ABSTRACT

Perceived Stress in Gifted Adolescents: An Exploratory Study

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High school aged adolescents face many challenges, including academic, social, athletic, and personal obstacles that can be forms of eustress (i.e. "good stress") which promote growth and development across domains, however these chronic stressors can also pose the threat (i.e. "distress") of undermining success and mental health. Psychological health has been rated at an all-time low in high school adolescents, and nearly one-third report high levels of daily stress. Despite some empirical exploration of stress in adolescent populations, one subset of teens that has garnered relatively little attention is gifted adolescents. It is possible that gifted students may be vulnerable to the 'culture of achievement' and performance expectations. It is also possible that they may be able to problem solve and cope with stress better than their peers. However, this is an area of limited research. This study will provide novel insight into this relatively unexplored field because it not only considers global perceptions of stress in gifted adolescents, but adolescents in general. It is important to understand if gifted students perceive stress differently, as this cognitive mechanism may be an effective target for intervention.

Perceived Stress in Gifted Adolescents: An Exploratory Study

by

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A Dissertation

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"I do not know what I may appear to the world, but to myself I seem to have been only like a [child] playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me."

--Sir Isaac Newton

A lifelong pursuit lies ahead, with today only a small step in a long journey.

For this reason, with my deepest gratitude and warmest
affection I dedicate this dissertation

to my parents--the reason for whom I am today.
to my brothers--my inspirations.
to my fiancé and soon husband--my support and foundation for all tomorrows.

CHAPTER ONE

Introduction

Stress is an inescapable part of development across the lifespan (Bale & Epperson, 2015). It has been a topic of intrigue for centuries (Fink, 2010), appearing in writings from Aristotle, Hippocrates, and other great thinkers, because stress is thought to be the gateway to both growth and disease. The stress system, a complex of physiological and psychological mechanisms, works to maintain homeostasis in response to environmental pressures, and is one of the most fundamental biological and psychological processes that ensures survival.

Stress can be negative or positive, propelling growth or becoming burdensome, thus it is typically divided into two separate constructs: eustress and distress (Selye, 1980). Eustress, known as 'good' stress, can include stimuli that spur change for the better, whereas distress, known as 'bad' stress, typically is considered destructive. Selye (1936) was one of the first to discuss how stressors can simultaneously cause illness while also improving resistance and increasing the body's ability to defy future stressors. Though stressors have the potential to be productive or damaging depending on the perception, duration, and magnitude of the stressor, colloquially 'stress' is used synonymously with distress, referring to "physical, mental, or emotional strain or tension" ("Stress," 2019). This damaging form of stress has garnered much attention in headlines and has been labeled a top public health concern.

A Nation of Stress

The Stress in America™ survey, conducted by The Harris Poll on behalf of the American Psychological Association, has collected information online for over a decade from a large sample of adults residing in the United States (American Psychological Association, 2019). With a healthy average stress level set around 3.8 on a 10-point scale, the 13th annual survey for 2019 revealed that the average stress level of the 3,617 adults surveyed fell at 4.9, which was commensurate with the levels of stress reported in 2018 and 2017 (American Psychological Association, 2019). Not surprisingly, Americans were touted as the most 'stressed' out individuals in the world (Chokshi, 2019). Most adults reported mass shootings (71%), health care (69%), work stress (64%), and money (60%) as being significant sources of stress (American Psychological Association, 2019). These statistics are alarming for researchers and health care providers. Though stress is a common part of daily life, it is highly related to negative health outcomes over time, including all leading causes of death: heart disease, cancer, and stroke (Boll, Johnson, Perry, & Rozensky, 2002; Cohen et al., 2007; Cooper, 1988; Genest, 1989). Seventy-five percent of adults report physical or emotional symptoms of stress daily, including feeling tired, having headaches, or losing sleep (American Psychological Association, 2019). However, despite the fact that most people surveyed recognize that stress can have an impact on health, most report not taking action to prevent stress, with time management being cited as the number one barrier to stress management (American Psychological Association, 2019).

Though everyone experiences stress daily, a portion of the population experiences stress to an elevated degree, which is accompanied by clinical impairment in daily living.

The Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5) has a division of stress-related disorders which include acute stress disorder and posttraumatic stress disorder (American Psychiatric Association, 2013). Trauma and stress-related disorders result from exposure to stressful or traumatic events. However, degree of distress is a common metric for diagnosis of most disorders included in the DSM-5, with levels of impairment being the primary diagnostic focus for determining clinical significance. Development of anxiety disorders and depression are highly related to stress (Bayram & Bilgel, 2008). It has been proposed that many psychological disorders, including depression and anxiety, occur when an individual's stress response becomes extended, is not appropriate to the stressor, or is not directly correlated to exposure of a stressor (Mariotti, 2015; National Institute of Environmental Health Sciences, 2017), meaning many psychological disorders are in part diseases of the stress response itself. Of note, nearly twenty percent of adults in the United States were diagnosed with an anxiety disorder in the past year (U.S. Department of Health and Human Services, National Institute of Mental Health, 2019) and it is estimated that nearly 10 percent of children ages three to seventeen meet criterion for a stress-related disorder (Ghandour et al., 2019). Suicide ranks as the fourth leading cause of death after age 35, and second for individuals age ten to thirty-four (U.S. Department of Health and Human Services, Center for Disease Control and Prevention, 2019). In addition, the rate of suicide for adults, adolescents, and children have been rising at an alarming rate in the last decade. These statistics have prompted experts and news outlets alike to declare that the United States is in a state of mental health crisis (Koons, 2019).

Adolescent Stress

Adults are not the only individuals susceptible to the negative effects of stress. Children and adolescents also experience stress from a variety of sources. Recent concern has arisen regarding a severe increase in levels of chronic stress among adolescents.

High school aged adolescents face many challenges, including academic, social, athletic, and personal obstacles that can be forms of eustress which promote growth and development across domains, however these chronic stressors can also pose the threat of undermining success, mental health, and overall wellbeing (de Anda et al., 2000; Hussain, Kumar, & Husain, 2008; Kouzma & Kennedy, 2004; Moeini et al., 2008). In fact, psychological health has been rated at an all-time low in high school adolescents, and nearly a third report high levels of daily stress (Bethune, 2014; de Anda et al., 2000). In the Stress in America™ survey, adolescents reported that their stress levels far surpassed what they believed to be healthy, rating themselves as a 5.8 on a 10-point scale. Of further concern, most teens reported that they did not believe that stress was impacting their health, which indicates naivety and underestimation of the potential harms of daily stress (Bethune, 2014).

In rigorous academic settings, the stress experienced by students is often used as a metric for how well a school is preparing students for post-secondary endeavors, including job attainment and collegiate pursuits (Porter, 2007; Gall & Stixrd, 2008). However, students enrolled in highly competitive academic environments report higher levels of chronic stress (Leonard et al., 2015; Pope & Simon, 2005; Porter, 2007; Gall & Stixrd, 2008) which often lead to academic disengagement and a multitude of health-

related difficulties after graduation from high school (Bollinger et al., 2003; Leonard et al., 2015).

In a recent study conducted by Leonard et al. (2015), nearly half of sampled high school students attending a highly competitive private high school reported feeling a great deal of stress on a daily basis, and over 30 percent of students reported using alcohol *and* other illegal substances in the last month despite only one percent admitting to having a substance use problem. Students surveyed also reported that pressures to perform academically and in extracurricular activities were immense, which helped push them to do their best, but also created unrealistic expectations, elevated anxiety, and increased rates of depression. Leonard et al. (2015) described a 'culture of achievement' as prioritizing success over development, which seems to be a driving force in adolescent stress. The researchers assert that this future orientation is difficult for adolescents to maintain, and often is developmentally inappropriate, because teens do not possess the same coping skills as adults (Leonard et al., 2015).

Despite some empirical exploration of stress in adolescent populations, one particular subset of teens that has garnered relatively low level of attention is gifted adolescents. It is possible that gifted students may be vulnerable to the 'culture of achievement' and performance expectations. It is also possible that they may be able to problem solve and cope with stress better than their peers. However, this is an area of research that is relatively unexplored. The following study will explore if there is a difference in levels of perceived stress in gifted students in compared to peers not identified as gifted.

CHAPTER TWO

Literature Review

Because of the clear relationship between stress and health many approaches to research have sought to better understand the mechanisms by which stress impacts outcomes and ways that we can better cope with stress over time (Cohen et al., 2016; Cohen et al., 1995). However, the term *stress* is used to describe different phenomena across research disciplines and has been used loosely over time, making discussion of the construct confusing and difficult (Kagan, 2016). Cohen et al. (2016) recommended dividing stress research into three distinct traditions based upon how stress is defined: (a) epidemiological research focuses on the measuring objective levels of stress by quantifying life events; (b) biological research focuses on the physiological mechanisms that regulate homeostasis; and (c) psychological research has focuses on stress appraisal in relation to availability of resources to cope with the stressor. Though it is possible to view stress research through this lens, temporally speaking, stress research has been divided into two models, the systemic model and transactional model, that integrate all three disciplines of research. Each approach to studying stress has revealed complex, interdependent processes by which individuals perceive and respond to stress, however most stress research to date has been completed with adults and has only incorporated the importance of cognitive appraisal in the stress response to a limited extent. The focus of this study will be on the cognitive appraisal of stress in adolescents.

The Modern Era of Stress Research

Hans Selye, known as the father of stress research, was the first to empirically describe the health impacts of prolonged exposure to stress, a state that he called 'disease of adaptation' or General Adaptation Syndrome (Selye, 1956, 1980). Selye believed that prolonged exposure to stress caused excess release of hormones and other chemicals that led to a variety of maladaptive outcomes over time, including high blood pressure, ulcers, and fragility (Selye, 1956, 1980). Selye influenced generations of stress research which soon adopted two different approaches to quantifying stress (Krohne, 2002), systemic and transactional. These approaches use different theoretical models to define stress which differ in their handling of cognitive impact on stress responses (Krohne, 2002). Though this study will primarily address stress as a psychological construct using the transactional model, it is important to consider both the systemic and transactional approaches, as they provide complimentary explanations as to how and why stress has short- and long-term implications for health and overall wellbeing.

The Systemic Stress Model

In physiology, stress is defined as any environmental condition that alters homeostasis of an organism (Bernard, 1859; Cannon, 1929, 1932; Selye, 1956). Animals and humans alike have a biological imperative to respond to environmental changes, as ability to meet environmental demand fuels general evolutionary processes through elimination of traits that are maladapted to the presented stressor. Holmes and Rahe (1967) introduced the systemic stress model as the first model to incorporate the relationship between environmental conditions and homeostasis (Krohne, 2002). In this model, objective measures of environmental conditions are the primary predictors of

psychological or biological harm to the individual. This approach was the primary conceptualization of stress in the early years of stress research, but biological and physiological stress research today still rely on the systemic model for measurement, as does a large proportion of research in the field of psychology (Krohne, 2002). Using the systemic approach, the measure of stress's impact on health typically is discussed in terms of biological cost. Hippocrates described the *ponos* of disease as the work or energy required to compensate for the disease burden (Colditz, 2019). In similar but more broad language, the impact of a stressor primarily considers the energy and time required to repair resource deficits and return to homeostasis (Moberg & Mench. 2000). Therefore, biological cost is dependent on the relationship between the qualities of the stressor and characteristics of the individual.

The stress system in the body is defined as a neuroendocrine system located in the hypothalamus and brainstem that reacts to perceived imbalances in homeostasis with a complex repertoire of physiological and behavioral responses (Chrousos, 2009; Kyrou, Chrousos, Tsigos, 2006). This perception varies based on interpersonal variables such as previous physiological states, genetics, experience (previous immune responses in particular), age, and others (see Figure 2.1 from Moberg & Mench, 2000). Thus, the systemic model incorporates perception of the stressor as the key factor in initiating and determining the type of stress response (Moberg & Mench, 2000).

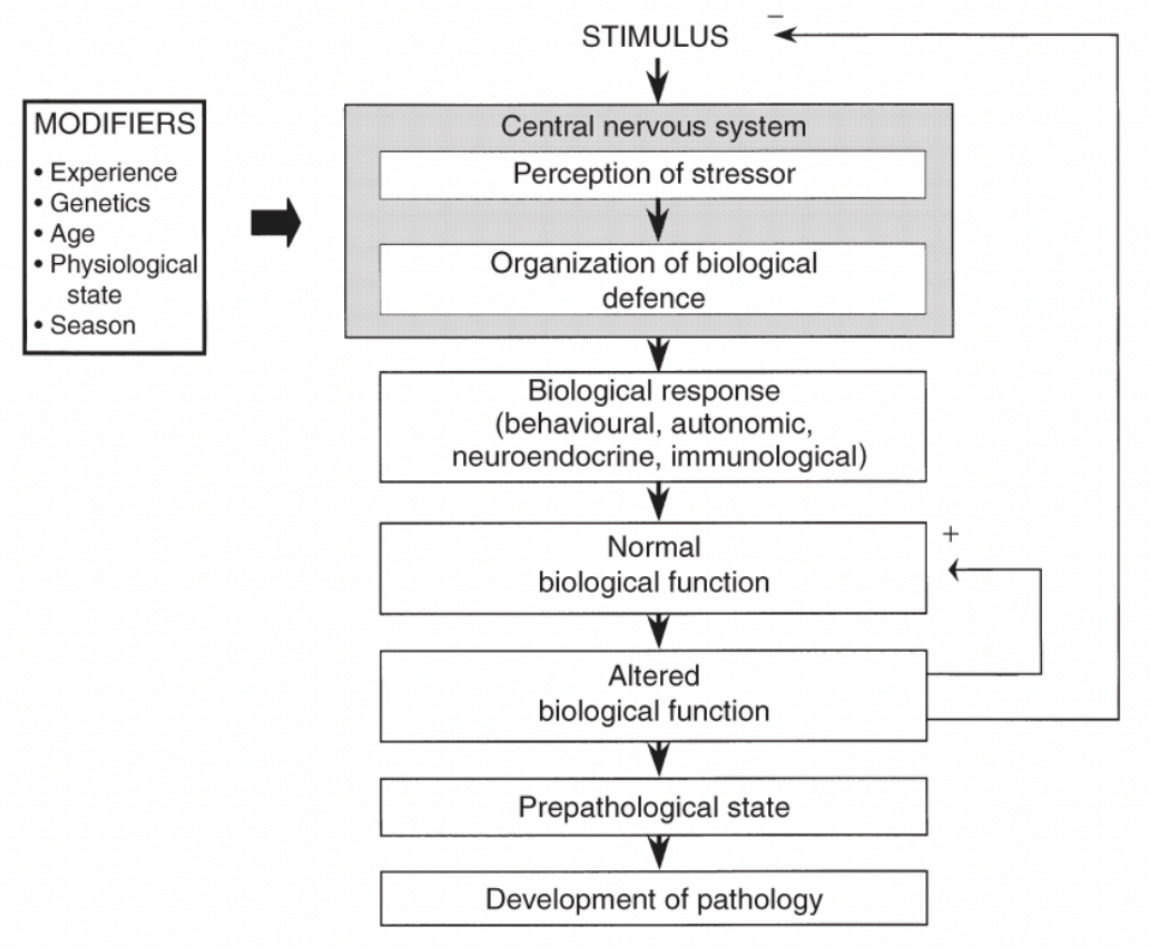

Figure 2.1. Organization of biological defense against stress (Moberg & Mench, 2000)

Depending on the perceived characteristics of the threat, including magnitude, immediacy, and type, the threat can provoke either an immediate, active coping response which diverts resources and activates autonomic (ANS) and sympathetic (SNS) systems to boost chances of survival, or an inactive aversive vigilance which involves continual SNS arousal (Adams, Baccelli, Mancia, & Zanchetti, 1969).

The biological cost to the individual depends on interpersonal characteristics, including the innate and adaptive immune responses. The innate stress response is the nonspecific defensive mechanism that is immediately reactive to an antigen, primarily

composed of pattern-recognition receptors and myeloid lineage cells which can recognize non-self signals and act to eliminate the threat (den Haan, Arens, & van Zeln, 2014). The adaptive stress response is a secondary defensive reaction that is initiated after the innate response is unsuccessful in restoring homeostasis, primarily composed of T cell and B cell responses that are tailored to the antigen (den Haan et al., 2014). Individual differences in immune responses and history of exposure to specific antigens alters the stress response over time.

Biological cost is also dependent on qualities of the stressor. The magnitude or severity of the stressor and the duration of the stimuli impact the resources needed by the individual to compensate with the change (Moberg & Mench, 2000). Organisms are typically able to cope with acute, low burden stressors without significant threat to wellbeing. However, when a stressor is more severe or is present for a longer time period, more resources are needed to return to a state of homeostasis. Not only is the organism at-risk for depleting resource stores, but the allocation of these resources to deal with the threat means that they are taken away from other important biological processes, marking the transition from normative stress and the state of distress. Thus, an additional threat of stress lies in the adaptive response itself. Though a state of vigilance or use of energy can help avoid danger, the biological mechanisms have cost trade-offs that are harmful over time (Kyrou et al., 2006).

It is important to note that, though the systemic stress model incorporates perception or sensing of changes to homeostasis, the model does not consider cognitive appraisal as part of the stress response. In general, a significant portion of stress research focusses on the magnitude or duration of an environmental demand in relation to some

outcome measure with adults (Cohen, Kessler, & Gordon, 1995, 1997; Grant et al., 2003), which includes study of psychological stress and health.

Psychological Stress and Health

Early stress research in the 1950s and 1960s in psychology revolved around the impact of life events in relation to physical illness, specifically attempting to demonstrate temporal proximity of a stressful event and the onset of illness (Kanner, Coyne, Schaefer, & Lazarus, 1981; Rabkin & Struening, 1976). One of the early attempts at measuring psychological stress involved use of the Social Readjustment Rating Scale (SRRS). The SRRS was developed by Holmes and Rahe as an early self-report measure of the intensity and length of time needed to accommodate to a stressful life event (Holmes & Rahe, 1967). Despite some psychometric concerns with the scale and methodological scrutiny, many studies during these early years using the SRSS reported a relationship between the number and intensity of a life event and probability of illness (see Blake & Vandiver, 1988; Cline & Chosy, 1972; Justice, McBee, & Allen, 1977; Rabkin & Struening, 1976; Simons & West, 1985), including increased incidents of myocardial infarction and coronary death (Rahe, Romo, Bennett, & Siltanen, 1974). However, these studies did not assess the processes through which various stressful events impact health, and only weak correlations between development of psychological or physical health outcomes (Kanner et al., 1981).

Similarly, Lazarus and colleagues proposed that life stressors have a cumulative impact and that the additive effect of daily stressors, referred to as *hassles,* were more impactful than large scale events and should also be considered in combination with daily pleasures and joy (Lazarus, Cohen, Folkman, Kanner, & Schaefer, 1980). The Hassles

Scale was developed as a measure of cumulative daily life stressors (Lazarus, 1966; Lazarus & Launier, 1978), originally intended to be a measure of how individual's perceive daily stressors differently based on coping and resource availability. However, among studies using the Hassles Scale and the Social Readjustment Rating Scale, relationships to psychological and physical disorders were minimal and weak at best, and ultimately did not account for the psychophysiological mechanisms by which stress impacts health outcomes (Kanner et al., 1981).

The biomedical community has only recently acknowledged that psychological stress can directly lead to disease (Cohen, Janick-Divert, & Miller, 2007; Marin et al., 2011). However, psychological stress has been linked to all leading causes of death, including arthritis, heart disease, cancer, and stroke (Boll, Johnson, Perry, & Rozensky, 2002; Cohen et al., 2007; Cooper, 1988; Genest, 1989). Psychological stress has also been connected to most mental health problems including depression, post-traumatic stress disorder (PTSD), schizophrenia, and pathologic aging (Marin et al., 2011; Paykel & Dowlatshahi, 1988).

The hypothalamic-pituitary-adrenocortical axis (HPA) and the sympathetic-adrenal-medullary (SAM) systems have been shown to be reactive to psychological stress. Specifically, cortisol released with the activation of the HPA and catecholamines released from the SAM system cause metabolic changes that lead to poor health outcomes like obesity, insulin resistance, and hypertension (Anagnostis, Athyros, Tziomalos, Karagianis, & Mikhailidis, 2009; Kyrou et al., 2006; Patterson et al., 1994). Job stress has been shown to impact cardiovascular disease risk and probability of a coronary event in adults (Kornitzer et al., 2006). Similarly, in a study conducted by

Rosengren and colleagues (2004), psychosocial risk factors including financial stress and lack of perceived control were related to myocardial infarctions. In addition, in a metanalysis conducted in 2010, anxiety and psychological stress were found to be a significant independent risk factors for coronary disease and cardiac death (Roest, Martens, Jonge, & Denollet, 2010). Other models of chronic stress studied in adults include burnout, depression, and PTSD, each of which are associated with poor health outcomes and shortened lifespan (Marin et al., 2011). High levels of glucocorticoids have also been associated with impaired cognitive performance, particularly with tasks that require memory (Borcel et al., 2008; Lupien et al., 1998). Psychological stress has also been shown to increase the probability of emotional and behavioral changes that influence susceptibility to disease and poor health outcomes, including smoking, dietary noncompliance, and sedentary lifestyle (Dimsdale, 2008; Zen, Whooley, Zhao, & Cohen, 2012). The physical and psychological impact of stress is commonly associated with adults, but there is also evidence that stress has a significant impact on adolescents.

Adolescents and Stress

Adolescence is a developmental stage typically considered in Western cultures to be between the ages of 12 and 18 (Kaplan, 2004) which is marked by significant transitions, change, and stress (Byrne, Davenport, & Mazanov, 2007; Compas, Orosan, & Grant, 1993; Cook & Furstenberg, 2002; Price, 1985). The magnitude of biological, cognitive, and psychosocial growth during this transitional stage between childhood and adulthood is often at odds with underdeveloped coping skills (Collins, 2011; Compas, Conner-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Kobus & Reyes, 2000). Because of this innate incongruency, adolescents' perception and management of stress

during this turbulent life stage highly influences positive and maladaptive outcomes into adulthood (Collins, 2011; Compas et al., 1993; Jessor, 1993).

Similar to the hypothesis regarding daily stressors and 'hassles' in adults, demands in the school, work, and relationship domains that are common, minor sources of stress for adolescents (Arnett, 2000) are thought to contribute to psychological problems to an equal or greater extent than major life events (Compas, Davis, Forsythe, & Wagner; Kanner et al., 1981; Wagner, Compas, & Howell, 1988). Adolescents that struggle to cope with daily stressors and develop negative coping patterns like emotional internalization or destructive behavioral patterns are more vulnerable to adjustment problems into adulthood (Masten et al., 2004). Daily stressors have also been shown to negatively impact learning and academic performance in school age children. In a large scale study of 1034 high school students, Kaplan, Liu, & Kaplan (2005) found that high academic expectations directly increase stress levels of adolescents which negatively impacts academic performance over time.

Elevated stress in adolescence results in epigenetic changes that lead to development of neuropsychiatric disorders in adulthood (Byrne & Mazanov, 2003; Niwa, M., Jaaro-Peled, Tankou, et al., 2013; van Os, Kenis, & Rutten, 2010). Adolescent stress is related to development of depression, anxiety, schizophrenia, increased suicidality, and other psychopathological symptomatology (Compas, Grant, & Ey, 1994; Deardorff, Gonzales, & Sandler, 2003; Diaz, Simantov, & Rickert, 2002; Dumont & Provost, 1999; Romeo & McEwen, 2006; Silberg, et al., 1999). Stress during adolescence has also been shown to be associated with many poor health behaviors in adulthood including alcohol use, overeating, physical inactivity, smoking, and drug use (Allison, Adlaff, Ialomiteanu,

& Rehm, 1999; Burke & Miczek, 2014; Byrne & Mazanov, 2003; Cartwright et al., 2003; McCubbin, Needle, & Wilson, 1985; Sinha, 2008; Udry, Li, & Hendrickson-Smith, 2003; Zimmerman, Ramirez-Valles, Zapert, & Maton, 2000). Cumulative stress and exposure to specific stressful events like divorce and poverty are consistently associated with increase in psychological symptoms in adolescent populations (Grant et al., 2004).

The impacts of psychological stress have become more widely accepted in the last decade, with a majority of physicians ranking the construct as 'very' important on a list of priorities to address with their patients (Avey, Matheny, Robbins, & Jacobson, 2003). Most studies of psychological stress and health ignore the role of cognitive appraisal in the stress response and focus on adults, with limited research on the impact on children and adolescents.

Integrating Cognitive Appraisal of Stress

The transactional model introduced by Lazarus and Folkman (1984) posits that stress is dependent on the relationship between an environmental stimuli *and* an individual's cognitive appraisal of the stimuli, wherein psychological distress occurs when an individual evaluates an environmental demand as exceeding their coping ability (Cohen et al.,1995; Lazarus, 1966, 1993). Because of the inherent personalization of stressors based on individualized experiences, perception of the stressor predicts the stress response (González-Morales, & Neves, 2015; Lazarus, 1993) which in turn is dependent on the individual's coping resources, characteristics of the stimulus, and an individual's experience (Lazarus & Folkman, 1984). Therefore, the transactional model considers that individuals may cognitively appraise and cope with the same objective event differently, which places an emphasis on the importance on *perceived stress.*

Cohen et al. (1995) proposed a similar comprehensive model that incorporates the biological and psychological traditions of stress research, which he called the stage model (Figure 2.2). Environmental demands are appraised as threatening and provoke both behavioral and physiological responses which lead to downstream changes in risk for disease (Cohen et al., 1995; Cohen, Giarnaros, & Manuck, 2016). The stage model proposes a sequential process to the stress response, with each progressive stage increasing proximity to disease risk. It is important to note that the feedback loops are not represented in Figure 2.2, and that more complicated mechanisms are at play at each stage which do not necessarily require linear progression to disease (Cohen et al., 2016). However, the model does allow a unique integration of the mediating mechanisms involved in the stress-disease relationship from each strand of stress research.

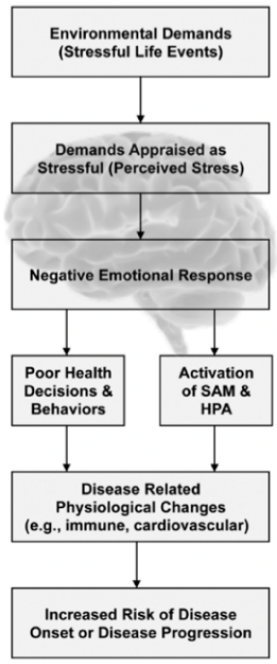

Figure 2.2. Model of biological and psychological stress responses (Cohen et al., 2016)

We will address the importance of perceived stress in a manner that is in line with both the stage and transactional models which acknowledge the impact of physiological, biological, and psychological components of the stress response working in tandem. However, measuring perceived stress and its role in the stress response has historically been a challenge and research has been somewhat limited across populations.

Measuring Perceived Stress

For the purposes of this study, the definition of *perceived stress* provided by Cohen, Kamarck, & Marmelstein (1994): "the degree to which situations in one's life are appraised as stressful" (p. 3). Measuring perceived stress with high validity has been a challenge and widely debated by researchers. Lazarus, Delongis, Folkman, & Gruen (1985) admitted that the appraisal process, though difficult to measure due to potential confounds, should not be removed in the measurement of psychological stress as this would undermine the accepted cognitive theory in the stress response (Lazarus et al., 1985).

Some of the first instances of the study of perceived stress on various outcome measures were conducted unintentionally, not directly targeting cognitive appraisal in relation to the stress response. In a study conducted by Ursin, Baade, and Levine (1978), it was determined that endocrine responses and subjectively reported levels of fear of parachutists decreased after the first training session, not because of aptitude in the parachuting task but because of appraisal of ability to manage the task increased. In other words, the participants' expectancies that they were able to cope with the stressor was the most predictive factor of the severity of the overall stress response. More formal attempts at measuring perceived stress typically involved life-event scales like Lazarus and

colleague's Hassles Scale or the Social Readjustment Rating Scale (SRRS) in conjunction with respondent's ratings of how stressful the events were (Cohen & Williamson, 1987).

As discussed previously, Lazarus and colleagues attempted to assess differences in perceptions of daily stressors or hassles (Lazarus, 1966; Lazarus & Launier, 1978), intended to incorporate components of the transactional model including an individual's contextual environment, personal resources, and social support. However, as Cohen (1986) and Dohrenwend and colleagues (Dohrenwend, Dohrenwend, Dodson, & Shrout, 1984; Dohrenwent & Shrout, 1985) pointed out, the Hassles Scale by Lazarus and colleagues did not measure stress appraisal or even event occurrence. The Hassles Scale ignored the importance or severity of the stressful event to the individual and merely counted the number of stressful events as a cumulative score, which does not align with the theory of the transactional or stage model (Dohrenwent et al, 1984, Cohen, 1986). Additionally, health-related outcomes were more related to how the participants rated their own stress levels than the cumulative number or severity of the stressors assessed (see Sarason, Johnson, & Seigel, 1978; Vinokur & Selzer, 1975).

Today, the most widely used and arguably the most psychometrically sound measure of perceived stress was developed by Cohen and colleagues in 1983, entitled 'The Perceived Stress Scale' (PSS; Cohen, Kamarck, & Mermelstein, 1983). However, even this scale underwent criticism upon its introduction as an alternative measure of perceived stress. Lazarus et al. (1985) argued that the PSS had significant overlap with scales that measure psychological symptoms, presenting significant confounds due to circularity. Cohen (1986) also addressed this measurement difficulty, stating that some

overlap with psychopathology and appraised stress is innate in the definitions of each. For example, depression symptomatology highly overlaps with some items included in the PSS, as perceived stress is a part of the measure of depression (Cohen et al., 1983). However, the PSS was found to be a valid predictor of development of psychological symptoms and health behaviors across multiple studies (Cohen et al., 1983; Glasgow, Klesges, Mizes, & Pachacek, 1985). Cohen (1986) asserted that the construct measured by the PSS was not the same construct that was measured by psychologic symptom checklists (Cohen et al., 1983) and that the "PSS is *the scale* to be used in stress research" (p. 718) because of its high predictive and construct validity.

The PSS is a self-report tool designed to evaluate the extent to which an individual judges that their life is uncontrollable, unpredictable, and overloaded within the last month, with items posing general questions rather than focusing on the nature of specific events (Cohen et al., 1983). The scale was designed to measure generalized perceived stress, rather than focusing on specific stressors, which has multiple theoretical strengths that Cohen et al., 1983) sites. For example, feelings of stress are often misattributed to a salient source, when in reality they may be cumulative from many sources or a different source altogether (Cohen et al., 1983; Worchel & Teddlie, 1976), thus measuring global levels of stress is more appropriate.

Psychometric properties of the PSS have been found to be favorable. Cohen (1988) evaluated the reliability and validity of the PSS in a large-scale administration to over 2300 participants and found that both the 14-item PSS scale (14-PSS) and the 10-item PSS scale (10-PSS) had adequate internal reliability (Cronbach's alpha = .75, .78). The scale has since shown acceptable reliability and validity across many populations and

has been translated into 25 languages to-date (see Chaaya, Osman, Naassan, & Mahfoud, 2010; Klein et al., 2016; Mitchell, Crane, & Kim, 2008; Ng, 2013; Örücü & Demir, 2009; Reis, Hino, & Rodriguez Añez, 2010; Remor, 2006; Sigari, 2014). Lee (2012) assessed the psychometric properties of the PSS in a metanalysis and found that the results were consistent with Cohen (1988), with the exception that test-retest reliability and criterion validity may need additional exploration. It was also noted that women tend so score higher on the PSS than men, though the reason for this is debated. It has been suggested that differences in social, biological, and psychological factors may cause females to have higher levels of perceived stress (Bail & Epperson, 2015; Lavoie & Douglas, 2012). It is also possible that females are be more likely to endorse negative items on the scale solely due to the wording of the items (Gitchel, Roessler, & Turner, 2011). However, in more recent studies, the PSS scores were found to not have significant gender bias with large samples (Taylor, 2015).

Higher mean scores on the PSS have been associated with increased health risks. After controlling for age, gender, educational level, and health practices, individuals that reported higher levels of perceived stress were more likely to develop a cold in a sample of individuals that were all exposed to the common cold virus (Cohen, Tyrell, & Smith, 1993). Higher mean levels of perceived stress are related to negative affect and physical symptoms in clinical psychiatric samples (Pbert, Doerfler, & DeCosimo, 1992). Higher levels of perceived stress in a sample of moderate-to-severe asthmatics was found to be related to poorer quality of life, decreased medication adherence, and morbidity after one year (Wisnivesky, Lorenzo, Feldman, Leventhal, & Halm, 2010). Mean score on the PSS was a better predictor for depression, social anxiety, and smoking behaviors than life-

event scores alone in a sample of college students (Cohen et al., 1983). High levels of perceived stress in medical students is associated with poor decision making, low self-esteem, high distraction levels, and poor academic performance (Dahlin, Joneborg, Runeson, 2005; Shah, Hasan, Malik, & Sreeramareddy, 2010). Perceived stress was also inversely related to levels of happiness in a study of college students (Schiffrin & Nelson, 2010).

Additional biological measures of stress have further validated use of the PSS as a measure of perceived stress and the relationship between perceived stress and physical stress reactions. In a study which compared perceived stress, mood states, and salivary cortisol, it was found that trait anxiety and depression only slightly correlated with increases in cortisol levels and perceived stress did not in a group of white- collar workers (Van Eck, Berkhof, Nicolson, & Sulon, 1996). Conversely, Pruessner, Helllhammer, and Kirschbaum (1999) used the PSS to study perceived stress and cortisol levels in a group of teachers and found that higher levels of perceived stress correlated to a 50% to 70% increase in cortisol levels compared to teachers that only reported average to below average levels of perceived stress. In a study conducted by Ebrecht and colleagues (2003), scores on the PSS were highly related to cortisol levels and wound healing. In addition, heart rate variability, a metric that has been long associated with low parasympathetic activity in response to chronic stress (Kim, Cheon, Bai, Lee, & Koo, 2018), has been shown to have an inverse relationship with levels of perceived stress, even when accounting for level of physical fitness and trait anxiety (Dishman et al., 2000). Stowell, Kiecolt-Glaser, & Glaser (2001) found that perceived stress levels

moderated the relationship between types of coping and the body's immune response, wherein high levels of perceived stress lead to higher proliferative responses.

It is evident that the PSS is a commonly used and reliable measure of perceived stress with adults, including young adult medical students, undergraduate student populations, and psychiatric populations, but there has been limited use of the PSS to measure perceived stress in adolescence.

Perceived Stress in Adolescence

Though the relationship between life stress and psychological and general health has been well documented in the adolescent population (Byrne & Mazanov, 2003;; Compas et al., 1994; Deardorff et al., 2003; Diaz et al., 2002; Niwa et al., 2013; Romeo & McEwen, 2006; Silberg et al., 1999; van Os, Kenis, & Rutten, 2010), study of perceived stress in adolescents has been somewhat limited (Grant et al., 2003). Similar to the challenges faced when measuring perceived stress in adult populations, measurement in adolescents has had many barriers over time including problems with the definition of stress, lack of theory-driven research, and measurement variability (Grant et al., 2003). However, partly due to the attention garnered from research with adult populations, the PSS has been recommended as a screening tool for adolescents to help identify individuals at risk for maladaptive outcomes related to perceived stress (Turley, Drake, Killackey, & Yung, 2019).

In a recent study, higher levels of perceived stress in adolescents was found to be related to development of psychotic-like experiences, or sub-threshold forms of psychosis that is the precursor to the development of psychotic disorders (Turley et al., 2019). Specifically, higher levels of perceived stress coincided with report of bizarre

experiences, persecutory ideation, perceptual abnormalities, and magical thinking, even after adjusting for depression (Turley et al., 2019). Kechter et al. (2019) examined perceived stress of seventh graders using the PSS and found that scores on the Mindful Awareness Attention Scale and Behavior Rating Inventory of Executive Function (BRIEF) were inversely related to mean levels of perceived stress after adjustment for demographic variables, supporting that executive functioning and mindfulness act as protective factors against the development of maladaptive factors associated with stress (Kechter et al., 2019). Perceived stress and maladaptive coping strategies were related to negative adjustment in a study of Australian adolescents ages 10 to 14 (Hampel & Petermann, 2006).

In a study conducted by Schraml, Perski, Grossi, & Makower (2012), adolescents that reported higher levels of perceived stress at both the beginning and end of the semester had significantly lower final grades than students whom reported high levels of perceived stress only at the beginning of the semester or normative levels of stress throughout the study. Higher levels of perceived stress were also correlated to insufficient sleep and self-reported poorer health in the sampled students (Schraml et al., 2012). In a similar study conducted with Iranian male 12th grade students, higher levels of perceived stress were associated with lower levels of overall mental health and levels of self-efficacy (Moeini et al., 2008). Perceived social support has also been found to be a significant mediator between levels of perceived stress and depressive symptoms in a large-scale study of junior high school students (Zhang, Yan, Zhao, & Yuan, 2014). Despite some empirical exploration of stress in adolescent populations, one particular subset of teens that has garnered relatively low level of attention is gifted adolescents

Gifted Students and Stress

The definition of what constitutes the label of 'gifted' has been debated for decades (Isaacs, 1965; Karnes & Collins, 1978; Stephens & Karnes, 2000). The National Association for Gifted Children defines gifted individuals as "those who demonstrate outstanding levels of aptitude (defined as an exceptional ability to reason and learn) or competence (documented performance or achievement in top 10% or rarer) in one or more domains". However, the flexibility innate in this definition has led to differences in how 'exceptional ability' or 'outstanding performance' is interpreted, and these descriptions can apply to a multitude of domains including academics, athletics, and the arts. Thus, the standards for identification of gifted children vary widely from state-to-state and even between school districts (Pfeiffer, 2012; Stephens & Karnes, 2000).

It is generally accepted that other factors in addition to intellectual ability are important for success and later life adjustment, including psychological wellbeing (Holahan, 1988; Suldo, Hearon, Shaunessy-Dedrick, 2018). Historically, a traditional approach to the psychological wellbeing and functioning of gifted students demanded dentification and remediation of interpersonal problems. In the past two decades however, the field of psychology and gifted education has shifted toward a new framework, a paradigm of positive psychology (Wright & Lopex, 2009). With this new lens, the education and care of gifted and talented students also shifted to focus on personal competencies and environmental factors which facilitate wellbeing and excellence in addition to remediating weaknesses (Seligman & Csikszentmihalyi, 2000).

Regardless of the talent development model, there has been a call to support the psychosocial factors that accompany high achievement across domains, particularly in

addressing risks for vulnerable students in the areas of underachievement, anxiety, perfectionism, and general stress management (Olszewski-Kubilius Subotnik, & Worrell, 2015). Environmental resources and personal characteristics can be protective or damaging mediators in the stress-health relationship, and teaching stress management skills proactively and targeting students that are of higher risk for elevated stress may be an important component in this new paradigm shift for meeting the needs of gifted learners (Pfeiffer & Stocking, 2000). However, the area of perceived stress in gifted children and adolescents is largely unexplored to date despite documented need.

It has been suggested that gifted students experience the adolescent transition differently than same-age-peers because their cognitive ability, emotional maturity, and environmental/academic demands are often out of sync (Mueller & Windsor, 2016). Gifted adolescents and adults are at a disproportionate risk for developing psychopathological symptomatology and dying from suicide. The rate of suicide in individuals with higher cognitive ability has been shown to be greater than in the general population (Cross, 2017; Cross, Cook, & Dixon, 1996; Dixon & Scheckel, 1996; Gust-Brey, & Cross, 1999; Joffe & Offord, 1983; Mueller, 2018) with risk factors including substance use, familial relation instability, and chronic stress. It has also been suggested that gifted student adjustment may be different due to varying intrapersonal, interpersonal, and environmental interactions (Eccles et al., 1993; Gagné, 2004; Hunt, 1975; Mueller, 2018). Corson, Loveless, Mochrie, and Whited (2018), called attention to increase risk of cardiovascular disease among gifted individuals as a result of higher levels of maladaptive perfectionism and stress. For these reasons, high intellectual ability is thought to impact social and emotional needs of gifted students, causing them to

present differently qualitatively than nongifted peers and requiring nontraditional approaches in counseling and other mental health settings (Peterson, 2015; Mueller, 2018).

A general cognitive score can be a reliable grouping measure for categorizing students as gifted, as it does not rely on recommendations from teachers or other more subjective qualifications which have been shown to be unreliable in identifying students as gifted. For example, students that struggle to follow classroom rules, are too energetic, have bad attitudes towards learning, do not fit-in socially, have a disability, or come from a socioeconomically disadvantaged or racially diverse background (Bianco & Leech, 2010; Briggs, Reis, Sullivan, 2008; Coleman & Gallagher, 1992; Esquierdo & Arreguín-Anderson, 2012; Ford, 2012; Geake & Gross, 2008; Rizza & Morrison, 2003). For the purposes of this study intellectual ability will be the primary qualifier of identifying a child as gifted. Similar qualifications have been used in other studies of gifted children (see Shaunessy & Suldo, 2010).

Cognitive Ability and Stress

Several studies have presented that cognitive ability can act as a protective factor against maladjustment and stress. Kitano and Lewis (2005) suggest that gifted students are better able to utilize their environmental resources in comparison to nongifted peers. Cognitive ability was found to be a protective factor against the development of PTSD in a co-twin cohort study (Kremen et al., 2007). The ability to cognitively structure problems and process information has been shown to aid in management of stressful situations (Bar-Tal, Raviv, & Spitzer, 1999; DeYoung, Flanders, & Peterson, 2008). In a longitudinal study conducted by Masten and colleagues (1999) which followed a group of

students for ten years starting in elementary school, parenting resources and intellectual ability were highly associated with positive outcomes, including academic competency and psychological well-being, even in the face of chronic stressors and severe adverse events, suggesting that cognitive ability does at as a protective factor against stress-related maladaptive outcomes (Masten et al., 1999). In a follow up study of the same students, individuals with higher cognitive ability showed greater resiliency, competency against life-stressors, and more positive patterns of coping behaviors over time (Masten et al., 2004). It has also been suggested that individuals with higher IQs can cognitively approach a problem for longer periods of time without becoming exhausted, which acts protectively against emotional exhaustion (Pines & Maslach, 2001).

Other studies of the relationship between cognitive ability and stress suggests that high ability students are also at risk for maladaptive outcomes involved with poor coping skills and elevated stress. Malik and Balda (2006) found that individuals with higher cognitive ability and higher levels of reported stress performed more poorly on academic tasks and had lower GPA's overall than their gifted counterparts that had lower levels of reported stress when matching for ability level. Similar to study of stress in the general adolescent population, study of stress in gifted adolescents has primarily been focused on types or sources of stress in relation to various outcome measures including academic performance, relationship development, and adjustment (Cross, 1997; Suldo et al., 2018; Fimian & Cross, 1986; Karnes & Oehler-Stinnett, 1986; Mueller & Winsor, 2018). Attention has also been given to various protective factors that correlate with more positive outcomes, like positive self-efficacy (Bénony, Van, Chahraoui, Bénony, & Marnier, 2007), resiliency (Kitano & Lewis, 2005; Reis, Colbert, Robert, & Hébert,

2004), and emotional intelligence (Lee, Olszewski-Kubilius, 2006).These empirical approaches, however, do not align with the current model of stress response which considers cognitive appraisal of stress.

Environmental Factors and Stress of Gifted Students

Public perceptions regarding giftedness and high intellectual ability generally accompany positive expectations (Peterson, 2009). Giftedness has been considered to be a ticket to success, higher education, white-collared employment, and a desirable lifestyle (Gross, 1993; Peterson, 2009). However, this positive regard can lead to misinformed generalizations regarding individuals characterized as gifted and can foster hostility with assumptions that these individuals do not have to work as hard to succeed or even believe themselves as superior (Ford, 2012; Howley, 1986). Many teachers have outdated beliefs that gifted students learn at an accelerated pace and with greater ease when compared to their non-gifted peers (Moon and Brighton, 2008; Syzmanski & Shaff, 2013) and teachers are less likely to recommend students for placement into gifted education programs if the student challenges classroom rules, is high energy, appears disinterested in learning, seems socially awkward, has a disability, or comes from a socioeconomically disadvantaged or racially diverse background (Bianco & Leech, 2010; Briggs, Reis, Sullivan, 2008; Coleman & Callagher, 1992; Esquierdo & Arreguín-Anderson, 2012; Ford, 2012; Geake & Gross, 2008; Rizza & Morrison, 2003), leading to achievement gaps and underrepresentation of certain profiles of high-ability learners. While some teachers expect gifted students to be quiet, follow the rules, and complete work with minimal assistance, in a study conducted by Geake and Gross (2008), a concerning profile of teacher attitudes included beliefs that students with high cognitive ability are

social misfits and antisocial leaders. Further, special education teachers and professionals that work with students with disabilities are less likely to support acceleration or gifted education (McCoach & Siegle, 2007) and concerns about sociability and beliefs about fairness in educational support are common barriers to acceleration and program implementation for gifted students (Ciegle, Wilson, & Little, 2013; Goldberg, 1981; McCoach & Siegle, 2007; Thorkildsen, 1994). Ultimately, many teachers do not support gifted education programming because these students "will be fine on their own" (Clark, 1997), a belief that is echoed outside of schools as well. For these reasons, it has been suggested that gifted students often try to moderate their academic achievements and feel that they do not fit-in socially, causing significant distress over time (Colangelo, 2002; Coleman & Cross, 1988; Coleman & Sanders, 1993; Cross & Colean, 2014).

Perceived Stress of Gifted Adolescents

Studies that consider cognitive appraisal of stress of gifted students are limited and have mixed results. Shaunessy and Suldo (2010) sampled a group of high achieving students enrolled in an International Baccalaureate (IB) Program and found that gifted students, defined as students with cognitive ability two standard deviations or higher, had similar levels of perceived stress as their nongifted peers enrolled in the same competitive academic environment as measured by the 14-PSS. Differences were however observed in other areas including use of humor, coping strategies, and problem-solving approaches, with gifted students tending to avoid stressors by increasing involvement in other activities (Shaunessy & Suldo, 2010). The two groups analyzed in the study had similar GPAs and excelled in academic coursework, making outcome measures related to perceived stress difficult to assess. Additionally, students that are enrolled in IB programs

have significantly higher levels of overall stress than typical students in the general education setting (Suldo, Shaunessy, & Hardesty, 2008), making differences in perceived stress less likely and more difficult to assess. However, the finding that non-gifted IB students had similar perceived stress levels as their gifted counterparts indicates that cognitive ability may not act as a protective factor against stress. Furthermore, limitations to the study include that a convenience sample from one high school in the southeast was utilized for the study, limiting generalizability of the findings.

Another study conducted by Erdem & Baloglu (2018) using a different measure of perceived stress, The Student-Life Stress Inventory, found that gifted adolescents reported significantly higher levels of perceived stress than their nongifted peers enrolled in the same Science and Art Center secondary school. They also found that gifted students were more likely to report higher levels of self-imposed stress but lower levels of change-related stress (Erdem & Baloglu, 2018). This study primarily used the systemic approach, targeting types of stress rather than generalized perceived stress, which can be considered a weakness and perhaps not the best indicator for long term outcomes (Cohen, 1986; Cohen et al., 1983; Dohrenwend et al., 1984; Dohrenwent & Shrout, 1985; Worchel & Teddlie, 1976). Additionally, the study was conducted with students attending Science and Art Center secondary school in Turkey, limiting generalizability, particularly for students in the general education setting or students in the United States.

Summary

Despite the theoretical basis of adolescent stress research resting in the transactional definition or stage model of stress, the interaction between environmental stimuli and cognitive appraisal of the stressor, most studies with this population do not

conceptualize stress in this way. Most stress research with teens focuses on the magnitude of stressful events like natural disasters and chronic conditions like poverty that are free from the confounds of perception and psychological processes rather than assessing perception of stress (Grant et. al., 2003; Grant et al., 2004). Similar to the research conducted in adolescents, study of stress in gifted adolescents has also generally focused on types of stress or stress sources rather than perceived stress which does not align with current cognitive models of stress. In addition, of the studies that incorporate perceived stress, the populations were limited to study of students enrolled in IB programs and students attending a Science and Art Center secondary school in Turkey. These studies had varying results, with one study finding that gifted students had comparable levels of general perceived stress as their nongifted peers, and the other study finding that gifted students were significantly higher levels of stress than their peers. Thus, research on cognitive appraisal of stress in gifted have not only lacked generalizability to students enrolled in general education settings in the United States but have also been generally inconclusive regarding perceptions of stress in this unique population (see Shaunessy & Suldo, 2010, Erdem & Baloglu, 2018). This study will provide novel insight into a relatively unexplored field because it not only considers global perceptions of stress in gifted adolescents, but adolescents as a whole. It is important to understand if gifted students perceive stress differently, as this cognitive mechanism may be an effective target for intervention.

Research Questions

1. Are there differences in the level of perceived stress in gifted adolescents and the level of perceived stress in adolescents not identified as gifted?
2. Are there differences in student's levels of perceived stress based on race?
3. Are there gender differences in levels of perceived stress?
4. Are their differences in perceived stress of students based on their grade level in school/school year?
5. Does level of perceived stress predict academic performance as it relates to GPA?
6. Does being identified as gifted mediate the relationship between perceived stress and academic performance as it relates to GPA?

CHAPTER THREE

Methods

The following study explored differences in levels of perceived stress in high school students identified as intellectually gifted in comparison to peers not identified as gifted. Additional demographic characteristics including age, number of advanced courses taken, and grade-point average (GPA) were also be collected to assess group differences in perceived stress.

Measures

The Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) was selected for measurement of perceived stress levels. The PSS is a self-report tool designed to evaluate the extent to which an individual judges that their life is "uncontrollable, unpredictable, and overloaded" within the last month (Cohen et al., 1983). (Cohen et al., 1983, p.387). The scale was designed to measure generalized perceived stress, rather than focusing on specific stressors, thus items pose general questions rather than focusing on the nature of specific events, requesting the participant to rate statements on a 5-point Likert scale from 0, 'never' to 4, 'very often' (Appendix A).

Psychometric properties of the PSS have been found to be favorable. Cohen (1988) evaluated the reliability and validity of the PSS in a large-scale administration to over 2300 participants and found that a two-factor model best explained the variance seen in the sample using both the 14-item PSS scale (14-PSS) and the 10-item PSS scale (10-

PSS). The 14-PSS had two factors which together accounted for 41.6% of the total variance with adequate internal reliability (Cronbach's alpha=.75). The 10-item PSS scale showed improvements in the total explained variance (48.9% for both factors combined, Factor 1=34.4% and Factor 2=14.5%) and total reliability (alpha coefficient=.78). The ten-item scale is still considered to be the most valid and reliable version of the scale to date (Lee, 2012; Roberti, Harrington, & Storch, 2006), though all versions show adequate reliability and validity across many populations and have been translated into 25 languages (see Chaaya, Osman, Naassan, & Mahfoud, 2010; Klein et al., 2016; Mitchell, Crane, & Kim, 2008; Ng, 2013; Örücü & Demir, 2009; Reis, Hino, & Rodriguez-Añez, 2010; Remor, 2006; Sigari, 2014, and others).

Generally, a two factor structure for the ten-item PSS (PSS-10) is considered to be the best model to explain variance across samples (Barbosa-Leiker et al., 2014; Cole, 1999; Golden-Kreutz et al., 2004; Kechter et al., 2019; Lee, 2012; Liu, et al., 2020; Martin, Kazarian, & Breiter, 1994; Orucu & Demir, 2009; Roberti et al. 2006), with one group of items representing distress and the other group corresponding to ability to cope with the stressor (Dumitrescu et al., 2014; Reis et al., 2010). Lui and colleagues (2020) recently conducted a study to assess the factor structure of the PSS-10 in Chinese adolescents. They concluded that, similar to previous studies using adult populations, the PSS-10 two-factor structure was a better fit than the one-factor model, with the first factor which they entitled "helplessness" representing items 1, 2, 3, 6, 9, and 10; and items 4, 5, 7, and 8 loading onto a second factor which they named "self-efficacy". All item loadings were found to be significant and the discrimination index (DI) of all items, or the ability of an item to distinguish between respondents with high scores and

respondents with low scores, was considered adequate for all items. Additionally, when assessing measurement invariance between gender groups, the structure of the PSS-10 was equivalent. It is important to note, however, that when assessing perceived stress as a global construct, the PSS instrument authors recommend using the total mean score, for research and health-related decision making (Cohen et al., 1995). Therefore, for this study, the PSS-10 Total Score was treated as the primary measure of global perceived stress.

Additional questions were also included in the survey along with the PSS-10 (Appendix A). Students were asked to disclose (a) whether they participated in the district gifted program; (b) age; (c) GPA; (d) number of AP classes enrolled; (e) number of honors classes currently enrolled; (f) hours spent on homework daily, and (g) time studying for tests and quizzes daily (Appendix A). In addition, students were asked to rank order a list of common stressors, which included (a) academic performance; (b) personal health; (c) health of a loved one, defined as friend, significant other, or family; (d) time management; (e) relationship with family; (f) relationship with peers/friends; (g) relationship with significant other; (h) extracurricular activities including sports, clubs, teams; and (i) plans for after high school (Appendix A). An online version of the survey was developed using Qualtrics (Qualtrics, Provo, UT) which was estimated to take approximately 6 minutes to complete.

Participants

Participants were recruited from a large school district in the Southeast (District A). District A is one of the most diverse and fastest growing school districts in its state with a Pre-K through 12th grade enrollment of 27,522 students in 40 schools and centers.

District A consists of 48.5% Black, 42.4% White, 4.1% Asian, .02% Native Hawaiian/Pacific Islander, and 0.2 % American Indian/Alaska Native with approximately 5.2% of the total population (any race) classifying as Hispanic or Latino (NCES, 2015). Forty-seven percent of students meet criteria for free and reduced lunch. Students are screened in elementary school (typically during the 2nd grade year) using the Cognitive Abilities Test (CogAT) for participation in the district gifted (GT) program.

In order to participate in the GT program at District A, students must meet the following criteria: students must score at or above the 93rd percentile on a nationally normed test including the Ravens, Otis-Lennon School Ability Test (OLSAT), or CogAT and score within the 94th percentile on the Measures of Academic Progress (MAP), Iowa Test of Basic Skills (ITBS), and/or the state assessment; or fall at or above the 98th percentile after second grade on one of the previously mentioned aptitude assessments.

Data Collection

The parent/guardians of all high school students in District A (*n*=7333) were sent an email inviting their child to participate in the research study (Appendix B) by the district Director of Accountability and Assessment. Emails were sent blindly; therefore, participant contact information was protected. Due to restrictions on how many emails could be sent daily, approximately 2500 emails were sent at one time and full email distribution took three days. The parent/guardian of each high school student was asked that, if they agreed to give permission for their student to participate in the research study, to share the survey link with their student. In this way, parent permission was granted indirectly for all student participants, even those above the age of 18.

Once the survey linked was clicked, participants were directed to an assent statement (Appendix B). Students that agreed to participate in the study were directed to the survey questions. Students that did not agree and dissented participation were directed to the end of the survey and thanked for their time. Of the students that followed the survey link (*n*=419), 403 assented to participation. All 403 participants completed the demographic section of the survey, along with the PSS scale. However, some students ended the survey prematurely or chose not to respond to the additional questions about study time, plans after high school, or areas of stress (*n*=8). Therefore, 395 students fully completed the survey.

It is important to note that the COVID-19 pandemic impacted the timeline for accessing subjects. The school district stopped on-campus education in the first week of March and all students finished the spring semester online. The rapid shift to online education slowed the approval process for the study and permission to send parents emails was approved and finalized on June 5th, 2020. Therefore, the 395 subjects completed the survey approximately 3 months after their last day of face-to-face interaction in their school district and were sent the survey four days prior to the end of their school year.

Analysis

Data was managed using SPSS, Version 26.0, and R (R Core Team, 2017). The PSS-10 was scored for each participant. The Perceived Stress Scale is typically scored by adding all items together after reverse scoring Item 4, Item 5, Item 7, and Item 8, which will yield a score from 0 to 40 (Cohen, 1988). Scores from 0 to 13 indicate low levels of stress, 14 to 26 indicating moderate levels of stress, and scores above 26 indicating high

levels of stress (Cohen, 1988; Roberti et al., 2006). Another equivalent scoring method is taking the average of all items scores after reverse-scoring appropriate items, where scores from 0 to 1.3 indicate low levels of stress, 1.4 to 2.6 indicating moderate levels of stress, and 2.6 and above indicating high levels of stress.

Management of Missing Data

To determine if missing data were missing completely at random (MCAR), Little's MCAR test was completed. Little's MCAR test was found to not be significant, indicating failure to reject the null hypothesis that data are missing completely at random, $\chi^2 = 11.32$ (11, p = .42). Therefore, though certain values were missing from the data set, they did not appear to be missing in a pattern and missing items are randomly distributed across observations and cases. Ultimately, only 8 participants did not fully complete the survey, which comprises approximately 2% of the overall sample. Of those that did not finish, 100% completed the PSS-10 entirely, as well as the demographic section of the survey, but stopped at the final page asking additional questions about time spent on homework, sources of stress, and plans after high school (Appendix B). Because of the nature of the questions that were missed, primarily that they were treated as categorical variables, and the fact that data appears to be missing completely random, the 8 participants were eliminated from final analyses using listwise deletion. Though listwise deletion, otherwise known as complete-case removal, can be a disadvantage in smaller samples or in samples where data is not MCAR, the qualities of the collected sample, including that only small percentage of individuals failed to respond to all items, merited listwise deletion as an acceptable procedure which would still produce unbiased estimators (Kalton & Kasprzyk, 1982; Kang, 2013; Lieberman-Betz et al., 2014).

Descriptive Statistics

Population demographics and participant responses were evaluated for normality and model assumptions. An acceptable range for skewness and kurtosis is often considered to be between -2 and +2 (Hair, Ringle, Sarstedt, 2013).

Item Analysis and Confirmatory Factor Analysis of PSS-10

Eigenvalues for each item of the PSS-10 were evaluated, parallel analysis conducted, and one-factor and two-factors solution compared using CFA to determine appropriateness of treating the Total Stress Score as the primary dependent variable and/or mediator in the stress-achievement relationship.

Inferential Analysis

A one-way analysis of variance (ANOVA) was used to assess differences in the perceived stress levels of students identified as gifted and students not identified as gifted, stratified by gender, year in school, and number of honors or AP classes currently enrolled. Scheffe's method was selected for post hoc comparisons, as this procedure is the most flexible and allows for analysis of complex pairs of means.

Additionally, structural equation modeling (SEM) was utilized to assess the relationship between stress and academic achievement, measured by the total perceived stress score and GPA (Figure 3.1). Participation in the district gifted program was assessed as a mediator in the relationship between stress and GPA (Figure 3.1). SEM is an advantageous approach to assessing mediation because, unlike using a series of regression formulas to assess the relationships, *a priori* assignment as either causal or an effect is unnecessary in SEM (Macinnon & Fairchild, 2009).

For SEM, the relationship is best depicted by a path model (Figure 3.1). The following equation shows the relationship between three variables: x_i, z_i, and y_i.

$$z_i = \beta_0 + \beta_{xz} x_i + \varepsilon_{zi},$$
$$y_i = \gamma_0 + \gamma_{zy} z_i + \gamma_{xy} x_i + \varepsilon_{yi}$$

The primary hypothesis to be tested is whether the effect of the independent variable, in our case level of stress, on the outcome variable, GPA, is changed by the mediating variable, gifted status (Figure 3.1). To do this, the simplified regression equation without the mediator is assessed first with the following equation:

$$y_i = \gamma^*_o + \gamma^*_{xy} x_i + \varepsilon^*_{yi}$$

The reduced regression equation is evaluated first to determine that there is a relationship between the independent and dependent variable (stress and GPA), given that if no primary relationship exists, there is no need to evaluate for a mediating variable. Once a relationship is established, the full model can be evaluated.

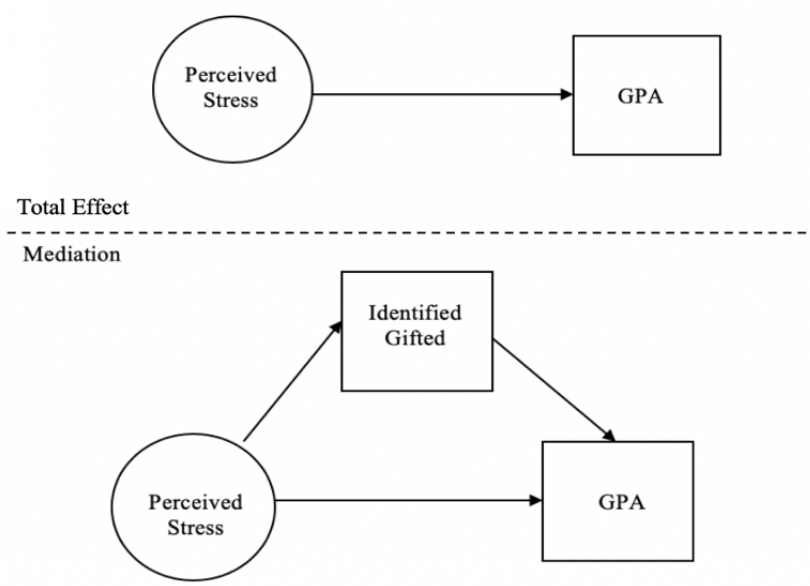

Figure 3.1. Total effect model and simple mediation model

CHAPTER FOUR

Results

Descriptive Statistics

According to NCES data collected in 2015, District A consisted of 48.5% Black, 42.4% White, 4.1% Asian, .02% Native Hawaiian/Pacific Islander, and 0.2 % American Indian/Alaska Native with approximately 5.2% of the total population (any race) classifying as Hispanic or Latino (NCES, 2015). The sample for this study consisted of approximately 37% Black or African American, 46.3% White, 11.6% Asian, 1.0% American Indian/Alaska Native, 2% Native Hawaiian/Other Pacific Islander, and 2% reporting to belong to two or more races (Table 4.1). Overall, representation of each race was similar in the study sample to that of the estimated district racial demographics, with slight underrepresentation from individuals identifying themselves as being Black or African American and slight overrepresentation of students identifying themselves as Asian (Table 4.1). Approximately 11.1% of the study sample identified as being Hispanic or Latino, whereas the district percentage is closer to 5.2% overall. Additionally, in the district, of high school students, approximately 29.8% are designated as Freshman (9th grade), 25.3% as Sophomores (10th grade), 23.1% as Juniors (11th grade), and 21.7% as Seniors (12th grade) (NCES, 2015). In the study sample, there was an underrepresentation of Seniors and an overrepresentation of Freshman (Table 4.1). The percentages of males and females sampled was very similar to overall district representation. However, it is important to note that updated information was unavailable regarding current

demographics of the district across all areas, therefore slight variance in representative proportions would be expected given it is likely that the district's racial, gender, ethnic, enrollment percentages would change over time.

Table 4.1

Sample Descriptive Statistics Compared to District A

Demographic Category	Percent of Sample	Percent of District
Race		
American Indian or Alaska Native	1.0	.02
Asian	11.6	4.1
Black or African American	37.0	48.5
Native Hawaiian or Other Pacific Islander	2.0	.02
White	46.3	42.4
Two or more races	2.0	2.8
Ethnicity		
Hispanic or Latino	11.1	5.2
Not Hispanic or Latino	88.9	94.8
Gender		
Male	44.6	46.0
Female	54.4	54.0
Other	1	n/a
Grade in School		
Freshman (9th)	38.2	29.8
Sophomore (10th)	23.3	25.3
Junior (11th)	27.8	23.1
Senior (12th)	10.6	21.7
Gifted Program		
Participated in Gifted Program	26.8	9.8
Did not participate in Gifted Program	73.2	90.2

n = 395; *N* = 8213 (NCES, 2015)

Of the students that were sampled (*n*=395), 106 identified themselves as participating in District A's gifted program and 289 reported that they did not participate in the district gifted program. Additional break-down of respondent demographics can be viewed in Table 4.2 sorted by participation in the GT program.

Table 4.2

. Demographic Characteristics of Sample by Gifted Program Participation

	Gifted Program Participants (*n*=106)		Non-Gifted Program Participants (*n*=289)		Total (*N*=395)	
Variable	*n*	%	*n*	%	*n*	%
Grade Level						
Freshman (9th)	46	43.4	105	36.3	155	38.2
Sophomore (10th)	10	9.4	82	28.4	92	23.3
Junior (11th)	32	30.2	78	27.0	110	27.8
Senior (12th)	18	17	24	8.3	42	10.6
Gender						
Male	36	34	140	48.4	176	44.6
Female	70	66	145	50.2	215	54.4
Other	0	0	4	1.4	4	1
Race						
American Indian or Alaska Native	0	0	4	1.4	4	1.0
Asian	12	11.3	34	11.8	46	11.6
Black or African American	36	34.0	110	38.1	146	37
Native Hawaiian or Other Pacific Islander	0	0	8	2.8	8	2
White	52	49.1	131	45.3	183	46,3
Two or more races	6	5.7	2	.7	8	2

Table 4.3 shows the descriptive statistics for each item of the PSS-10, as well as for the Total Stress Score, calculated as the mean of all items after appropriate items are reverse-scored (denoted as PPSS_number_R, Table 4.3). All item scores were relatively normally distributed, similar to results reported by Lui et al. (2020), as was the Total Stress Score (Table 4.3). Total Stress Scores from 0 to 1.3 indicate low levels of stress, 1.4 to 2.6 moderate levels of stress, and 2.6 and above high levels of stress. The Total Stress Score of all participants ($\bar{x}$ = 1.90) indicates an overall elevated global perceived stress level for the sample (Table 4.3).

Table 4.3

Descriptive statistics of the PSS-10

Item	Mean	SD	Skewness	Kurtosis
PSS1	2.28	0.98	-0.13	-0.49
PSS2	2.16	1.06	-0.03	-0.60
PSS3	2.19	1.12	-0.05	-0.58
PSS4R	1.46	0.88	0.64	0.59
PSS5R	2.19	1.03	-0.13	-0.34
PSS6	1.63	1.13	0.22	-0.73
PSS7R	1.71	0.96	0.40	-0.34
PSS8R	1.72	1.09	0.45	-0.42
PSS9	2.12	1.13	0.03	-0.64
PSS10	1.56	1.20	0.37	-0.69
Total Stress Score	1.90	0.77	0.23	-0.12

n = 395; *SD standard deviation*

Confirmatory Factor Analysis

Confirmatory factor analysis was selected to assess the factor structure of the PSS-10 (Table 4.4). The Root Mean Square Error of Approximation (RMSEA) of 0.13 for both the one-factor and two-factor solution was an indicator that neither model was more informative than the other, which supported using the more parsimonious model (one-factor solution). The Comparative Fit Indexes (CFI) for both models was also very similar. CFI is penalized for complexity. The Standardized Root Mean Square Residual (SRMR) is an absolute measure of fit which takes into account the standardized difference between the observed and predicted correlations. The SRMR was also very similar for both model solutions, but the two-factor solution was slightly lower, indicating somewhat better fit. The Tucker Lewis Index (TLI), also known as the Non-normed Fit Index, was very similar in both the one-factor and two-factor models but the two-factor solution was a bit lower. It should be noted that the TLI is sensitive to the average size of the correlations in the dataset. The Akaike Information Criterion (AIC)

and Bayesian Information Criterion (BIC) were both slightly lower for the two-factor solution, indicating marginally better fit. The $\chi 2$ value for the two-factor model was also slightly lower for the two-factor solution as well.

Table 4.4

Fit Indices for One- and Two-Factor Models for PSS-10 Structure

Model	SRMR	*df*	CFI	RMSEA	90% CI	AIC	BIC	$\chi 2$	TLI
One-Factor	0.058	35	0.88	0.13	0.12-0.15	9927.4	10007.0	279.07	0.84
Two-Factor	0.056	34	0.89	0.13	0.11-0.14	9905.7	9989.3	255.40	0.85

Despite the two-factor solution being a better fit according to the AIC, BIC, $\chi 2$, and TFI, the RMSEA and CFI indicate that the one-factor solution is better or at least equivalent to the two-factor solution. Overall, the fit indices were so similar that it was difficult to distinguish how much better the more complex two-factor model was. For this reason, the one-factor solution was selected as the more parsimonious model in addition to the recommendation of the authors to use the Total Stress Score as the indicator for health-related decision making.

Analysis of Variance

The perceived global stress levels, measured by the mean score on the PSS-10, Total Stress Score, of students was compared across gifted program participation, gender, race, and year in school using the one-way Analysis of Variance (one-way ANOVA, Table 4.5).

Adolescents Identified as Gifted Compared to Non-Identified Peers

Of the students sampled, 106 identified themselves as participating in District A's gifted program and 289 reported that they did not participate in the district gifted program. Students identified as gifted reported a significantly higher level of perceived stress (μ = 2.21, *SD* = .75) than students not identified as gifted (μ = 1.78, *SD* = .74), $F(1, 394) = 30.5$, $p < .001$. On average, students identified as gifted reported moderately elevated perceived stress overall, however gifted program participation only accounted for approximately 6.0% of the total variance in the Total Stress Scores ($\eta^2 = .06$), with only a small to medium effect size (Table 4.5).

Variance of Total Stress by Race, Gender, and School Year

There were also significant differences in Total Stress Scores based on differences in race and gender. Participants reporting their race as American Indian/Alaska Native (μ =2.5, *SD* =.00), Asian (μ =2.31, *SD* =.73), or Black/African American (μ =1.94, *SD* = .69) reported higher levels of overall stress than the other groups, including Native Pacific Islander/Native Hawaiian (μ =1.78, *SD* = .36) and White (μ =1.79, *SD* = .80), $F(1, 394) = 17.12$, $p < .001$ (Table 4.5). Student's reported race accounted for approximately 30% of the variance in the Total Stress Score ($\eta^2 = .30$), which is considered to be a strong effect.

Variance in Total Stress Scores was also significantly impacted by gender, $F(1, 394) = 65.82$, $p < .001$, accounting for approximately 13% of variance ($\eta^2 = .13$, Table 4.5). Students that reported gender as "other" reported severely elevated stress levels (μ =3.90, *SD* =.12), however it is important to note that only four participants classified themselves in this way ($n = 4$). Additionally, those reporting gender as "female" also

reported elevated stress levels (μ =2.12, *SD* =.72), that were significantly different than those reporting "other" or "male" (μ =1.61, *SD* =.68), however both male and female students reported moderate levels of stress on average.

Though differences in a student's year in school (Freshman, Sophomore, Junior, Senior) did not impact variance in Total Stress Scores overall, $F(1, 394) = 3.77$, $p = .053$, with an effect size of 1% ($\eta^2 = .01$, Table 4.5), the stress levels of Seniors (μ =2.3, *SD* =.68) was considered to be significantly elevated in comparison to the three younger age groups, Freshman (μ =1.83, *SD* =.76), Sophomores (μ =1.9, *SD* =.69), and Juniors (μ =1.81, *SD* =.82) in post hoc analysis, though all students reported moderately elevated stress levels.

Table 4.5

One-Way ANOVA Results

Predictor	*df*	Sum of Squares	Mean Square	*F*	*p*	η^2	Partial η^2
Gifted Participation	1	13.91	13.91	30.51	6.09e-08***	0.06	0.07
Race	1	7.80	7.80	17.12	4.31e-05***	0.3	0.04
Gender	1	30.00	3.00	65.82	6.51e-15***	0.13	0.14
Year in School	1	1.72	1.72	3.77	0.053	0.01	0.01

Structural Equation Modeling

Using R, three models were tested to evaluate the mediation effect of being identified as gifted in the relationship between stress and academic achievement, measured by GPA. Model A represents the primary effect of the independent variable (stress) and the dependent variable (GPA), Model B represents the relationship between

the mediator (GT) and the outcome variable (GPA), and Model C evaluated the full mediation model (Table 4.7).

Table 4.6

SEM Mediation Analysis

Model	Multiple R^2	Adjusted R^2	Residual Std. Error	*df*	*F*	*p*
Model A	0.01	0.01	0.76	393	4.251**	0.04**
Model B	0.13	0.13	0.41	393	57.83***	2.12e-13***
Model C	0.06	0.06	0.74	392	12.68***	4.95e-06***

There was a significant relationship between the Total Stress Score of participants and GPA, a significant relationship between being identified as gifted and GPA, and a significant mediation of being identified as gifted on the relationship between stress and GPA (Table 4.6, Figure 4.1). As Figure 4.1 illustrates, the regression coefficient between perceived stress and GT was statistically significant, as was the standard regression coefficient for GT and GPA.

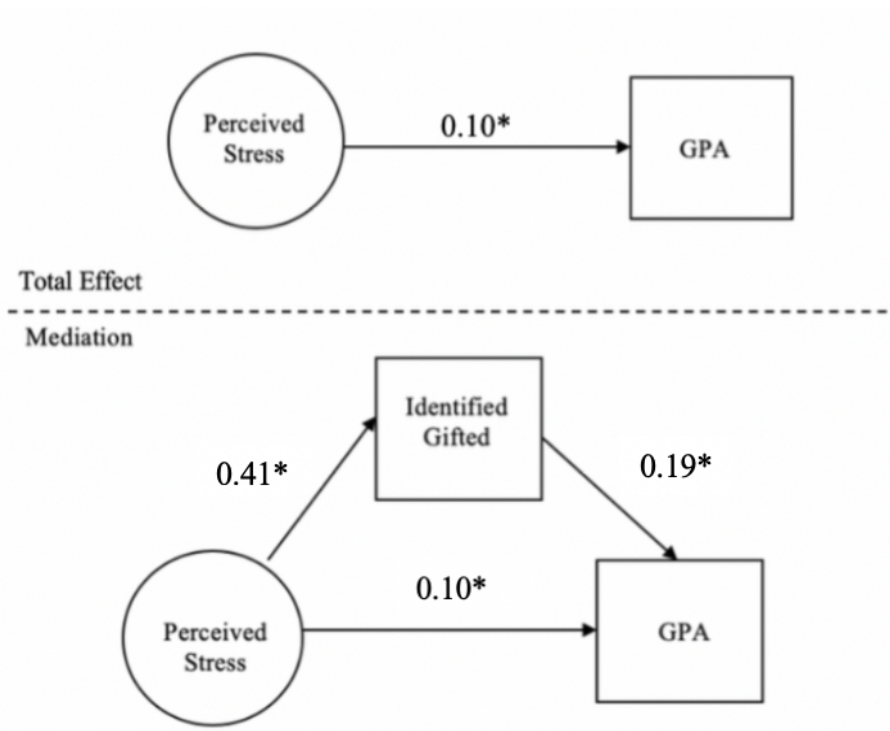

Figure 4.1. SEM mediation analysis

CHAPTER FIVE

Conclusion

Adolescence is a developmental stage marked by significant transitions, change, and stress (Byrne et al., 2007; Compas et al., 1993). During high school years, teens are faced with a myriad of challenges that are often at odds with their abilities to problem solve and cope, which has been hypothesized to lead to higher levels of daily stress (Collins, 2011; Conner-Smith, et al., 2001). Higher levels of stress coincide with destructive behavioral patterns into adulthood including alcohol use, overeating, smoking, and drug use. Similarly, elevated stress has been linked to poor health outcomes and to development of neuropsychiatric disease in adulthood. Nearly one-third of adolescent students report significantly elevated daily stress and overall psychological health in teens has been rated at an all-time low in the last five years (Bethune, 2014; de Anda et al., 2000).

Despite the acknowledged importance of cognitive appraisal in the stress response process, adolescent stress research has failed to incorporate assessment of cognitive appraisal empirically. The model which addresses the impact of cognitive appraisal, the transactional model, is as an integral part of the adult stress response model but has only been adopted theoretically and overall is rarely evaluated in younger populations. Most stress research with teens focuses on the magnitude of stressful events like natural disasters and chronic conditions like poverty that are free from the confounds of perception and psychological processes rather than assessing perceptions of stress (Grant

et. al., 2003; 2004). Despite some empirical exploration of stress in adolescent populations, one particular subset of teens that has garnered little attention in research is gifted adolescents. This study sought to provide novel insight into the perceptions of stress in gifted adolescents by answering the following questions:

1. Are there differences in the level of perceived stress in gifted adolescents and the level of perceived stress in adolescents not identified as gifted?
2. Are there differences in student's levels of perceived stress based on race?
3. Are there gender differences in levels of perceived stress?
4. Are their differences in perceived stress of students based on their grade level in school/school year?
5. Does level of perceived stress predict academic performance as it relates to GPA?
6. Does being identified as a gifted mediate the relationship between perceived stress and academic performance as it relates to GPA?

Participants were recruited from high schools in a large, public school district in the Southeastern United States of America. Once the institutional Review Boards (IRB) at Baylor University and the school district, District A, approved the study near the end of the spring semester, parental permission was acquired through email. Parents shared the survey with their child, and 395 subjects (n=395) completed the online survey electronically during the first two weeks of June.

Results revealed that the demographics of the sample were relatively consistent with the school district. The percent of males (45%) and females (54%) in the sample were very similar to the district data (male = 46%; females = 54%). Regarding race, there

was a slight overrepresentation of subjects identified as Asian in the sample versus the district (11.6% to 4.1%) and a slight underrepresentation of Black/African American (37% to 48.5%) in the sample compared to the district. Subjects self-identified as Caucasian was somewhat higher in the sample compared to the district (46.3% to 42%). Regarding ethnicity, Hispanic/Latino was more represented in the sample than the district population (11.1% to 5.2%). Finally, there was a higher percentage of freshman students that completed the survey than represent the district (38.2% to 29.9%) with an equal underrepresentation of senior students in the sample compared to the district (16.6% to 21.7%). Finally, there was an overrepresentation of students participating in GT in the sample compared to the district (26.8% to 9.8%), though the distribution of race and gender was relatively consistent with the overall sample demographics.

Overall, the high school students that participated reported moderately elevated stress levels across grade levels, genders, and races, with an overall sample average 1.90 on the PSS-10. Additionally, being identified as gifted, gender, and race all accounted for significant variability in Total Stress Scores. Students identified as gifted reported a significantly higher level of perceived stress than students not identified as gifted. Females reported significantly elevated levels of stress, as did racial minorities when compared to peers that self-identified as White. Additionally, giftedness appears to act as a mediator in the relationship of stress and GPA. Further interpretation of these results is discussed below.

Research Question 1: Are there differences in level of perceived stress in gifted adolescents compared to students not identified as gifted?

Students identified as gifted reported a significantly higher level of perceived stress (μ = 2.21, *SD* = .75) than students not identified as gifted (μ = 1.78, *SD* = .74), $F(1, 394) = 30.5$, $p < .001$. On average, students identified as gifted reported moderately elevated perceived stress overall, however gifted program participation only accounted for approximately 6.0% of the total variance in the Total Stress Scores ($\eta^2 = .06$), with only a small to medium effect size.

Previous studies of gifted student stress have been limited and had mixed results. The finding that gifted students perceive higher levels of stress than their peers aligns with results from a study conducted by Erdem and Baloglu (2018), which inferred that gifted adolescents report higher levels of perceived stress than their peers, but their study targeted types of stress rather than generalized perceived stress, therefore the results of our study are novel in that way. In addition, this study was conducted in a public-school setting in the United States, whereas the study conducted by Erden and Baloglu was conducted in a private school setting in Turkey. Additionally, this study's findings are divergent from findings reported by Shaunessy and Suldo (2010). In the study by Shaunessy and Suldo (2010), gifted students had comparative levels of stress than their peers. However, Shaunessy and Suldo's study (2010) only observed stress levels of students involved in an International Baccalaureate (IB) program, meaning that the peers not identified at gifted were still considered to be high performers and may not be a representative comparison to the general population.

There is evidence that adolescents experience elevated life stress (Byrne & Mazanov, 2003; Compas et al., 1994; Deardorff et al., 2003; Diaz et al., 2002; Niwa et

al., 2013; Romeo & McEwen, 2006; Silberg et al., 1999; van Os, Kenis, & Rutten, 2010), but little is known about differences in stress between students participating in gifted programs versus those that are not. It is important to acknowledge that the students identified as gifted in this study reported moderately elevated perceived stress compared to their peers, but this difference accounted for only a small percent of the total variance in stress scores. There are several reasons that could account for this result.

First, the subjects completed the survey in early June, which coincided with the end of the school year but, due to the COVID-19 pandemic, March 16th was the last day the student's attended school in person. Therefore, interpreting stress levels with this population during the spring of 2020 is challenging, irrelevant of whether students were identified gifted or not. Second, and consistent with this theme, academics continued between March and June 2020 but was online. In addition, the district announced that grades for the 4th (and final) 9 weeks would be pass/fail, and thus would not impact student GPA. For students driven to have high academic success, which is part of the criteria for qualifying for the gifted program in the district, this could become more (or less) stressful. Finally, being identified as gifted accounted for only 6% of the variance in stress scores, meaning despite being statistically significant, the differences in stress scores between gifted and non-gifted students in this sample may not translate to a practical difference. This in part could be attributed to an overall elevated level of stress of all adolescents sampled.

Research indicates the stage of adolescence is marked by many stressful events and experiences (Byrne, Davenport, & Mazanov, 2007; Compas, Orosan, & Grant, 1993; Cook & Furstenberg, 2002; Price, 1985) but the confound of a global pandemic that

significantly disrupted academic and social routines likely led to the elevated scores for all subjects. Students of all ages endorsed "health of a loved on" and concerns about "relationships with peers" as high sources of stress, which supports this notion. Given the environment spurred by isolation as part of COVID-19 quarantine, students likely had not seen their friends or extended loved ones for months at the time of the survey. Concern about loved ones and personal health was also a significant stressor for many during the pandemic, making these sources of stress understandable and likely common among teens in general.

Research Question 2: Are there differences in student levels of perceived stress based on race?

The results revealed significant differences in Total Stress Scores based on differences in race. Participants reporting their race as American Indian/Alaska Native (μ =2.5, *SD* =.00), Asian (μ =2.31, *SD* =.73), or Black/African American (μ =1.94, *SD* = .69) reported higher levels of overall stress than the other groups, including Native Pacific Islander/Native Hawaiian (μ =1.78, *SD* = .36) and White (μ =1.79, *SD* = .80), $F(1, 394) = 17.12$, $p < .001$. Student's reported race accounted for approximately 30% of the variance in the Total Stress Score ($\eta^2 = .30$), which is a strong effect. It should be noted that there were very few American Indian/Alaska Native (n=-4), Native Pacific Islanders (n=8), or Native Hawaiian (n=8) in the sample size of 395. Therefore, the conservative interpretation of the results is that Black/African American and Asian (n=46) reported significant differences in Total Stress Scores than White participants, resulting in a strong effect on Total Stress Scores. These results are somewhat surprising and difficult to explain based on the current literature. From a societal perspective, this

survey was completed during a pandemic that has had a significant health impact globally. Further, the health impact reportedly has been more pronounced with racial minorities (Black and Hispanic populations) compared to White populations. The Center for Disease Control (2020) reported Black/African Americans are 4 times as likely to be hospitalized for COVID-19 in comparison to White Americans. Further, Black/African American and Asian populations have reported having negative social experiences due to COVID-19 compared to White populations. A Pew research study (2020) revealed a significantly higher percentage of Black individuals and Asian individuals reported being "the subject of racial slurs or jokes," and, "feared someone might threaten or physically attack them," when compared to White individuals. Therefore, the adolescent stress due to events outside of school during the spring of 2020 likely led to the differences by race.

Research Question 3: Are there gender differences in levels of perceived stress?

The results showed subject reporting gender as "female" reported elevated stress levels (μ =2.12, *SD* =.72), that were significantly different than those reporting as "male" (μ =1.61, *SD* =.68), however both male and female students reported moderate levels of stress on average. This is consistent with international research that indicates female adolescents self-report higher levels of stress than male adolescents in Korea (Kim & Park, 2016) and Sweden (Friberg, Hagquist, & Osika, 2012). This is also consistent with research showing adult females report higher levels of sadness (Brebner, 2003) and anxiety/fear (Fischer et al., 2004) than men.

Research Question 4: Are there differences in levels of perceived stress of students based on their grade level in school/school year?

Differences in a student's year in school (Freshman, Sophomore, Junior, Senior) did not impact variance in Total Stress Scores overall, $F(1, 394) = 3.77$, $p = .053$, with an effect size of 1% ($\eta^2 = .01$, Table 4.5). However, stress levels of Seniors ($\mu = 2.3$, $SD = .68$) was considered to be significantly elevated in comparison to the three younger age groups, Freshman ($\mu = 1.83$, $SD = .76$), Sophomores ($\mu = 1.9$, $SD = .69$), and Juniors ($\mu = 1.81$, $SD = .82$) in post hoc analysis, though all students reported moderately elevated stress levels.

One reason all students reported modestly elevated stress levels could be due to completing the survey at the end of the semester. Schraml, et al. (2012) found that adolescents reported higher levels of stress at both the beginning and end of the semester. Seniors also cited most frequently that "plans for after high school" were the highest source of stress. This aligns with research conducted by Kouzma and Kennedy (2004), as students in their final year of high school are faced with a time of significant transition with many stressors that are novel in the final year of high school. Further, as noted above, the survey was completed during the COVID-19 pandemic, which led to the abrupt end of traditional schooling in this school district as well as all school districts in the United States. Thus, Seniors were unable to experience many of the milestone events that define the spring semesters for a high school Senior including social events (e.g., end-of-year school dances, parties), award recognition events, musicals, theatre productions, sporting events, and in-person graduation ceremonies. This may have led to higher stress levels reported by seniors as compared to underclass persons. Further, graduating Seniors experience transition away from P-12 education and either enter the

workforce or college. By the time the survey was completed in early June, the economic impact of COVID-19 resulted in the unemployment rate in the state the school district is located increasing from 2.5% in late February to 12.5% at the end of May 2020. This, in addition to all colleges and universities in the U.S. finishing school online, may have led to high levels of uncertainty about one's future and may have increased stress for high school Seniors when compared to their underclass peers.

Research Question 5 & 6: Does level of perceived stress predict academic performance as it relates to GPA? Does being identified as gifted mediate the relationship between perceived stress and academic performance as it relates to GPA?

There was a significant relationship between the PSS-10 Total Stress Score of participants and GPA, a significant relationship between being identified as gifted and GPA, and a significant mediation of being identified as gifted on the relationship between stress and GPA. The results indicated that approximately 10% of the variance in GPA could be attributed to student stress levels. Students with higher GPA's reported higher stress levels than students with lower GPA's. This contrasts conclusions from the study conducted by Schraml and colleagues (2012), as their findings suggested high levels of stress at the beginning and end of the semester was directly related to lower academic achievement and GPA. When identification as gifted was added as a mediating factor, differences in GPA and stress became more pronounced. Of note, not only were gifted students more likely to report higher levels of perceived stress, but they were also more likely to have a higher GPA despite the high levels of stress. In other words, despite doing well academically, high performers were still reporting high levels of perceived stress.

As Figure 4.1 illustrates, the regression coefficient between perceived stress and GT was statistically significant, as was the standard regression coefficient for GT and GPA. It is possible that this result implies that gifted students possess different coping or problem-solving skills that help them be successful even when stressed, as suggested by DeYoung and colleagues (2008). It may also be that these students are better able to utilize their environmental resources in comparison to nongifted peers, as suggested by Kitano and Lewis (2005). It is also possible that students that take more difficult classes are more likely to prioritize achievement even when under stress. Of qualitative interest, students that reported participating in the district GT program also reported being enrolled in 2.5 AP classes and 3.6 honors classes on average, across grade levels, whereas students that did not participate in the GT program reported taking 1.4 AP classes and 1.9 honors classes on average across grade levels.

Limitations

There are several limitations to this study. First, it is important to note the time of the study. Surveys were released at the last week of the school year and remained open for participation for two weeks total, meaning that some participants responded to the survey after the school year had completely ended. At the time the survey was released, students had been engaged in online learning for three months due to the unexpected COVID-19 pandemic. In the beginning of March, classes were suddenly cancelled, and students were expected to engage in online learning from home. In addition to concern about the direct effects of the virus and staying healthy, many families also lost their sources of income. Sources of student and familial stress were abundant when the survey

was released, and it is likely reflected in student responses to their levels of perceived stress.

It is also difficult to determine meaningful relationships between stress and GPA at this time as well. Many teachers revised their grading criterion to be pass/fail. Students were primarily engaged in self-directed learning, therefore grades and GPAs likely were not as viable of reflections of academic achievement at the time that the survey was distributed. Additionally, students had mostly completed the school year at the time the survey was completed, therefore we were assessing student's current stress and the relationship to previously earned academic achievement.

Future Directions

This study was intended to explore perceived stress levels in gifted adolescents and their peers. We found that students identified as gifted had elevated stress in comparison to students not identified as gifted. Additionally, giftedness appears to mediate the relationship between stress and GPA. Though we did not explore coping skills or differences for why this relationship may be present in this study, future study that includes these measures may be helpful in understanding why this mediation exists.

Further exploration into this topic is also needed to eliminate the potential confounders present during this study. Specifically, completing the survey during the school year would be more appropriate in understanding the relationship between stress and academic performance or GPA. It is difficult to assess this relationship when students are not active in school. It could also be helpful to complete the survey at multiple time-points throughout the year to determine when students are at higher risk for elevated stress which would allow for more targeted intervention of stress management.

APPENDICES

APPENDIX A

Student Survey Questions

Demographic Information (drop down menu options)

- Age: 14, 15, 16, 17, 18, 19, 20, 21
- Year in school: Freshman (9th), Sophomore (10th), Junior (11th), Senior (12th)
- Race: American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, White
- Ethnicity: Not Hispanic or Latino, Hispanic or Latino
- Current GPA: 0-0.99, 1.0-1.99, 2.0-2.99, 3.00-3.99, 4.0+
- AP/Advanced Classes taken previously/currently enrolled (list of available classes)
- Gender: Male, Female, Other
- Enrolled in the Gifted/Talented program in Richland 2: yes or no

Perceived Stress Scale (PPS-10) (Cohen, 1994)

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling how often you felt or thought a certain way

0 = Never, 1 = Almost Never, 2 = Sometimes, 3 = Fairly Often, 4 = Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly?

0 1 2 3 4

2. In the last month, how often have you felt that you were unable to control the important things in your life?

0 1 2 3 4

3. In the last month, how often have you felt nervous and "stressed"?

0 1 2 3 4

4. In the last month, how often have you felt confident about your ability to handle your personal problems?

0 1 2 3 4

5. In the last month, how often have you felt that things were going your way?

0 1 2 3 4

6. In the last month, how often have you found that you could not cope with all the things that you had to do?

0 1 2 3 4

7. In the last month, how often have you been able to control irritations in your life?

0 1 2 3 4

8. In the last month, how often have you felt that you were on top of things?

0 1 2 3 4

9. In the last month, how often have you been angered because of things that were outside of your control?

0 1 2 3 4

10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

0 1 2 3 4

Additional Questions

11. How much time, on a typical week day, do you spend on homework (assignments for class)?

12. How much time, on a typical week day, do you spend studying for tests or quizzes? (Or how much time did you used to study when school was in session?)

13. What do you plan to do after high school? (Employment, Four-year College or University, Two-Year College, Trade and Certificate Program, Military, Other)

14. Please rank the following types of stress from most stressful for you (1) to least stressful for you (9) Or rate as N/A (Not applicable for me):

- Academic performance
- Relationship with family
- Relationship with peers/friends
- Relationship with significant other
- Your health
- Health of a loved one (family, friend, significant other)
- Time management
- Extracurricular activities (sports, clubs, teams)
- Plans for after high school

APPENDIX B

Assent, Consent, and Permissions Documents

Parental/Guardian Email to Parent/Guardian

Dear ____*District*____ Families,

We would like to learn more about how your student is experiencing stress. A member of our district and affiliate of Baylor University, Rebecca Tipton, is asking for your student to participate in a study about adolescent stress. The survey is completed online and asks questions about their current stress level, GPA, class schedule, extracurricular involvement, hours spent on homework, and other demographic information like race/ethnicity and gender.

Although your child may not benefit immediately from taking part in the survey, stress in high school students and children in general has been identified as a significant contributor to poor health and academic outcomes long term. We hope to learn more about how high school students perceive stress in order to develop more effective programs to teach coping skills and identify students that are at higher risk levels.

All ____*District Name*_____ high school students are invited to take part in the survey. However, the survey is voluntary. Completing the survey will cause little or no risk to your child. The only potential risk is that some students might find certain questions to be sensitive. If your child is not comfortable answering a question, he or she may skip it. No action will be taken against the school, you, or your child, if your child does not take part. In addition, students may stop participating in the survey at any point without penalty.

If you have questions about the study, you can contact rebecca_tipton@baylor.edu or eric_robinson@baylor.edu. If you have questions about your/your child's rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), you may contact the Baylor University IRB through the Office of the Vice Provost for Research at 254-710-3708 or irb@baylor.edu.

All of your student's responses and information will be completely anonymous in accordance with Federal Education Right to Privacy Act (FERPA) and Health Insurance Portability and Accountability Act (HIPPA) regulations should you choose to allow them to participate. No personally identifiable information will be collected.

If you allow your child to participate in this study, they will be asked to:

- complete a brief survey online
- answer questions about how stressed they have been feeling in the last month.
- answer questions about demographics, including age, gender, and race/ethnicity

Students will have the option to stop the survey or study at any time.

Please share this survey link with your child if you agree that they can participate in the study:

Insert Study Link

Assent Statement to Participate (On First Page of Survey)

My name is Rebecca Tipton. I am a student at Baylor University in Waco, Texas. I am also an intern psychologist working for Richland School District Two. I am inviting you to participate in a research study about stress in high school students.

What is the key information about this research study?
The purpose of this study is to learn about levels of psychological stress in high school students. You will be asked to complete a brief survey that will ask questions about how you have been feeling in the last month.

We expect that the survey will take approximately five to ten minutes to complete. There are no foreseeable risks to participation in this study. The main benefit is that we will learn about the stress levels of students like you so that we can serve you better at school.

Why is this study being done?
The purpose of the study is to learn about levels of psychological stress in high school students. You are being asked to take part in the study because you are currently enrolled as a high school student in Richland School District Two.

What do I need to do?
If you decide to be in the study, I will ask you to complete a brief survey online. The survey will ask questions about how stressed you have been feeling in the last month. You will also share some personal details, including your age, gender, and race/ethnicity. We will NOT collect your name or any other identifying information, thus all of your answers will be anonymous. The survey will take five to ten minutes to complete. You will have the option to quit or delete your answers at any time. Your answers and information will not be collected without your permission.

What are the benefits to me?
Taking part in this study may not have direct benefits to you, but it will help me learn about how students in high school today experience stress.

Are there any risks to me if I decide to be involved in this study?

There are no foreseeable risks however some kids may feel tired or feel a little uncomfortable with answering all of the questions. However, if you feel too tired to finish the survey, you may pause and come back to it after taking a break. If you do not want to answer a question or if you would like to stop the survey and delete your answers, you may drop out of the study at any time.

How will my information be protected?
No identifying information like your name will be connected to your survey answers – your answers will be completely anonymous. The data from the survey will only be seen by me, Rebecca Tipton, and my faculty mentor, Dr. Robinson. Once your survey is completed, I will input your answers into a computer program that will not have any identification to you directly. Though the information like your GPA and classes will be connected to your survey answers, your name will not be kept and there will be no master list with participant identification information. All data will be kept on a password protected computer and will be kept in a locked room belonging to the researcher. Data will be retained for up to 5 years after the project is complete and then deleted. It is possible that Richland Two will request survey answers to better help their students.

Do I have to be in the study?
No, you don't. The choice is yours. Your participation in this study is completely voluntary. No one will get angry or upset if you don't want to do this. And you can change your mind anytime if you decide you don't want to be in the study anymore.

What if I have questions?
If you have questions about the study, you can contact me at rebecca_tipton@baylor.edu. You may also contact my faculty mentor, Dr. Eric Robinson at eric_robinson@baylor.edu.
If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), you may contact the Baylor University IRB through the Office of the Vice Provost for Research at 254-710-3708 or irb@baylor.edu.

ASSENT STATEMENT
By selecting yes below, you assent (agree) to participate in the study. If you select no, you will be directed to an ending screen thanking you for your time. You can choose to stop the survey at any time by exiting the survey window.

Assent to Participate: Yes or No (click options on survey)

If student agrees (assents, yes) to participate, the survey continues. If the student does not agree (dissents, no), they are directed to the end of the survey and thanked for their time.

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