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Eustress in Advanced Placement (AP) and International Baccalaureate (IB) Students

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Eustress in Advanced Placement (AP) and International Baccalaureate (IB) Students

by

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A thesis submitted in partial fulfillment of the requirements for the degree of Education Specialist
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# TABLE OF CONTENTS

List of Tables

List of Figures

Abstract

Chapter I: Introduction
  Statement of the Problem
    Measurement of eustress. 1
    Correlates of eustress. 2
    Outcomes of eustress. 3
    Eustress in unique youth populations, namely students in accelerated curricula. 4
  Purpose of the Study 4
  Definition of Key Terms
    Academic success 6
    Advanced Placement (AP). 6
    Coping. 6
    Emotional well-being. 6
    Engagement. 6
    Eustress. 6
    Flow 7
    Grit. 7
    International Baccalaureate (IB). 7
    Nomological network. 7
    Savoring. 7
    Self-efficacy. 7
    Stress. 7
    Student success. 8
  Research Questions 8
  Hypotheses 9
  Significance of the Study 11

Chapter II: Literature Review
  Conceptualization of Stress 13
  Theoretical Background of Stress 15
    Holistic Stress Model. 16
    Conceptualization of stress in the current study. 17
  Conceptualizing Eustress 18
    Challenge Stressor-Hindrance Stressor Framework. 23
Measurement of Eustress 24
  Qualitative approach. 25
  Quantitative approach. 26
Constructs Related to Eustress among Adolescents 34
The Adolescent Development Context and Stressors 36
Constructs Potentially Associated with Eustress in Adolescents 37
  Self-efficacy. 37
  Flow. 38
  Student engagement. 39
  Coping. 41
  Grit. 42
Adolescents in Accelerated Curricula 43
Summary of the Literature 46

Chapter III: Methods 48
  Participants 48
  Issues of Diversity 50
  Procedures 51
    Data collection. 51
Measures: Nomological Network of Eustress 52
  School Attitude Assessment Survey-Revised 52
  Perceived Stress Scale 54
  Eustress Scale 54
  Coping with Academic Demands Scale 56
  Short Dispositional Flow Scale-2 57
  Short Grit Scale 58
Measures: Outcomes 58
  Student’s Life Satisfaction Scale 58
  Behavioral and Emotional Screening System 59
  School Burnout Inventory 59
Academic outcomes 60
  Grade Point Average 60
Ethical Concerns 62
Data Analysis 62

Chapter IV: Results 66
  Data Screening 66
    Data entry 66
    Missing data 66
Psychometric Properties of the Eustress Scale 67
    Descriptive statistics. 67
    Factor structure. 69
    Total sample. 69
    Gender. 72
Chapter V: Discussion

Measuring Eustress within Adolescents in Rigorous Academic Programs
Measuring Eustress within Gender, Grade Level, and Program Subgroups
Correlates of Eustress
Relationship between Eustress and Student Outcomes
Implications for School Psychologists
Contributions to the Literature
Limitations
Summary and Future Directions

References

Appendices
Appendix A: Eustress Scale used by O’Sullivan (2011)
Appendix B: Parent Consent Form
Appendix C: Student Assent
Appendix D: Demographics Form
Appendix E: School Attitude Assessment Survey-Revised (SAAS-R)
Appendix F: Perceived Stress Scale (PSS)
Appendix G: Modified Eustress Scale
Appendix H: Coping with Academic Demands Scale (CADS)
Appendix I: Short Grit Scale
Appendix J: Student Life Satisfaction Scale (SLSS)
Appendix K: School Burnout Inventory (SBI)
Appendix L: Confirmatory Factor Analysis for Gender
Appendix M: Confirmatory Factor Analysis for Grade
Appendix N: Confirmatory Factor Analysis for Program
<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>Eustress Distress Model</td>
<td>148</td>
</tr>
<tr>
<td>P</td>
<td>Eustress Affective Engagement Model</td>
<td>149</td>
</tr>
<tr>
<td>Q</td>
<td>Eustress Cognitive Engagement Model</td>
<td>150</td>
</tr>
<tr>
<td>R</td>
<td>Eustress Time and Task Management Model</td>
<td>151</td>
</tr>
<tr>
<td>S</td>
<td>Eustress Cognitive Reappraisal Model</td>
<td>152</td>
</tr>
<tr>
<td>T</td>
<td>Eustress Talk with Classmates and Friends Model</td>
<td>153</td>
</tr>
<tr>
<td>U</td>
<td>Eustress Deterioration Model</td>
<td>154</td>
</tr>
<tr>
<td>V</td>
<td>Eustress Self-Efficacy Model</td>
<td>155</td>
</tr>
<tr>
<td>W</td>
<td>Eustress Flow Model</td>
<td>156</td>
</tr>
<tr>
<td>X</td>
<td>Eustress Grit Model</td>
<td>157</td>
</tr>
<tr>
<td>Y</td>
<td>Model Fit Information for Eustress and Student Outcomes</td>
<td>158</td>
</tr>
<tr>
<td>Z</td>
<td>Permission Information for Figure 2</td>
<td>159</td>
</tr>
<tr>
<td>AA</td>
<td>IRB Approval Letter</td>
<td>160</td>
</tr>
</tbody>
</table>
LIST OF TABLES

Table 1: Eustress Self-Report Measure 32
Table 2: Demographic Characteristics of Participants 49
Table 3: Measures Selected from Primary Data Set 61
Table 4: Descriptive Statistics for Eustress Items 69
Table 5: Model Fit Indices for Eustress Measure 73
Table 6: Descriptive Statistics for Distress 79
Table 7: Descriptive Statistics for Student Engagement 81
Table 8: Descriptive Statistics for Coping Strategies 84
Table 9: Descriptive Statistics for Self-Efficacy 88
Table 10: Descriptive Statistics for Flow 89
Table 11: Descriptive Statistics for Grit 90
Table 12: Eustress and Student Outcomes Coefficients and Significance 92
Table 13: Descriptive Statistics for Life Satisfaction 93
Table 14: Descriptive Statistics for School Burnout 95
Table 15: Descriptive Statistics for Psychopathology 97
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Seyle’s Conceptualization of Stress</td>
<td>14</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Holistic Model of Stress</td>
<td>17</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Yerkes-Dodson Law</td>
<td>21</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Potential Nomological Network Diagram of Eustress, with Corresponding Measure(s) Indicated in Far-Right Column</td>
<td>51</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Factor Diagram for Eustress Measure</td>
<td>71</td>
</tr>
</tbody>
</table>
ABSTRACT

Eustress, the positive response to stress, is a relatively understudied concept. Most of the research on eustress has been concentrated in the occupational and management setting. Empirical studies of eustress in adolescents are absent, even though youth experience unique sources and magnitudes of stress. Specifically, Advanced Placement (AP) and International Baccalaureate (IB) students report more stress than their general education peers but excel in their rigorous academic program. Eustress is related to a variety of positive psychological and physiological outcomes among adult samples, which makes it an important concept to explore in adolescent samples. Many constructs such as self-efficacy, hope, meaningfulness, flow, engagement and coping have correlated with eustress among samples of adults. This study investigated different aspects of eustress in a sample of 2379 AP and IB students (grades 9 – 12), and explored if its relationship with positive outcomes (among adults) holds true in this population. First, the psychometric properties of a modified self-report measure of eustress were examined. Results from this study supported a five-item eustress measure that had adequate reliability (α=.85) and construct validity based on a confirmatory factor analysis. Second, differences between the eustress measure in different subgroups, namely gender, grade level, and academic program were explored. Only a significant difference in eustress was found between grade levels, indicating that students in upper grade levels had higher levels of eustress. Third, relationships between eustress scores and a nomological network of theoretically similar
constructs (potential correlates) and salient outcomes – indicators of students’ academic and emotional success—were examined. Consistent with previous literature, eustress had a significant positive relationship with task-focused coping, cognitive and affective engagement, self-efficacy, flow, and grit. Eustress had a negative relationship with distress and emotion-focused coping. Related to student outcomes, eustress was a significant predictor of higher levels of positive indicators of success—GPA and life satisfaction—lower levels of indicators of undesirable outcomes—school burnout and psychopathology. Implications for practitioners and future directions for research are discussed.
CHAPTER I: INTRODUCTION

Statement of the Problem

It has been well documented in the literature that stress causes undesirable outcomes in adolescents physically, emotionally and psychologically (Byrne, Davenport, & Mazanov, 2007). While the word “stress” has been traditionally interpreted in a negative way, the original definition of stress by Hans Seyle (1975) was that “stress is the nonspecific response of the body to any demand” (p. 39). In this context, stress can take the form of distress, which is a negative response to stress, but it can also take the form of eustress, which is a positive response to stress. While coping strategies exist for students to cope with distress, the form of stress that motivates people in a positive direction has received little attention in the literature. Even though the term eustress originated in 1975, it has been relatively understudied. However, the little that we know about eustress has shown associations between this concept and a variety of desirable outcomes psychically, cognitively and emotionally (Cavanaugh, Boswell, Roehling, & Boudreau, 2000; Hargrove, Nelson, & Cooper, 2013; Jamieson, Nock, & Mendes, 2012; Little, Simmons, & Nelson, 2007; O’Sullivan, 2011; Quinones, Rodríguez-Carvajal, & Griffiths, 2017; Simmons & Nelson, 2001)

Measurement of eustress. Initial studies of eustress have involved construct definition and corresponding measurement approaches using qualitative data, physiological data, measures of indirect constructs, and direct self-report measures. The qualitative approach has utilized semi-structured interviews (Oksman et al., 2016). Physiological data have consisted of heart rate
and blood pressure (Bhat, Sameer, & Ganaraja, 2011; Oksman, Ernes, & Kati, 2016). Indirect measurements of eustress have included the presence of positive psychological states, such as positive affect, meaningfulness, and hope (Nelson & Simmons, 2011; Simmons & Nelson, 2001). Lastly, other studies have utilized a self-report Likert-scale direct measure of eustress (Cavanaugh et al., 2000; Gibbons, Deempster, & Moutray, 2009; O’Sullivan, 2011). This study approached the measurement of eustress through direct measurement so that quantitative data can be analyzed regarding an individual’s perception of stress. A 2011 study of eustress in college students advanced a 15-item direct self-report measure called the Eustress Scale (O’Sullivan, 2011). The psychometric properties of this measure with youth, such as high school students, have yet to be examined in published research.

**Correlates of eustress.** Eustress, when conceptualized as a positive response to stress, has been related to positive psychology states such as positive affect, meaningfulness, and hope (Edwards & Cooper, 1998; Nelson & Simmons, 2004). Also, it is proposed in the literature that eustress leads to savoring (i.e., attending to and appreciating positive experiences; Bryant & Veroff, 2007), which in turn leads to a flow state (i.e., a state of peak performance where an individual is completely absorbed in a task), which is touted as the ultimate eustress experience (Hargrove et al., 2013). Flow has been seen to facilitate an indirect relationship between eustress and student engagement (Mesurado, Cristina Richaud, & José Mateo, 2016). Certain individual characteristics such as optimism, locus of control, hardiness (reflected in one’s commitment [viewing tasks as interesting and meaningful], challenge, and sense of control), self-reliance, and sense of coherence are theorized to promote eustress (Nelson & Simmons, 2011). Personal beliefs about one’s abilities to be successful in a particular task or domain, captured by the
construct self-efficacy, have also been seen to contribute to a positive response to stress (O’Sullivan, 2010). Similarly, coping strategies seem to be associated with the development of eustress; specifically, task-focused coping strategies have been seen to precede eustress, whereas emotion-focused coping strategies were precursors to distress (McGowan, Gardner, & Fletcher, 2006). Correlates of eustress are still being explored in the literature. This study examined specific correlates within a high-achieving high school population, a group that has been shown to experience elevated levels of distress (Suldo & Shaunessy-Dedrick, 2013).

**Outcomes of eustress.** Even with the limited amount of research available on this construct, multiple studies have shown a correlational relationship between eustress and indicators of emotional and occupational success. Specifically, eustress relates positively to job satisfaction and life satisfaction, as well as benefits people physiologically through adaptive cardiovascular stress response, and cognitively through increased attention (Cavanaugh et al., 2000; Jamieson et al., 2012; O’Sullivan, 2011). For example, youth who viewed the Graduate Record Exam (GRE) as a challenge, rather than an anxiety-provoking situation, performed better than a control group during a simulated GRE test, as well as on the actual GRE months later (Jamieson, Mendes, Blackstock, & Schmader, 2010). In workplace settings, it is theorized that eustress is associated with improved employee performance (Hargrove, Becker, & Hargrove, 2015). Conversely, distress has been associated with decreased job satisfaction and the development of psychopathology (Cavanaugh et al., 2000; Grant et al., 2003; McMahon et al., 2003). With students taking accelerated curricula, such as Advanced Placement (AP) classes and International Baccalaureate (IB) programs, experiencing more distress and academic stressors than their general education peers (Suldo & Shaunessy-Dedrick, 2013b; Suldo, Dedrick, Shaunessy-
Dedrick, Roth, & Ferron, 2015b), it is important that students have the ability to reap the benefits associated with eustress as well as prevent and limit the detrimental effects associated with distress. More information regarding AP/IB classes is provided in the next section.

**Eustress in unique youth populations, namely students in accelerated curricula.** The notion of eustress may be especially relevant to populations that experience more overall stress, such as teenagers in AP and IB (Suldo & Shaunessy-Dedrick, 2013). Students in AP classes and IB programs experience intense academic stressors (Suldo, Shaunessy, Thalji, Michalowski, & Shaffer, 2009). Despite their academic demands, they maintain exceptionally high academic performance, while remaining similar to their peers in general education on psychological functioning (Suldo & Shaunessy-Dedrick, 2013b). A successful student status might be captured through indicators of both academic and emotional success; eustress would seem to lead to higher levels of all relevant outcomes including optimal performance in classes and the presence of positive emotional states. However, little research of eustress has been conducted in the educational realm. Most studies have concentrated in the occupational/management literature (Cavanaugh et al., 2000; Oksman et al., 2016; Simmons & Nelson, 2001). While, it can be hypothesized that improved work performance would be parallel to improved school performance, there have not been any studies to support that hypothesis.

**Purpose of the Study**

The purpose of this study was to examine the concept of eustress in the growing population of AP and IB students. First, the psychometric properties of a modified self-report measure of eustress (Eustress Scale; O’Sullivan, 2011) were examined for the total sample, as well as different subpopulations. Second, differences between the eustress measure in different
subpopulations were explored. Third, in an initial effort to find out if this is a meaningful concept in this population, relationships between eustress scores and a nomological network of theoretically similar constructs (potential correlates) and salient outcomes – indicators of students’ academic and emotional success were examined. These analyses occurred through secondary analysis of data collected in 2012 as part of a larger study that examined predictors of success among AP and IB students (Suldo & Shaunessy, 2010; Suldo, Shaunessy-Dedrick, Ferron, & Dedrick, 2018). A quantitative approach was used to examine cross-sectional data from students from all grade levels (9th-12th).

This study provided a first step in exploring the concept of eustress in high school students in accelerated curricula. Basic research of this construct needs to be established before applied research (e.g., how to facilitate eustress) can begin. Long-term, fostering student eustress might help them capitalize on an automatic biological response to improve performance and keep students engaged. Also, if educators learn how to foster eustress first instead of preventing and treating distress, it is possible that fewer students would experience the negative consequences associated with distress. More research is needed to take this largely theoretical concept, which is associated with positive outcomes in preliminary research with adults, from an idea in the research literature to having practical implications for educators and psychologists.

**Definition of Key Terms**

Throughout the study, many of the terms listed below are used frequently. They are defined when they are introduced in the text, and the reader can use the list below as a reference.

**Academic success.** Achievement can be indexed through attitudes, behaviors, or skills that co-occur with and predict positive school-related outcomes, such as on-time graduation and
attainment of postsecondary education. In the current study, students’ academic success is indexed by grade point averages, an outcome that is highly pertinent to the high school years and participation in accelerated curricula.

**Advanced Placement (AP).** College-level classes offered in high school that generally have higher academic rigor than general education classes (College Board, 2003).

**Coping.** Coping refers to the resources, either in the cognitive or behavioral realm, that an individual uses to manage the demand(s) placed upon him or her (Lazarus & Folkman, 1984).

**Emotional well-being.** Mental health defined in accordance with a dual-factor framework (Suldo & Shaffer, 2008), in which high well-being is reflected in the presence of positive indicators (i.e., high levels of life satisfaction) and subclinical levels of negative indicators (e.g., symptoms of academic burnout and psychopathology).

**Engagement.** The construct of student engagement is multidimensional, and often consists of three different types of engagement: behavioral, affective, and cognitive. Together, these constructs define how involved students are in school-related activities, how much pride and belonging they feel towards their school, and how students regulate and motivate themselves to achieve future academic goals (Reschly & Christenson, 2012).

**Eustress.** A form of stress that reflects a positive interpretation and response to the stress response (Nelson & Simmons, 2011).

**Flow.** A state individuals experience where they feel completely involved in something and all other things not related to the task are temporarily forgotten (Csikszentmihalyi, Abuhamdeh, & Nakamura, 2005).
Grit. An internal drive, “perseverance and passion” (Duckworth, Peterson, Matthews, & Kelly, 2007, p. 1087) that pushes an individual to consistently persist towards his or her goals through time. Grit is considered a “noncognitive quality,” (p.1088), but it is seen as an important predictor of success.

International Baccalaureate (IB). A comprehensive, internationally recognized program for high school juniors and seniors that emphasizes content depth, metacognitive thinking, global understanding, interpersonal and communication skills, and service to the community. Students who are freshman and sophomores can take a pre-IB curriculum or enroll in the Middle Years Program (International Baccalaureate Organization [IBO], 2018).

Nomological network. A nomological network is a synthesis of the constructs, outcomes, and the dynamic relationships between the factors of a given concept (Connelly, Ones, & Chernyshenko, 2014).

Savoring. The act of savoring refers to how well people “attend to, appreciate, and enhance positive experiences in their lives” (Bryant & Veroff, 2007, p. 2).

Self-efficacy. Self-efficacy represents one’s beliefs about their ability to meet the demands of a task, such as school assignments and learning. People develop self-efficacy in different areas (e.g., academic vs. social efficacy) and to varying degrees (Bandura, 2006).

Stress. “The pattern of specific and nonspecific responses an organism makes to stimulus events that disturb its equilibrium and tax or exceed its ability to cope” (Gerrig & Zimbardo, 2002, “S,” para. 74). In addition to such psychological definitions of stress as causing distress (perceived stress, a form of stress that reflects a negative interpretation and response to the stress response; Lazarus & Folkman, 1984; Nelson & Simmons, 2011), it can be examined more
objectively as consisting of *environmental* stressors (i.e., “physical or psychological stimuli to which the individual responds”; Nelson & Simmons, 2011, p. 57) or *physiologically* via tests of heartrate, cortisol, etc.

**Student success.** In prior studies of optimal outcomes among high school students in accelerated curricula, student success has been examined with attention to indicators of both academic success and emotional well-being (e.g., Grade Point Average [GPA], happiness; Suldo & Shaunessy-Dedrick, 2013a).

**Research Questions**

The specific research questions that were examined in this study are as follows:

1. What are the psychometric properties of the Eustress Scale in students in accelerated curricula, with regard to the:
   a) Factor structure
   b) Internal consistency reliability?

2. To what extent, if any, does eustress differ in students in accelerated curricula by:
   a) Gender
   b) Grade level (9th-12th)
   c) Program (AP vs. IB)?

3. What is the nomological network of eustress in students in accelerated curricula, as determined through examination of concurrent associations with:
   a) Distress
   b) Student engagement
   c) Coping strategies
d) Self-efficacy  
e) Flow  
f) Grit?

4. To what extent, if any, is eustress in students in accelerated curricula related to indicators of student success, including:
   a) Academic performance  
   b) Emotional well-being?

Hypotheses

Since eustress has been relatively understudied, with no studies within an adolescent sample, the research questions are mainly exploratory. Drawing on the limited research, for question one, this researcher hypothesized that eustress can reliably be measured in adolescents using an adapted version of an instrument that yielded acceptable psychometric properties in an earlier study of college students (Time 1 $\alpha = .77$ and Time 2 $\alpha = .81$; O’Sullivan, 2011). For question two, the differences in eustress among various subgroups of youth are impossible to speculate about given the absence of prior research with adolescent samples. For question three, this researcher’s tentative hypotheses were informed by findings from different studies (Cavanaugh et al., 2000; McGowan, Gardner, & Fletcher, 2006; Mesurado et al., 2016, O’Sullivan, 2011) and aspects of conceptual frameworks (Lepine, Podsakoff, & Lepine, 2005; Nelson & Simmons, 2011). For (a) distress, it is hypothesized that eustress and distress will have some association (due to the hypothesized concept that eustress and distress can occur in the same context), but the exact nature of the association is unclear. Cavanaugh and colleagues (2000) measured both challenge stressors (related to eustress) and hinderance stressors (related to
distress) but only performed analysis on their relationship with outcomes, and not the relationship between these two constructs. Since eustress is usually associated with positive outcomes, and distress is generally associated with negative outcomes, it is possible that an inverse association would occur between eustress and distress. For (b) student engagement, it is hypothesized that eustress will have a positive association with engagement, based on prior studies finding positive correlations with different aspects of engagement (Mesurado et al., 2016). Based on the theoretical Holistic Stress framework by Nelson and Simmons (2011), student engagement may be a proxy for “community involvement,” (p. 56) which is indicated as an outcome of eustress. For (c) coping strategies, it is hypothesized that eustress will have a positive association with task/problem-focused coping strategies, and no relationship with emotion-focused coping strategies. This hypothesis is based on similar results from McGowan and colleagues (2006) who examined eustress and distress in relation to coping strategies, and Lepine, Podsakoff, and Lepine (2005) who stated that challenge stressors (related to eustress) can “activate [a] problem-solving style of coping” (p. 765). For (d) self-efficacy, O’Sullivan (2011) found a positive correlation between eustress and self-efficacy in college-aged students. It is hypothesized that a similar relationship would be found among this sample of AP/IB students. Also, self-efficacy may be a proxy of “self-reliance” (p. 56) which is indicated as an individual difference that precedes eustress in the Nelson and Simmons (2011) model. It is hypothesized to be a construct that precedes eustress because it is a factor that might help an individual appraise a stressor more positively, if they feel that have more internal resources to manage the stressor. For (e) flow, it is hypothesized that flow would have a positive association with eustress, and be an outcome of eustress, because it has been reported as the ultimate eustress experience (Mesurado
et al., 2016). Last, (f) grit is hypothesized to mimic self-efficacy’s relationship with eustress.

There have been no studies examining the relationship between grit and eustress, but grit may be a proxy for “hardiness” (p. 56) which is also indicated as an individual difference in the Nelson and Simmons (2011) model, and may be a contributing factor to whether an individual appraises a stressor negatively or positively. For question four, higher eustress scores are hypothesized to co-occur with higher scores on positive indicators of academic and emotional success, since it has been previously related to increased work performance and positive psychology states, respectively (Hargrove, Nelson & Cooper, 2013). It is also hypothesized that negative relationships will be found between eustress and negative emotional indicators, such as psychopathology and school burnout.

Significance of the Study

The results of this study are important for a number of reasons. First, this study provided descriptive information about eustress in an academically advanced high school population, and began building a literature base of eustress in adolescents. A reliable and validated measure of eustress has not yet been established; this study provided psychometric data on a modified version of a direct measure of eustress that has been used in college students (O’Sullivan, 2011). Second, this study shed light on other constructs that are related to eustress and provided future directions for research. The nomological network of eustress was explored in adolescents, and theoretically related constructs to eustress were examined. Research in this area contributes to a more refined knowledge base, and paves the way for use of this construct in work with youth. For instance, this study shed light on how eustress relates to different coping strategies used in adolescents; findings might provide practical implications and support for fostering specific
styles of coping, pending support for eustress as related to positive outcomes. Third, this study helped determine if eustress is related to overall positive indicators in an adolescent population, by investigating the relationship of eustress with indicators of student success, e.g., academic performance and emotional well-being.
CHAPTER II: LITERATURE REVIEW

Eustress, the positive response to stress, is a relatively understudied concept. This review aimed to explore stress as a non-specific response, specifically its ability to be interpreted positively and negatively. Different theoretical constructs of stress were examined to provide a rationale for the current study’s theoretical underpinning. Next, consistencies and inconsistencies in the current literature on eustress were described and synthesized to construct a thorough understanding of the construct, including the varied measurement approaches that have been used to capture eustress. Factors found to be related to eustress such as self-efficacy, flow, engagement, and coping were explored, as well as theoretically similar constructs such as grit (related to hardiness). Lastly, research and rationale for examining this construct in AP and IB students were presented. While this is not an exhaustive review of all literature on stress, the most relevant studies based on population and method were selected.

Conceptualization of Stress

The American Psychological Association (APA, 2002) defines stress as “the pattern of specific and nonspecific responses an organism makes to stimulus events that disturb its equilibrium and tax or exceed its ability to cope” (Gerrig & Zimbardo, 2002, “S,” para. 74). As this definition states, stress does not always manifest itself in a negative way. This non-directionality view of stress is contrary to popular belief about stress and how the term is colloquially used. Stress is a popular area of research since it is a pervasive and common response across the life span, and can arise in many aspects of life.
While the term “stress” has been used by individuals— including scientists— for centuries, an endocrinologist named Hans Seyle applied the term to the biological sciences in 1936. Seyle defined stress as “the nonspecific response of the body to any demand for change” (Seyle, 1987, p. 17). Many years later, the APA has kept true to this non-directional definition of stress. The reason for this non-directionalism is that Selye conceptualized that stress could be perceived and manifested either positively or negatively (Seyle, 1975). According to his model, when a person encounters a stressor, his or her body may automatically react with the physiological stress response, but the outcome and interpretation of this stressor can either be positive or negative. The evaluation stage is when a person determines the directionality of the stress. In this model, the negative conceptualization and reaction to stress is referred to as “distress.” This is typically the reaction people are talking about when they mention stress. However, stress can also be responded to positively and related to positive outcomes. This positive response to stress is called “eustress.” See Figure 1 (Seyle, 1975) for a diagram of this process.

![Figure 1. Seyle’s Conceptualization of Stress](image)

Throughout this study, the term “stress” is used to describe physiological arousal, “distress” is used to denote a negative reaction to stress, and “eustress” is used to describe a
positive response to stress. The following sections describe the theoretical models of stress, describe the limited research base on eustress, explore factors related to eustress, and identify the gaps in the literature that this study aims to fill.

**Theoretical Background of Stress**

Three distinct models of stress have been put forth in the literature that conceptualize stress: the medical model, the environmental model, and the psychological model (McNamara, 2000). The medical model focuses on the body’s physiological response to a stressor (Szabo, Tache, & Somogyi, 2012). The environmental model focuses on the external (environmental) characteristics that induce stress, and views the psychological appraisal of stress as potentially confounding (Cohen, Kessler, & Gordon, 1995; McNamara, 2000). While stressors place an environmental demand upon the individual, eustress and distress are a result of the interpretation of those demands, which is sometimes based on an evaluation of one’s personal resources. Lastly, in the psychological model, stress is conceptualized as an interactive relationship between the stressors individuals face, and their cognitive appraisal of their ability to manage the stressor (Lazarus & Folkman, 1984).

The psychological model, or theory of cognitive appraisal, by Lazarus and Folkman (1984), is the conceptualization of stress most pertinent to this study. This model purports that the response to stress consists of a primary and secondary appraisal of the stressor. The primary appraisal determines whether the stressor is worth attending to, and the secondary appraisal requires individuals to determine the amount of resources this stressor requires, and if they possess the resources to handle the stressor. Besides the perception of the amount of demand required by the stressor, the way we view stress can also be influenced by characteristics such as
“its source, timing, the degree to which they have of control over it, and the degree to which they consider it desirable” (Le Fevre, Kolt, & Matheny, 2006, p. 551). Secondary appraisal is where the interpretation of a stressor as challenging or hindering occurs. Eustress occurs when individuals determine they possess adequate resources to handle the stressor, while distress occurs when individuals determine if the demand of the stressor exceeds their resources. Determining the balance between demand by the stressor and an individual’s resources to handle those demands is the hallmark characteristic of eustress. This model of cognitive appraisal was used in the current study to explain how stress can be channeled positively or negatively.

**Holistic Stress Model.** Drawing off the psychological view of stress (Lazarus & Folkman, 1984), how an individual interprets the stressor determines whether they react in a positive or negative way. In Nelson and Simmons’ (2003) Holistic Model of Stress, when individuals appraise a situation as negative (distress) then they tend to use coping strategies, but when they appraise a situation as positive (eustress) then they will savor that experience (Nelson & Simmons, 2011). Savoring is defined as “how well people attend to, appreciate, and enhance positive experiences in their lives” (Bryant & Veroff, 2007, p.2). It has been hypothesized that individual differences can contribute to a person interpreting the physical response of stress as eustress. According to Nelson and Simmons (2011), these hypothesized constructs include optimism, hardiness, locus of control, self-reliance, and a sense of coherence. A diagram of Nelson and Simmons Holistic Model of Stress is presented in Figure 2. These characteristics tend to make an individual more likely to appraise demands positively, and to choose problem-focused coping strategies in the face of distress. Although individual differences may contribute
to the eustress response, this study examined more global concepts and outcomes of eustress instead of personality characteristics.


**Conceptualization of stress in the current study.** Since a stressor is determined to be distress or eustress through an individual’s cognitive appraisal, focusing on either the body’s physiological reaction to stress or the environmental source of stress — without the inclusion of an individual’s interpretation of the event — would not be consistent with the concept of eustress. The current literature discussing the theoretical underpinnings of eustress universally favor the psychological model of stress (Hargrove, Nelson, & Cooper, 2013; Nelson & Simmons, 2011).
Therefore, in this study, the psychological model was used to conceptualize an individual’s stress response.

**Conceptualizing Eustress**

Eustress is defined as a positive response to a stressor. In behavioral terms, a eustressed individual is described as being engaged, motivated, and appropriately challenged by their task. Their productivity is not hindered due to negative thoughts or feelings. Eustress is related to positive psychological and physiological responses. Hargrove, Nelson and Cooper (2013) found support for the relationship between eustress and good health, well-being, and positive job performance. Even though this concept may seem simple, there are many intricacies that justify research attention.

In 1996, Mesler summarized the scope of the literature on eustress as “relatively few studies, and no adequate models, proposing the concept of eustress and its associated regenerative qualities” (p. 63). Twenty years later, eustress remains a largely theoretical concept. This dearth of literature on eustress may result from the jingle jangle phenomenon, where different terms are used to describe the same construct (e.g., Reschly & Christenson, 2012). Research on similar constructs from different disciplines, such as challenge/hindrance stressors, and stress reappraisal (Cavanaugh, et al., 2000; Jamieson, Nock, & Mendes, 2012), were used to inform the conceptualization of eustress and its potential associations in this study. There is not yet an accepted universal definition of eustress. Within research studies, eustress has been defined as both a positive response to stress and an optimal level, or amount, of stress (Oksman, Virpi, Ermes, Miikka, Kati, & Tikkamäki, 2016). It is important to note that even though eustress is a positive response to stress, individuals do not want to experience eustress *all* of the time,
since individuals need time to relax and recover from stressors (Hargrove et al. 2013). This literature review attempts to examine the most salient studies related to eustress, in order to combine similar views and point out discrepancies between them.

A fundamental similarity in the literature is that eustress and distress are distinct constructs and are not opposite ends of a spectrum (Le Fevre, Kolt, & Matheny, 2006; Nelson & Simmons, 2011). Eustress and distress can occur simultaneously, and manipulating the amount of either eustress or distress does not automatically increase or decrease the other construct. Nelson and Simmons (2011) are prominent authors in the eustress literature who have contributed empirical and theoretical pieces related to this construct. They advocate for a holistic view of stress that incorporates both the positive and negative responses, and supports the notion that we may respond to a stressor with both eustress and distress at the same time (Nelson & Simmons, 2011). For example, Nelson and Simmons (2011) examined the situation of getting a promotion at work. This could elicit eustress from an individual if he or she finds the new position engaging and meaningful and looks at it as a challenge, and it could also elicit distress if an individual is worried about meeting the standards and expectation of the new position. An example more relevant to AP/IB youth could be getting into the IB program or an AP class itself. The student may feel eustress about the growth in learning they will experience from the class, but they may feel distress about the expectations or workload required by the class. Overall, Nelson and Simmons (2011) reaffirm that eustress and distress are distinct constructs and that individual differences may affect eustress. If both states of stress are present, it is not clear which one an individual will attend to the most. Future research should gather information about which
stress response is dominant if both are present. Regardless, it is important to note that eustress and distress are separate and distinct constructs.

A fundamental difference exists in the literature regarding if a positive response to stress, eustress, is related to the amount of stress or the interpretation of the stress response. This debate about amount versus interpretation comes from the Yerkes-Dodson law (Cohen, 2011) and how Seyle’s (1975) stress research has been applied to this concept. Psychologists Robert Yerkes and John Dodson established this law in 1908 when they investigated increasing arousal levels on maze completion in rats. The two scientists discovered that a mild electric shock was associated with the best maze performance, whereas when the shock became too strong the rat’s performance declined. This led the scientists to conclude that arousal level and performance were associated in an inverted U shape. This means that as arousal level increases, so does performance, but only up to a certain point. Once a tipping point is reached, performance decreases with increasing arousal level. However, this optimal amount of stress is not defined in the literature. Figure 3 displays the Yerkes-Dodson law. The application of the Yerkes-Dodson law to eustress suggests that there exists an optimal level of stress, which some interpret as eustress, that is associated with positive outcomes, namely optimal performance. This application of eustress to the Yerkes-Dodson law has come under some debate. Le Fervre, Matheny, and Kolt (2003) argue that the Yerkes-Dodson law is not an accurate representation of Seyle’s (1975) original concept of eustress. The original concept of eustress is a positive response to stress due to interpretation, not amount, and this delineation cannot be measured using rats. In other words, to keep true to Seyle’s (1987) fundamental conceptualization of eustress, Le Fervre and
colleagues (2006) argue that eustress should be primarily thought of as an individual’s interpretation and subsequent response to stressors.

Figure 3. Yerkes-Dodson Law

Researchers using the interpretational view of eustress have extended their focus to measurement instruments and stress management interventions (Cavanaugh et al., 2000; Le Fevre, Kolt & Matheny, 2006). Cavanaugh et al. (2000) used measurement methods (i.e., interpretational view of stress) that are more consistent with the original definition of eustress than the measurement methods (i.e., level of stress) used in the Yerkes-Dodson law. In this longitudinal study, Cavanaugh et al. (2000) gathered self-report data from high-level managers about their perceptions of stress and their job satisfaction and job search behavior. A total of 1,886 participants (mostly married white males) completed surveys at the first wave of data collection, and 841 participants remained in the study at the second wave of data collection a year later. The researchers developed a new measure to capture perceptions of stress and whether participants viewed stress as a challenge stressor or a hindrance stressor. While the words

21
“eustress” and “distress” do not appear in this study, the challenge stressor can be translated to “eustress” and the hindrance stressor can be translated to “distress.” The authors completed a thorough measure validation process similar to what Crocker and Algina (1986) recommend. While this measure had some promising psychometric properties, the questions were specifically worded for high level managers and would not be relevant for populations in a non-managerial position. Findings include that challenge-related stressors were positively related to job satisfaction and negatively related to job search behavior. In contrast, hindrance-related stressors were related negatively to job satisfaction and positively to job search behavior. This supports the notion that when a stressor is viewed as a challenge rather than a hindrance, one is more likely to be satisfied with their current position and less likely to search for other employment.

Regarding interventions, ven der Klink and colleagues (2001) performed a quantitative meta-analysis to determine the effectiveness of different stress management interventions. To be included in the metanalysis, studies had to meet a list of inclusion criteria (e.g., target population, experimental design, intervention implemented) created by the authors. A search of the literature, produced 48 studies (n=3736) that met the inclusion criteria and were included in this meta-analysis. Overall, the authors found a significant effect (d=.44) on a range of physiological and psychological variables from stress management interventions that targeted an individual’s interpretation of stressors (e.g., cognitive-behavioral interventions) but found a nonsignificant effect from interventions that aimed to reduce overall stress levels in the workplace (e.g., organization-focused interventions). Extending this research into the realm of eustress, Le Ferve and colleagues (2006) layered the conceptualizations of eustress and distress over the meta-analysis performed by ven der Klink and colleagues (2001). Le Ferve et al. (2006) argued the
results from this meta-analysis (ven der Klink et al., 2001) support the notion that the expression of eustress and distress is determined by “the individual’s perception of the amount of demand it represents,” (p. 551) and their recognition of certain characteristics about the stressor such as its “source, timing, the degree to which they have control over it, and the degree to which they consider it desirable” (p. 551). These studies provide preliminary support for using an interpretational view to measure eustress, rather than strictly looking at the sheer amount of stress to classify it as positive or negative.

While the literature is not advanced enough to definitively state if it is a combination of the two concepts, amount and interpretation, that elicits eustress, previous research supports the interpretational view of eustress (Cavanaugh et al., 2000; Le Fevre, Kolt & Matheny, 2006). Therefore, for the purposes of this study, eustress was conceptualized as the interpretation of the stressor, and not as an optimal amount of stress.

**Challenge Stressor-Hindrance Stressor Framework.** The aforementioned Yerkes-Dodson law (Cohen, 2011) proposed that there is an ideal level of stress that corresponds with an ideal level of performance, however, multiple studies have not supported this relationship (Lienert & Baumler, 1994; Teigen, 1994; Westman & Eden, 1996). The Challenge Stressor Hindrance Stressor Framework (CSHSF) provides one explanation for the inconsistent relationship between stress and performance (Lepine, Podsakoff, & Lepine, 2005). In the CSHSF, the challenge stressors are those situations that are appraised as “having the potential to promote personal gain or growth, trigger positive emotions, and activate [a] problem-solving style of coping” (p. 765), and the hindrance stressors are demands that are appraised as “having the potential to harm personal growth or gain, trigger negative emotions, and [activate] a passive
style of coping” (p. 765). Using the expectancy theory (Vroom, 1964), it is hypothesized that
with challenge stressors, people would be more motivated, because they are likely to believe that
they possess the resources to cope with the demands, and that the effort put into the situation will
produce desired and personally valuable results. On the other hand, it is hypothesized that
hindrance stressors would be associated with low motivation, because people believe they are
less likely to successfully cope with these demands, so this roadblock prevents them from
evaluating the potential outcomes of the situation because success is viewed as extremely
unlikely. Results from the meta-analysis examining this framework (Lepine et al., 2005), showed
that the relationship between motivation and challenge stressors was significantly positive
(β=.22), and the relationship between motivation and hindrance stressors was significantly
negative (β= -.19). Regarding overall performance, stressors as a whole explained 8% of the
variance in performance, with challenge stressors having a positive relationship (β= .21), and
hindrance stressors having a negative relationship (β= -.27). This framework is applicable to the
proposed study, because it increases the importance of understanding and harnessing “good
stress” to increase performance and motivation. Since eustress is relatively understudied in the
literature, related constructs such as challenge stressors, can be used to deepen our understanding
of eustress and the potential benefits it might provide to those in occupational or educational
realms.

Measurement of Eustress

Since eustress is a relatively understudied concept, measurement, which is the next step
in bringing this concept into more applied research, is an important aspect to analyze. Reliability
and validity are important indicators of a psychometrically sound measure. Reliability refers to
the consistency of a measure and indicates that the timing of assessment should not affect results (American Educational Research Association [AERA], APA, & National Council on Measurement in Education [NCME], 2014). According to the Standards for Educational and Psychological Testing (2014), assessing validity, i.e., support that the measure appropriately assesses its intended construct(s), is foundational for any proposed measurement tool. Validity is established through five essential components: content, response process, internal structure, relationships to other variables, and consequences of testing (AERA, APA, & NCME, 2014). If available, data related to these different aspects of measurement will be reported for the different measures presented below.

**Qualitative approach.** The qualitative approach, which is limited in this literature, has consisted of mainly interviews with specific groups of people who experience high levels of stress (Gibbons et al., 2008; Oksman et al., 2016). For example, Oksman and colleagues (2016) examined eustress in 21 entrepreneurs in Finland through semi-structured interviews to find out how they balanced positive and negative stress. Nine of these participants also wore a heart-rate monitor for a week to capture physiological data. This physiological stress measurement uses heart rate to determine if the body is in recovery mode or stress mode, while considering situational factors. Since this physiological data does not differentiate between positive and negative stress, the semi-structured interviews were used to in conjunction with this data to determine results. The participants were primarily in their thirties and forties and were leaders of small companies. The interviews took approximately two hours. Qualitatively, the participants confirmed the presence of both eustress and distress in situations, such that they were “mixed with both positive and negative emotions, such as excitement, joy, and anxiety” (p. 346), even
when the physiological data showed similar levels of stress across situations. The researchers concluded that the physiological reaction to stress is similar, and that it is the individual’s interpretation of the situation that determines how he or she reacts. The situations that triggered a positive stress experience were a presentation, a challenging negotiation, and preparing for a meeting with a potential client. However, the individuals reported that it was difficult to categorize events as either positive or negative stress experiences, because both emotions were present together frequently. This study illustrates that the concept of eustress cannot be determined by the amount physiological stress experienced, rather it is understood in how an individual interprets the stressor.

**Quantitative approach.** The quantitative approach is the most prevalent in measuring eustress, and has consisted of largely self-report measures (Gibbons et al., 2009, O’Sullivan, 2011, Rodriguez, Kozusnik, & Perio, 2013; Simmons, 2001). Researchers have taken two different approaches in the quantitative measurement of eustress: indirect or direct measurement.

**Indirect measurement of eustress.** In some studies and conceptual frameworks (Nelson & Simmons, 2011; Simmons & Nelson, 2001), eustress was conceptualized and measured in an indirect way as the presence of positive psychology states (Little, Simmons, & Nelson, 2007; Simmons & Nelson, 2001). For example, Nelson and Simmons (2011) proposed that positive psychological states such as hope, positive affect, vigor, meaningfulness, manageability, satisfaction, and commitment are indicators of eustress. The Holistic Stress Model (Nelson & Simmons, 2003) only focuses on the psychological response to stress, so Nelson and Simmons (2011) argue that a positive response to stress, i.e. eustress, is equivalent to positive psychology states, e.g. hope.
Simmons and Nelson (2001) examined eustress and its relationship to perceived health in 158 hospital nurses, a population selected because their line of work is associated with high levels of stress. The researchers defined eustress as “a positive psychological response to a stressor, as indicated by the presence of positive psychological states” (p. 9), specifically positive affect, meaningfulness, and hope. In this cross-sectional study, the independent variables were measured through self-report questionnaires measuring each of these positive states to represent eustress, and negative affect to represent distress. Measures included the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), the meaningfulness subscale of a situational sense of coherence measure (Artinian & Conger, 1997), and the State Hope Scale (Snyder, Sympson, Ybasco, Borders, Babyk, & Higgins, 1996). The dependent variable was perceived physical health, measured by select items from the Health Perceptions Questionnaire (Ware, Davies-Avery, & Donald, 1978). The study found that eustress can be distinguished from distress, and that the positive relationship between hope and perceptions of health ($\beta = .51$) indicated the benefits of eustress. The researchers noted that even with large exposure to stressors, the nurses who dealt with the most extreme cases were the most actively engaged in their work. These findings illustrate that even in populations with high stress levels, people can still view stress positively and manifest positive psychology states. While this study shows how positive responses to stress in the form of hope, meaningfulness, and positive affect led to positive health, eustress was measured indirectly and the three states were not combined into one composite score of eustress. Instead, each positive state was deemed an appropriate proxy of eustress and was examined individually in relation to outcomes.
Little, Simmons, and Nelson (2007) examined eustress and distress in pastors to assess the health of these organizational leaders. The positive psychological state of engagement and the positive behavior of forgiveness were conceptualized as indicators of eustress. Indicators of distress included the negative psychological state of burnout and the negative behavior of revenge. The study sample consisted of 117 male pastors, with the most endorsed age range falling between 45-54 years old (24.1%). Participants completed self-report measures of family-work conflict, negative affect, positive affect, burnout, engagement, revenge behavior, forgiveness behavior, and perception of health. After controlling for family-work conflict, positive affect positively related to health ($r = .47$), and revenge behavior negatively related to health ($r = -.29$). This result adds support to the research that suggests eustress (as defined by eustress proxies) is related to better perceptions of health. However, it is unclear whether positive psychology states are a part of eustress, related to eustress, or by-products of eustress. The indirect measurement of eustress is questionable, since using related constructs requires more interpretation by the researcher and may not accurately capture what eustress uniquely contributes to the relationship. There is not enough research, especially with adolescents, to determine how these positive psychology states are related to eustress.

**Direct measurement of eustress.** Other studies have used a direct measurement of the interpretation of stress (Gibbons, 2009; O’Sullivan, 2011; Rodriguez et al., 2013). To date, there are three direct measurement scales of eustress. Each of the scales is reviewed below, as well as summarized in Table 1.

Gibbons et al. (2009) explored what stressors in nursing students were related to distress and/or eustress, using the Index of Sources of Stress in Nursing Students (ISSN). Many stress
measures only measure distress, but this measure permitted respondents to report and rate a positive or negative stress response. The ISSN consisted of 29 items that reflect common stressors nursing students experienced. Participants rated each stressor twice: on a scale of distress (i.e., if they viewed this stressor as a hassle) and on a scale of eustress (i.e., if they viewed the stressors as an uplift). Both scales were rated on a 0 (no source of stress) to 5 (a major source of stress) Likert scale. Participants included 176 final year nursing students (ages under 21 to 50), at a university in Northern Ireland. Confirmatory factor analysis identified a three-factor model (learning and teaching, placement related, and course organization) with adequate fit for hassle rated stressors $\chi^2 (176, 367)= 728.03; \text{RMSEA} = 0.076$, and uplift rated stressors $\chi^2 (176, 342)= 451.77; \text{RMSEA} = 0.042$. No significance values for the chi-squared test or other fit statistics were reported. Results from this study show that this scale can measure both negative and positive perceptions of stress, and provides an evidence base that both types of stressors can be measured in a population that experiences high levels of stress. However, the items are specifically worded for the nursing population, so this limits the use of this measure in other populations.

Rodriguez, Kozusnik, and Pelro (2013) created the Valencia Eustress-Distress Appraisal Scale (VEDAS) and tested it in a population of public social service workers in Spain. The initial item pool for this self-report measure was drawn from the Pressure Management Indicator (PMI; Williams & Cooper, 1998). A sample of 603 employees, ranging in age from 20-70 years old (80% female), answered 34 items on a 6-point scale. The anchors for distress ranged from 1 (very definitely is NOT a source of pressure) to 6 (very definitely IS a source of pressure), and the eustress anchors ranged from 1 (very definitely is NOT a source of opportunity/challenge) to
6 (very definitely IS a source of opportunity/challenge). Results from the item-item correlations supported the removal of eight items from the scale. The exploratory factor analysis with the remaining 26 items revealed four factors: Relationships, Personal Accountability, Workload, and Home-Work Balance. This four-factor structure accounted for 42% of the variance of eustress, and 48% of the variance for distress. A follow-up study published in the same article examined the validity of the VEDAS compared to other questionnaires, and reliability over a 6-month period. The sample in this study consisted of 431 participants (79% female) returning from the development study, who ranged in age from 21 to 65 years old. Participants completed the VEDAS for the second time 6-months later, as well as questionnaires related to burnout, work engagement, satisfaction, and general psychological health. The VEDAS had good internal consistency reliability (α = .91 for distress, α = .89 for eustress). Confirmatory factor analyses showed that a four-factor model for both eustress and distress had a significantly better fit than a one factor model (4-factor distress model: RMSEA = .067, CFI = .98, SRMR = .059; 1-factor distress model: RMSEA = .10, CFI = .95, SRMR = .08; 4-factor eustress model: RMSEA = .07, CFI = .97, SRMR = .06; 1-factor eustress model: RMSEA = .10, CFI = .92, SRMR = .10). Test-retest reliability of the four different individual factors yielded moderate stability (distress: Relationships r = .45, Personal Accountability r = .50, Workload r = .46, and Home-Work Balance r = .43, p< .01; eustress: Relationships r = .37, Personal Accountability r = .46, Workload r = .39, and Home-Work Balance r = .38, p< .01). With regards to validity, distress correlated positively with burnout (r = .20), and negatively with satisfaction (r = -.26) and general psychological health (r = -.62). Eustress correlated positively with work engagement (r = .15), and negatively with burnout (r = -.12). This study shows that eustress and distress can be measured through a self-
report measure with adequate psychometric properties. While this tool is more generic than the ISSN described above, this scale was designed for adults in an occupational setting, and not youth in an educational setting.

O’Sullivan (2011) posited that the most accurate measure of eustress is one that captures how an individual interprets stressors, and created a direct self-report questionnaire called the Eustress Scale (ES; O’Sullivan, 2011) as displayed in Appendix A. O’Sullivan examined the relationships between eustress, hope, and life satisfaction in college-age students. This section only covers aspects related to the Eustress Scale while the relationships between eustress and other constructs are discussed later. The original scale created by O’Sullivan consisted of 15-items, five of which were filler questions. The other ten items asked questions to determine if a person interpreted an academic stressor as a challenge, and if this interpretation caused them to be more engaged or motivated. Participants response options included: “Never,” “Almost Never,” “Sometimes,” “Often,” “Very Often,” and “Always,” with higher scores indicated higher levels of eustress. The test-retest validation sample consisted of 30 college age students from the larger study sample of 118. Regarding internal consistency of the core 10 items indexing eustress, the two administrations of the measure, which were given within two weeks of each other, produced a Cronbach’s alpha of .766 and .806 respectively, and there were no significant differences found between the first and second administration ($t= -.418, p= .679$). These data indicate that eustress can be measured reliability in a student population. Drawing off the Standards of Educational and Psychology Testing (AERA, APA, & NCME, 2014) components of validity (referenced above), this study investigated the internal structure and relationships to other variables to
advance the validity of this measure in an adolescent population. Further details about this instrument are described in the methods section of Chapter 3.

Table 1

_Eustress Self-Report Measures_

<table>
<thead>
<tr>
<th>Study</th>
<th>Measure</th>
<th>Number of items</th>
<th>Response Scale</th>
<th>Study sample</th>
<th>Cronbach’s alpha coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gibbons et al. (2009)</td>
<td>Index of Sources of Stress in Nursing Students (ISSN)</td>
<td>29</td>
<td>Likert Scale ranging from 0 to 5</td>
<td>Nursing students</td>
<td>N/A</td>
</tr>
<tr>
<td>Rodriguez, Kozusnik, &amp; Pelro (2013)</td>
<td>Valencia Eustress-Distress Appraisal Scale (VEDAS)</td>
<td>34</td>
<td>Likert Scale ranging from 1 to 6 for the distress and eustress scales</td>
<td>Public social service job professionals</td>
<td>Distress: α = .91  Eustress: α = .89</td>
</tr>
<tr>
<td>O’Sullivan (2011)</td>
<td>Eustress Scale (ES)</td>
<td>15 (10 content items, 5 filler items)</td>
<td>Likert Scale ranging from 1 (“Never”) to 6 (“Always”)</td>
<td>College students</td>
<td>α = .766  α = .806</td>
</tr>
</tbody>
</table>

Another important consideration in measurement relates to whether eustress should be measured as a state (i.e., frame of mind related to a specific instance) or a trait (i.e., stable behavior related to engrained characteristics) in individuals. Determining which perspective best describes eustress informs the appropriate instruments for data collection. This debate about whether eustress is a trait or a state is mentioned in an article (Nelson & Simmons, 2011) that is the most comprehensive theoretical review of eustress to date. In their review, Nelson and Simmons advocate that no stable indicators should be used to measure eustress, only the presence of positive psychological states, which are situation specific indicators. However, with
the relationship of positive psychological states, e.g., hope, being an acceptable proxy of eustress, there is precedent for these concepts to be measured as both a state and a trait. Specifically, in the case of hope, Snyder, Lopez, Shorey, Rand, and Feldman (2003) assert that hope can be measured as both a stable personality characteristic (trait), or as a temporary situation specific frame of mind (state). To support this claim, Snyder et al. (2003) cited the work of Curry et al. (1997), where data were combined from both a state measure of hope and a trait measure of hope to analyze the holistic construct of hope related to other measures (Curry et al., 1997). Such findings show that data can be effectively used from either conceptualization, and that a concept like hope, or eustress, does not have to be viewed through a singular lens.

Regarding the transactional model of stress in which each stressor is evaluated based on the demand imposed on the individual, and the individual’s skills to handle the situation, it would seem that each situation could have a unique equation. However, in this cognitive appraisal, the individual is evaluating his or her skill set to handle a specific problem. Likely this skill set has some variability, but there may be many skills that are relatively stable and do not rapidly change. For example, if a student is able to write a two-page journal for history, he or she would also likely apply those same skills in writing a four-page book report in English. While the situation is different, the academic skill set in basic writing, grammar, and organization is likely relatively stable. This would tend to support the view of eustress as taking on the characteristics of a trait. With a stable skill set, and likely a predictable way a person naturally interprets the world, eustress may not be as situation dependent as it may have appeared at first glance.

However, in the overall conceptualization of eustress, data from both types of measurement are valuable in the understanding of this construct.
This study subscribed to a direct measure of eustress, since using related constructs requires more interpretation by the researcher and may not accurately capture what eustress uniquely contributes to the relationship. A modified version of the Eustress Scale (ES; O’Sullivan, 2011) was chosen because of its concise nature and its appropriateness of use with a younger population (i.e., college students vs. adult workers). Eustress was measured as representing a trait, rather than a situation specific state. The Eustress Scale used in this study asked about high school students’ perceptions of feeling motivated by their academic stress during this past school year. While this is a more time limited trait, it asks students to think about their academic stressors as a whole, and then rate their interpretation of their stressor overall, and not in specific situations. In the education setting, for measurement purposes, a detailed state measure may not be feasible. Measuring eustress as a time-limited trait allows for more efficient measurement and provides consistency with the previous use of this measure. Future research should explore this differentiation, since this difference in conceptualization has not been thoroughly explored.

**Constructs Related to Eustress among Adolescents**

Nearly all the studies of eustress have been conducted and examined in occupational settings measuring work performance (Cavanaugh et al., 2000; Oksman et al., 2016; Simmons & Nelson, 2001). These studies have found eustress is associated with better physical and emotional health (Cavanaugh et al., 2000; Simmons & Nelson, 2001). Only a few studies have examined eustress in the realm of education, namely among college students (Gibbons, Dempster, & Moutray, 2008; O’Sullivan, 2011). While there is no current research of eustress in adolescents, the populations studied by Gibbons and colleagues (2008) and O’Sullivan (2011)
are most representative of high school students in advanced coursework, because their studies took place in an educational setting, with a population taking college-level classes associated with high amounts of stress.

Closer to the target population of AP and IB high school students in the proposed study, Gibbons et al. (2008) examined eustress qualitatively in nursing students. They conducted focus groups with 16 nursing students who reported high academic stress levels which manifested in longer hours of study, and therefore a lack of free time. Participants were female students in the United Kingdom ranging in age from 18-42. The focus group yielded information that showed that experiential learning and interacting with patients were associated with eustress, and that social support, especially from peers, moderated the relationship between stressors and a positive outlook. To handle academic demands, utilizing academic tutoring from an instructor who was empathic and gave guidance were associated with eustress. These results have limited generalizability due to the small and largely homogeneous sample.

O’Sullivan’s (2011) study of relationships between eustress, hope, self-efficacy, and life satisfaction in college students is most closely related to the proposed study in terms of population and measurement approach. The sample consisted of 118 students between the ages of 18 and 25. Participants completed the Eustress Scale, as described in a prior section, in addition to the six-item Hope Scale (Snyder, 2000), a modified 10-item self-efficacy scale (Bandura, 2006), and a modified 10-item Satisfaction with Life Scale (Diener et al., 1985). Results included positive correlations between eustress and hope ($r = .30, p < .01$), self-efficacy ($r = .21, p < .05$), and life satisfaction ($r = .33, p < .01$), as well as between hope and self-efficacy ($r = .367, p < .01$). The combination of eustress, hope, and self-efficacy explained 22.1% of the
variance of life satisfaction, which was greater than predicted by eustress alone (11%). In sum, eustress emerged as a key predictor of students’ life satisfaction.

These aforementioned studies encompass relevant populations and measurement styles, and shed light on related constructs. However, there are many things that are as of yet unknown. There is a lack of an established definition of eustress and the populations this construct has been studied in are relatively isolated to one or two settings. Also, there have been very few studies in the realm of education, and no published studies conducted with a sample of adolescents. Since stress is an experience that extends across the lifespan, and can culminate in perfect storm during adolescence due to the changing and heightened demands and physical development, it is important to extend the realm of research to this population so that the unique characteristics of eustress can be understood and applied.

**The Adolescent Development Context and Stressors**

While stress affects many groups of people, the nature and frequency of stressors faced by adolescents in particular create vulnerability. Youths face stressors in the realms of academics, home life, and peer relationships, to name a few (Byrne, Davenport, & Mazanov, 2007). As social media becomes more prevalent, modern adolescents are exposed to even more stressors, with females being more susceptible to stressors than their male counterparts (Byrne, Davenport, & Mazanov, 2007; McNamara, 2000). Much research has been done to document the deleterious effects of stress on academic success and emotional health (Hess & Copeland, 2001; McKnight, Huebner, & Suldo, 2002). The construct of eustress is important to investigate in this age group, in part because of the advantages that can potentially come from viewing a stressor in a positive light. While the research on distress is quite expansive and prevalent, little attention
has been paid to its positive counterpart, eustress. Notably, no studies have looked at eustress in an adolescent population. The types of stressors experienced by adolescents varies in part as a function of their curricular experiences and academic emphasis. Because academic stressors (i.e., stress inherent to school, their primary developmental context) for adolescents can mirror work stressors in adults, it is reasonable to expect that the correlates of eustress in occupational realms might apply to the educational realm for high-achieving high school students. Given correlates identified in prior research with adults, this study proposes to examine associations between eustress and the constructs described next.

Constructs Potentially Associated with Eustress in Adolescents

**Self-efficacy.** The seminal researcher on self-efficacy defines it as follows: “perceived self-efficacy is concerned with people’s beliefs in their capabilities to produce given attainments” (Bandura, 2006, p. 307). Self-efficacy is an especially important factor to study alongside eustress, because it likely contributes to the interpretational response of a stressor. The balance between demand by the stressor and an individual’s resources to handle those demands can become skewed depending on an individual’s belief in their ability to succeed in a particular situation.

In a larger context, Mesurado et al. (2016) looked at the relationship between self-efficacy, eustress, flow, and academic engagement in 347 college students residing in two different countries: the Philippines (N= 176; Age: $M$=17.54, $SD$= 1.32) and Argentina (N= 171; Age: $M$=20.07, $SD$= 1.05). The authors conceptualized that self-efficacy and eustress would each individually contribute to the manifestation of flow and academic engagement, but they also allowed the two variables to co-vary in the tested model. Both measures of self-efficacy and
eustress were drawn from O’ Sullivan’s (2011) work. O’Sullivan’s (2011) self-efficacy scale requires participants to rate their confidence on a scale from zero to six in performing 10 academic tasks (e.g., “Organize my schoolwork”). The 15-item Eustress Scale (O’Sullivan, 2011) was used to quantify the construct of eustress. Results from the tested model in both countries, The Philippines: $\chi^2 (6, 176) = 3.12, p=\text{ns}, \text{CFI}=.99, \text{RMR}=.01, \text{RMSEA}=.01$ and Argentina: $\chi^2 (6, 171) = 7.77, p=\text{ns}, \text{CFI}=.99, \text{RMR}=.02, \text{RMSEA}=.04$, indicated that self-efficacy had a direct relationship with both flow and academic engagement, while eustress only had a direct relationship with flow. The two constructs, self-efficacy and eustress, had a small to moderate correlation in each country (The Philippines: $r=.34, p < .01$; Argentina: $r=.15, p < .05$) but no other analyses were performed with these two factors.

As described earlier, O’Sullivan (2011) found a positive correlation between eustress and self-efficacy ($r=.21, p<.05$) among young adults. The author of this study located no published studies that investigated the relationship among eustress and self-efficacy in younger samples. Prior research has shown a positive relationship between self-efficacy and performance (Risemberg & Zimmerman, 1992; Stajkovic & Luthans, 1998), so it is important to understand the contribution of eustress on academic performance beyond the influence of self-efficacy.

**Flow.** Csikszentmihalyi et al. (2005) defined flow as “a subjective state that people report when they are completely involved in something to the point of forgetting time, fatigue, and everything else but the activity itself” (p.600). A relationship between flow and eustress has been posited by Hargrove et al. (2013) and Mesurado et al. (2016). Flow happens when individuals are appropriately challenged by a situation, and are at their peak performance. High school students who experience flow in relation to academic demands might increase their enjoyment of tasks of
that nature. It is proposed that eustress leads to savoring, which in turn can lead to a flow state. Flow might be thought of as the “ultimate eustress experience- the epitome of eustress” (Hargrove et al., 2013, p. 67).

The study by Mesurado et al. (2016), described in the section above, used the Optimal Experience Scale (Mesurado, 2008) to measure flow. This measure consists of 26 items which assess two aspects of the flow experience: “cognitive and affective experiences [which participants rated on a seven-point Likert scale] and …achievement and ability perceptions [which participants rated on a five-point Likert scale],” (p. 9). The correlation between eustress and flow was small but significant in the Argentinian population (r=.17, p<.05), and in the Philippines population, the correlation fell in the moderate range (r=.39, p<.01). Results from the tested model (described above) indicated that eustress had a direct effect on flow (standardized coefficient for model with Philippines participants= .20, p<.01; standardized coefficient for model with Argentinean participants= .18, p < .01), but a non-significant direct effect on academic engagement. From these data, Mesurado and colleagues (2016) suggest that eustress has a direct effect on flow, and an indirect effect on engagement through flow. Considering the paucity of research relating eustress to predictors and/or facilitators of engagement, it is important to further investigate these relationships in different cultures and populations. This study provided another examination of relationships between these variables, in youth.

**Student engagement.** While flow is a fluctuating mental state that depends on the balance between demand and skill, engagement has been considered a more stable and persistent state of mind (Mesurado et al. 2016). Nelson and Simmons (2011) note that eustressed individuals are engaged, meaning “they are enthusiastically involved in and pleasurably occupied
by the demands of the work at hand” (p.58). While engagement seems to be a related construct to eustress that leads to positive outcomes, such as academic performance (Salanova, Schaufeli, Martinez, & Breso, 2010), the relationship between eustress and engagement is understudied to date. Many of the indicators of eustress put forth by Nelson and Simmons (2011), such as positive affect, meaningfulness, manageability, hope, satisfaction, commitment and vigor, are related to the different aspects of student engagement namely a combination of interest, enjoyment, and concentration (Mesurado et al., 2016). The most widely accepted model of engagement proposes that engagement is multidimensional, and that it consists of behavioral engagement, emotional engagement, and cognitive engagement (Fredericks, Blumenfeld, & Paris, 2004). As indicated in the section above, results from the study done by Mesurado and colleagues (2016), supported the theory that eustress (measured by the Eustress Scale; O’Sullivan, 2011) had an indirect effect on student engagement (measured by the Utrecht Student Engagement Scale; Schaufeli, Martinez, et al., 2002) through flow (measured by the Optimal Experience Scale; Mesurado, 2008). The Utrecht Student Engagement Scale used to measure academic engagement consisted of three subscales, namely vigor, dedication, and absorption, that are meant to capture the underlying constructs of engagement. While the article does not refer to Fredericks and colleagues’ (2004) conceptualization of engagement, sample items from the different constructs (e.g. *I find my studies to be full of meaning and purpose*, *When studying I feel strong and vigorous*) indicate that this measure may tap into the cognitive and affective aspects of engagement, but not the behavioral aspect. Even though a non-significant direct relationship was found between eustress and these selected indicators of academic engagement, eustress had a significant moderate correlation with these three measured
aspects of engagement in the Philippines sample (Vigor: $r=.32$, $p<.01$; Dedication: $r=.33$, $p<.01$; Absorption: $r=.33$, $p<.01$), and a small correlation in the Argentinean sample (Vigor: $r=.15$, $p<.05$; Dedication: $r=.16$, $p<.05$; Absorption: $r=.15$, $p<.05$). The literature is still unclear about the directionality and pathways by which eustress and engagement interact. Further research is needed to explore this relationship in adolescents, using indicators of affective, behavioral, and cognitive engagement.

**Coping.** Nelson and Simmons (2011) contend that the stress response is complex, and that positive and negative responses can be triggered by a stressor. In the Holistic Model of Stress, when distress is experienced a coping strategy is employed by the individual. Resolving the stressor positively, namely with effective coping strategies, may lead to different future appraisal beliefs and positive emotions. McGowan and colleagues (2006) gathered self-report data from 141 public sector employees, ages 18 to 55+, to assess the relationship between stress (eustress vs. distress) and coping (task-focused vs. emotion-focused). The Job Related Affective Wellbeing Scale (JAWS) assessed participants’ emotional response to a stressor, e.g. eustress or distress in the last 30 days, and the Ways of Coping Questionnaire (WCQ; Folkman & Lazarus, 1988) assessed the coping strategies used to handle a previous stressful situation. In this study the specific task-focused coping strategies were “planful problem solving, positive reappraisal, seeking social support and self-controlling,” (p. 95), and specific emotion-focused coping strategies were “confrontive coping, distancing, accepting responsibility, and escape avoidance,” (p. 95). This study employed a similar classification style of coping styles into task-focused and emotion-focused strategies as used by Suldo and colleagues (2015) in a study of AP/IB students. Results from the study supported the hypotheses that task-focused strategies were associated
with eustress \((r=.37, p<.01)\), while emotion-focused strategies were associated with distress \((r=.53, p<.01)\). Correlations between eustress and emotion-focused coping \((r=-.03, p=\text{ns})\), and distress and task-focused coping \((r=.09, p=\text{ns})\), were close to zero and non-significant. Eustress was also associated with a satisfactory outcome (measured by a participants agreement with the statement, “I felt positive about the outcomes of the situation,” \(p=.94\); \(r=.25, p<.05\)), while distress was negatively correlated with one’s satisfaction with an event’s outcome \((r=-.34, p<.05)\). Due to the positive student outcomes associated with coping strategies that directly address the stressor (Suldo, Shaunessy-Dedrick, Ferron, & Dedrick, 2018), instruction in task/problem-focused coping strategies to promote eustress may be a promising avenue to explore in adolescents.

Grit. In the last decade or so, the field of psychology has recognized that when predicting an individual’s ability to succeed in his or her job, or in achieving goals in general, a broader range of factors beyond cognitive ability needs to be considered. Duckworth, Peterson, Matthews, and Kelly (2007) posit that one of those essential factors is grit, which is defined as “perseverance and passion for long-term goals” \(p. 1087\). Having the determination and persistence to continuously pursue a course of action through time and circumstances is an essential internal factor in achievement and success. Since advanced high school curricula and higher education (e.g., college, graduate school) likely require persistence through rigorous coursework, it is important to understand the influence grit has on students. Duckworth and colleagues (2007) developed a self-report measure of grit (12-item Grit Scale), which was used to investigate the relationship between grit and retention in 1,218 freshman cadets at West Point. Results included that those cadets who scored higher on the grit measure (by 1 standard
deviation) were 60% more likely to be enrolled after the summer semester. In a later study of West Point cadets (Kelly, Matthews, & Bartone, 2014), the researchers focused on measuring both hardiness and grit in this population. Hardiness is defined as “a personality dimension linked to continued health and performance,” (p. 330), which has three dimensions: “commitment, challenge, and control” (Nelson & Simmons, 2011, p. 64). While these constructs are measured separately, grit and hardiness share a common thread of an individual characteristic that is essential is pushing one to persist through the difficult circumstances to ultimately achieve their desired goals. In the study by Kelly and colleagues (2014), grit was shown to have a moderate correlation with hardiness ($r=.34, p > .01$). While there have been no studies of grit and eustress in the literature, Nelson and Simmons (2011) hypothesized that hardiness may be related to eustress in the appraisal process of a stressor. Individuals with a high level of hardiness may be more likely to view stressors as challenges, instead of obstacles, which is commiserate with the eustress experience. However, this hypothesis exists only at the theoretical level. Using a proxy of hardiness, namely grit, this study provided initial empirical evidence about the relationship between this individual characteristic and eustress.

**Adolescents in Accelerated Curricula**

High schools are on the rise in offering students the chance to take college-level courses early, such as through Advanced Placement (AP) classes or the International Baccalaureate (IB) program. For example, recent estimates show that 1,777 schools are offering IB programs (IBO, 2018). Students are enrolling in these accelerated curricula in part due to the educational and monetary benefits of taking college level classes in high school. These students are engaged in coursework and service requirements that are above and beyond that of state graduation.
requirements (Suldo, Shaunessy, & Hardesty, 2008). While students in these advanced classes tend to succeed, they report overall higher stress levels than their general education peers (Suldo & Shaunessy-Dedrick, 2013) primarily due to academic stressors (Suldo, Shaunessy, Thalji, Michalowski, & Shaffer, 2009). Due to this fact, a small body of research exists examining the academic functioning and socio-emotional well-being of this population of students. It is important to study eustress in this population because these youths experience heightened levels of stress but have positive outcomes, including academic superiority and levels of mental health (psychopathology and life satisfaction) that are on par with age expectations. Modern definitions have indicated the need for a dual factor model of mental health, which defines mental health not just as the absence of psychopathology, but the presence of well-being (Suldo & Shaffer, 2008). It is important to assess both positive indicators of well-being (life satisfaction) and negative aspects of distress (psychopathology) for a complete picture of mental health in adolescents.

Typical sources of stress that AP/IB students face that are similar to other general high school students include studying for tests, getting good grades, completing homework and managing time; nevertheless, their elevated stress levels can be linked to their rigorous academic demands (Suldo & Shaunessy-Dedrick, 2013b). Suldo and Shaunessy-Dedrick (2013b) gathered self-report measures related to perceived stress levels (Perceived Stress Scale; Cohen, Kamarck, & Mermelstein, 1983), psychopathology (Youth Self-Report; Achenbach & Rescorla, 2001), anxiety (Multidimensional Anxiety Scale for Children; March, Parker, Sullivan, Stallings, & Conners, 1997), and life satisfaction (Student Life Satisfaction Scale; Huebner, 1991) from 134 youth prior to their entry into high school, and then one semester into their chosen academic program (general education or IB program). Results identified differences in student stress levels.
once they began their chosen academic track. Specifically, students in the IB program had a significantly steeper incline in their stress levels compared to their general education peers (IB group slope=.54, General education group slope=.08, $p=.03$). Even though these students in accelerated curricula experienced increased stress, they had similar socioemotional functioning to their general education peers. Could the presence of eustress be a unique contributor to these positive outcomes? Hargrove, Nelson and Cooper (2013) mention four specific kinds of stressors that are associated with eustress: work load, work pace, job responsibility, and job complexity. If the word “job” was replaced with “school” or “academics,” most of these stressors would apply to AP and IB students. It is important to explore if eustress is related to similar positive outcomes in adolescents as it is in adults.

Suldo, Dedrick, Shaunessy-Dedrick, Fefer, and Ferron (2015) explored how youth in accelerated curricula cope with their elevated academic stress. Coping generally targets two different aspects related to the stressor. Problem-focused strategies are used to directly manage the stressor, while emotion-focused strategies are used to mitigate the unpleasant emotions and thoughts associated with the stressor. Suldo and colleagues (2015) developed a measure that identifies coping strategies used by AP/IB youth. While there are an infinite number of coping behaviors, 16 factors emerged as meaningful on the Coping with Academic Demands Scale: “Time and task management, Cognitive reappraisal, Seek academic support, Turn to family, Talk with classmates and friends, Skip school, Social diversions, Athletic diversions, Creative diversions, Technology diversions, Substance use, Reduce effort on school work, Attempt to handle problems alone, Deterioration, Sleep, and Spirituality” (p. 368). AP/IB students commonly coped with stress through the factors reflecting Cognitive Reappraisal and Attempt to
Handle Problems Alone, and rarely coped with stress by Substance Use. Related to positive student outcomes (e.g., high GPA and life satisfaction), students who relied on approach/problem-focused strategies, such as Time and Task Management, and Cognitive Reappraisal, had the best outcomes. The empirical associations between frequency of use of specific coping styles and eustress levels have yet to be examined thoroughly in youth, but is warranted in part due to significant associations between coping and valued outcomes reflective of student success.

**Summary of the Literature**

The concept of eustress has been around for many years but has recently received more attention in the literature. There is not yet an agreed upon universal definition of eustress, and some studies measure eustress directly through quantitative or qualitative means, whereas others capture it through the presence of positive psychological states. Eustress is related to a variety of positive psychological and physiological outcomes among adult samples. Most of this research has been concentrated in the occupational and management setting. Outcomes associated with eustress in youth are anticipated but not yet confirmed. While it is debated whether eustress results from an optimal level or interpretation of stress, this study used the psychological model of stress and took the approach that an individual’s interpretation of the stressor determines whether they react positively or negatively to it. Many constructs such as self-efficacy, hope, meaningfulness, flow, engagement and coping have been seen to correlate with eustress among samples of adults. However, it is unclear how much eustress contributes to outcomes above and beyond these other constructs. There has been no research of eustress in adolescents, even though they experience unique sources and magnitudes of stress. Specifically, AP and IB
students report more stress than their general education peers but excel in their rigorous academic program. This study investigated eustress in AP and IB students, and explored if its relationship with positive outcomes (among adults) holds true in this population. Potential predictors or eustress were also examined to help expand the literature base on characteristics of individuals that correlate with eustress.
CHAPTER III: METHODS

This study involved secondary data analysis of an archival dataset. This dataset arose from an Institute of Education Sciences (IES) grant (R305A100911) awarded to the University of South Florida, via principal investigators Drs. Shannon Suldo and Elizabeth Shaunessy-Dedrick (2010). The purpose of the grant was to examine malleable predictors of success for AP and IB students. The study within the grant that yielded the dataset was a cross-sectional study, and data were collected in March through May of 2012. This is the largest known dataset consisting exclusively of AP and IB students, and the variables collected include a eustress measure as well as other related factors (as reported in Suldo, Shaunessy-Dedrick, Ferron, & Dedrick, 2018). Due to the size and relevance of this dataset, the current researcher performed a secondary analysis of these data. This study employed a correlational design to investigate the research questions. Permission was granted from the principal investigators to access this data for secondary analysis.

Participants

The participants in the dataset consist of 2,379 students who were enrolled in AP classes or in the IB program during 2012. Students were drawn from 20 total programs (10 AP and 10 IB) from five districts in a southeastern state. These five districts were diverse and included urban and suburban settings. The sample was also diverse in regards to socioeconomic status, with 27.7% of students eligible for free or reduced-price lunch, as well as in regards to gender and race/ethnicity. The demographic features of the sample can be found in Table 2.
Table 2

Demographic Characteristics of Participants

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Issues of Diversity

Diversity is an important aspect in regards to generalizability of the study findings. The principal investigators were cognizant of diversity and sought to gather a representative sample. The researchers recruited students from 19 schools in five districts with different classifications (urban, rural, suburban) across a single southeastern state. As seen in Table 2, the sample was fairly evenly distributed between the AP and IB programs, as well as between grade levels. The majority of the sample was female, but this may represent the distribution of gender in this academic population. In regards to race/ethnicity, almost half of the sample was Caucasian, but
the other race/ethnicity categories were represented by at least 10% of the sample in each major group.

**Procedures**

**Data collection.** All procedures for data collection were approved through the appropriate Institutional Review Board (IRB), as well as the school district’s offices of research. Data were only collected from participants who had written parent consent to participate (see Appendix B) and also provided their written assent (Appendix C). Survey packets that contained the measure described below and others of relevance to the larger study were distributed to students to complete in a large auditorium. Following a standard first page that contained a demographics form, the order of the measures in the packet was varied to account for order effects. On the demographics form (see Appendix D), students reported their gender and race/ethnicity, in addition to features of their living arrangement and family educational level. Students spent between 45-60 minutes completing the entire packet. A member of the research team was available to answer questions the participants had, and to check for accidental missing items on the packets. These data were collected between March and May of 2012. Variables such as current grade point average (GPA), end-of-course AP/IB exam scores, and demographic characteristics were provided to the research team through electronic school records in August 2012. All students completed the survey packet one time during the data collection period. More details about the specific measures from the survey packet that were utilized in this study can be found at the end of this chapter in Table 3. Figure 4 provides an overview of the correlates and outcomes potentially associated with eustress this study aimed to explore.
Figure 4. Potential Nomological Network Diagram of Eustress, with Corresponding Measure(s) Indicated in Far-Right Column

Measures: Nomological Network of Eustress

School Attitude Assessment Survey-Revised (SAAS-R; McCoach & Siegle, 2003). This 35-item measure (provided in Appendix E) looks at five factors related to adolescents’ attitude towards school in a variety of domains. The five factors consist of an adolescent’s attitudes towards school (e.g., “I am glad that I go to this school”), attitudes towards teachers (e.g., “My teachers make learning interesting”), goal valuation (e.g., “It is important for me to do well in school”), motivation/self-regulation (e.g., “I can concentrate on my schoolwork”) and academic self-perceptions (e.g., “I am smart in school”). Participants rated these items on a
seven-point Likert scale ranging from “Strongly Disagree” to “Strongly Agree.” The distribution of the number of items for each factor are as follows: five questions measure attitudes towards school, seven questions measure attitudes towards teachers, six questions measure goal valuation, 10 questions measure motivation/self-regulation, and eight questions measure academic self-perceptions. McCoach and Siegle (2003) found a moderate correlation ($r = .30$ to $.65$) between each of the five factors (attitudes towards school, attitudes towards teachers, goal valuation, motivation, and academic self-perceptions), with the exception of the correlation between the goal valuation and motivation factor ($r = .74$). Regarding internal consistency, each factor had an $\alpha \geq .85$. Dedrick, Shaunessy-Dedrick, Suldo, and Ferron (2015) examined the psychometrics of the SAAS-R in high school aged youth (grades 9-12) in accelerated coursework (pre-IB and IB program). The authors found adequate reliability for each of the five scales of this measure for use with this population ($\alpha \geq .80$). The academic self-perceptions subscale was analyzed in this study to index participants’ levels of self-efficacy.

In examining the different aspects of engagement (affective, cognitive, and behavioral) in relation to eustress, affective engagement and cognitive engagement appear most conceptually aligned with eustress. These particular aspects of engagement may influence how an individual interprets a stressor because high scores on these aspects of engagement signal positive feelings about an individual’s environment and strong relationships/support with the people in an individual’s environment. A student may perceive a stressor as more manageable if they are generally satisfied with their school, and have positive relationships with teachers from whom they can ask for help. In this study, the affective and cognitive aspects of engagement were explored in relation to eustress. Reschly and Christenson (2012) purport that affective
engagement is indicated by “belonging/identification with school and school connectedness” (p10), and cognitive engagement is indicated by “self-regulation, relevance of school to future aspirations, and value of learning (goal setting)” (p.10). To this end, the attitudes towards school and the attitudes towards teachers subscales was used to index affective engagement, and the goal valuation and motivation/self-regulation subscales was used to index cognitive engagement.

**Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983).** This six-item measure (provided in Appendix F) is an indicator of global perceived distress, assessing the extent to which a situation is perceived as stressful. The original PSS (Cohen, Kamarck, & Mermelstein, 1983) contained 14-items, which consisted of a mixture of positively-worded items and negatively-worded items. Research investigating this version of the PSS found that negatively-worded items (6 items) made up a distress factor, while the positively-worded items loaded onto a perceived coping factor (Golden-Kreutz, Browne, Frierson, & Anderson, 2004). Due to the fact that distress was the target construct, participants were only asked direct questions related to perceived stress, e.g., *In the last month, how often have you felt nervous and “stressed?”* and *In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?*, which they rated on a 5-point scale ranging from 1 (*Never*) to 5 (*Very Often*). Suldo, Shaunessy, and Hardesty (2008) obtained a Cronbach’s alpha of .91 for the six-item PSS in a population of high-achieving students (enrolled in the IB program).

**Eustress Scale (ES; O’Sullivan, 2011).** This scale was designed to be a direct measurement of eustress. The original Eustress Scale consisted of 15 items, five of which were filler items. Higher scores on the 10 non-filler items indicated higher levels of eustress. O’Sullivan gathered internal consistency and test-retest data on the measure by administering the
eustress measure to the total sample \((N=118)\), and then to a small subset of the sample \((N=30)\) within two weeks of the original administration. The Cronbach’s alpha from the first and second administrations were \(.77\) and \(.81\) respectively, and there were no significant differences found between the first and second administrations \((t=-.418, p=.679)\). Besides the reliability coefficients presented by O’Sullivan (2011), there is no other literature that analyzed the development, factor structure, or validation of this scale.

The Eustress Scale administered to the sample of students in the archival dataset that was analyzed in the current study (see Appendix G) was a modified version of the O’Sullivan (2011) measure. Before the modified eustress measure was included in data collection in 2012, several steps were taken by the research team in consultation with the initial developer of the measure to ensure its usability with adolescents. First, the developer of the measure (O’Sullivan, 2011) gave permission via electronic communication for the eustress measure to be modified for a different target demographic (S. Suldo, personal communication, February 1, 2012). The original eustress measure was used with an older population (college-aged students between the ages of 18-24). Before data collection in 2012, Suldo and colleagues removed the filler questions and then pilot tested the original versions of the remaining 10 items with a convenience sample of 19 high school students (14 in 9th grade, 5 in 12th grade) drawn from AP classes, to determine the acceptability and readability of the 10 content items with a younger population. After filling out the measure, the high school students were interviewed in small groups, and asked about what words or items were unclear or difficult to understand (S. Suldo, personal communication, April 12, 2018). Students had challenges with five of the ten items, for instance not knowing what was meant by “irritating academic hassle” or to “fail” at an academic task. From this pilot work, the
research team decided to only retain the five items that were most easily understood by adolescents, e.g. “In general, how often do you feel motivated by your stress?” This reduction of items falls in line with the current interest in the measurement field to have shorter self-report scales for youth. To ensure readability, the shortened five-item measure was administered to another sample of 38 sophomores in an IB program. No concerns were expressed by participants in that sample. In sum, as reported by Suldo and colleagues (2018), a total of 57 AP and IB students in grades 9, 10 and 12 took part in pilot work on the Eustress Scale before the resulting 5-item version was administered during data collection for the primary study. That pilot sample of students was not a part of the primary study sample that was examined in the current study.

**Coping with Academic Demands Scale** (CADS; Suldo, Dedrick, Shaunessy-Dedrick, Fefer, & Ferron, 2015). The CADS (see Appendix H) was designed to assess the ways that AP and IB students in particular cope with academic stressors/demands. The CADS consists of 58-items that measure 16 different coping styles. Participants respond to each item on a five-point scale, indicating if they engage in this coping behavior “1=Never” to “5=Almost Always,” with each factor of coping consisting of a range from three and six individual items. The 16 coping styles, sample items from each CADS factor, and internal consistency reliability for each factor are as follows: Time and Task Management (e.g., Prioritize the order in which you complete work, α=.77), Cognitive Reappraisal (e.g., Adopt an optimistic or positive attitude, α=.74), Seek Academic Support (e.g., Get extra help for class from tutors, α=.55), Turn to Family (e.g., Spend time with family, α=.79), Talk with Classmates and Friends (e.g., Talk to classmates friends in your school program) about what’s bothering you, α=.75), Spirituality (e.g., Rely on your faith to help deal with the problem, α=.90), Social Diversions (e.g., Have fun with other
people to get your mind off the problem, $\alpha = .68$), Athletic Diversions (e.g., *Play team sports* (basketball, soccer, football, etc., $\alpha = .73$), Creative Diversions (e.g., *Write creatively* (poetry, lyrics, etc.), $\alpha = .62$), Technology Diversions (e.g., *Surf the internet* (YouTube, news websites, etc.), $\alpha = .53$), Substance Use (e.g., *Smoke cigarettes or use other tobacco products*, $\alpha = .71$), Reduce Effort on Schoolwork (e.g., *Stop caring about schoolwork*, $\alpha = .79$), Attempt to Handle Problems Alone (e.g., *Keep problems to yourself*, $\alpha = .61$), Deterioration (e.g., *Panic or “freak out” about the problem without trying to fix it*, $\alpha = .79$), Sleep (e.g., *Take naps*, $\alpha = .75$), and Skip School (e.g., *Take a day off from school to get work done*, $\alpha = .86$). Psychometric properties, including internal consistency (for 11 of 16 factors $\alpha \geq .70$) and test-retest reliability (coefficients ranged from .71 to .93), were acceptable for the majority of the 16 factors. Those factors that had an internal consistency coefficient below .70 were made up of the least number of items (e.g., only three items). In the current study, two most representative types of task-focused coping strategies (Time and Task Management, Cognitive Reappraisal), and two most representative types of emotion-focused coping strategies (Talk with Classmates and Friends, Deterioration) were examined in data analysis.

**Short Dispositional Flow Scale-2 (SDFS-2; Jackson, Martin, & Eklund, 2008).** This scale is used to measure the concept of dispositional (general approximation of a holistic experience) flow. The short dispositional flow scale is a nine-item measure that captures each of the nine dimensions of flow. Respondents rate each item on a five-point scale, with responses ranging from “Never” to “Always.” Analysis on the psychometric properties of the SDFS-2 (Jackson, Martin, & Eklund, 2008) revealed acceptable model fit, CFA: $\chi^2$ (27, $N = 692$) = 66.89, $p$=not reported, CFI=.99, RMSEA=.05, SRMR=.03, and acceptable Cronbach’s alpha at two
different administrations, .81 and .74. While Jackson and colleagues’ (2008) research was done with young adults (\(M=26\) years old, \(SD=10.55\)), Martin, Tipler, Marsh, Richards, and Williams (2006) explored the use of this measure with high school students. These authors found an acceptable reliability coefficient (\(\alpha=.82\)), lending support for the use of this measure with the current sample of AP and IB youth. The SDFS-2 is not included in the Appendix due to copyright restrictions.

**Short Grit Scale** (Duckworth & Quinn, 2009). This measure (see Appendix I) is used to quantify grit, which is conceptualized as an individual’s persistence and dedication towards long-term goals. This eight-item measure retains the two-factor structure (consistency of interest and perseverance of effort) of the original longer (12-item) grit measure. Respondents answered items such as, “*I often set a goal but later chose to pursue a different one,*” and “*I am a hard worker,*” on a 5-point scale ranging from “*Very much like me,*” to “*Not like me at all.*” In four different samples of participants ranging from high-school aged students to college-aged students the internal consistency for the short grit scale was above .70 for all groups (ranged from .73 to .83).

**Measures: Outcomes**

**Student’s Life Satisfaction Scale** (*SLSS*; Huebner, 1991). This 7-item questionnaire (see Appendix J) assesses global life satisfaction with a mixture of direct and reverse-scored items (e.g., “*My life is just right,*” and “*I wish I had a different kind of life*”) in children ages 8 – 18. Participants mark which agreement response on the six-point Likert scale, ranging from “*Strongly disagree*” to “*Strongly agree*” best describes them. Higher scores on this measure indicate higher life satisfaction. Through initial psychometric validation of this scale (Huebner,
1991), and additional research of its application in high school youth (Gilman & Huebner, 1997; Suldo & Huebner, 2006), this scale has demonstrated good internal consistency with estimates ranging from $\alpha = .82$ to .86.

Behavioral and Emotional Screening System (BESS; Kamphaus & Reynolds, 2007). This measure was used to assess psychopathology, specifically symptoms of internalizing problems, inattention/hyperactivity, social problems, and school problems. There are three different versions of the BESS, a student, teacher, and parent report. Due to the age of the population (adolescents) and consistency with other rating scales, the student self-report measure was administered in the primary study. For the student report measure, participants rate 30 items on a 1 (Never) to a 4 (Almost Always) scale. Their responses are combined into a total score that assess their total level of emotional and behavioral distress; resulting $T$-scores can be categorized as normal, elevated, or extremely elevated. The BESS is regarded as a universal screening instrument that was derived from the items on the larger Behavior Assessment System for Children (BASC). Kamphaus and Reynolds (2007) reported a test-retest reliability coefficient for the student BESS of .80. Renshaw, Eklund, Dowdy, Jimerson, Hart, Earhart, and Jones (2009) supported the validity of the BESS through significant correlations with students identified at academic/emotional risk based on other indicators, e.g., report card. While most of the studies of this measure have been done with elementary age students, the measure is designed to be a screening instrument for students from elementary to high school aged. The BESS is not included in the Appendix due to copyright restrictions.

School Burnout Inventory (SBI; Salmela-Aro, Kiuru, Leskinen, & Nurmi, 2009). This 10-item measure (see Appendix K) was used to assess school burnout in the larger study.
Respondents rated each item, e.g., *I feel overwhelmed by my schoolwork, I feel that I am losing interest in my schoolwork*, on a six-point Likert scale, with response options ranging from 1 (*Completely disagree*) to 6 (*Strongly agree*). In a sample of 1,418 high school and vocational school students (Mean age= 16.47, *SD*=1.73), the SBI was found to have three dimensions: (1) exhaustion at school, (2) critical toward the meaning of school, and (3) a sense of failure at school. Confirmatory factor analysis supported the conceptualization and measurement of a three factor model \( \chi^2 (24, N=1344) = 108.91, p < .001, \text{RMSEA} = .05, \text{CFI} = .98, \text{SRMR} = .03 \). For the three-factor model that fit the data best, the authors also found adequate factor score reliability coefficients for each factor: exhaustion (\( \alpha= .84 \)), cynicism (\( \alpha=.89 \)), and inadequacy (\( \alpha=.91 \)). Concurrent validity was also assessed, and school burnout significantly correlated with depression (correlations ranging from .50 to .59, \( p<.001, \) for the three factors), and lower levels of academic achievement (correlations ranging from -.11 to .13, \( p<.01, \) for the three factors), and school engagement (correlations ranging from -.36 to .57, \( p<.001, \) for the three factors).

**Academic outcomes**

**Grade Point Average (GPA).** Researchers from the primary study quantified students’ academic achievement through their unweighted GPA earned during the semester of collection of student self-report data (Spring 2012). School administrators provided the researchers with electronic records for each student consisting of the title of the courses taken that semester and the letter grade the student received in that class. The research team used these data to calculate a student’s unweighted GPA for the spring semester. For the calculation of the unweighted GPA, the standard point system used by the public schools that these data were collected from was utilized (A= 4 points, B= 3 points, C= 2 points, D= 1 point, F= 0 points). Additional weightings
for other factors, e.g., honors or AP classes, were not considered so that all students GPA fell within a 0 to 4.0 range.

Table 3

*Measures Selected from Primary Data Set*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Construct</th>
<th>Number of items</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographic Form</strong></td>
<td>Gender, Race/Ethnicity/Grade Level/Program</td>
<td>Data gathered from self-report measure and school record</td>
<td>Gender: M (Male) or F (Female)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Race/Ethnicity: A. White B. Black or African American C. Hispanic D. American Indian or Alaska Native E. Asian F. Native Hawaiian and Other Pacific Islander G. Other</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Grade Level: 9th, 10th, 11th, or 12th</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Program: AP or IB</td>
</tr>
<tr>
<td><strong>SAAS-R: Academic Self-Perceptions subscale</strong></td>
<td>Academic Self-Efficacy</td>
<td>Seven (7)</td>
<td>1 (Strongly Disagree) to 7 (Strongly Agree)</td>
</tr>
<tr>
<td><strong>SAAS-R:</strong></td>
<td>Affective Engagement</td>
<td>- Five (5)</td>
<td>1 (Strongly Disagree) to 7 (Strongly Agree)</td>
</tr>
<tr>
<td>- Attitudes Towards School</td>
<td>- Seven (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Attitudes Towards Teachers Subscale</td>
<td>Cognitive Engagement</td>
<td>- Six (6)</td>
<td>1 (Strongly Disagree) to 7 (Strongly Agree)</td>
</tr>
<tr>
<td><strong>SAAS-R:</strong></td>
<td>- Motivation/ Self-Regulation Subscale</td>
<td>- Ten (10)</td>
<td></td>
</tr>
<tr>
<td>- Goal Valuation</td>
<td>Global Perceived Distress</td>
<td>Six (6)</td>
<td>1 (Never) to 5 (Very Often)</td>
</tr>
<tr>
<td>Measure</td>
<td>Construct Description</td>
<td>Number of Items</td>
<td>Response Options</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>------------------------------------------------</td>
<td>-----------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Eustress Scale (ES)</td>
<td>Eustress</td>
<td>Five (5)</td>
<td>1 (Never) to 6 (Always)</td>
</tr>
<tr>
<td>CADS: Time and Task Management</td>
<td>Coping Styles (Task Focused)</td>
<td>Six (6)</td>
<td>1 (Never) to 6 (Almost Always)</td>
</tr>
<tr>
<td>CADS: Cognitive Reappraisal</td>
<td>Coping Styles (Task-Focused)</td>
<td>Four (4)</td>
<td>1 (Never) to 5 (Almost Always)</td>
</tr>
<tr>
<td>CADS: Talk with Classmates and Friends</td>
<td>Coping Styles (Emotion-Focused)</td>
<td>Three (3)</td>
<td>1 (Never) to 5 (Almost Always)</td>
</tr>
<tr>
<td>CADS: Deterioration</td>
<td>Coping Styles (Emotion-Focused)</td>
<td>Six (6)</td>
<td>1 (Never) to 5 (Almost Always)</td>
</tr>
<tr>
<td>S-DFS2</td>
<td>Flow</td>
<td>Nine (9)</td>
<td>1 (Never) to 5 (Always)</td>
</tr>
<tr>
<td>Short Grit Scale</td>
<td>Grit</td>
<td>Eight (8)</td>
<td>1 (Not Like Me At All) to 5 (Very Much Like Me)</td>
</tr>
<tr>
<td>SLSS</td>
<td>Life Satisfaction</td>
<td>Seven (7)</td>
<td>1 (Strongly Disagree) to 6 (Strongly Agree)</td>
</tr>
<tr>
<td>BESS</td>
<td>Psycho-pathology</td>
<td>Thirty (30)</td>
<td>1 (Never) to 4 (Almost Always)</td>
</tr>
<tr>
<td>SBI</td>
<td>Academic Burnout</td>
<td>Nine (9)</td>
<td>1 (Completely Disagree) to 6 (Completely Agree)</td>
</tr>
<tr>
<td>GPA</td>
<td>Academic Performance</td>
<td>Electronic records used to calculate unweighted GPA</td>
<td>A= 4 points, B= 3 points, C= 2 points, D= 1 point, F= 0 points</td>
</tr>
</tbody>
</table>
Ethical Concerns

Data used in this study were collected in accordance with approved IRB produces regarding ethical considerations. All students obtained written parent permission and provided written assent for their data to be collected. The archival database contains de-identified data, and this study did not use any personal identifying information. Since this is secondary analysis, this study had no contact with the original participants. The main purpose of this study was aligned with investigating stress, namely eustress, and this aim fit within the original study aims to explore stress and coping in AP and IB students. Therefore, using the data for a secondary analysis is within the scope of to what the participants originally consented.

Data Analysis

Permission was obtained from the principal investigators for secondary analysis to be conducted. The measures specific to this study, described in Table 3, were extracted from this larger data set and put into a secondary data file. This secondary data file was used to conduct all analyses. The unit of analysis for this study was the individual student level. Due to the fact the students were nested within programs, analyses took into account the nesting of data using the Type=Complex within Mplus. In consultation with the committee, the specific analyses that were run were decided a priori. Visual analysis and descriptive statistics were utilized first to assess any inconsistencies in the data prior to analysis.

Research Question 1:

What are the psychometric properties of the Eustress Scale in students in accelerated curricula, with regard to the factor structure and internal consistency reliability?
Composite reliability was used to determine the reliability of the five-item measure in the sample. This measure was only administered at one-time point, so test-retest analysis cannot be performed. Since no studies have performed factor analysis on this measure, a confirmatory factor analysis (CFA) was conducted to determine if all five items load onto a single factor. For this research question, the statistical software Mplus, using the complex option, was utilized to take into account the nested data. The CFA was performed in the total sample of AP/IB students, as well as in different subpopulations, namely gender, grade, and program. Since this research question conceptualizes eustress as a latent variable with five measured individual variables, in accordance with sound methodical practice, latent variables and measured variables were kept consistent throughout each research question. Distinguishing between measured variables, e.g., items on a self-report scale, and latent variables, e.g., the larger factor they aim to index or represent, accounts for the measurement error that exists within data collection. This factor analytic view of eustress was used throughout the analyses of this study, as well as with all other factors of interest, e.g., self-efficacy, grit.

Research Question 2: To what extent, if any, does eustress differ in students in accelerated curricula by gender, by grade level (9th-12th), and by program (AP or IB)?

In research question one, the factor structure of the eustress measure in these different populations was assessed using CFA in Mplus Version 8. A variety of model fit indices were presented for each group. For analysis regarding the differences in eustress among the variables of interest, i.e., gender, grade level, and program, a multiple regression with latent variables was run using Mplus Version 8. A single model with all the variables was run so that all for each factor, e.g., grade, the other factors were controlled, e.g., gender, program. The significance
levels associated with the regression coefficient signal whether there are significant differences between groups.

**Research Question 3:** *What is the nomological network of eustress in students in accelerated curricula and its concurrent associations with distress, student engagement, coping strategies, self-efficacy, flow, and grit?*

First, descriptive statistics for each construct were assessed and analyzed before further analyses were performed. Second, model fit indices for each construct with eustress were calculated. To examine the bivariate associations between all variables of interest, particularly eustress in relation to the other constructs, correlations were computed. Correlation of constructs using a latent variable framework was performed using Mplus Version 8 using the complex option to take into account the nested data structure.

**Research Question 4:** *To what extent, if any, is eustress in students in accelerated curricula related to academic performance and/or emotional well-being?*

Similar to question three, descriptive statistics for each construct were assessed for normality before further analyses were performed. Academic success was represented by a student’s unweighted GPA. Emotional success was represented by three indicators, namely life satisfaction, academic burnout and psychopathology. To be consistent with demographic variables of interest, program, gender, and grade were incorporated as predictor variables in each model. Individual models, with eustress, program, gender, and grade as the predictor variables and each indicator of academic performance (GPA) and emotional success (life satisfaction, burnout psychopathology) as the continuous dependent variable were analyzed. A multiple regression with latent variables was run using Mplus Version 8. After the original model was run...
with all the predictors, another model was run with only the demographic predictor variables to explore the amount of variance explained by the demographic variables compared to the variance explained when eustress is an additional predictor. Each academic and emotional indicator was analyzed separately so that important differences were not masked by combining variables.
CHAPTER IV: RESULTS

This chapter presents the results of statistical analyses used to answer the study’s four research questions. First, data screening, such as data entry and missing data is discussed, then, the analyses and results for the four research questions are presented sequentially.

Data Screening

Data entry. Data from the research study were entered and verified using a systematic process. First, once survey packets were completed by students, graduate research assistants used a software program, Remark, to scan in survey packets. The Remark software automatically alerts the user to abnormalities in every survey packet, e.g. missing items, two responses marked for one question. After this stage of scanning and screening, the data were input into SPSS, where it went through another process of data screening lead by the statistical consultant, a Ph.D. level measurement professor, working on the grant. To ensure accuracy of the data, 10% of the packets were verified by a different research assistant from original entry. If errors were detected in data entry, research assistants corrected the errors in both the database and the surveys, and the packets before and after the corrected survey were also checked for accuracy. This process was repeated until there were no errors discovered in the checked packets. Overall, the researchers took care to systematically enter and screen the data for accuracy.

Missing data. There were low rates of missing data on the student self-report measures. During data collection, research assistants checked each students packet for any missing items and offered them a chance to respond to any items that were not skipped intentionally. Data that
were collected from school records ranged in their amount of missing data, due to researchers limited access to these systems.

**Psychometric Properties of the Eustress Scale**

To answer research question one, which aimed to explore the psychometric properties of the modified Eustress Scale in AP/IB students, descriptive statistics, factor structure, and reliability of this measure were investigated. Descriptive statistics were analyzed before a factor analysis was performed. Since this study was analyzing the eustress measure in a new population, the factor structure of the five-item eustress measure was assessed with the total sample, as well as with different subgroups namely gender, grade, and program. Last, the reliability of the Eustress Scale was calculated using composite reliability.

**Descriptive statistics.** Descriptive statistics, including the number of responses for each item (N), mean (M), standard deviation (SD), skewness, kurtosis, and the distribution of responses for each of the five items on the eustress measure are presented in Table 4.
### Descriptive Statistics for Eustress Items

<table>
<thead>
<tr>
<th>Eustress&lt;sup&gt;a&lt;/sup&gt; (α = .85)</th>
<th>Item Text</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Skew</th>
<th>Kurtosis</th>
<th>Distribution of Item Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How often do you feel that stress positively contributes to your ability to handle your academic problems?</td>
<td>2379</td>
<td>3.20</td>
<td>1.36</td>
<td>0.22</td>
<td>-0.62</td>
<td>12&lt;sup&gt;b&lt;/sup&gt; 19 32 19 13 6</td>
</tr>
<tr>
<td>2</td>
<td>In general, how often do you feel motivated by your stress?</td>
<td>2377</td>
<td>3.04</td>
<td>1.26</td>
<td>0.31</td>
<td>-0.38</td>
<td>11 23 32 20 9 4</td>
</tr>
<tr>
<td>3</td>
<td>When faced with academic stress, how often do you find that the pressure makes you more productive?</td>
<td>2377</td>
<td>3.22</td>
<td>1.32</td>
<td>0.18</td>
<td>-0.61</td>
<td>10 20 31 21 13 5</td>
</tr>
<tr>
<td>4</td>
<td>How often do you feel that you perform better on an assignment when under academic pressure?</td>
<td>2378</td>
<td>3.21</td>
<td>1.35</td>
<td>0.23</td>
<td>-0.58</td>
<td>11 19 31 20 12 6</td>
</tr>
<tr>
<td>5</td>
<td>How often do you feel that stress for an exam has a positive effect on the results of your exam?</td>
<td>2379</td>
<td>2.75</td>
<td>1.31</td>
<td>0.53</td>
<td>-0.31</td>
<td>19 27 28 15 7 4</td>
</tr>
</tbody>
</table>

*Note.* <sup>a</sup> All items on the Eustress measure have item responses between 1 and 6. <sup>b</sup> All values in this section are percentages that have been rounded to the nearest whole number.

The distribution of the items on the Eustress Scale are consistent with the means for each item. All eustress items, except for item 5, had a mean that fell within the “Sometimes” response category on the Eustress Scale, and similar standard deviations, ranging from 1.26-1.36. The eustress items also had an approximately normal distribution (skewness and kurtosis considered relatively normal between -2.0 and +2.0; George & Mallery, 2010). The negative kurtosis values,
while within the normal range, implied a slightly flatter distribution as compared to a normal distribution.

**Factor structure.** To investigate the factor structure of the eustress measure, a confirmatory factor analysis was conducted using the statistical software *Mplus* Version 8. The *Mplus* software was selected for this analysis so that the nested survey data were handled appropriately and that standard error measurements were adjusted for nested data. Based on previous research (O’Sullivan, 2011), the model tested hypothesized that all five measured items would converge onto one latent factor: Eustress.

**Total sample.** Using the total sample of 2379 AP/IB participants, a confirmatory factor analysis was performed. The diagram representing the standardized factor loadings and standard errors is presented in Figure 5. Figure 5 shows the five items from the eustress scale (es1, es2, etc.) termed measured variables, and how they each relate to the latent variable, eustress. In factor analysis, measured variables are represented by squares and latent variables are represented by circles. All subsequent diagrams in the appendices have the same structure and notation of measured variables and latent variables.
All standardized factor loadings ranged between 0.59-0.89, which are deemed acceptable factor loadings (>0.40). This indicates that for the total sample, all items are appropriate for measuring eustress, and that no items should be deleted from this measure. The standard errors ranged in value from 0.01 to 0.02.

For model fit indices, four common fit indices were examined: chi-squared ($\chi^2$), Standardized Root Mean-Square Residual (SRMR), Root Mean Square Error of Approximation (RMSEA), and the Comparative Fit Index (CFI). These indices were chosen for interpretation because they represent different aspects of model fit. The chi-squared model fit was significant, $\chi^2 (5, N = 2379) = 299.13, p < .05$. A significant chi-squared is an indication that the hypothesized model is not correct, but this test should be interpreted with caution because it is
heavily influenced by sample size. The SRMR was 0.04, which represents adequate fit (<.08; Hu & Bentler, 1998). The RMSEA value was 0.16, which indicate questionable fit (MaCallum, Browne, & Sugawara, 1996). Research shows that this statistic does not fare well with a factor made up of a small number of items (Kenny, Kaniskan, & McCoach, 2014), so this fit index should be interpreted with caution. Last, the CFI was 0.94 which borders on adequate fit (> .95; Hu & Bentler, 1998). Table 5 presents the confirmatory factor fit indices for the total sample, as well as the subgroups, which are discussed below.
Table 5

Model Fit Indices for Eustress Measure

<table>
<thead>
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<th>N</th>
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<th>RMSEA$^b$</th>
<th>CFI$^c$</th>
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Note. All chi-squared ($\chi^2$) tests had 5 degrees of freedom. $^a$ For the SRMR, smaller values indicate better fit, with value less than .08 representing adequate fit. $^b$ For the RMSEA, smaller values indicate better fit, with values <.05 representing close fit, values <.08 representing reasonable fit, and values >.10 representing questionable fit. $^c$ For the CFI, higher numbers indicate better fit, with values >.95 representing adequate fit.

**Gender.** The five-item eustress factor structure was tested to explore the model fit for males and females. Table 5 presents the confirmatory factor fit indices for both males and females. There was a large difference in sample size between the two groups (579 more females than males), but each group had a sample size adequate for analysis. A diagram representing the CFA for eustress by gender is presented in Appendix L. For the overall gender fit indices, the chi-squared index was significant in both groups, the SRMR ranged between 0.04 – 0.05 ($M=0.045$),
the RMSEA was consistent (0.17), and the CFI ranged between 0.90 - 0.93 ($M= 0.915$). Specific fit indices for each group are presented below.

For the model fit indices for males, the chi-squared model fit was significant, $\chi^2 (5, N = 900) = 127.93, p < .05$. The SRMR was 0.04, which is the same as the SRMR value for the total sample. The RMSEA value was 0.17, similar to the value found for the total sample. Last, the CFI was 0.93 which borders on adequate fit and is only slightly lower than the value found for the total sample.

For females, the chi-squared model fit was significant, $\chi^2 (5, N = 1479) = 207.57, p < .05$. The SRMR was 0.05, which is slightly higher than the SRMR values for the total sample and for males. The RMSEA value was 0.17, which mirrors the value found for males, but is .01 higher than the total sample. Last, the CFI was 0.90 which is .04 and .03 lower than the values found for both the total sample and males, respectively.

**Grade.** This study also explored the five-item eustress factor structure for each high-school grade level, namely 9th, 10th, 11th, and 12th. Table 4 above presents the confirmatory factor fit indices for all grade levels. There was a fairly even distribution of students for each grade level, with 10th grade having the largest sample ($N= 644$) and 12th grade having the smallest sample ($N=538$). A diagram representing the CFA for eustress by grade is presented in Appendix M. For the overall grade fit indices, the chi squared index was significant in all four groups, the SRMR ranged between 0.04 – 0.05 ($M=0.048$), the RMSEA ranged between 0.14 – 0.20 ($M=0.16$), and the CFI ranged between 0.84 - 0.95 ($M= 0.92$). Specific fit indices for each group are presented below.
Regarding the model fit indices for 9th graders, the chi-squared model fit was significant, $\chi^2 (5, N= 604) = 82.22, p < .05$. The SRMR was 0.05, which is slightly higher than the SRMR value for the total sample. The RMSEA value was 0.16, which is similar to the value found for the total sample. Last, the CFI was 0.94 which is slightly higher than the value found for the total sample.

For the indices for 10th grade students, the chi-squared model fit was significant, $\chi^2 (5, N= 644) = 136.82, p < .05$. The SRMR was 0.05, which is slightly higher than the SRMR values for the total sample but the same as the value for 9th graders. The RMSEA value was 0.20, which is .03 higher than value for the total sample. Last, the CFI was 0.84 which is lower than the values found for both the total sample and 9th graders.

Regarding the model fit indices for 11th grade students, the chi-squared model fit was significant, $\chi^2 (5, N= 593) = 59.92, p < .05$. The SRMR was 0.04, which is similar to the value for the SRMR for the total sample and is lower than the values for 9th and 10th graders. The RMSEA value was 0.14, which is lower than value for the total sample, 9th and 10th graders. Last, the CFI was 0.95 which represent adequate fit, and is slightly higher than the value for the total sample.

Last, regarding the model fit indices for 12th grade students, the chi-squared model fit was significant, $\chi^2 (5, N= 538) = 57.53, p < .05$. The SRMR was 0.05, which is similar to the SRMR for 9th and 10th graders. The RMSEA value was 0.14, which is similar to the RMSEA value for 11th graders, and lower than the value for the total sample, 9th and 10th graders. Last, the CFI was 0.93 which is slightly lower than the value for the total sample.
Program. The five-item eustress factor structure was also explored for students who were in AP classes vs. IB programs. Table 5 above presents the confirmatory factor fit indices for both programs, AP and IB. There was a large sample size for each program type, with IB having slightly more participants (N=1229) than AP (N=1150). A diagram representing the CFA for eustress by program is presented in Appendix N. For the overall program fit indices, the chi-squared index was significant in both groups, the SRMR ranged between 0.04 – 0.05 (M=0.045), the RMSEA ranged between 0.14 – 0.22 (M= 0.18), and the CFI ranged between 0.87 – 0.97 (M= 0.92). Specific fit indices for each group are described below.

For the model fit indices for students in AP, the chi-squared model fit was significant, $\chi^2(5, N= 1150) = 274.46, p < .05$. The SRMR was 0.05, which is slightly higher than the SRMR value for the total sample, but still represents adequate fit. The RMSEA value was 0.22, which is .06 higher than the value found for the total sample. Last, the CFI was 0.87, which is .07 lower than the value found for the total sample.

Regarding students in IB, the chi-squared model fit was significant, $\chi^2(5, N= 1229) = 116.32, p < .05$. The SRMR was 0.04, same as the SRMR values for the total sample and slightly lower than the value for AP students. The RMSEA value was 0.14, which is lower than the total sample and for AP students. Last, the CFI was 0.97 which represents adequate fit and is .10 higher than the value found for the total sample and AP students.

Overall, taking into account all the fit indices, the factor structure of the eustress measure is considered adequate. There were certain groups for whom the factor structure fit was slightly worse, such as 10th graders, and AP students, and groups for whom the factor structure fit slightly better, such as 11th grade students and IB students. Since there was relatively low
variation in the factor structure of the eustress measure for the different subgroups, the total sample seems to be a representative structure that was used in the other research questions this study explored.

**Reliability.** To assess the internal consistency of the eustress measure, composite reliability was considered to be most appropriate approach. Cronbach’s alpha is the most commonly used statistic for this construct (and was also calculated for this measure), but it assumes equal factor loadings for each item. Since that assumption was not most representative of the eustress measure, composite reliability was calculated which takes into account the varying factor loading of each item. The value for composite reliability was .85, which is the same as the Cronbach’s alpha value for this measure.

Overall, the modified eustress measure seems to be a psychometrically sound measure and is acceptable to be used in further statistical analyses.

**Eustress by Gender, Grade, and Program**

To answer research question two, this study explored the eustress measure in the AP/IB population in regards to gender, grade, and program. The differences in sample size between the different groups are discussed above. For analysis, a multiple regression with a latent variable for eustress was run using Mplus Version 8 (the predictor variables of gender, grade, and program were added to the latent variable model that included the five items measuring eustress). A single model was run with all three variables, so results show the effects of one variable while controlling for the other two variables. Gender (0=Male, 1=Female) and program (0=AP, 1=IB) were coded as dummy variables; grade was coded 9, 10, 11, 12. Unstandardized coefficients were reported for this model which is common to use when examining different groups, however
the significance value remains the same for both standardized and unstandardized models. For gender, the coefficient from the model was -0.02 (SE=0.04), but it was nonsignificant ($p=.58$). For grade, the coefficient was 0.079 (SE=0.02), and significant ($p < .05$). This indicates that students in higher grades are expected to have significantly higher eustress than those in lower grades. Last, for program, the coefficient was 0.052 (SE=0.05), but it was non-significant ($p=0.33$). In sum, of the demographic variables, there was only a significant difference in eustress by grade level. However, it should be noted that these three predictors, gender, grade, and program, only explain 1.3% of the variance in eustress ($R^2= 0.013$, $p < .05$).

**Correlates of Eustress**

For research question three, this study explored the nomological network of eustress and its concurrent associations with distress, student engagement, coping strategies, self-efficacy, flow and grit. First, descriptive statistics for each construct measures a presented below (descriptive statistics for eustress are presented above). In accordance with the same conceptualization of eustress, each construct consisted of its measured variables, and the overall factor of interest was considered a latent variable. Second, the model fit indices for the model of eustress and distress is presented. Third, correlations of constructs using a latent variable framework in Mplus Version 8 are also presented below.

**Distress.** Descriptive statistics, including sample size ($N$), mean ($M$), standard deviation ($SD$), skewness, and kurtosis for the individual items from the Perceived Stress Scale, which measures distress, are presented in Table 6. The PSS items had an approximately normal distribution (skewness and kurtosis between -2.0 and +2.0). The negative skewness and kurtosis values, while within the normal range, indicate data that are slightly skewed left in a flatter
distribution as compared to a normal distribution. The Cronbach’s alpha value (.85) indicates
good internal consistency of items within the measure.

Table 6

*Descriptive Statistics for Distress*

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<th>Latent Variable</th>
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<th>Measured Variable</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Skew</th>
<th>Kurtosis</th>
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</table>

*Note.* Items on the PSS range from 1 to 5.

Regarding fit indices, the chi-squared model fit was significant, $\chi^2 (34, N= 2379) = 579.02, p < .05$. The SRMR was 0.05, which represents adequate fit (<.08; Hu & Bentler, 1998). The RMSEA value was 0.08, which indicates reasonable fit (MaCallum, Browne, & Sugawara, 1996). Last, the CFI was 0.94 which borders on adequate fit (> .95; Hu & Bentler, 1998). A diagram of the eustress distress model can be found in Appendix O. Overall, the fit of this model can be considered adequate. To assess the association between these two constructs, the correlation between eustress and distress was analyzed. The correlation was small, but significant, $r = - .09, p < .001$; the negative value indicates that eustress and distress have a small inverse relationship.
**Student engagement.** Student engagement was represented by two different types of engagement: affective engagement and cognitive engagement. Each aspect of engagement was represented by two subscales on the School Attitude Assessment Survey-Revised (SAAS-R). Descriptive statistics, including sample size (N), mean (M), standard deviation (SD), skewness, and kurtosis for the individual items for all subscales, are presented in Table 7 below. The affective engagement items had an approximately normal distribution (skewness and kurtosis between -2.0 and +2.0). For the cognitive engagement items, the motivation/self-regulation subscale had approximately normal distribution, however, the goal valuation subscale had a non-normal distribution. The mean score on the goal valuation subscale on the SAAS-R was high, so the skewness and kurtosis values reflect the limited variation of scores. Findings from this subscale should be interpreted with caution. The Cronbach’s alpha values, which ranged between .90 - .95, indicate good internal consistency of items within the measure.
Table 7

**Descriptive Statistics for Student Engagement**

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<th>Latent Variable</th>
<th>Alpha</th>
<th>Measured Variable</th>
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Regarding fit indices for affective engagement, the chi-squared model fit was significant, \( \chi^2 (116, N = 2379) = 1012.40, p < .05 \). The SRMR was .03, which represents adequate fit. The RMSEA value was 0.06, which indicates reasonable fit. Last, the CFI was .97, which represents adequate fit. A diagram of the eustress affective engagement model can be found in Appendix P. Overall, the fit of this model can be considered adequate. To assess the association between these two constructs, the correlation between eustress and each subscale representing affective engagement was analyzed. The correlation between eustress and the attitudes towards school subscale was small but significant, \( r = .14, p < .001 \), and the correlation between eustress and the attitudes towards teachers’ subscale was moderate and significant, \( r = .26, p < .001 \). The
direction of both relationships is positive; higher levels of affective engagement co-occur with higher levels of eustress.

Regarding fit indices for cognitive engagement, the chi-squared model fit was significant, $\chi^2(186, N = 2379) = 1046.47, p < .05$. The SRMR was 0.04, which represents adequate fit. The RMSEA value was 0.04, which indicates reasonable fit. Last, the CFI was 0.95, which represents adequate fit. A diagram of the eustress cognitive engagement model can be found in Appendix Q. Overall, the fit of this model can be considered adequate. To assess the association between these two constructs, the correlation between eustress and each subscale representing cognitive engagement was analyzed. The correlation between eustress and the goal valuation subscale was small but significant, $r = .16, p < .001$, and the correlation between eustress and the motivation/self-regulation subscale was moderate and significant, $r = .22, p < .001$. The direction of both relationships is positive; higher levels of cognitive engagement co-occur with higher levels of eustress.

Coping strategies. To assess the relationship between coping strategies and eustress, the two most salient indicators of task-focused coping strategies (time and task management and cognitive reappraisal) and emotion-focused strategies (talk with classmates and friends and deterioration) were analyzed. Each aspect of coping was represented by a subscales of the Coping with Academic Demands Scale (CADS). Descriptive statistics, including sample size ($N$), mean ($M$), standard deviation ($SD$), skewness, and kurtosis, for the individual items for all subscales, are presented in Table 8. All items on the four subscales had an approximately normal distribution (skewness and kurtosis between -2.0 and +2.0). The Cronbach’s alpha values, which ranged between .70 - .77, indicate adequate internal consistency of items within the measure.
Table 8

**Descriptive Statistics for Coping Strategies**

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<th>Latent Variable</th>
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<th>Measured Variable</th>
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<th>SD</th>
<th>Skew</th>
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<td>Task-Focused Coping Strategies: Subscale from CADS (Cognitive Reappraisal)</td>
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<td>Emotion-Focused Coping Strategies: Subscale from CADS (Talk with Classmates and Friends)</td>
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<td>-0.83</td>
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<td>Emotion-Focused Coping Strategies: Subscale from CADS (Deterioration)</td>
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<td></td>
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<td>CADS10</td>
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### Table 8 continued

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<th>$SD$</th>
<th>Skew</th>
<th>Kurtosis</th>
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<td>CADS26</td>
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</tr>
</tbody>
</table>

*Note. Items on the CADS range from 1 to 5.*

Fit indices and correlations were assessed for task-focused coping strategies. Regarding fit indices for the time and task management coping strategy, the chi-squared model fit was significant, $\chi^2(43, N=2379) = 536.89, p < .05$. The SRMR was 0.04, which represents adequate fit. The RMSEA value was 0.07, which indicates reasonable fit. Last, the CFI was 0.92, which borders on adequate fit. A diagram of the eustress time and task management model can be found in Appendix R. Overall, the fit of this model can be considered adequate. To assess the association between these two constructs, the correlation between eustress and time and task management was analyzed. The correlation between eustress and the time and task management subscale was moderate and significant, $r = .25, p < .001$.

For fit indices for the cognitive reappraisal coping strategy, the chi-squared model fit was significant, $\chi^2(26, N=2379) = 419.36, p < .05$. The SRMR was 0.04, which represents adequate fit. The RMSEA value was 0.08, which indicates reasonable fit. Last, the CFI was 0.94, which borders on adequate fit. A diagram of the eustress cognitive reappraisal model can be found in Appendix S. Overall, the fit of this model can be considered adequate. To assess the association between these two constructs, the correlation between eustress and cognitive reappraisal was analyzed. The correlation between eustress and the cognitive reappraisal subscale was moderate and significant, $r = .29, p < .001$. The direction of the associations between eustress and indicators of task-focused coping was positive, indicating more frequent use of task-focused
coping behaviors (time and task management, cognitive reappraisal) co-occurred with higher levels of eustress.

Fit indices and correlations were assessed for emotion-focused coping strategies. Regarding fit indices for talk with classmates and friends, the chi-squared model fit was significant, $\chi^2 (19, N = 2379) = 370.22, p < .05$. The SRMR was 0.03, which represents adequate fit. The RMSEA value was 0.09, which boarders on reasonable fit. Last, the CFI was 0.95 which represents adequate fit. A diagram of the eustress talk with classmates and friends model can be found in Appendix T. Overall, the fit of this model can be considered adequate. To assess the association between these two constructs, the correlation between eustress and talk with classmates and friends was analyzed. The correlation between eustress and the talk with classmates and friends’ subscale was small but significant, $r = .06, p < .05$.

For fit indices for deterioration, the chi-squared model fit was significant, $\chi^2 (43, N = 2379) = 777.89, p < .05$. The SRMR was 0.05, which represents adequate fit. The RMSEA value was 0.09, which boarders on reasonable fit. Last, the CFI was 0.89, which does not indicate adequate fit. A diagram of the eustress deterioration model can be found in Appendix U. Overall, the fit of this model can be considered questionable to adequate. To assess the association between these two constructs, the correlation between eustress and deterioration was analyzed. The correlation between eustress and the deterioration subscale was small but significant, $r = -.10, p < .05$. This negative association between deterioration and eustress indicates that higher levels of coping through behaviors that reflect emotional deterioration are associated with lower levels of eustress.
Overall, the associations between eustress and task-focused coping strategies were moderate positive correlations, while the associations between eustress and emotion-focused strategies were small, and one coping strategy (deterioration) had a negative association.

**Self-efficacy.** Self-efficacy was assessed using the academic self-perceptions subscale from the SAAS-R. Descriptive statistics, including sample size (\(N\)), mean (\(M\)), standard deviation (\(SD\)), skewness, and kurtosis, for the individual items from the academic self-perceptions subscale, are presented in Table 9 below. The academic self-perceptions subscale items had an approximately normal distribution (skewness and kurtosis between -2.0 and +2.0), except for the kurtosis for item two. While the kurtosis values were mixed (positive and negative values), the negative skewness values, while within the normal range, indicate data that are slightly skewed left. The Cronbach’s alpha value (.87) indicates good internal consistency of items within the measure.
Table 9

Descriptive Statistics for Self-Efficacy

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Alpha</th>
<th>Measured Variable</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Skew</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy: Subscale from SAAS-R (Academic Self-Perceptions)</td>
<td>.87</td>
<td>SAAS-R2</td>
<td>2378</td>
<td>5.90</td>
<td>1.03</td>
<td>-1.40</td>
<td>2.88</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SAAS-R3</td>
<td>2377</td>
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<td>1.15</td>
<td>-1.05</td>
<td>1.43</td>
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<tr>
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<td></td>
<td>SAAS-R5</td>
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<td>5.68</td>
<td>1.11</td>
<td>-1.15</td>
<td>1.75</td>
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<td></td>
<td></td>
<td>SAAS-R11</td>
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<td>1.20</td>
<td>-1.03</td>
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<td></td>
<td></td>
<td>SAAS-R13</td>
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<td>-0.66</td>
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<td></td>
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<td>SAAS-R20</td>
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<td>-0.85</td>
<td>0.65</td>
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<tr>
<td></td>
<td></td>
<td>SAAS-R22</td>
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<td>1.63</td>
<td>-1.19</td>
<td>0.60</td>
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</tbody>
</table>

Note. Items on the SAAS-R range from 1 to 7.

Regarding fit indices, the chi-squared model fit was significant, $\chi^2(53, N = 2379) = 939.43, p < .05$. The SRMR was 0.04, which represents adequate fit. The RMSEA value was 0.08, which indicates reasonable fit. Last, the CFI was 0.91, which does not indicate adequate fit. A diagram of the eustress self-efficacy model can be found in Appendix V. Overall, the fit of this model can be considered questionable to adequate. To assess the association between these two constructs, the correlation between eustress and self-efficacy was analyzed. The correlation between eustress and self-efficacy was moderate and significant, $r = .26, p < .001$. This indicates that these constructs have a positive relationship.

Flow. Descriptive statistics, including sample size ($N$), mean ($M$), standard deviation ($SD$), skewness, and kurtosis, for the individual items from the Short Dispositional Flow Scale (S_DFS2), which measures flow, are presented in Table 10 below. The flow items had an approximately normal distribution (skewness and kurtosis between -2.0 and +2.0). The negative
skewness and kurtosis values, while within the normal range, indicate data that are slightly skewed left in a flatter distribution as compared to a normal distribution. The Cronbach’s alpha value (.75) indicates adequate internal consistency of items within the measure.

Table 10

*Descriptive Statistics for Flow*

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Alpha</th>
<th>Measured Variable</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Skew</th>
<th>Kurtosis</th>
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<td></td>
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<td></td>
<td>S_DFS26</td>
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<td>0.93</td>
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<td>-0.20</td>
</tr>
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<td>S_DFS27</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td>S_DFS29</td>
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<td>-0.53</td>
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</table>

*Note. Items on the S_DFS range from 1 to 5.*

Regarding fit indices, the chi-squared model fit was significant, \(\chi^2 (76, N = 2379) = 944.11, p < .05\). The SRMR was 0.04, which represents adequate fit. The RMSEA value was 0.07, which indicates reasonable fit. Last, the CFI was 0.90, which does not indicate adequate fit. A diagram of the eustress flow model can be found in Appendix W. Overall, the fit of this model can be considered questionable to adequate. To assess the association between these two constructs, the correlation between eustress and flow was analyzed. The correlation between
eustress and flow was moderate and significant, $r = .34, p < .001$. This indicates that these constructs have a positive relationship.

**Grit.** Descriptive statistics, including sample size ($N$), mean ($M$), standard deviation ($SD$), skewness, and kurtosis, for the individual items from the Short Grit Scale (GRIT), which measures grit, are presented in Table 11 below. The flow items had an approximately normal distribution (skewness and kurtosis between -2.0 and +2.0). While the skewness and kurtosis values were mixed for different items, they were both predominately negative. The Cronbach’s alpha value (.71) indicates adequate internal consistency of items within the measure.

Table 11

**Descriptive Statistics for Grit**

<table>
<thead>
<tr>
<th>Latent Variable</th>
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<th>Measured Variable</th>
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<th>$SD$</th>
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<th>Kurtosis</th>
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<td>2379</td>
<td>2.83</td>
<td>0.97</td>
<td>0.02</td>
<td>-0.12</td>
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</tr>
<tr>
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<td>0.08</td>
<td>-0.60</td>
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</tr>
<tr>
<td>GRIT3*</td>
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<td>-0.59</td>
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*Note.* Items on GRIT range from 1 to 5. * indicates items that are reversed-scored.

Regarding fit indices, the chi-squared model fit was significant, $\chi^2 (64, N = 2379) = 1278.83, p < .05$. The SRMR was 0.07, which represents adequate fit. The RMSEA value was
0.09, which indicates between reasonable and questionable fit. Last, the CFI was 0.83, which does not indicate adequate fit. A diagram of the eustress grit model can be found in Appendix X. Overall, the fit of this model can be considered questionable to adequate. To assess the association between these two constructs, the correlation between eustress and grit was analyzed. The correlation between eustress and grit was moderate and significant, \( r = .20, p < .001 \). This indicates that these constructs have a positive relationship.

**Relationship Between Eustress and Student Outcomes**

To answer research question four, this study explored the eustress measure in relation to student outcomes variables, namely academic performance and emotional well-being. Academic performance was measured by unweighted semester GPA, and student emotional well-being was captured by three measures related to life satisfaction (SLSS), school burnout (SBI), and psychopathology (BESS). All measures representing emotional well-being were analyzed separately so as not to mask differences in associations with various aspects of mental health through group analysis. For analysis, a multiple regression was run using Mplus Version 8, with each outcome variables, i.e. life satisfaction predicted by eustress, gender, grade, and program. A single model was run with all variables, so results show the effects of each variable while controlling for the other variables in the model. Gender (0=Male, 1=Female) and program (0=AP, 1=IB) were coded as dummy variables; grade was coded 9, 10, 11, 12. Unstandardized coefficients were reported for this model which is common to use when examining different groups, however the significance value remains the same for both standardized and unstandardized models. Table 1 below summarizes the results of the analyses performed for all variables. The beta coefficient (b), standard error (SE), the coefficient of determination (R²) and
significance levels (indicated by *) are presented, and the model fit information for each model is presented in Appendix Y.

Table 12

*Eustress and Student Outcomes Coefficients and Significance*

<table>
<thead>
<tr>
<th>Predictors</th>
<th>GPA</th>
<th>Life Satisfaction</th>
<th>School Burnout</th>
<th>Psychopathology</th>
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<tr>
<td></td>
<td>b</td>
<td>SE</td>
<td>b</td>
<td>SE</td>
</tr>
<tr>
<td>Eustress</td>
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<td>0.022</td>
<td>0.187***</td>
<td>0.036</td>
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<td>0.070</td>
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<tr>
<td>Gender</td>
<td>0.079**</td>
<td>0.025</td>
<td>-0.130*</td>
<td>0.055</td>
</tr>
<tr>
<td>Grade</td>
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<td>0.019</td>
<td>0.005</td>
<td>0.016</td>
</tr>
<tr>
<td>(R^2)</td>
<td>0.035**</td>
<td>0.012</td>
<td>0.030***</td>
<td>0.008</td>
</tr>
</tbody>
</table>

*Note.* *p < .05, **p < .01, ***p < .001.

**Academic performance.** In this sample, grade point average (GPA) ranged from 0.33 to 4.0 (\(M = 3.29, SD = 0.63\)), with a skewness value (-1.14) and kurtosis value (1.53) falling within the acceptable range. It is notable that the mean GPA value is close to the maximum value, however this level of performance is not surprising given the general academic level of students taking AP and IB classes. GPA had a significant relationship with eustress and gender, indicating that students with higher eustress, and who are female, are predicted to have a significantly higher GPA. GPA had a non-significant relationship with program and grade. The \(R^2\) indicates that 3.5% of the variance in GPA is explained by eustress, program, gender, and grade (\(R^2 = 0.035, SE = 0.012, p < 01.\)). To account for the amount of variance explained by the demographic variables in the model, each model was run with only the demographic predictors, namely program, gender, and grade. For this model without eustress, the \(R^2\) coefficient was non-
significant ($R^2 = 0.006, \ SE = 0.006, p > .05$). This indicates that eustress makes a unique and significant contribution to explaining the variance in GPA above and beyond grade, program, and gender.

**Life satisfaction.** Descriptive statistics, including sample size (N), mean (M), standard deviation (SD), skewness, and kurtosis, for the individual items from the Student’s Life Satisfaction Scale (SLSS), which measures life satisfaction, are presented in Table 13. The SLSS items had an approximately normal distribution (skewness and kurtosis between -2.0 and +2.0). The negative skewness on the majority of the items, while within the normal range, indicate data that are slightly skewed left as compared to a normal distribution. The Cronbach’s alpha value (.87) indicates good internal consistency of items within the measure.

Table 13

*Descriptive Statistics for Life Satisfaction*

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Alpha</th>
<th>Measured Variable</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Skew</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Satisfaction (SLSS)</td>
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<td>SLSS1</td>
<td>2379</td>
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<td>1.15</td>
<td>-1.06</td>
<td>0.91</td>
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<td>SLSS2</td>
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<td>-0.96</td>
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<td>SLSS4*</td>
<td>2374</td>
<td>4.02</td>
<td>1.51</td>
<td>-0.41</td>
<td>-0.85</td>
</tr>
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<td></td>
<td>SLSS5</td>
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<td>4.91</td>
<td>1.01</td>
<td>-1.11</td>
<td>1.53</td>
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<tr>
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<td></td>
<td>SLSS6</td>
<td>2377</td>
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<td>1.24</td>
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<tr>
<td></td>
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<td>2378</td>
<td>4.79</td>
<td>1.14</td>
<td>-0.99</td>
<td>0.92</td>
</tr>
</tbody>
</table>

*Note.* Items on the SLSS range from 1 to 6. * indicates items that are reversed-scored.
Life Satisfaction had a significant relationship with eustress and gender, indicating that students with higher eustress, and who are female, are predicted to have significantly higher life satisfaction. Life Satisfaction had a non-significant relationship with program and grade. The $R^2$ indicates that 3.0% of the variance in life satisfaction is explained by eustress, program, gender, and grade ($R^2= 0.030, \text{SE}= 0.008, p < 001$). For the model without eustress, the $R^2$ coefficient was non-significant ($R^2= 0.008, \text{SE}= 0.005, p > .05$). This indicates that eustress makes a unique and significant contribution to explaining the variance in life satisfaction above and beyond grade, program, and gender.

**School burnout.** Descriptive statistics, including sample size ($N$), mean ($M$), standard deviation ($SD$), skewness, and kurtosis, for the individual items from the School Burnout Inventory (SBI), which measures academic burnout, are presented in Table 14. The SBI items had an approximately normal distribution (skewness and kurtosis between -2.0 and +2.0). The negative skewness and kurtosis values (with the exception of the skewness value on SBI9), while within the normal range, indicate data that are slightly skewed left in a flatter distribution as compared to a normal distribution. The Cronbach’s alpha value (.88) indicates good internal consistency of items within the measure.
Table 14

Descriptive Statistics for School Burnout

<table>
<thead>
<tr>
<th>Latent Variable</th>
<th>Alpha</th>
<th>Measured Variable</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Skew</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>School Burnout</td>
<td>.88</td>
<td>SBI1</td>
<td>2377</td>
<td>4.39</td>
<td>1.32</td>
<td>-0.70</td>
<td>-0.01</td>
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<tr>
<td></td>
<td></td>
<td>SBI2</td>
<td>2374</td>
<td>3.41</td>
<td>1.54</td>
<td>-0.06</td>
<td>-0.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SBI3</td>
<td>2377</td>
<td>3.48</td>
<td>1.41</td>
<td>-0.13</td>
<td>-0.67</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SBI4</td>
<td>2373</td>
<td>3.63</td>
<td>1.66</td>
<td>-0.19</td>
<td>-1.11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SBI5</td>
<td>2374</td>
<td>3.72</td>
<td>1.51</td>
<td>-0.29</td>
<td>-0.77</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SBI6</td>
<td>2375</td>
<td>3.56</td>
<td>1.55</td>
<td>-0.18</td>
<td>-0.92</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SBI7</td>
<td>2376</td>
<td>3.50</td>
<td>1.46</td>
<td>-0.20</td>
<td>-0.83</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SBI8</td>
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<td>-1.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SBI9</td>
<td>2378</td>
<td>3.00</td>
<td>1.52</td>
<td>0.19</td>
<td>-0.96</td>
</tr>
</tbody>
</table>

Note. Items on the SBI range from 1 to 6.

School Burnout had a significant negative relationship with eustress, and a significant positive relationship with the other predictors, namely gender, grade and program. This indicates that students with higher eustress are predicted to have significantly lower levels of school burnout than those students with lower eustress. For the positive relationship with the other predictors, this indicates that students in an IB program, who are female, are predicted to have significantly higher school burnout as they progress throughout the grade levels. The $R^2$ indicates that 10.0% of the variance in school burnout is explained by eustress, program, gender, and grade ($R^2= 0.101$, SE= 0.014, $p < 0.001$). For the model without eustress, 4.3% of the variance in school burnout was explained ($R^2= 0.043$, SE= 0.009, $p < .001$). This indicates that eustress
makes a unique contribution (5.7%) in explaining the variance in school burnout above and beyond grade, program, and gender.

**Psychopathology**  Descriptive statistics, including sample size (N), mean (M), standard deviation (SD), skewness, and kurtosis, for the individual items from the Behavioral and Emotional Screening System (BESS), which measures psychopathology, are presented in Table 15. The vast majority of BESS items had an approximately normal distribution (skewness and kurtosis between -2.0 and +2.0), with items 6 and 13 falling slightly outside of the normal range. The Cronbach’s alpha value (.89) indicates good internal consistency of items within the measure.
### Table 15

*Descriptive Statistics for Psychopathology*

<table>
<thead>
<tr>
<th>Latent Variable (BESS)</th>
<th>Alpha</th>
<th>Measured Variable</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Skew</th>
<th>Kurtosis</th>
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</thead>
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<td></td>
<td></td>
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<td>0.77</td>
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<td>Measured Variable</td>
<td>$N$</td>
<td>$M$</td>
<td>SD</td>
<td>Skew</td>
<td>Kurtosis</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------</td>
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<td>0.65</td>
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<td>0.13</td>
</tr>
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<td>0.72</td>
<td>0.57</td>
<td>-0.45</td>
</tr>
</tbody>
</table>

*Note.* Items on the SLSS range from 0 to 3. * indicates items that are reversed-scored. * indicates skewness or kurtosis values that are above the approximately normal range.

Psychopathology had a negative significant relationship with eustress and a positive significant relationship with gender. This indicates that students with higher eustress are predicted to have significantly lower psychopathology, and that female students are predicted to have higher psychopathology than males. Psychopathology had a non-significant relationship with program and grade. The $R^2$ indicates that 5.0% of the variance in psychopathology is explained by eustress, program, gender, and grade ($R^2 = 0.050$, SE= 0.008, $p < 0.001$). For the
model without eustress, the $R^2$ coefficient was non-significant ($R^2 = 0.012$, SE= 0.006, $p > .05$). This indicates that eustress makes a unique and significant contribution to explaining the variance in psychopathology above and beyond grade, program, and gender.
CHAPTER V: DISCUSSION

The purpose of this study was to explore the construct of eustress and extend this concept to an adolescent population that experiences a particularly high level of stress due to their rigorous academic demands. Specifically, this study explored the psychometric properties of a modified self-report eustress measure in the general AP/IB student population, as well as in different subgroups within the sample. Additionally, this study brought together hypothesized and existing correlates of eustress and examined their relationship within this population. Last, this study examined the relationship between eustress and important student outcomes, namely academic and emotional success. This section summarizes the results of the analyses performed and discusses key findings for each research question including in the context of existing literature. The implications of the results, including the limitations of the study and directions for future research are discussed.

Measuring Eustress within Adolescents in Rigorous Academic Programs

Since eustress is a relatively understudied concept, measurement is an important first step in further studying and applying eustress in real world practices. To date, there are no published measurement tools that have been developed for adolescents, or researched in adolescents. To fill this gap, this study explored the psychometric properties of an existing eustress measure—the Eustress Scale (O’Sullivan, 2011)—which was modified (i.e., reduced in item length) to be used with adolescents.
Results from a confirmatory factor analysis showed that all five items on the modified Eustress Scale mapped onto the construct of eustress substantially (standardized factor loadings between 0.59 and 0.89). This supports all five retained items as valid indicators of eustress in this population; no item was found to be extraneous or unrelated to eustress. In addition to the factor loadings of the items, the unidimensional factor structure of the Eustress Scale was explored within the total sample of AP/IB students. Four model fit indices were examined as pieces of evidence to assess the goodness of fit of this measure. Model fit indices are not black and white, and different data considerations (e.g., sample size, number of items on a measure) must be considered when reviewing these indices. For the total sample, two of the four fit indices that are relatively independent of sample size and number of items (SRMR and CFI) indicated that the five-item eustress measure was close to, or achieved adequate fit. Within the total student sample, the internal consistency reliability for the Eustress Scale fell within the acceptable range (.85). Test-retest reliability was not examined due to the cross-sectional nature of the data.

Taken together, this study found initial support for the psychometric properties of the five-item Eustress Scale in AP and IB students, with regard to reliability and factorial validity. The reliability of the eustress measure fell within the acceptable range, but further studies should explore the consistency of the measure when it is administered at different times. To examine validity, this study explored the internal structure component of validity as indicated in the Standards for Educational and Psychological Testing (2014), through factor loadings and model fit indices. In examining indicators of both reliability and validity, this study provides support that the five-item modified Eustress Scale has adequate psychometric properties when used to assess eustress in adolescents in AP classes or the IB program. These results are consistent with
the hypothesis posited by this study that eustress can be reliability measured in adolescents using an adapted version of a eustress measure that previously yielded acceptable psychometric properties (O’Sullivan, 2011).

Measuring Eustress within Gender, Grade Level, and Program Subgroups

In addition to examining the model fit of the modified (5-item) Eustress Scale in the total sample of AP/IB students, this study explored the model fit of the modified Eustress Scale in different subgroups, namely by gender, grade level, and program. This was done to confirm that the model fit of the total sample was representative of different subgroups by exploring if vast differences in model fit existed within different groups. With regard to gender, there was relatively little difference with the fit indices for males and females, as compared to the total sample. This indicates that by taking into account only gender for AP/IB students, the model fit is relatively the same. When grade (9, 10, 11, 12) is taken into account, there was a slight change in one of the fit indices, which indicated that the model fit is best in 11th grade students (CFI=0.95), and worse in 10th grade students (CFI=0.84). In regards to program, the model fit also had a slight differentiation in one of the model indices that indicted that the eustress measure had a better fit for students in the IB program (CFI=0.97) than students taking AP classes (CFI=0.87). Even though small differences emerged, overall the model fit indices for the total group were relatively similar to the model fit indices among the subgroups.

To extend the understanding of eustress in different groups, a multiple regression was performed to detect any significant differences in eustress in regards to gender, grade, and program. This study employed a purely exploratory approach for this research question since there were no previous studies of eustress in adolescents on which to base a hypothesis. Results
indicated that there were no statistically significant gender differences in eustress levels among AP/IB students, and there were also not significant differences in eustress levels among students in different programs, i.e. AP or IB. However, a significant difference in eustress was found for students in different grade levels. Students in older high school grade levels reported significantly higher levels of eustress. There are a few possible factors that may explain this trend. First, with more experience in AP/IB classes throughout the years, students may incur success experiences in this setting that increase their self-efficacy in their ability to handle academic tasks. Since they have risen to the academic demands in past classes, students may perceive new academic tasks with more knowledge on how to be successful and feel greater confidence in their abilities. Second, as students progress in their high school career, they may be able to take classes that are of personal interest, such as AP Psychology, so the tasks associated with that class may be intrinsically interesting and therefore perceived as more of a challenge than an obstacle. It is also worth noting that this increase in eustress throughout the grade levels could be due to survivorship bias. In a school setting, survivorship bias relates to the fact that the students taking AP/IB classes in higher grades are those who had higher eustress initially, and those with lower eustress stopped taking higher levels courses and effectively removed themselves from the sample.

Of note, gender, grade, and program only explained 1.3% of the variance in eustress among this sample of AP/IB students. These three factors, which are generally fixed, explain very little of the difference in eustress between students. Since 98.7% of the variance in eustress is unexplained, it is possible that eustress is explained by factors that are potentially malleable,
e.g., coping strategies, as well as factors that are non-malleable, e.g., ethnicity, that were not explored in this model.

**Correlates of Eustress**

To better understand the concept of eustress in relation to other variables in the target population, a nomological network of potential correlates was explored including distress, engagement, coping, self-efficacy, flow, and grit. This analysis also helped to explore another component of validity, namely relationships to other variables (AERA, APA, & NCME, 2014).

Previous research on eustress and distress has posited that the constructs are distinct, but that they are also able to occur in the same context (Le Fevre, Kolt, & Matheny, 2006; Nelson & Simmons, 2011). Going off this conceptualization, some researchers have measured both eustress and distress with their participants (Cavanaugh et al., 2000), but the relationship between these two constructs has not been analyzed. For this study, the researcher predicted that eustress and distress would have an inverse relationship, due to the opposite nature of the constructs they represent. Results from analysis show that eustress and distress have a significant, albeit small, inverse relationship ($r = -.09, p < .001$). These results fall in line with the posited hypothesis, and support the notion that eustress and distress are distinct constructs, and not opposite ends of a stress spectrum. This theoretical notion has been accepted in the literature, but this study provides quantitative data to support this relationship among youth.

The next relationship explored in this study was between eustress and student engagement. Prior studies found a positive correlation between eustress and engagement (Mesurado et al., 2016), thus it was hypothesized that eustress would continue to demonstrate a positive relationship with engagement in an adolescent sample. Both affective engagement and
cognitive engagement demonstrated a positive relationship with eustress. Out of the different subscales representing engagement, the Attitudes Towards Teachers subscale had the highest correlation with eustress ($r = .26, p < .001$). It is possible that a student’s perception of their teacher as supportive and promoting improvement, influences how they perceive academic tasks as either an obstacle or a challenge. This finding warrants further investigating as a possible target to influence eustress in adolescents.

Coping was another variable examined in the nomological network of eustress. The emotion-focused coping strategies were found to be weakly related to eustress or to have an inverse relationship with eustress. Both problem-focused coping strategies, time and task management and cognitive reappraisal, had a moderate positive relationship with eustress, with cognitive reappraisal having the largest effect size ($r = .29, p < .001$). These findings are congruent with previous research by McGowan and colleagues (2006) and Lepine, Podsakoff, and Lepine (2005), which found that eustress has a positive relationship with task/problem-focused coping strategies, and a small to non-existent relationship with emotion-focused coping strategies. Conceptually, it seems that eustress and cognitive reappraisal both involve mindset, therefore coping with stress through cognitive reappraisal could be a plausible target to increase eustress. This could also open the doorway for other mindset reappraisal strategies, possibly from positive psychology and mindfulness, to be pathways to increasing eustress. These ideas are in need of further research given the cross-sectional, observational nature of the current study.

The relationship between self-efficacy and eustress was explored in previous studies. O’Sullivan (2011) found a positive correlation between eustress and self-efficacy in college-aged
students. A similar relationship between eustress and self-efficacy was predicted to occur due to the commonality of college-level academic demands. Results showed that the effect size between eustress and self-efficacy was moderate and positive in AP/IB youth ($r=.26, p < .001$), with an association of similar size to the magnitude observed in college-aged students ($r=.21, p < .05$).

Across age groups, self-efficacy may be linked to eustress because it is a factor that might help an individual appraise a stressor more positively.

Flow has been touted as the ultimate eustress experience (Mesurado et al., 2016), so it was hypothesized that flow and eustress would have a significant positive relationship. This notion by Mesurado and colleagues (2016) that eustress and flow were highly related, was supported by the fact that flow had the largest effect size with eustress ($r = .34, p < .001$) compared to all other correlates. Future studies should examine the direction of the flow eustress relationship.

No other studies have explored the relationship between eustress and grit, but the theoretically similar construct, hardiness, was related to eustress. Therefore, it was hypothesized that grit and eustress would have a positive relationship. As expected, grit and eustress had a small to moderate, positive relationship ($r = .20, p < .001$). Tasks that require continual work throughout the year, e.g., the IB extended essay, may be less daunting, and perceived more positively, by students who have the stamina to persist through tasks whether they take weeks, months or years.

Overall, all the relationships between eustress and potential correlates were significant, and fit the hypothesizes that were based on prior research with adults. Eustress had the strongest association with flow, and the weakest association with the emotion-focused coping strategy, talk
to classmates and friends. There was only a negative relationship between eustress and distress, and the emotion-focused coping strategy, deterioration. Examining the nomological network of eustress supported the validity of the eustress measure since it produced relationships that were conceptually sound, and it also uncovered some associations with variables that could be examined as targets in future intervention development studies that aim to foster eustress in AP/IB youth.

**Relationship between Eustress and Student Outcomes**

Previous research has supported positive relationships between eustress and increased work performance and positive psychology states (Hargrove, Nelson, & Cooper, 2013). Thus, it was hypothesized that higher eustress would co-occur with higher scores on positive indicators of academic success (GPA) and emotional success (life satisfaction). It was also hypothesized that eustress would have a negative relationship with undesirable emotional indicators (psychopathology and school burnout).

As predicted, eustress was a significant positive predictor of GPA and life satisfaction, and a negative predictor of burnout and psychopathology. This falls in line with previous literature that eustress is associated with positive outcomes and negatively associated with undesirable outcomes. For GPA, life satisfaction, and psychopathology, between 3% to 5% of the variance was explained by gender, grade, program and eustress, but the model became non-significant when eustress was removed. Eustress had a small effect on life satisfaction and psychopathology, likely because these are constructs that have a wide breadth of factors that influence how they manifest. GPA is more confined to the school realm, but that is likely influenced by previous academic experience, e.g., middle school performance, which was not
accounted for in the model. However, for school burnout, all predictors were significant (negative coefficient of eustress, positive coefficient for gender, grade, and program), and the full model explained 10% of the variance in school burnout, which is double the amount of variance explained in the other outcomes. Without eustress, the model was still significant, but only 4.3% of the variance in school burnout was explained. School burnout is a more confined construct and is influenced more by school-related stress, and current school-related factors than the other outcomes. The current study can not isolate the directionality of the relationships between eustress and those variables conceptualized as outcomes. But, if level and change in eustress does influence these outcomes, even small gains in GPA and mental health (life satisfaction, psychopathology), attributable to eustress, would be clinically and educationally important. Further, increasing eustress might one day be shown to be a promising avenue in reducing burnout in students taking rigorous classes. Reduced burnout is advantageous in that it may help students continue to pursue higher levels of education and not be dissuaded from academic experiences with high level academic tasks, e.g. writing a dissertation, because they have become burnt out by school. Increasing eustress may be a way that students are not limited in their academic potential by a negative emotional state.

**Implications for School Psychologists**

The popularity of the IB program and AP classes are on the rise in high school, and it is documented that these students experience more (dis)stress than students in traditional high school classes (Suldo et al., 2018). Stress is a major factor that school psychologists will be called upon to address in these students. This study provides some insights into ways that the concept of eustress is relevant to AP/IB students.
First, this study advances a psychometrically sound measure that can be used to assess eustress in school-based assessments. Many school psychologists are called upon to select appropriate measures for both screening and targeted assessments. For tier 1, the modified Eustress Scale is brief enough (only five items) that it might lend well to universal screening. This measure is easily scored and interpreted, and can be used to gauge the eustress level of the whole school, or certain grade levels. At the selective level (tiers 2 and 3), this measure might be part of a myriad of tools used to identify why students are struggling with AP/IB classes.

Second, since eustress was seen to increase by grade level, it might be useful to have a mentoring program that connects younger students with older students to promote eustress. In these mentoring meetings, the older students can share the ways they acclimated to the workload of AP/IB classes and share strategies for challenging stress positively. By sharing these lessons with students early in their high school career, younger students may develop a positive conceptualization of stress in earlier grades and employ this mindset in high school longer.

Third, some of the correlates of eustress that were positively associated with eustress, e.g., task-focused coping strategies, affective engagement, are also associated with other positive outcomes (Suldo et al., 2018). Encouraging students to engage in these behaviors may have an added bonus of increasing their eustress, an idea that can be examined in future longitudinal and experimental research.

Last, eustress is a significant predictor of academic and emotional outcomes, including mental health, course grades, and especially school burnout. The establishment of links between eustress and salient student outcomes provides further rationale for attending to eustress in research and practice. With regard to practice, it is possible that students who take accelerated
courses and do not experience much eustress may feel burnt-out and not choose to pursue post-secondary education. Given societal trends that generally encourage higher education, increasing eustress could be a way to accomplish that goal. It could be useful to increase eustress, so that students can continue to utilize their advanced academic skills in post-secondary education without being limited by feelings of burnout.

**Contributions to the Literature**

This study contributes to the eustress literature by bolstering previous findings and providing new insights from a previously under-studied population. The literature base for eustress is growing, but many of the previous studies of eustress are theoretical and/or limited to the occupational realm. This concept of positive stress is ripe for expansion to other groups for whom stress is particularly salient.

From this study of eustress in AP/IB youth, several findings from the previous eustress literature were extended to this population as well. First, a fundamental similarity between findings from this study to findings in existing literature is that eustress and distress are distinct constructs and are not opposite ends of a spectrum (Le Fevre, Kolt, & Matheny, 2006; Nelson & Simmons, 2011). The correlation found between eustress and distress showed that they are weakly related, providing support that these are not highly related constructs. With eustress and distress being distinct factors, it is logical to expect that interventions for combating distress may not automatically result in increasing eustress. This underscores the need for separate interventions to increase eustress in students. Also, similar relationships between eustress and other correlates were found in this population of adolescents. Previous research found positive relationships between eustress and self-efficacy, engagement, task-focused coping, and flow
(McGowan et al., 2006; Mesurado et al., 2016; O’Sullivan, 201); the same relationships were found to be significant in this sample, demonstrating that eustress is related to the same factors for youth and adults. In relation to outcomes, Hargrove, Nelson and Cooper (2013) found support for relationships between eustress and good health, well-being, and positive job performance in people considered to be in stressful positions. Those findings illustrate that even in populations with high stress levels, people can still view stress positively and manifest positive psychology states. This study also found positive relationship between eustress and desirable outcomes, namely higher life satisfaction and GPA in AP/IB youth. This same phenomenon of high stress levels being able to translate to positive outcomes may also be applicable to AP/IB students. This bolsters the notion from prior research that eustress is related to positive outcomes.

This study also contributes to research by building upon the available measurement tools. Currently, only three quantitative self-report measurement tools exist to gather eustress data. The Index of Sources of Stress in Nursing Students (ISSN) and the Valencia Eustress-Distress Appraisal Scale (VEDAS) are both longer measures (ranging between 29-34 items) and intended to be used for a specific population. O’Sullivan (2011) created a shorter measurement tool (15 items) that was able to be used more generally. To translate measures into the education field, there is a need for tools that are developmentally appropriate, can be administered quickly, and are easily interpreted. This study provided data that support the use of the modified five-item Eustress Scale with adolescents. Several aspects of reliability and validity of this measure were found to be acceptable in this sample of AP/IB students. In the realm of measurement, there is now an additional self-report eustress measure that can be used with adolescents, in particular
those in accelerated courses. Having this additional measurement tool may pave the way for further study of eustress in this population. Data analyses provided initial insight into the levels of eustress related to gender, grade level, and academic program, which can be expanded upon in further studies.

**Limitations**

There were several limitations to this study that should be noted. First, the generalizability of these findings may be limited since this sample consisted of participants from a single southeastern state. While this sample was diverse in race/ethnicity and district type, e.g., urban, suburban, rural, there may be unaccounted variance related to regional differences. For example, there may be different entry requirements for AP/IB classes in different states, which could create a population with different characteristics than the one in this study. With this study as a foundation for bringing eustress into education, a more national sample would be preferred to determine if there are different trends in eustress in AP/IB in other states. Second, the data gathered were non-experimental, so analyses were limited to correlational findings. This researcher was unable to manipulate any variables to test causal relationships. While these analyses pave the way for experimental studies, key findings and recommendations from this study are based on non-causal relationships and should be interpreted as such. Third, since this was an archival dataset, decisions points were reached regarding constructs for analysis. In this archival dataset, there were constructs that were not available for analysis, specifically, certain positive psychology states, e.g., positive affect, optimism. Conversely, there were other constructs present in the archival dataset, e.g., ethnicity, AP/IB exam performance, that were not analyzed. With a large archival dataset, a manageable number of constructs that were available
and consistent with previous literature were chosen for analysis. Future studies should expand the nomological network of eustress by analyzing different constructs in relation to eustress. Fourth, the data was only gathered at one time point, so changes in eustress and its different correlates were not able to be measured. It is important to assess relationships both at a single time point, and over time. For example, it was found in this study that eustress levels are significantly different across grade levels. Longitudinal data analysis would be a way to uncover how these eustress levels change over time in the same students. Also, related to student outcomes, it would be beneficial to see how eustress affect student’s progression through AP/IB education.

**Summary and Future Directions**

In sum, the current study adds to the existing literature on eustress by studying this construct in a new population, namely youth in AP/IB classes. Results from the study advanced a five-item eustress measure that was found to have adequate reliability and validity in a large sample of AP/IB students. To initially understand how eustress presents in high school aged youth, levels of eustress were examined by gender, grade and program. Only a significant difference in eustress was found between grade levels. A nomological network of theoretical and previous correlates of eustress was explored in this population. Consistent with previous literature, eustress had a significant positive relationship with task-focused coping, engagement, self-efficacy, flow, and grit. Eustress had a negative relationship with distress and emotion-focused coping. These analyses provide the first look at correlates of eustress in an adolescent population. Last, eustress was a significant positive predictor of positive indicators of success, GPA and life satisfaction, and a significant negative predictor of indicators of undesirable
outcomes, school burnout and psychopathology. While eustress only accounted for a small amount of variance in these different outcomes, these analyses show that eustress may contribute a small piece of the puzzle in academic and emotional success in AP/IB students.

Given that this is the first study to investigate eustress in an adolescent population, there are several future directions for research. First, this cross-sectional data provided foundational research for eustress in adolescents, but future studies should investigate eustress in AP/IB youth longitudinally. The test-retest reliability of the eustress measure was not able to be computed due to fact that data were only collected at one time. Also, exploring developmental trends in eustress over time may provide valuable information related to the manifestation of eustress through internal or environmental factors. Future studies should look to collect a longitudinal data set of eustress on students every year in high school. Second, to expand the understanding of eustress, future researchers should use cognitive interviewing techniques to explore how youth interpret items on the Eustress Scale. Gathering qualitative data will allow researchers to further explore how adolescents attribute meaning to items within the Eustress Scale. Third, while it is documented that AP/IB student experience heightened levels of stress, adolescents not in advanced classes also experience life stressors (Byrne et al., 2007). Future studies should explore the psychometric properties of the modified eustress measure in adolescents in traditional classes. It would be interesting to determine if the modified eustress measure is appropriate for all adolescents, and if there are different trends in eustress between AP/IB youth and youth in traditional classes. Last, this quantitative study suggests targets to be explored in future research on intervention strategies for increasing eustress. Intervention strategies from different
disciplines, e.g., positive psychology, should be vetted theoretically and then experimentally tested with adolescents.
REFERENCES


Kelly, D. R., Matthews, M. D., & Bartone, P. T. (2014). Grit and hardiness as predictors of


Development and initial validation of the coping with academic demands scale (CADS):
How students in accelerated high school curricula cope with school-related stressors.


Development and initial validation of the student rating of environmental stressors scale:


APPENDICES
Appendix A: Eustress Scale used by O’Sullivan (2011)

How often do you effectively cope with stressful changes that occur in your academic life?
Never           Almost Never           Sometimes           Often           Very Often           Always

How often do you deal successfully with irritating academic hassles?
Always           Very Often           Often           Sometimes           Almost Never           Never

Do you read books for pleasure? (FILLER QUESTION)
Always           Very Often           Often           Sometimes           Almost Never           Never

How often do you feel that stress positively contributes to your ability to handle your academic problems?
Never           Almost Never           Sometimes           Often           Very Often           Always

In general, how often do you feel motivated by your stress?
Never           Almost Never           Sometimes           Often           Very Often           Always

Do you go out with friends during the week? (FILLER QUESTION)
Always           Very Often           Often           Sometimes           Almost Never           Never

In general, how often are you able to successfully control the irritations in your academic life?
Never           Almost Never           Sometimes           Often           Very Often           Always

In general, how often do you speak with your family? (FILLER QUESTION)
Never           Almost Never           Sometimes           Often           Very Often           Always

In general, how often do you fail at an academic task when under pressure?
Never           Almost Never           Sometimes           Often           Very Often           Always

In general, how often are you unable to control the way you spend your time on schoolwork?
Always           Very Often           Often           Sometimes           Almost Never           Never

How often do you feel comfortable in your surroundings? (FILLER QUESTION)
Never           Almost Never           Sometimes           Often           Very Often           Always

When faced with academic stress, how often do you find that the pressure makes you more productive?
Never           Almost Never           Sometimes           Often           Very Often           Always

How often do you feel that you perform better on an assignment when under academic pressure?
Always           Very Often           Often           Sometimes           Almost Never           Never

How often do you practice meditation? (FILLER QUESTION)
Always           Very Often           Often           Sometimes           Almost Never           Never

How often do you feel that stress for an exam has a positive effect on the results of your exam?
Never           Almost Never           Sometimes           Often           Very Often           Always
Appendix B: Parent Consent Form

Dear Parent or Caregiver:

This letter provides information about a research study that will be conducted in your child’s high school by investigators from the University of South Florida. We are examining high school students in academically demanding college preparatory programs in order to understand what factors are linked to emotional wellness and academic success among youth in Advanced Placement (AP) courses and International Baccalaureate (IB) Programs.

✓ **Who We Are**: We are Shannon Suldo, Ph.D., and Elizabeth Shaumessy, Ph.D., professors in the College of Education at the University of South Florida (USF). Several graduate students in the USF College of Education are also on the research team. We are planning the study in cooperation with school administrators to ensure the study provides information that will be helpful to the school.

✓ **Why We Are Requesting Your Child’s Participation**: This study is being conducted as part of a project entitled, “Predictors of Academic Success among High School Students in College Preparatory Programs.” Your child is being asked to participate because he or she is a high school student in an International Baccalaureate (IB) Program and/or Advanced Placement (AP) courses.

✓ **Why Your Child Should Participate**: There is a great need for educators and researchers to understand what leads to school success and happiness for students in rigorous academic programs. The information that we collect from your child may help increase our overall knowledge of how factors such as stressors and coping strategies relate to academic, social, and emotional success among high-achieving students. Information from this study will provide a foundation from which to improve the schooling experiences and well-being of high school students in college preparatory programs, which we will use to inform our work with educational professionals. Please note neither you nor your child will be paid for your child’s participation in the study. However, every student that returns this form (regardless of whether you give permission for your child to participate or not) will be included in a class-wide drawing for a $50 Visa gift card. In order to show our appreciation for your child’s participation, each student who participates will receive either a $10 iTunes gift card or a pre-paid movie ticket to a local theater.

✓ **What Participation Requires**: If you grant your child permission to participate in the study, we will ask him or her to complete several paper-and-pencil surveys. These surveys will ask your child about his or her stressors and coping strategies; school-related attitudes and behaviors; personal academic engagement; relationships with classmates, teachers, and parents; thoughts about his or her personality and psychological well-being (happiness and emotional distress); and participation in extracurricular activities. It will take approximately 45-60 minutes to complete the survey during one school day. We will personally administer the surveys at the high school, during regular school hours, this spring to large groups of students who have parent permission to participate. A final part of participation involves a review of your child’s school records. School/district employees will provide the USF research team with the following information about your child: courses taken for high school credit, including grades earned in these courses as well as scores on AP and IB exams; scores on college entrance readiness exams (e.g., PSAT, SAT, ACT); FCAT scores since middle school; student demographic characteristics including race/ethnicity, eligibility for free or reduced-price lunch, identification as an English Language Learner (ELL) or a student with an exceptionality; student distance from current high school (e.g., high school student is zoned to attend); extent of involvement in unique educational services, such as the AVID program, services for ELL students, and/or gifted education; district/state student ID numbers; student attendance and discipline history (i.e., number of office discipline referrals); number of community service hours completed; for 12th grade students: college acceptances and scholarships, and obtainment of IB diploma and/or IB certificate.

✓ **Please Note**: Your decision to allow your child to participate in this research study must be completely voluntary. You are free to allow your child to participate in this study or to withdraw him or her at any time. You or your child’s decision to participate, not to participate, or to withdraw participation at any point during the study will in no way affect your child’s student status, his or her grades, or your relationship with your child’s high school, USF, or any other party.
Appendix B continued

Confidentiality of Your Child’s Responses: There is minimal risk to your child for participating in this research. We will be present during administration of the surveys in order to provide assistance to your child if she or he has any questions or concerns. Your child’s privacy and research records will be kept confidential to the extent of the law. Authorized research personnel, employees of the Department of Health and Human Services, the USF Institutional Review Board and its staff, and other individuals acting on behalf of USF may inspect the records from this research project, but your child’s individual responses will not be shared with school system personnel or anyone other than us and our research assistants. Your child’s completed surveys will be assigned a code number to protect the confidentiality of his or her responses. Only we will have access to the locked file cabinet stored at USF that will contain: (1) all records linking code numbers to participants’ names, and (2) all information gathered from school records. All records from the study (completed surveys, information from school records) will be destroyed five years after the study is complete. Please note that although your child’s specific responses on the surveys will not be shared with the school staff, if your child indicates that he or she intends to harm him or herself, we will contact district mental health counselors to ensure your child’s safety.

What We’ll Do With Your Child’s Responses: We plan to use the information from this study to inform educators and psychologists about the types of stressors faced by students in high school college preparatory programs, which coping strategies are associated with positive and negative outcomes, and which student characteristics and environmental factors are associated with success and risk in AP and IB courses. The results of this study may be published. However, the data obtained from your child will be combined with data from other people in the publication. The published results will not include your child’s name or any other information that would in any way personally identify your child.

Questions? If you have any questions about this research study, please contact Dr. Suldo at (813) 974-2223 or Dr. Shaunessy at (813) 974-7007. If you have questions about your child’s rights as a person who is taking part in a research study, you may contact a member of the Division of Research Integrity and Compliance of the University of South Florida at (813) 974-5638, and refer to eIRB # 1094.

Want Your Child to Participate? To permit your child to participate in this study, complete the attached consent form and have your child turn it in to his or her designated teacher. The second copy of this letter is yours to keep.

Sincerely,

Shannon Suldo, Ph.D.  
Associate Professor of School Psychology  
Department of Psychological and Social Foundations  

Elizabeth Shaunessy, Ph.D.  
Associate Professor of Gifted Education  
Department of Special Education  

Consent for Child to Take Part in this Research Study
I freely give my permission to let my child take part in this study. I understand that this is research. I have received a copy of this letter and consent form for my records.

__________________________  ____________________________  _______________________
Printed name of child  Grade level of child  School

__________________________  ____________________________  _____________
Signature of parent of child  Date  Printed name of parent taking part in the study

Statement of Person Obtaining Informed Consent
I certify that participants have been provided with an informed consent form that has been approved by the University of South Florida’s Institutional Review Board and that explains the nature, demands, risks, and benefits involved in participating in this study. I further certify that a phone number has been provided in the event of additional questions.

__________________________  ____________________________  _____________
Signature of person obtaining consent  Date  Printed name of person obtaining consent
Appendix C: Student Assent

Dear Student:

Today you will be asked to take part in a research study titled, “Predictors of Academic Success among High School Students in College Preparatory Programs” (Pro0001094). You will be asked to complete several surveys that inquire about stressors that you experience; the things you do to deal with those stressors; your attitudes towards your classes and schooling in general; your relationships with classmates, teachers, and parents; features of your personality; your happiness and emotional distress, and your participation in extracurricular activities. Completing these surveys will take you approximately 45-60 minutes. To thank you for your participation, you will receive your choice of either a pre-paid movie ticket or a $10 iTunes gift card.

You are being asked to participate in this study because you are a high school student in an either in an International Baccalaureate (IB) Program, and/or Advanced Placement (AP) classes. Your parent or guardian has already given you permission to take part in this study. Your answers will be kept confidential to the extent of the law. However, if you tell us that you plan to hurt yourself or someone else, we would have to tell someone at your school in order to keep everyone safe. You are free to withdraw from participating at any time, and you will not be penalized.

If you have any questions about the study, please feel free to contact Dr. Suldo at (813) 974-2223 or Dr. Shaunessy at (813) 974-7007.

Assent to Participate

I understand what participating in this study requires, and I agree to take part in this study.

Signature of person taking part in the study  Printed name of person taking part in the study  Date

Signature of person obtaining assent  Printed name of person obtaining assent  Date
Appendix D: Demographics Form

Spring 2012 (Study #)  School: ___________  Version: ______   Code #: ______  IB

1. Birthdate: _______   _______   _______  
   (month)  (day)  (year)

2. I am in grade:  9   10   11   12
3. My age is:  13   14   15   16   17   18   19   20
4. My gender is:  Male  Female

5. In middle school, were you:
   a. in an IB school (MYP)?   No   Yes   Which school?__________________________
   b. in a magnet program?   No   Yes   Which program?__________________________
   c. in Honors/advanced classes?   No   Yes

6. Have you attended your current high school since the start of 9th grade?
   a. Yes
   b. No
   c. If no, what grade were you in when you transferred to this high school? 9   10   11   12

7. Are you of Hispanic, Latino, or Spanish origin?
   a. No, not of Hispanic, Latino, or Spanish origin
   b. Yes, Puerto Rican
   c. Yes, Mexican, Mexican American, Chicano
   d. Yes, another Hispanic, Latino, or Spanish origin (specify)____

8. My race/ethnic identity is: (circle all that apply)
   a. White
   b. Black or African American
   c. Asian
   d. American Indian/Alaska Native
   e. Native Hawaiian or Other Pacific Islander
   f. Other (specify):____

9. My parents are:
   a. Married
   b. Divorced
   c. Never married
   d. Never married but living together
   e. Separated
   f. Widowed

10. Which adult(s) do you live with most of the time?
    a. Mother and Father
    b. Mother only
    c. Father only
    d. Mother and Step-father (or partner)
    e. Father and Step-mother (or partner)
    f. Grandparent(s)
    g. Other relative (please specify):________________

11. My father’s highest education level is:
    a. 8th grade or less
    b. Some high school, did not complete
    c. High school diploma/GED
    d. Some college, did not complete
    e. College/university degree
    f. Master’s degree
    g. Doctoral level degree (Ph.D., M.D., etc.) or other degree
    h. Beyond Master’s level

12. My mother’s highest education level is:
    a. 8th grade or less
    b. Some high school, did not complete
    c. High school diploma/GED
    d. Some college, did not complete
    e. College/university degree
    f. Master’s degree
    g. Doctoral level degree (Ph.D., M.D., etc.) or other degree
    h. Beyond Master’s level

13. About how long does it take you to travel from your house to school on most mornings?__hrs__mins

14. About how many times have you visited the school nurse’s office this school year?____

15. How many of your friends are in an IB program?
    a. 1   b. 2   c. 3   d. 4   e. 5

16. I am satisfied with my school program (IB)
    a. Strongly Disagree
    b. Disagree
    c. Not Sure
    d. Agree
    e. Strongly Agree

130
Appendix E: School Attitude Assessment Survey-Revised (SAAS-R)

**Directions:** Please rate how strongly you agree or disagree with the following statements. In answering each question, use a range from (1) to (7) where (1) stands for strongly disagree and (7) stands for strongly agree. Please circle only one response choice per question.

<table>
<thead>
<tr>
<th>Statement:</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Slightly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am intelligent.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>2. I can learn new ideas quickly in school.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>3. I check my assignments before I turn them in.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>4. I am smart in school.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>5. I work hard at school.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>6. I am self-motivated to do my schoolwork.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>7. I am good at learning new things in school.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8. School is easy for me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>9. I want to get good grades in school.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>10. Doing well in school is important for my future career goals.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>11. I can grasp complex concepts in school.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
12. Doing well in school is one of my goals.  
13. I am capable of getting straight A’s.  
15. It’s important to get good grades in school.  
16. I am organized about my schoolwork.  
17. I use a variety of strategies to learn new material.  
18. I want to do my best in school.  
19. It is important for me to do well in school.  
20. I spend a lot of time on my schoolwork.  
21. I am a responsible student.  
22. I put a lot of effort into my schoolwork.  
23. I concentrate on my schoolwork.

<p>| | | | | | | |</p>
<table>
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<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
Appendix F: Perceived Stress Scale (PSS)

Directions: The next questions ask you about feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly.

<table>
<thead>
<tr>
<th>In the last month, how often have you...</th>
<th>Never</th>
<th>Almost never</th>
<th>Sometimes</th>
<th>Fairly often</th>
<th>Very often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ...been upset because of something that happened unexpectedly?</td>
<td>1 2 3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. ...felt that you were unable to control the important things in your life?</td>
<td>1 2 3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. ...felt nervous and “stressed”?</td>
<td>1 2 3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. ...found that you could not cope with all the things that you had to do?</td>
<td>1 2 3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. ...been angered because of things that happened that were outside of your control?</td>
<td>1 2 3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. ...felt difficulties were piling up so high that you could not overcome them?</td>
<td>1 2 3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix G: Modified Eustress Scale

We would like to know about your experiences with stress during this past school year. Here are some questions that ask you to indicate how often, in general, you have felt a certain way. For each statement, circle a number from (1) to (6) where (1) indicates you “Never” feel this way and (6) indicates this “Always” happens to you.

<table>
<thead>
<tr>
<th>How often...</th>
<th>Never</th>
<th>Almost Never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How often do you feel that stress positively contributes to</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>your ability to handle your academic problems?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. In general, how often do you feel motivated by your stress?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3. When faced with academic stress, how often do you find that</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>the pressure makes you more productive?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. How often do you feel that you perform better on an</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>assignment when under academic pressure?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. How often do you feel that stress for an exam has a positive</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>effect on the results of your exam?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix H: Coping with Academic Demands Scale (CADS)

**Instructions:** Many students face challenges or stress due to school. When this happens, students may react differently and do different things to make things better or to feel better about the way things are. For the items below, indicate how often you did each one in response to school-related challenges or stress this school year. There are no right or wrong answers, so please select the response that best reflects how often you react in each way during times of stress.

1 = Never (this means you do not ever respond to stress in this way)
2 = Rarely (this means you respond to stress in this way about a quarter of the time you feel stress)
3 = Sometimes (this means you respond to stress in this way about half the time you feel stress)
4 = Frequently (this means you respond to stress in this way about three-quarters of the time you feel stress)
5 = Almost always (this means you respond to stress in this way every or almost every time you feel stress)

Think about the current school year. When you are (or have been) faced with school-related challenges or stress, how often do you:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Almost Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Play videogames</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. Go over and over a negative situation in a conversation with a friend</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. Vent or complain to friends outside of your school program</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. Take less demanding classes</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. Talk to parent(s) about what’s bothering you</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. Go to church or place of worship</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. Focus on calming yourself down</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. Panic or “freak out” about the problem without trying to fix it</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. Turn in assignments late</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. Watch TV or videos</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. Have fun with other people to get your mind off the problem</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>12.</td>
<td>Take naps</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13.</td>
<td>Copy other students’ homework and assignments</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14.</td>
<td>Take a day off from school to get work done</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15.</td>
<td>Try to handle things on your own</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>16.</td>
<td>Try to ignore feelings of stress</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17.</td>
<td>Vent or complain to parent(s)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18.</td>
<td>Take part in enjoyable extra-curricular activities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19.</td>
<td>Focus on the work until it is complete</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20.</td>
<td>Ask teacher(s) questions about assignments or coursework</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21.</td>
<td>Pray</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22.</td>
<td>Exercise (run, go to the gym, swim, dance, etc.)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23.</td>
<td>Continue to think about your problem(s) even when doing other activities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24.</td>
<td>Stop caring about schoolwork</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25.</td>
<td>Keep problems to yourself</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>26.</td>
<td>Break work into manageable pieces</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>27.</td>
<td>Think about the bigger picture (your goals or values) to put things in perspective</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Think about the current school year. When you are (or have been faced with school-related challenges or stress), how often do you:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Frequentl</th>
<th>Almost</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.</td>
<td>Tell yourself that you can do it, for example that you’ve managed similar situations before</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>29.</td>
<td>Use a planner to keep track of activities and assignments due</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>30.</td>
<td>Keep thinking about work to be done (obsess about workload)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>31.</td>
<td>Take deep breaths</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
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<td>---</td>
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<td></td>
</tr>
<tr>
<td>32.</td>
<td>Spend time with family</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>33.</td>
<td>Talk to others to get your mind off the problem</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>34.</td>
<td>Become quiet (talk less or not at all to others)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>35.</td>
<td>Study with other students</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>36.</td>
<td>Get extra help for class from tutors</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>37.</td>
<td>Take a day off from school to sleep or relax (a “mental health day”)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>38.</td>
<td>Yell, scream, or swear</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>39.</td>
<td>Rely on your faith to help deal with the problem</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>40.</td>
<td>Surf the Internet (YouTube, news websites, etc.)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>41.</td>
<td>Go shopping</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>42.</td>
<td>Stop trying (give up)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>43.</td>
<td>Sleep to escape or put off the problem</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>44.</td>
<td>Work less on or just don’t do assignments that are less important</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>45.</td>
<td>Drink alcoholic beverages, such as beer, wine, liquor, etc.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>46.</td>
<td>Play team sports (basketball, soccer, football, crew, etc.)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>47.</td>
<td>Use drugs, such as marijuana, medications not prescribed to you, etc.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>48.</td>
<td>Skip school to avoid tests you are not ready for or assignments you have not finished</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>49.</td>
<td>Adopt an optimistic or positive attitude</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>50.</td>
<td>Talk to classmates (friends in your school program) about what’s bothering you</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>51.</td>
<td>Get and keep materials for school organized</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>52.</td>
<td>Take it out on other people (lash out, be mean, be sarcastic)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
### Appendix H continued

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>53.</td>
<td>Get mad, annoyed, or irritated</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>54.</td>
<td>Remind yourself of future benefits or rewards of finishing your school program, such as getting into college or getting scholarships</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>55.</td>
<td>Share (split-up) assignments with classmates</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>56.</td>
<td>Be purposeful about how you schedule and spend all of your time</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>57.</td>
<td>Sleep to recharge so you can tackle a problem</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>58.</td>
<td>Smoke cigarettes or use other tobacco products</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>59.</td>
<td>Prioritize the order in which you complete your work</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>60.</td>
<td>Hang out with friends</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>61.</td>
<td>Put off work until the last minute (procrastinate)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Appendix I: Short Grit Scale

Directions for taking the Grit Scale: Please respond to the following 8 items. Be honest – there are no right or wrong answers!

1. New ideas and projects sometimes distract me from previous ones.*
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all

2. Setbacks don’t discourage me.
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all

3. I have been obsessed with a certain idea or project for a short time but later lost interest.*
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all

4. I am a hard worker.
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all

5. I often set a goal but later choose to pursue a different one.*
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all

6. I have difficulty maintaining my focus on projects that take more than a few months to complete.*
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all
Appendix I continued

7. I finish whatever I begin.
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all

8. I am diligent.
   - Very much like me
   - Mostly like me
   - Somewhat like me
   - Not much like me
   - Not like me at all
Appendix J: Student Life Satisfaction Scale (SLSS)

We would like to know what thoughts about life you've had during the past several weeks. Think about how you spend each day and night and then think about how your life has been during most of this time. Here are some questions that ask you to indicate your satisfaction with life. In answering each statement, circle a number from (1) to (6) where (1) indicates you strongly disagree with the statement and (6) indicates you strongly agree with the statement.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My life is going well</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2. My life is just right</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3. I would like to change many things in my life</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4. I wish I had a different kind of life</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5. I have a good life</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6. I have what I want in life</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7. My life is better than most kids'</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>
Appendix K: School Burnout Inventory (SBI)

**Directions:** Please choose the alternative that best describes your situation in the past month.

<table>
<thead>
<tr>
<th>In the past month…</th>
<th>Completely</th>
<th>Partly Disagree</th>
<th>Disagree</th>
<th>Partly Agree</th>
<th>Agree</th>
<th>Completely Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I feel overwhelmed by my schoolwork.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2. I feel a lack of motivation in my schoolwork and often think of giving up.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3. I often have feelings of inadequacy in my schoolwork.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4. I often sleep badly because of matters related to my schoolwork.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5. I feel that I am losing interest in my schoolwork.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6. I’m continually wondering whether my schoolwork has any meaning.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7. I brood over matters related to my schoolwork a lot during my free time.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>8. I used to have higher expectations of my schoolwork than I do now.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>9. The pressure of my schoolwork causes me problems in my close relationships with others.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
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Appendix L: Confirmatory Factor Analysis for Gender

Females

Males

143
Appendix M: Confirmatory Factor Analysis for Grade

9th Grade

10th Grade

Appendix M continued
11th Grade

12th Grade
Appendix N: Confirmatory Factor Analysis for Program

AP

IB

146
Appendix O: Eustress Distress Model
Appendix P: Eustress Affective Engagement Model
Appendix Q: Eustress Cognitive Engagement Model
Appendix R: Eustress Time and Task Management Model
Appendix S: Eustress Cognitive Reappraisal Model
Appendix T: Eustress Talk with Classmates and Friends Model
Appendix U: Eustress Deterioration Model
Appendix V: Eustress Self-Efficacy Model
Appendix W: Eustress Flow Model
Appendix X: Eustress Grit Model
Appendix Y: Model Fit Information for Eustress and Student Outcomes

<table>
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<tr>
<th>Student Outcomes</th>
<th>N</th>
<th>df</th>
<th>$\chi^2$</th>
<th>SRMR$^a$</th>
<th>RMSEA$^b$</th>
<th>CFI$^c$</th>
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<td>24</td>
<td>369.46***</td>
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<td>.91</td>
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<tr>
<td>Life Satisfaction</td>
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<td>86</td>
<td>1140.50***</td>
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<td>.92</td>
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<td>Academic Burnout</td>
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<td>115</td>
<td>1943.32***</td>
<td>.06</td>
<td>.08</td>
<td>.86</td>
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<td>Psychopathology</td>
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<td>661</td>
<td>10291.09***</td>
<td>.08</td>
<td>.08</td>
<td>.61</td>
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</tbody>
</table>

*Note. *p < .05, **p < .01, ***p < .001.*
Appendix Z: Permission Information for Figure 2

Electronic Correspondence with American Psychological Association (APA) Permissions

Department

Dear Amanda,

If the material you are requesting is a figure and not a test/scale/measure, then permission is not needed. Please see our permissions guidelines page for how to properly cite our work. Please let me know if it is a test, etc.

http://www.apa.org/about/contact/copyright/index.aspx#not-required

Best,

Adele

Adele Hutchinson
Permissions Manager, Publications & Databases
American Psychological Association
750 First Street NE, Washington DC 20002-4242
202-432-0152

APA Permission Guidelines

Return to Top

3. Permission is Not Required for the Following:

- A maximum of three figures or tables from a journal article or book chapter
- Single text extracts of less than 400 words
- Series of text extracts that total less than 800 words

No formal requests to APA or the author are required for the items in this clause.
Appendix AA: IRB Approval Letter

July 23, 2010

Shannon Suldo, PhD
Psychological and Social Foundations
EDU 105

RE: Expedited Approval for Initial Approval
IRB#: Pro00001094
Title: Intrapersonal Factors Associated with Academic Success among High School Students in Advanced Placement and International Baccalaureate (AP-IB) Programs

Dear Dr. Suldo,

On 7/23/2010, the Institutional Review Board (IRB) reviewed and APPROVED the above referenced protocol. Please note that your approval for this study will expire on 7/23/2011.

Approved Items:
Consent/Assent Document(s):

<table>
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<th>Date</th>
<th>Time</th>
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</table>

It was the determination of the IRB that your study qualified for expedited review which includes activities that (1) present no more than minimal risk to human subjects, and (2) involve only procedures listed in one or more of the categories outlined below. The IRB may review research through the expedited review procedure authorized by 45 CFR 46.110 and 21 CFR 56.110. The research proposed in this study is categorized under the following expedited review category:

Appendix AA continued
(5) Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis).

(6) Collection of data from voice, video, digital, or image recordings made for research purposes.

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Please be advised that this initial approval only includes subjects recruited from the Pinellas County School District. Data collection within Hillsborough, Pasco, Broward and Duval school districts cannot begin until approval letters from those school districts are provided to the USF IRB.

Please note, the informed consent/assent documents are valid during the period indicated by the official, IRB-Approval stamp located on the form. Valid consent must be documented on a copy of the most recently IRB-approved consent form.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval by an amendment.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-9343.

Sincerely,

Krista Kutash, PhD, Chairperson
USF Institutional Review Board

Cc: Anna Davis, USF IRB Professional Staff
February 9, 2012

Shannon Suldo Ph.D.
Psychological and Social Foundations

RE: Approved Amendment Request
IRB#: MS6_Pro00001094
Title: Intrapersonal Factors Associated with Academic Success among High School Students in Advanced Placement and International Baccalaureate (AP-IB) Programs

Dear Shannon Suldo Ph.D.,

On 2/8/2012, the Institutional Review Board (IRB) reviewed and approved your Amendment by expedited review procedures.

(Study Description: Changes to protocol documents: In December and January, the study design (i.e., measures intended to be administered to the study participants) was externally reviewed by five expert consultants. These consultants recommended several measures to add to the data collection, as well as others to substitute to measures originally intended to be administered to assess a given construct. Thus, the primary changes in this amendment are to request permission to use a modified battery of measures in the upcoming study (Study 7 in the 7-study research plan). Below is a summary of which measures have been revised, which additional measures were added to the measure battery, as well as which measures have been dropped from the data collection plan to ensure that student completion of survey packet could occur in the 60 minutes that was initially planned for and stated in the consent and assent forms. Some measures were dropped to conserve space, while others were replaced with measures which assess the same constructs with fewer items. Furthermore, separate versions of several measures were made for administration to youth in different academic programs, specifically Advanced Placement (AP) and International Baccalaureate (IB) programs (i.e., one form of the measure for AP students only, another form for IBoI students only).

- Revised measures: Demographics, S0SI, CADS, SAAS-R, APS-R, PSSM, SDFS-2, TMBS, PSI-II, Eustress
- Added (new) measures: Dweek, HES, ECA, CAM, CLM, SBI
- Deleted measures: MASC, FOST I MPS, PALS- Parent performance scale, PALS- Parent Masstray GoalScale, Participation in School Activities Q, and CASSS

A second request in this amendment (in addition to using slightly different measures of the same constructs) is to increase the total number of participants permitted to participate in Study 7. Initially, we anticipated (and sought permission for) 2000 youth participants. We distributed
Appendix AA continued

4000 parent consent forms, anticipating a 50% response rate (consistent with our past studies of high school students). However, approximately 3000 students have gained parent consent to participate, and we would like to include all of these students in the data collection. We have sufficient funds from the grant to cover the costs of the additional participants. In sum, because the recruitment efforts were more successful than initially estimated at several of the schools that we are working with, we would like to include 3000 participants (high school students in AP and IB classes) in Study 7. The TOTAL number of participants in all three stages of the research project (Studies 1 - 7) thus increases from 2790 to 3790. These updated figures are now reflected in sections 6.1a and 6.1d of the original research request.)

The submitted request has been approved from date: 2/8/2012 to date: 7/23/2012

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

John Schinka, Ph.D., Chairperson
USF Institutional Review Board

Cc: Various Menzel, CCRP, USF IRB Professional Staff