree. Although there are increases across Canada with regard to standardized testing and a very slight increase over time in TA reported in this study, the impact on TA does not appear to be overly concerning, as the increase is still well below the high prevalence reported in recent American studies. This may be because the stress associated with educational reform is not as severe in Canada compared to that in the United States.

Another encouraging conclusion of this finding is that the multi-informant assessment system of TA yielded consistent endorsement of significantly elevated TA symptomatology (Total Score) across all three informants. This lends support to the possibility that students, parents, and teachers alike recognize significant TA symptomatology in a consistent manner. This highlights the reliability of the TAI-G across informants and supports the utility of a multi-informant assessment system for identifying significantly elevated TA, particularly with a focus on Total Scores. From this, it may be concluded that all informants are capable of identifying significantly elevated TA in a manner that is quite consistent across all raters. Therefore, when students fail to endorse symptoms despite teacher and parent endorsement, one should consider the possibility that the student is under-reporting. Data was not obtained on specific factors for any of the informants, as the Total Score was considered the best indicator of overall significant TA.

Question Four. Does TA within the high TA group (i.e., as identified by TAI-G student self-reports, parent reports, and teacher reports) vary as a function of age or sex?

Hypothesis Four. TA within the high TA group will differ as a function of age and sex demographics across all informants (i.e., students, parents, and teachers).

Discussion of results for Question and Hypothesis Four. This study also investigated whether TA within the group with elevated TA differed as a function of age and sex demographics across all informants, including students, parents, and teachers. The effects of age on TA reporting is not well established and somewhat inconsistent. Therefore, this study set out to compare and corroborate the effects of age with previous findings and possibly establish a more consistent relationship between age and TA. Correlational analyses yielded no significant correlations between TAI-G total score and sex in the student sample. This finding is very interesting because the conclusion is contrary to well-established research claiming that females endorse TA symptomatology to a greater degree than males (Ferrando et al., 1999; Gierl & Rogers, 1996; Hembree, 1988; Seipp & Schwarzer, 1996; Wren & Benson, 2004; Zeidner & Schleyer, 1999). This study suggests that although females report higher levels of TA than males, the group with significantly elevated TA (i.e., one standard deviation or more above the mean) is not significantly different with regard to sex. Furthermore, the student sample analysis demonstrated no relationship between TA and age in the significantly elevated TA group. This fails to corroborate any previous research findings linking age with TA endorsement. Finally, these findings remained consistent in the data provided by alternative, teacher and parent, informants. Students, parents, and teachers alike agree that students with significantly elevated TA demonstrate no differences as a function of age or sex. This pattern of multi-rater concordance lends consistent support to the

possibility that individuals with high TA do not demonstrate the sex and age differences that are demonstrated by the sample as a whole.

Question Five. Do student rated TAI-G subscale and Total scores demonstrate relationships with SSS subscales, sex, or age?

Hypothesis Five. Student rated TAI-G subscale and Total scores will demonstrate relationships with SSS subscales, sex and age.

Discussion of results for Question and Hypothesis Five. A primary aim of this study was to investigate the relationship between TAI-G subscales and SSS subscales. Consistent with the Transactional Model of Stress & Coping (Lazarus & Folkman, 1984), it is held that stressful experiences precipitate anxious symptomatology. Considering that school stress represents the major source of stress among children and adolescents (Armacost, 1989; Barrett & Heubeck, 2000; Green, 1988; McGuire et al., 1987; Omizo et al., 1988; Sheridan & Smith, 1987; Stark et al., 1989) and that written tests represent the greatest source of school stress among children (Romano, 1997; Ryan-Wenger et al., 2005; Skybo & Buck, 2007; Taxis et al., 2004), it was expected that student-rated TAI-G subscale and Total scores would demonstrate significant relationships with SSS subscales. Correlations analyses and Multiple Regression Analyses were conducted to examine these relationships.

Correlational analyses. The results of the correlational analyses yielded significant positive linear relationships between most of the TAI-G scales and most SSS scales. These results are highly consistent with predictions derived from the Transactional Model of Stress and Coping, thereby, providing significant evidence for the

use of this model as a theoretical foundation for the study of TA. A few exceptions were found, including no significant relationship between the TA factor of Worry and Teacher Interactions nor Worry and Peer Interactions, but a significant negative correlation between Worry and Behavioral Manifestations of School Stress. In other words, students who had high Worry scores on the TAI-G had low Behavioral Manifestations of School Stress on the SSS and visa versa.

Correlational analysis was also applied to investigate relationships between student-rated scales with sex, age, and grade level on TAI-G and SSS subscales. The results yielded positive relationships between females and Worry, Emotionality, TAI-G Total Score, Academic Stress, and Physiological Manifestations of School Stress. The results also yielded a significant relationship between males and Behavioral Manifestations of School Stress. These findings corroborate previous research that suggest a female predisposition for developing TA (Ferrando et al., 1999; Gierl & Rogers, 1996; Hembree, 1988; Seipp & Schwarzer, 1996; Wren & Benson, 2004; Zeidner & Schleyer, 1999). Specifically, this study suggests that the TAI-G factors Worry and Emotionality, as well as Total Score, present particular problems for females. Results associated with the SSS indicate that academic stress is present among females when they endorse Worry and Emotionality, the two original factors of TA. Furthermore, the SSS results indicate that females experience Physiological Manifestations of School Stress, whereas males experience Behavioral Manifestations of School Stress. This is not surprising, as males are known to present more externalizing behavior problems than females (Liu, 2004). The data suggests that although females endorse Academic School

Stress to a greater degree than males, as well as TA factors of Worry and Emotionality, these problems among females may easily go unnoticed by outside observers compared to males because females appear to experience stress and anxiety symptoms physiologically and by worrying, whereas males tend to act out.

The results for age and grade established a significant correlation with Worry, as well as Academic Self-Concept. These relationships are characterized by higher Worry scores among younger students and higher Academic Self-Concept scores among older students. Results for grade level were congruent with the patterns of significant correlations established for age. These results corroborate the Manly and Rosemire (1972) study, which suggested that TA prevalence, in this case Worry, is highest at the junior high level compared to the senior high level. Based on the TMSC, this decline in Worry would theoretically result from a decline in stress, which the TMSC holds precipitates anxious symptomatology such as Worry. In this study, there is an increase in Academic Self Concept among older adolescents, which may account for the decrease in Worry scores among older teens. Compared to older teens, it would appear that the cognitive component of negative outcome focus (i.e., Worry) may present a particular problem among younger teens, especially with regard to how their skills in school are assessed. The results call for further research investigating the possibility that better transitional, as well as emotional supports for students from the elementary levels of education to junior high might help alleviate fear of failure in school and develop a healthy Academic Self-Concept at an earlier age.

A correlational analysis was also conducted exploring relationships between TAI-G scales with sex and age variables across all three informants. This analysis revealed that only one relationship, between sex and Worry, was significant across the student, parent, and teacher samples. Specifically, females yielded higher levels of Worry according to all three informants. Such concordance among all three informants presents more supportive evidence for a female susceptibility toward developing TA symptoms, particularly Worry. Ample previous research has made this claim using self-rating scales. This study provides even stronger evidence, demonstrating endorsement of the relationship within a multi-informant assessment system. Furthermore, as noted, ample research has demonstrated that the relationship between Worry and testing performance is stronger than the relationship between the other TA subscales and performance (Deffenbacher, 1980; Hembree, 1988; Liebert & Morris, 1967; Mueller, 1992). In order to lend further support to this claim, future research should investigate the relationships between TA factors and testing performance within a multi-informant framework of assessment. If the pattern remains consistent across all informants, the reliability of the relationship between Worry and test performance would be further indicated, underscoring an already established need for the development of appropriate intervention strategies focusing on student Worry (i.e., negative outcome focus). Such a finding would provide even more evidence in support of using a multi-informant assessment system for TA.

Multiple regression analyses. This study also conducted multiple linear regression analyses on the student sample designating all seven SSS subscales, sex, and

age as predictor variables and TAI-G subscales and the TAI-G total score as criterion variables. The results from the first and second multiple regressions showed that higher academic stress was predictive of higher Worry and higher Emotionality. These patterns remained even when controlling for sex and age. Thus, one can also say that Worry and Emotionality scores differ as a function of academic stress scores—students with higher academic stress scores will have higher Worry and Emotionality scores, and students with lower academic stress scores will have lower Worry and Emotionality scores. This data suggests that the original two-factor model including Worry and Emotionality (Liebert & Morris, 1967) of TA is subject to variation as a function of academic stress. Furthermore, this is especially important to know because Worry is considered the most influential TA factor, presenting the most significant barrier to actual testing performance compared to the other factors (Deffenbacher, 1980; Hembree, 1988; Liebert & Morris, 1967; Mueller, 1992). This study, then, suggests that a very important school stressor associated with Worry and Emotionality is academic stress. Consistent with the TMSC, intervention strategies should aim toward alleviating academic stress among students in an effort to reduce levels of Worry and Emotionality and, possibly, enhance test performance. Future research should be conducted to examine the efficacy of such interventions.

A third multiple regression was conducted examining the student TAI-G subscale, Lack of Confidence, as a function of SSS scales, sex and age. The analysis showed that School Stressors, Peer Interaction, and Academic Self-Concept were predictive of Lack of Confidence on the TAI-G. These patterns remained even when controlling for sex and

age. From the theoretical perspective of the TMSC, this analysis suggests that negative peer interactions and poor academic self-concept may diminish one's confidence in his or her ability to be successful on tests. This corroborates previous research suggesting that academic self-confidence is enhanced through peer support (Sarason & Sarason, 1994). This finding seems to reveal the function of social supports during testing as a booster of confidence, which may facilitate better test performance. The data also suggests that intervention strategies aiming to develop student confidence toward testing should focus on developing adaptive peer interactions. Further research should investigate the role of social supports during testing, examining the underlying social interactions (e.g., study groups, resources to help clarify points of confusion, etc.) that impact both positively and negatively on student testing confidence and, ultimately, testing performance.

This analysis also revealed that school stress associated with poor academic self-concept also predicted Lack of Confidence towards testing. This is not surprising because both subscales are measuring constructs that are very much alike. Academic self-concept is measuring a broader school stress associated with confidence in one's ability to be successful in school, whereas Lack of Confidence is measuring anxiety associated with confidence in one's ability to be successful in school tests. The finding does, however, suggest that the Lack of Confidence factor of TA is possibly a subcomponent of a broader, more generalized problem related to a poor academic self-concept. In other words, Lack of Confidence towards testing may not be specific to testing situations alone. As such, broader intervention aiming to develop general confidence toward academic challenges may be appropriate.

A fourth multiple regression was conducted examining student TAI-G Interference subscale scores as a function of SSS scales, sex and age. The analysis showed that school stress associated with academic self-concept was predictive of higher problems associated with the TA factor Interference. This pattern remained even when controlling for sex and age. During the early development of the construct of TA, several studies supported the inclusion of Cognitive Obstruction or Cognitive Interference (McKeachie, 1984; Swanson & Howell, 1996; Tyron, 1980; Wine, 1971). Sarason (YEAR) agreed, claiming that both Worry (i.e., preoccupation with failure, negative self-talk) and Cognitive Interference (i.e., disruptive/blocking thoughts) could more accurately describe the cognitive domain of TA than Worry alone. This study lends further support to the separation of Worry and Cognitive Interference into two distinct factors of the cognitive domain of TA. Specifically, the first multiple regression indicated that Worry was predicted by academic stress. Academic stress did not, however, predict Cognitive Interference in this study. Instead, this analysis demonstrated that school stress associated with academic self-concept was a predictor of Cognitive Interference. This finding suggest that by nature, school stress related to academic self-concept facilitates blocking and/or intrusive thoughts during testing. It seems plausible that problems associated with academic self-concept could generate intrusive thoughts that might diminish one's concentration levels during tests. This pattern, however, does not seem to be associated with failure focused thoughts because it is not predictive of the Worry factor of the TAI-G. Further research should investigate what types of thoughts are generated when students are experiencing problems with academic self-concept. If

not Worry/failure focused, then there must be other intrusive thoughts that interfere with concentration levels and possibly test performance.

This analysis also demonstrated that Behavioral Manifestations of School Stress predict Cognitive Interference on the TAI-G. This seems plausible, as maladaptive overt behavioral reactions to school stress could very well divert from one's focus during testing. Based on the TSMC, which holds the view that stress precipitates anxiety, the analysis suggests that interventions designed to enhance concentration during testing by reducing cognitive interference should target stressors associated with academic self-concept and provide alternative strategies to maladaptive behavioral reactions to school stress. Future studies should investigate the impact of such interventions on Cognitive Interference and actual testing performance.

A final multiple regression was conducted for the student ratings examining student TAI-G total score as a function of SSS scales, sex and age. Hypothesis 5 was supported by this analysis by demonstrating that higher scores on the variables of Academic Stress, Academic Self-Concept, Emotional Manifestations of School Stress, Physiological Manifestations of School Stress, and younger age were predictive of higher TAI-G total scores. These patterns remained even when controlling for sex and age. This analysis investigated how the seven factors of the SSS generally related to TA by way of the TAI-G total score, which represents the combining of all four factors. Not surprisingly, the analysis revealed that academic stress predicted TAI-G total score. Since academic progress is often gauged through testing in school, and the TMSC holds that stress precipitates anxiety, it stands to reason that academic stress would predict

general TA. This underscores the need to design intervention strategies to reduce academic stress in schools. Ironically, school reform initiatives may actually be increasing academic stress among students (Kruger et al., 2007). Therefore, interventions may first target government reform initiatives, making the case that reform should be implemented in a manner that is perceived as less threatening by students. Further research is required to determine how this might occur.

Problems associated with academic self-concept also predicted the TAI-G Total Score, suggesting that a diminished sense of one's ability to be successful in academics may be facilitative of TA. Therefore, enhancing academic self-concept should be included in intervention strategies designed to reduce TA. Further research should investigate how this can be achieved, as well as whether such interventions impact testing performance.

The analysis also demonstrated that Emotional and Physiological Manifestations of school stress predict the TAI-G total score. In other words, emotional reactions to stress (e.g., anger, crying, frustration) and bodily symptoms (e.g., stomachaches, headaches) appear to impact the TAI-G total score, again underscoring the need to develop interventions that provide students with alternative coping strategies. With regard to emotional reactions, students may benefit from learning to react to school stress in a more adaptive manner. With regard to physiological reactions, students may benefit from learning relaxation strategies.

Finally, younger age predicted the TAI-G total score, suggesting that younger students demonstrate difficulties with general TA to a greater extent than their older

counterparts. Again, this underscores the need to reduce school stress and anxiety from very early on in students' school careers.

Question Six. Do teacher and parent rated TAI-G subscale and Total scores demonstrate relationships with SSS subscales?

Hypothesis Six. Positive linear relationships will be established between parent and teacher rated TAI-G subscales and Total scores and the subscales of the SSS.

Discussion of results for Question and Hypothesis Six. The analysis examining parent-rated TAI-G Total Scores revealed SSS subscales Academic Self-Concept and Physiological Manifestations as significant predictor variables. In other words, stress associated with academic self-concept and physiological manifestations of stress scores were predictive of higher parent-rated TAI-G Total Scores. These patterns remained even when controlling for sex and age. The analysis also examining teacher-rated TAI-G Total Scores identified only age as a significant predictor, with older age predicting higher TAI-G Total Scores. The parent results demonstrated some consistencies with the results obtained by the student informants (i.e., students also identified Academic Self-Concept and Physiological Manifestations as significant TAI-G Total Score predictors). Consistent with the TMSC, such informant concordance underscores the role school stress, specifically academic self-concept, likely plays in contributing to general TA. It also suggests that parents and students are both aware of the interplay between academic self-concept and TA. It seems likely that this concordance is due to communication differences between parents and students compared to teachers and students. If awareness of the relationship between academic self-concept and TA hinged entirely

upon direct observation, one would think that teachers would also endorse this relationship. It is possible that students are much more forthcoming with parents with regard to feelings associated with academic self-concept and TA, thereby facilitating concordance in their reporting. There was also concordance between parents and students with regard to their endorsement of Physiological Manifestations predicting TAI-G Total Scores. This suggests that parents and students alike recognize the link between physiological symptoms associated with School Stress and general TA symptomatology. This also supports the possibility that parents and students communicate well with regard to symptoms associated with these variables. It is possible that they do not communicate so well with regard to Academic Stress and Emotional Manifestations, as only student informants endorsed these as predictors and TA.

Teacher reports demonstrated no relationships between SSS subscales and TAI-G Total Scores. Although teachers play a crucial role in these areas, for some reason teachers are not endorsing any link between the two. Since teachers are directly involved in the general school setting and possibly have an advantage over parents to observe school stress and TA, it is likely that the numbers of students that teachers have to interact with fails to facilitate personal relationships with students to the point that they would recognize the role school stressors might play in TA. Perhaps since stress and anxiety are personal subjects, students are better able to express associated problems more comfortably with parents compared to teachers. Possibly, students would be embarrassed to raise concerns about these issues at school for social reasons. Perhaps students fear how their teachers would respond to expression of concerns related to

school stress and TA. Regardless of the reason, this study suggests that much work needs to be invested in helping teachers become more aware and supportive of school stress and test anxiety among their students. Future research might examine how this can be done (e.g., more effective communication, more direct observation, allotting time for one-to-one discussion specifically related to school stress and TA).

Limitations of the Study

This study had one major limitation that should be considered and addressed in future projects with similar designs. The sample sizes, especially for parents and teachers, are considered minimally acceptable. Given the challenges associated with forming student-parent-teacher groups, achieving adequate teacher data was particularly difficult because each teacher provided ratings for only one student. As such, only one student from each teacher's class could be used. This required lobbying hundreds of classrooms to gather adequate teacher-student data. Future research projects of this nature should make efforts to achieve adequate sample sizes, particularly for teachers, in order to substantiate the claims of this study. Given a larger sample size across informants, further analyses of gender and culture differences within a multi-informant TA assessment framework could be conducted.

Discussion of the 17-item TAI-G Results

Preliminary analyses of results obtained from the 17-item version of the TAI-G demonstrate very similar findings compared to the 30-item TAI-G. The 17-item TAI-G demonstrated the best CFA model fit compared to the 30-item version, lending support to the possibility of substituting the 30-item TAI-G with the 17-item version when engaging

in multi-informant assessment of TA. Further support for this possibility was garnered in the subsequent analyses. Results associated with internal consistency were highly consistent between the two measures, with a difference noted only between the Emotionality subscales (i.e. 17-item $\alpha = .69$ vs. 30-item $\alpha = .80$). There were very few differences identified between the two measures when correlational analyses were applied to determine relationships between TAI-G scales and SSS scales, as well as major demographic variables, sex and age. Both measures drew the same conclusion that significant positive relationships between most of the TAI-G scales and most of the SSS scales. The only differences noted included no relationship found between Emotionality and Teacher Interactions or Peer Interactions for the 17-item version of the TAI-G. Therefore, the results of the 17-item version lend no support for any influence of stress associated with negative Teacher and Peer Interactions in the development of the Emotionality component of TA. There was also no relationship established between TAI-G Total Score and Physiological Stress on the 17-item TAI-G. These relationships were identified on the 30-item version. With regard to age, there was a difference in that another relationship was established between Worry and younger students, with higher Worry demonstrated among younger students. With regard to the regression analyses, the results between the 17-item TAI-G and the 30-item TAI-G were essentially the same, with one small exception in that younger age also predicted higher Worry scores on the 17-item version.

Overall, these preliminary analyses suggest that the 17-item version of the TAI-G is worthy of further research focus in developing a multi-informant approach to the

assessment of TA. This version of the TAI-G appears to present the best CFA model fit compared to the 30-item version, yields similar relationships compared to those established between SSS and TAI-G (30-item) subscales, yields very similar relationships with demographic variables compared to the 30-item version of the TAI-G, and yields almost exactly the same regression data when the subscales of the SSS are set as predictor variables for the subscales of the TAI-G.

Future Research

This study demonstrates the value of using a multi-informant system for the assessment of TA. Future research should be directed toward further development of the multi-informant assessment system of TA, as well as substantiation of patterns associated with concordant and discordant reports between informants. This study suggests that such an endeavor may require some alteration of the currently used scales (e.g., scale item reduction) in order to maintain the four-factor construct of TA. A second direction for future research relates to the development and evaluation of efficacious interventions designed to support TA. Using the TMSC as a theoretical guide, this study demonstrated some very important relationships between various types of school stress and the four factors of TA. Future research should be directed toward corroborating these findings. Furthermore, continued substantiation of the TMSC as a governing model for TA can be conducted by way of efficacy studies designed to target school stressors that predict TA factors. For example, interventions designed to reduce academic stress should be examined to determine their potential impact on the TA factors of Worry and Emotionality.

Although research consistently demonstrates a strong link between Worry (i.e., negative outcome focus) and poor test performance (Deffenbacher, 1980; Hembree, 1988; Liebert & Morris, 1967; Mueller, 1992), this study suggests that the TA factor, Worry, is not linked to stressful Teacher or Peer Interactions at school. Other sources of school stress, including academic stress and academic self-concept, appear to represent more important variables in the development of TA. In other words, research studies engaged in designing efficacious interventions for TA may investigate the possibility that targeting academic stress and academic self-concept may yield more positive effects on TA, especially the particularly important Worry factor, compared to interventions that target negative Teacher and Peer Interactions at school.

It may be that students who fear failure the most (i.e., High Worry) also fear the negative ramifications of expressing stress as externalizing behavior. Conversely, students who are not worried about tests may possess a generally carefree personality and, as such, may also be less fearful about the possible consequences of acting out as a result of general school stress. As such, this pattern may represent one's level of care and concern for actions and consequences. If this is true, students with low worry and high behavioral manifestations may actually be representative of students who have developed learned helplessness. It would be interesting to examine how the low Worry/high Behavioral Manifestations group performs on actual testing. Normally, students with low worry should do better on test performance compared to students with high worry (Hembree, 1988; Liebert & Morris, 1967; Deffenbacher, 1980; Mueller, 1992). If this lack of worry and increase in behavioral manifestations has come about as a result of

learned helplessness, however, it is theoretically possible that low worry in this group would not result in better test performance as research suggests. Future research should examine the possibility that learned helplessness may serve to moderate the typical relationship between worry and test performance.

Conclusion

This study contributes to the theory, extant empirical literature, and practices related to TA. From a theoretical perspective, a valuable contribution is extended toward the substantiation of the four-factor model within a multi-informant framework of TA assessment. Furthermore, the study provides ample support for the placement of TA within the general framework of Anxiety Theory by way of the TMSC. Empirically, this study substantiates and extends claims made with regard to TA ratings as a function of demographic variables of gender, age, grade level, and significantly elevated TA. Ultimately, this study supports the use of a multi-informant assessment system of TA within the governing theoretical framework of the TMSC.

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Appendix A

Test Anxiety Index-German (English Translation): Student Form

In the following you find a couple of statements that describe feelings and thoughts one might have when taking an exam. Please indicate how often you have such feelings and thoughts in exam situations in general.

	Almost Never	Sometimes	Often	Almost Always
1. I am confident about my performance.	☐	☐	☐	☐
2. I think about how important the examination is for me.	☐	☐	☐	☐
3. I get "butterflies".	☐	☐	☐	☐
4. I think about my abilities.	☐	☐	☐	☐
5. Distracting thoughts keep "popping" into my head.	☐	☐	☐	☐
6. I worry about whether I can cope with being examined.	☐	☐	☐	☐
7. I am "up-tight".	☐	☐	☐	☐
8. I have faith in my own performance.	☐	☐	☐	☐
9. I am thinking about the consequences of failing.	☐	☐	☐	☐
10. I ask myself whether my performance will be good enough.	☐	☐	☐	☐
11. I am preoccupied by other thoughts which distract me.	☐	☐	☐	☐
12. I feel uneasy.	☐	☐	☐	☐
13. I know that I can rely on myself.	☐	☐	☐	☐
14. I think about how important it is for me to receive a good result.	☐	☐	☐	☐

15. I easily lose my train of thoughts.	☐	☐	☐	☐
16. My heart pounds.	☐	☐	☐	☐
17. I worry about my results.	☐	☐	☐	☐
18. I feel anxious.	☐	☐	☐	☐
19. I forget things because I am too preoccupied with my personal problems.	☐	☐	☐	☐
20. I am satisfied with myself.	☐	☐	☐	☐
21. I am concerned about my grades.	☐	☐	☐	☐
22. I tremble with fear.	☐	☐	☐	☐
23. I worry that something might go wrong.	☐	☐	☐	☐
24. My concentration is interrupted by interfering thoughts.	☐	☐	☐	☐
25. I feel overwhelmed.	☐	☐	☐	☐
26. I think that I will succeed.	☐	☐	☐	☐
27. I think about what will happen if I don't do well.	☐	☐	☐	☐
28. I feel upset.	☐	☐	☐	☐
29. I am convinced that I will do well.	☐	☐	☐	☐
30. I have the feeling everything is so difficult for me.	☐	☐	☐	☐

Appendix B

Test Anxiety Index-German (English Translation): Parent Form

In the following you find a couple of statements that describe feelings and thoughts YOUR CHILD might have when taking an exam. Please indicate how often YOUR CHILD has such feelings and thoughts in exam situations in general.

	Almost Never	Sometimes	Often	Almost Always
1. Your child is confident about their performance.	☐	☐	☐	☐
2. Your child thinks about how important the examination is for them.	☐	☐	☐	☐
3. Your child gets "butterflies".	☐	☐	☐	☐
4. Your child thinks about their abilities.	☐	☐	☐	☐
5. Distracting thoughts keep "popping" into your child's head.	☐	☐	☐	☐
6. Your child worries about whether they can cope with being examined.	☐	☐	☐	☐
7. Your child is "up-tight".	☐	☐	☐	☐
8. Your child has faith in their own performance.	☐	☐	☐	☐
9. Your child thinks about the consequences of failing.	☐	☐	☐	☐
10. Your child asks themselves whether their performance will be good enough.	☐	☐	☐	☐
11. Your child is preoccupied by other thoughts which distract them.	☐	☐	☐	☐
12. Your child feels uneasy.	☐	☐	☐	☐

13. Your child knows that he or she can rely on their self.	☐	☐	☐	☐
14. Your child thinks about how important it is to receive a good result.	☐	☐	☐	☐
15. Your child easily loses their train of thought.	☐	☐	☐	☐
16. Your child's heart pounds.	☐	☐	☐	☐
17. Your child worries about their results.	☐	☐	☐	☐
18. Your child feels anxious.	☐	☐	☐	☐
19. Your child forgets things because they are too preoccupied with their personal problems.	☐	☐	☐	☐
20. Your child is satisfied with theirself.	☐	☐	☐	☐
21. Your child is concerned about their grades	☐	☐	☐	☐
22. Your child trembles with fear.	☐	☐	☐	☐
23. Your child worries that something might go wrong.	☐	☐	☐	☐
24. Your child's concentration is interrupted by interfering thoughts.	☐	☐	☐	☐
25. Your child feels overwhelmed.	☐	☐	☐	☐
26. Your child thinks that he or she will succeed.	☐	☐	☐	☐
27. Your child thinks about what will happen if they don't do well.	☐	☐	☐	☐
28. Your child feels upset.	☐	☐	☐	☐
29. Your child is convinced that they will do well.	☐	☐	☐	☐
30. Your child has the feeling everything is so difficult for them.	☐	☐	☐	☐

Appendix C

Test Anxiety Index-German (English Translation): Teacher Form

In the following you find a couple of statements that describe feelings and thoughts THIS STUDENT might have when taking an exam. Please indicate how often THIS STUDENT has such feelings and thoughts in exam situations in general.

		Almost Never	Sometimes	Often	Almost Always
1.	This student is confident about their performance.	☐	☐	☐	☐
2.	This student thinks about how important the examination is for them.	☐	☐	☐	☐
3.	This student gets "butterflies".	☐	☐	☐	☐
4.	This student thinks about their abilities.	☐	☐	☐	☐
5.	Distracting thoughts keep "popping" into this student's head.	☐	☐	☐	☐
6.	This student worries about whether they can cope with being examined.	☐	☐	☐	☐
7.	This student is "up-tight".	☐	☐	☐	☐
8.	This student has faith in their own performance.	☐	☐	☐	☐
9.	This student thinks about the consequences of failing.	☐	☐	☐	☐
10.	This student asks themselves whether their performance will be good enough.	☐	☐	☐	☐
11.	This student is preoccupied by other thoughts which distract them.	☐	☐	☐	☐
12.	This student feels uneasy.	☐	☐	☐	☐
13.	This student knows that he or she can rely on theirself.	☐	☐	☐	☐

14.	This student thinks about how important it is to receive a good result.	☐	☐	☐	☐
15.	This student easily loses their train of thought.	☐	☐	☐	☐
16.	This student's heart pounds.	☐	☐	☐	☐
17.	This student worries about their results.	☐	☐	☐	☐
18.	This student feels anxious.	☐	☐	☐	☐
19.	This student forgets things because they are too preoccupied with their personal problems.	☐	☐	☐	☐
20.	This student is satisfied with their self.	☐	☐	☐	☐
21.	This student is concerned about their grades.	☐	☐	☐	☐
22.	This student trembles with fear.	☐	☐	☐	☐
23.	This student worries that something might go wrong.	☐	☐	☐	☐
24.	This student's concentration is interrupted by interfering thoughts.	☐	☐	☐	☐
25.	This student feels overwhelmed.	☐	☐	☐	☐
26.	This student thinks that he or she will succeed.	☐	☐	☐	☐
27.	This student thinks about what will happen if they don't do well.	☐	☐	☐	☐
28.	This student feels upset.	☐	☐	☐	☐
29.	This student is convinced that they will do well.	☐	☐	☐	☐
30.	This student has the feeling everything is so difficult for them.	☐	☐	☐	☐

Appendix D

Parent – Student Consent Form

Name of Researcher, Faculty, Department, Telephone & Email:

Jody Harpell, School Psychologist, Faculty of Education, Division of Applied Psychology

Ph.#. (902) 270-2391 email: jodyharpell@yahoo.ca

Supervisor:

Dr. Jac Andrews, Coordinator of School & Applied Child Psychology, Faculty of Ed

Title of Project:

Test Anxiety Measurement Among Adolescents: Multi-Informant Assessment & School Based Stress

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This consent form, a copy of which has been given to you, is only part of the process of informed consent. If you want more details about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information. The University of Calgary Conjoint Faculties Research Ethics Board has approved this research study.

Purpose of the Study:

Dear Parent & Student: I am an employee of the Cape Breton-Victoria Regional School Board's Student Services Department. I have been working in the field of student assessment for eight years. Currently, I am enrolled in a PhD program at the University of Calgary and would really appreciate your assistance in completing this program by participating in a study which examines stress and anxiety among junior high and high school students. This research aims to enhance assessment procedures for test anxiety, as well as determine the general levels and types of stress among students. Your participation is being requested because your child is a student

within the CB-VRSB. It is important that consent be granted by both parent and student to be considered for the selection process. All participants (i.e. parents & students) will be granted the opportunity to enter their names in a draw to **win one of eight prizes of $50.00**.

What Will I Be Asked To Do?

If selected, your involvement simply requires the completion of one short questionnaire for parents and two short questionnaires for the students. These will be conducted over the phone at a later date. The questionnaires take about three to five minutes each to complete. There is a chance that the student participants will be randomly selected to be rated by one of their teachers using the same questionnaire as completed by parents. Confidentiality will be respected, as no information that discloses your identity will be released or published. Participating is entirely voluntary and any participant may withdraw at any time. Please do not hesitate to contact the researcher to clarify any uncertainties that parents and students have in regard to participating in this study. If you wish, a review of general conclusions derived from this study can be forwarded to you. Simply sign the line indicating a desire to receive a summary of results, including your mailing address, and your request will be granted upon completion of the study. If you are willing to support this research by participating, please sign below. I will collect them from the homeroom teachers.

What Type of Personal Information Will Be Collected?

Parents who agree to participate will be asked to provide their name, parent role (i.e. mother, guardian, etc...) and phone number. Parents will be asked to complete a short questionnaire regarding student anxiety. Students who agree to participate will be asked to provide their name, grade, gender, school, and homeroom teacher's name. Students will be asked to complete two short questionnaires regarding student stress.

Are there Risks or Benefits if I Participate?

Risks associated with this study are minimal. It is possible that questions from the surveys might serve to cause students to think about anxious symptoms that they normally would not think about. In the event that a student or parent raises this concern, the nature of their distress will be recorded. It may be necessary to provide further explanation of the study goals, further clarification of why they are asked to partake, and/or information regarding local agencies, practitioners, and resources capable of supporting students with stress and anxiety.

What Happens to the Information I Provide?

Participation is completely voluntary, anonymous and confidential. You are free to discontinue participation at any time during the study. Information collected from participants who withdraw from the study will be destroyed (i.e. shredded). Nobody, except the researcher and research assistants, will be allowed to see any of the answers to the questionnaires. There are no names on the questionnaires. Only group information will be summarized for any presentation or publication of results. The questionnaires are kept in a locked cabinet only accessible by the researcher and supervisor. The anonymous data (i.e. hard copies & computer disk or questionnaires and consent forms) will be stored for three years, at which time, it will be permanently destroyed.

Signatures (written consent)

Your signature on this form indicates that you 1) understand to you satisfaction the information provided to you about your participation in this research project, and 2) agree to participate as a research subject. In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from this research project at any time. You should feel free to ask for clarification or new information throughout your participation.

Parent Name (Please Print):_____ Signature: _____

Student Name (Please Print): _____ Signature: _____

Phone numbers (if different add both): _____

Home Rm Teacher: _____ I would like a results summary (circle): Yes No

Researcher's Name: Jody Harpell Signature: _____ Date: _____

Questions / Concerns:

If you have further questions or want clarification regarding this research and/or your participation, please contact:

Mr. Jody Harpell, Faculty of Education or Dr. Jac Andrews, Faculty of Education
(902) 270-2391, jodyharpell@yahoo.ca (403) 220-7503, jandrews@ucalgary.ca

If you have any concerns about the way you've been treated as a participant, please contact Bonnie Scherrer, Ethics Resource Officer, Research Services Office, University of Calgary at (403) 220-3782; email bonnie.scherrer@ucalgary.ca. A copy of this consent form has been given to you to keep for your records and reference. The investigator has kept a copy of the consent form.

Appendix E

Teacher Consent Form

Name of Researcher, Faculty, Department, Telephone & Email:

Jody Harpell Ph.#. (902) 270-2391 Faculty of Education, Division of Applied Psychology School Psychologist email: jodyharpell@yahoo.ca

Supervisor: Dr. Jac Andrews, Coordinator of School & Applied Child Psychology Program, Faculty of Education

Title of Project:

Test Anxiety Measurement Among Adolescents: Multi-Informant Assessment & School Based Stress

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This consent form, a copy of which has been given to you, is only part of the process of informed consent. If you want more details about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

The University of Calgary Conjoint Faculties Research Ethics Board has approved this research study.

Purpose of the Study:

Dear teacher: I am an employee of the Cape Breton-Victoria Regional School Board's Student Services Department. I have been working in the field of student assessment for nine years. Currently, I am enrolled in a PhD program at the University of Calgary and would really appreciate your assistance in completing this program by participating in a study which examines

stress and anxiety among junior high and high school students. This research aims to enhance assessment procedures for test anxiety, as well as determine the general levels and types of stress among students. Your participation is being requested because you are a teacher within the CB-VRSB. It is important that consent be granted by at least 150 teachers. All participants will be granted the opportunity to enter their names in a draw to **win one of eight prizes of $50.00**.

What Will I Be Asked To Do?

Your involvement simply requires the completion of one short questionnaire regarding anxious symptoms of one student in your class. You will only be asked to rate a student from whom prior personal and parental consent was granted. The questionnaire will be delivered to you by a research assistant. The questionnaire takes about three minutes to complete. Confidentiality will be respected, as no information that discloses your identity will be released or published. Participation is entirely voluntary and any participant may withdraw at any time. Please do not hesitate to contact the researcher to clarify any uncertainties that parents and students have in regard to participating in this study. If you wish, a review of general conclusions derived from this study can be forwarded to you. Simply sign the line indicating a desire to receive a results summary, including your mailing address, and your request will be granted upon completion of the study. If you are willing to support this research by participating, please sign below and forward the form to the main office.

What Type of Personal Information Will Be Collected?

Teachers who agree to participate will be asked to provide their name and homeroom grade. Teachers will be asked to complete a short questionnaire regarding student anxiety for one randomly selected student.

Are there Risks or Benefits if I Participate?

There are no risks to teachers.

What Happens to the Information I Provide?

Participation is completely voluntary, anonymous and confidential. You are free to discontinue participation at any time during the study. Information collected from participants who withdraw from the study will be destroyed (i.e. shredded). Nobody, except the researcher and research assistants, will be allowed to see any of the answers to the questionnaires. There are no names on the questionnaires. Only group information will be summarized for any presentation or publication of results. The questionnaires are kept in a locked cabinet only accessible by the researcher and supervisor. The anonymous data (i.e. hard copies & computer disk or questionnaires and consent forms) will be stored for three years, at which time, it will be permanently destroyed.

Signatures (written consent)

Your signature on this form indicates that you 1) understand to you satisfaction the information provided to you about your participation in this research project, and 2) agree to participate as a research subject. In no way does this waive your legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from this research project at any time. You should feel free to ask for clarification or new information throughout your participation.

Participant's Name & Homeroom Grade (Please Print):_____

Participant's Signature: _____ Date:_____

I would like a summary of the study results: ☐ Yes ☐ No

Researcher's Name: Jody Harpell, School Psychologist

Researcher's Signature: _____ Date: _____

Questions / Concerns:

If you have further questions or want clarification regarding this research and/or your participation, please contact:

Mr. Jody Harpell, Faculty of Education or Dr. Jac Andrews, Faculty of Education

(902) 270-2391, jodyharpell@yahoo.ca (403) 220-7503, jandrews@ucalgary.ca

If you have any concerns about the way you've been treated as a participant, please contact Bonnie Scherrer, Ethics Resource Officer, Research Services Office, University of Calgary at (403) 220-3782; email bonnie.scherrer@ucalgary.ca.

A copy of this consent form has been given to you to keep for your records and reference. The investigator has kept a copy of the consent form.

Appendix F

Test Anxiety Index-German: 17-Item (English Translation): Student Form

In the following you find a couple of statements that describe feelings and thoughts one might have when taking an exam. Please indicate how often you have such feelings and thoughts in exam situations in general.

	Almost Never	Sometimes	Often	Almost Always
1. I get "butterflies".	☐	☐	☐	☐
2. I have faith in my own performance.	☐	☐	☐	☐
3. I am thinking about the consequences of failing.	☐	☐	☐	☐
4. I ask myself whether my performance will be good enough.	☐	☐	☐	☐
5. I am preoccupied by other thoughts which distract me.	☐	☐	☐	☐
6. I feel uneasy.	☐	☐	☐	☐
7. I know that I can rely on myself.	☐	☐	☐	☐
8. I easily lose my train of thoughts.	☐	☐	☐	☐
9. My heart pounds.	☐	☐	☐	☐
10. I worry about my results.	☐	☐	☐	☐
11. I feel anxious.	☐	☐	☐	☐
12. I am satisfied with myself.	☐	☐	☐	☐
13. My concentration is interrupted by interfering thoughts.	☐	☐	☐	☐
14 .I feel overwhelmed.	☐	☐	☐	☐

15. I think that I will succeed.	☐	☐	☐	☐
16. I think about what will happen if I don't do well.	☐	☐	☐	☐
17. I am convinced that I will do well.	☐	☐	☐	☐

UNIVERSITY OF CALGARY

CERTIFICATION OF INSTITUTIONAL ETHICS REVIEW

This is to certify that the Conjoint Faculties Research Ethics Board at the University of Calgary has examined the following research proposal and found the proposed research involving human subjects to be in accordance with University of Calgary Guidelines and the Tri-Council Policy Statement on *"Ethical Conduct in Research Using Human Subjects"*. This form and accompanying letter constitute the Certification of Institutional Ethics Review.

File no:	**5248**
Applicant(s):	**Jody Vincent Harpell**
Department:	**Applied Psychology, Division of**
Project Title:	**Test Anxiety Measurement Among Adolescents: Multi-Informant Assessment and School Based Stress**
Sponsor (if applicable):	

Restrictions:

This Certification is subject to the following conditions:

1. Approval is granted only for the project and purposes described in the application.
2. Any modifications to the authorized protocol must be submitted to the Chair, Conjoint Faculties Research Ethics Board for approval.
3. A progress report must be submitted 12 months from the date of this Certification, and should provide the expected completion date for the project.
4. Written notification must be sent to the Board when the project is complete or terminated.

Janice Dickin

Janice Dickin, Ph.D, LLB,
Chair
Conjoint Faculties Research Ethics Board

JUN 0 8 2007
Date:

Distribution: (1) Applicant, (2) Supervisor (if applicable), (3) Chair, Department/Faculty Research Ethics Committee, (4) Sponsor, (5) Conjoint Faculties Research Ethics Board (6) Research Services.