PERFORMANCE AVOIDANCE, NEUROCOGNITION, AND NEUROPHYSIOLOGY IN A SAMPLE OF FIRST-GENERATION COLLEGE STUDENTS

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## ABSTRACT

What motivates individuals to achieve? This study uses achievement goal orientation theory and the Reinforcement Sensitivity Theory (RST), parallel theories which attempt to explain motivational behavior, to explore relationships between performance avoidance, academic achievement, neurocognition, and physiological arousal in first-generation college students. Performance avoidance, a component of achievement goal orientation, posits that individuals attempt to gain competence by avoiding performing worse than others. This orientation has been associated with negative risk factors and outcomes, such as anxiety, shame, fixed ideas of intelligence, fear of failure, procrastination and disorganization, academic dishonesty, and low GPA. First-generation college students, in comparison to continuing-generation college students, face unique academic, social, and financial challenges when pursuing higher education; thus, their motivational behavior is rife for exploration. Results of the study demonstrated several differences and similarities between first-generation and continuing-generation college students on the study's variables. It is hoped that the findings will support the current and future academic, financial, and psychological success of first-generation college students.

# Performance Avoidance, Neurocognition, and Neurophysiology in a Sample of First-Generation College Students

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## Chapter 1: Introduction

What motivates individuals to achieve? Achievement motivation is the desire to accomplish a challenging goal, a concept undergirded by the drive to succeed or avoid failure (McClelland et al., 1953). When individuals focus on success, their behavior is often oriented toward obtaining positive outcomes; a fear of failure often focuses one's behavior on avoiding negative outcomes, such as failure.

Achievement goal orientation theory, also called goal orientation, is a component of achievement motivation which applies to specific situations whereby individuals attempt to develop competence. Goal orientation theorists have applied the theory to various settings, including schools and universities, athletic competitions, and work. It has been posited that competence can be measured by task skill development, termed a mastery goal orientation, or by outperformance of others on tasks, termed performance goal orientation (Dweck, 1986; Nicholls, 1984). Mastery goal orientation is directed intrapersonally; the task is used as a measurement of competence in comparison to oneself. Somewhat oppositely, performance goal orientation is directed interpersonally, using one's standing in relation to others as the measurement of competence. Research has generally associated mastery goal orientation with positive outcomes, such as intrinsic motivation, excitement, and hope (Elliot & Harackiewicz, 1996; Pekrun et al., 2006). The research on performance goal orientation, however, is equivocal. For example, in academic settings, performance goal orientation has been associated with higher college GPA, as well as increased anxiety, academic dishonesty, boredom, and decreased intrinsic motivation (Elliot & Church, 1997; Huang, 2012).

Expanding goal orientation research, scientists applied an approach-avoidance spectrum to create four components of goal orientation: mastery-approach goals, mastery-avoidance goals,

performance-approach goals, and performance-avoidance goals (Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001). Mastery-approach goals concentrate efforts on improving task competence whereas mastery-avoidance goals concentrate efforts on avoiding task incompetence. Performance-approach goals concentrate efforts on demonstrating competence in comparison to other individuals whereas performance-avoidance goals concentrate efforts on avoiding incompetence in comparison to others. While the benefit of adopting either approach orientation has been debated, much literature has associated negative individual risk factors and outcomes with the adoption of performance-avoidance goals regardless of setting. Such risk factors and outcomes include neuroticism, fixed ideas of intelligence, fear of failure, anxiety, shame, procrastination and disorganization, impaired focus and concentration, and low GPA (Elliot & Church, 1997; Elliot & McGregor, 2001; Elliot & Murayama, 2008; Huang, 2012; Hulleman et al., 2010; Linnenbrink-Garcia et al., 2008; McGregor & Elliot, 2002).

There seems to be an intuitive relationship between a neurobiological theory of motivation and personality, Gray's Reinforcement Sensitivity Theory (RST; Gray, 1990), and goal orientation theory. Both utilize the approach-avoidance spectrum and attempt to illuminate motivational behavior. In RST, motivational behavior and related personality characteristics are suggested to be regulated by three biobehavioral brain systems, the Behavioral Approach System (BAS), the Behavioral Inhibition system (BIS), and the Fight-Flight System (FFS). The BAS was thought to regulate approach, or appetitive, behavior by focusing attention on rewards in the environment. Further research related the BAS to positive emotions such as hope and elation, as well as to resting left frontal alpha asymmetry when measured by electroencephalogram (EEG; Harmon-Jones & Allen, 1997). In contrast, the BIS was thought to regulate avoidant behavior by

focusing attention to possible failure, punishment, or even novelty in the environment. Further research associated the BIS with negative feelings such as fear, anxiety, and frustration, as well as resting right frontal alpha asymmetry as measured by EEG (Sutton & Davidson, 1997). A third brain system, the Fight-Flight System (FFS), was thought to mediate an individual's reaction to aversive stimuli. Revision of the RST amended the BIS, subsequently relating the system less with withdrawal behavior and more with resolving "goal conflict" or "risk assessment" (Gray & McNaughton, 2000). The experience of risk assessment was suggested to engender worry and rumination when attempting to decide between withdrawal or approach behavior.

First-generation college students are university students whose motivational behavior is rife for exploration. While the prevalence of American first-generation college students is rising, the pursuit of post-secondary education presents unique challenges for this group of students whose parents or guardians have not obtained a bachelor's degree (Garriott et al., 2015). Research suggests that they are generally financially, socially, and academically less equipped to pursue higher education in comparison to their continuing-generation college student peers (DeAngelo & Franke, 2015; Garriott et al., 2015; Wibrowski et al., 2017; Wohn et al., 2013). Such challenges in first-generation college students include higher uncertainty about attending college, lower completion of college entrance exams, less self-efficacy, less academic persistence, feeling "out of place" at university, and difficulty with academic and social identity development (Garriott et al., 2015; Jury et al., 2015). Research applying goal orientation theory to this group has demonstrated that they may be particularly vulnerable to adopting performance-avoidance goals while at university (Jury et al., 2015; Wibrowski et al., 2017).

Broadly, the purpose of the present study is to explore the relationship between goal orientation, neurocognition, and neurophysiology in first-generation college students. Specifically, performance avoidance, as well as academic achievement and personality characteristics, will be assessed in both first-generation and continuing-generation college students. Although intuitively related, the interrelationship between performance avoidance, neurocognition, and neurophysiology has yet to be explored in first-generation college students. Therefore, room exists to assess the connection between these variables in hopes of improving the academic experience and overall well-being of first-generation college students.

# Chapter 2: Literature Review

## Achievement Motivation and Achievement Goals

According to theorists, achievement motivation is the desire to accomplish a challenging goal which involves focusing one's behavior on success or avoiding failure (Lewin et al., 1944; McClelland et al., 1953; Murray, 1938). When achievement motivation is oriented towards a positive outcome, such as success of any sort, it often results in self-regulation to attain that positive outcome (Elliot & Church, 1997). Conversely, fear of failure focuses on avoiding a negative outcome which results in self-regulation to avoid potential failure. One form of achievement motivation is goal orientation or achievement goal orientation (Dweck, 1986; Nicholls, 1984; Vandewalle et al., 2018). Achievement goal orientation, derived from the literature on achievement motivation, are specific goals which focus on developing competence whereby an individual either develops their skills on a task or outperforms others on a task. Thus, achievement goals focus motivational orientations on competence in specific situations. Stated another way by different theorists, achievement goals are cognitive, future-oriented representations which guide behavior towards competence (Hulleman et al., 2010). Since achievement goal theory focuses on motivation and the understanding of its underlying components, research about the theory has proliferated for decades in the psychological subfields of social, cognitive, industrial-organizational, and educational psychology. Theorists have further been concerned with how this theory might relate to applied settings, such as academics and learning, work, and athletic competition.

**Mastery and performance goals.** In the 1980's, researchers posited that such achievement goals can be categorized into two components, either mastery-based goals or performance-based goals (Dweck, 1986; Nicholls, 1984). Individuals who adopt mastery-based

goals focus on developing competence, or a mastery of skills/tasks. Their motivation is orientated intrapersonally. When individuals utilize performance-based goals, they focus on developing competence in relation to others. Their motivation is oriented interpersonally.

In the extant literature, mastery goals have generally been associated with positive effects, while performance goals have evidenced mixed results. For example, some theorists have posited that mastery goals tend to promote and reinforce intrinsic motivation, because they create conceptual challenge, encourage involvement in the task, and engender excitement and self-determination (Elliot & Harackiewicz, 1996; Elliot & Church, 1997). While performance goals have been associated with positive effects, it generally depends on the outcome variable and the setting. For example, research has demonstrated that utilization of performance goals can hamper intrinsic motivation, because they can engender perceived threat and can interrupt involvement in the task. Further, their utilization can evoke anxiety or worry regarding evaluation (Elliot & Harackiewicz, 1996; Elliot & Church, 1997). One setting where mastery and performance goals may be adopted is the university classroom. College students often adopt achievement goals when attempting to meet the requisite academic demands of university.

**Addition of approach-avoidance spectrum.** In the 1990's, researchers applied the approach-avoidance spectrum to expand the achievement goal construct (Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001). The application of this spectrum developed the achievement goal construct into a four-component model comprised of mastery-approach goals, mastery-avoidance goals, performance-approach goals, and performance-avoidance goals. When an individual holds mastery-approach goals, they concentrate on task-based attainment; somewhat oppositely, when an individual holds mastery-avoidance goals, they focus on avoiding task incompetence. When an individual acts in a manner of performance-

approach, they focus on achieving positive goals and demonstrating superiority to others. Somewhat conversely, performance-avoidance goals focus on avoiding negative outcomes in comparison to others. Stated differently, they orient the individual to avoid performing poorly in relation to others. While research has demonstrated that individuals can simultaneously hold multiple goal orientations, depending on the context (Huang, 2012; Hulleman et al., 2010; Janssen et al., 2010; Linnenbrink-Garcia et al., 2008), and the extent to which individuals possess each goal orientation varies, many models of goal orientation posit that individuals associate with one component of goal orientation over other components (Vandewalle et al., 2018).

**Outcomes Related to Achievement Goal Orientations**

Since applying the approach-avoidance spectrum to achievement goals, research has generally demonstrated positive effects for both mastery and performance-approach goals. However, over the past two decades, there has been debate about whether positive outcomes are associated with the adoption of approach orientations (Elliot & McGregor, 2001; Harackiewicz et al., 2008; Hulleman et al., 2010; Stoeber et al., 2009). This debate has applied to many areas of psychology (e.g., educational, work, athletic settings). Focusing on academic achievement, for example, higher college GPA has been associated with both approach orientations (Brophy, 2005; Huang, 2012), but reduced help-seeking and cheating have also been associated with performance-approach goals (Hulleman et al., 2010; Payne et al., 2007).

On the contrary, much literature has demonstrated negative associations with performance-avoidance goals, including risk factors and outcomes (Elliot & McGregor, 2001; Hulleman et al., 2010; Linnenbrink-Garcia et al., 2008; McGregor & Elliot, 2002). For example, in post-secondary education, performance-avoidance has been associated with an array of

negative outcomes, such as procrastination, disorganization (Elliot & McGregor, 2001; McGregor & Elliot, 2002), and negative emotions such as anxiety, shame, and hopelessness (Pekrun, Elliot, & Majer, 2006, 2009). Further, this orientation to achievement has been shown to negatively predict GPA (Elliot & Church, 1997; Huang, 2012). Research has demonstrated that individual characteristics or beliefs may precede the adoption of performance-avoidance goals. Such examples of beliefs include fear of failure and fixed ideas of intelligence (Elliot & Church, 1997; Elliot & Murayama, 2008); individual personality characteristics associated with performance-avoidance goals include neuroticism and avoidance temperament (Bipp, Steinmayr, & Spinath, 2008; Elliot et al., 2011; Elliot & Thrash, 2010). Despite the generally negative consequences associated with performance avoidance goals, many college students continue to utilize them in university settings.

**Academic achievement.** Much literature has applied achievement goal theory to the study of academic performance and learning. Huang (2012) performed a series of meta-analyses which utilized a total of 151 studies and approximately 53,000 participants. The studies included journal articles, dissertations, theses, and conference papers. Huang assessed two, three, and four-factor achievement goal models to understand their discriminant and criterion-related validity, as well as assessed the studies to determine the relationship between achievement goals and academic achievement. Results indicated that for both the three and four-factor models of achievement goal (e.g., mastery approach, performance approach, and performance avoidance, and mastery approach, mastery avoidance, performance approach, and performance avoidance, respectively), mastery approach was positively correlated with academic achievement (e.g., SAT score and GPA), while performance avoidance was negatively correlated with overall academic achievement.

Linnenbrink-Garcia and colleagues (2008) assessed mastery and performance approach goals and academic achievement. They performed a systematic review of over 90 studies which assessed the benefits of these approach goals on academic achievement. They focused their review on peer-reviewed, empirical articles which were based in classroom and laboratory settings. Further, they analyzed studies assessing both self-reported goal orientations and experimentally manipulated goal orientations. Lastly, they assessed four potential moderating variables of these relationships, including ethnicity, age, gender, and ability. In the review, the authors also examined the relationship between approach goals and type of achievement task. This assessment showed that the usage of course grade, rather than overall GPA or performance on a specific course exam, provided the largest percentage of significant effects. The results suggested that 52% of effects demonstrated a positive relation for mastery-approach and course grade while 55% of effects demonstrated this pattern for performance-approach goals. Speaking about ability, the review suggested that, for those with low ability, the adoption of performance-approach goals may be harmful.

In a longitudinal, prospective study of undergraduate students, Harackiewicz and colleagues (2008) examined individual and situational interest, achievement goals, and academic performance in a psychology course. Data was collected across five time points, four time points during the semester that students were enrolled in Introductory Psychology, and once more, seven semesters later, from the academic record of the student. In total, 858 participants were studied across five time points. While the authors were primarily concerned with studying individual and situational interest and mastery goals, they also sought to replicate prior research regarding relationships between performance-avoidance goals, performance-approach goals, interest, and academic performance. More specifically, they hypothesized that performance-

avoidance goals would negatively predict grades in the course. Through a series of regression analyses, results demonstrated that students who utilized performance-avoidance goals obtained lower course grades and lower semester grades than students who used approach goals (both mastery and performance). Further analyses which incorporated longitudinal data from the students' academic performance seven semesters after taking Introductory Psychology demonstrated that students who utilized performance-avoidance goals during the Introductory Psychology class obtained lower grades over their academic career than students who used approach goals.

**Performance-Avoidance and Neurocognition**

Given that performance-avoidance is based in a fear of failure, adoption of this orientation may be related to pre-existing personality characteristics. Further, it has been shown to impair task focus. The negative experience of fear of failure may pervade one's outlook and can evoke vigilance, such that attempts to regulate the fear can interfere with an individual's attention to the task at hand (Pekrun et al., 2006; 2009). While such an approach may be helpful during some tasks (e.g., proof-reading, quality control and assurance), it can be less pleasant emotionally than approach-based goals, and it is not well-suited for task focus.

**Personality characteristics.** Bipp and colleagues (2008) studied the relationship between achievement goals, personality characteristics, and intellectual performance. To define achievement goals, they utilized a trichotomous model of achievement goals (e.g., mastery-approach, performance-approach, and performance-avoidance) and added a fourth dimension that has been previously posited in the literature, work-avoidance. Work-avoidance is theorized to be different than the trichotomous components in that it is not based in worry or fear, but simply in the tendency to avoid work or to put as little effort into a task as possible. Rather than

use the broad Big Five factors, the authors utilized the 30 sub-facets of the revised NEO personality inventory (NEO-PI-R; Costa & McCrae, 1992) to assess personality characteristics. Participants included 160 university students from a German University. Results demonstrated the strongest correlation (positive) between performance-avoidance and neuroticism, such that individuals who rated themselves higher in performance avoidance reported more neuroticism. There was no significant relationship between any of the goal orientations and intellectual performance.

**Attention.** Naismith and Lajoie (2018) utilized the achievement goal orientation framework to study attention to feedback in medical education. The authors sought to understand how motivation and emotion might impact medical students' attention to computer-based feedback. Based in the idea that students who seek feedback will attend to it, the researchers hypothesized that student adoption of mastery goals would positively predict attention to feedback while adoption of performance goals (both approach and avoidance) would negatively predict attention to feedback.

Using a single-group, repeated measures study, the participants were 28 new medical students from a Canadian university medical school. As a prerequisite for participation in the study, the participants had to complete a 7-week medical module. During their individual session, each participant gave informed consent to participate, then rated their achievement goal orientation using a questionnaire before they began using the virtual training software for a "think-aloud" experiment. During the think-aloud experiment, participants were tasked with thinking-aloud while they reviewed the medical background of three simulated virtual patients, ordered appropriate laboratory tests, provided diagnoses, and provided rationale for solving the case. After each patient, expert virtual, written feedback and solutions were provided to the

participant. Participants were also instructed to think-aloud while they reviewed the expert feedback. The feedback consisted of a short summary paragraph of 150-250 words, as well as a bulleted list of the participants' correct or incorrect solutions. Attention was then measured by matching participants' verbal utterances to "idea units" of the expert solutions. At the end of every expert feedback solution, each participant's achievement emotion was assessed.

Contrary to the researchers' hypotheses, results indicated that the most significant predictor of attention to the summary feedback paragraph was performance-avoidance. A one-unit increase in performance-avoidance increased attention to the summary by approximately 4 times. The researchers also found that shame was a strong predictor of attention to the summary feedback. In conclusion, they asserted that further research is warranted about the seemingly beneficial relationships between performance-avoidance, shame, and attention, especially in high ability populations.

**Differing Labels for Achievement Goal Components**

Researchers from different psychological subspecialties (e.g., social, industrial-organizational, educational) have historically defined achievement goals using different labels. Hulleman and colleagues (2010) conducted a meta-analytic review to address whether differing labels of achievement orientation were measuring the same constructs or whether similar labels were measuring dissonant constructs. They were further concerned with how potential differences in conceptualization and measurement might affect results. The meta-analytic review considered the discriminant and predictive validity of achievement goal theory across 243 correlational, self-report studies with more than 91,000 participants. In their review of more than 25 years of literature which spanned through 2006, the authors identified much diversity in the conceptualization and measurement of each of the four components of achievement goal theory.

Results indicated that performance avoidance was negatively correlated with performance outcomes and interest; however, this negative correlation between performance avoidance and performance outcome turned positive when a moderator analysis for nationality was performed. Asian samples demonstrated a more positive correlation between these variables in comparison to American and Canadian samples. The authors went on to assert that the results of the meta-analysis indicate differences in conceptualization and measurement of achievement goal components. They further asserted that given their results, achievement goal researchers are using the same label for varied constructs. In terms of the discussion of future studies, the authors suggest that further exploration is needed regarding the relationship between performance goals (both approach and avoidance), appearance, and self-worth, because these variables remain intertwined. Despite these critiques, the authors suggested that their results offered general support for the predictive and discriminant validity of achievement goals, especially for the separation of the performance goal into approach and avoidance components.

**Reinforcement Sensitivity Theory and Neurophysiology**

Reinforcement Sensitivity Theory (RST; Gray, 1990) can provide a useful theoretical backdrop to assist with explaining the relationships between achievement goal orientation, personality characteristics, and neurophysiology. Originally based in pharmacological research with animals, RST is a theory of emotion and cognition which helped elucidate the concept of motivation. The original theory posits that behavior is rooted in three distinct neurobiological systems which process pleasant and unpleasant emotional stimuli: a Behavioral Inhibition System (BIS), a Behavioral Activation System (BAS), and a Fight/Flight system (FFS). The BIS was theorized to initiate when a mammal encounters unpleasant stimuli, such as failure, threat, punishment, or even novelty. The BIS typically motivates the mammal to avoid, withdrawal, or

circumvent the threat. The BAS was theorized to initiate when encountering pleasant or desired stimuli, such as success, reward, or non-punishment, and typically motivates the mammal to approach the desired goal. The FFS was theorized to activate when encountering unconditioned stimuli, with resultant aggression or escape.

Further animal experimentation expanded RST to explore potential nuanced behavioral consequences of motivation and emotion (Blanchard & Blanchard, 1990). Utilizing predator/prey experiments, the results of Blanchard and Blanchard's experiments revealed that behavioral consequences were different for potential danger, or anxiety, versus actual danger, or fear. They asserted that the main difference between anxiety and fear was that of risk assessment whereby an animal was "assessing risk" if they were cautiously approaching a situation and scanning for aversive or hazardous stimuli. Expanding upon this research, Carver and White (1994) developed the BIS/BAS Scales to measure RST's proposed neurobiological systems in humans. The BIS/BAS Scale is a self-report questionnaire that investigates individual motivational responses to aversive or appetitive stimuli. Human neurophysiological research utilizing electroencephalography (EEG) helped establish a relationship between baseline frontal asymmetry and differences in motivational behavior as proposed by the RST. Specifically, greater relative left frontal baseline asymmetry was associated with BAS, approach behavior, and positive affect, whereas greater relative right frontal brain activity was associated with BIS, withdrawal behavior, and negative affect (Harmon-Jones & Allen, 1997; Sutton & Davidson, 1997).

**RST revision.** Considering the expanded animal and human neurophysiological data, Gray and McNaughton (2000) revised the Reinforcement Sensitivity Theory. According to the revised version of RST, the Behavioral Activation System (BAS) continued to influence

approach behavior. This system was again theorized to result from the desire to obtain appetitive or rewarding stimuli. The FFS system was renamed the Fight-Flight-Freeze system (FFFS) and was theorized to be a response to both unconditioned and conditioned stimuli with resultant aggression, escape, or freezing. The Behavioral Inhibition System (BIS) changed rather significantly and was no longer solely associated with withdrawal behavior; rather, the BIS came to represent the experiencing, identifying, and resolving of goal conflicts through "risk assessment". In other words, BIS is stimulated when there is a conflict between approach (BAS) or avoidance (FFFS) which likely results in cautious approach, worry, or rumination about potential loss or danger.

**Achievement Goal Orientation and Revised RST**

Achievement goal theory posits that individuals seek to develop competence either by motivation to develop their skills (mastery orientation) or by motivation to outperform others (performance orientation; Dweck, 1986; Nicholls, 1984). Subsequent theorists applied an approach-avoidance spectrum to the theory, thus subdividing the orientations into the components of mastery approach, mastery avoidance, performance approach, and performance avoidance (Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Elliot & McGregor, 2001). The approach-avoidance spectrum is also a component of the original and revised RST. Intuitively, similarity exists between the revised RST and achievement goal orientation theory. Namely, they both utilize the approach-avoidance spectrum in an attempt to elucidate the motivation behind behavior.

**Neurophysiological data.** In a study by Wacker and colleagues (2003), the authors attempted to understand how different emotions and motivational direction (e.g., approach or withdrawal) relate to frontal asymmetry. One reason for the study included a question about the

emotion of anger and its relationship with motivational direction. Extant research has shown that anger is a negatively valenced emotion associated with approach behavior and left anterior EEG asymmetry. However, other research has typically associated negatively valenced emotions with withdrawal behavior. In their study, the authors presented a model, termed the preference model, in which an emotion is coupled with a motivational state, both of which relate to frontal EEG asymmetry. Specifically, the researchers asserted that anger is preferentially coupled with approach motivation and fear is preferentially coupled with withdrawal motivation. They went on to assess multiple models of frontal EEG asymmetry, including their own, during different emotional states, namely anger and fear. They also assessed "goal conflict", the extent to which anger or fear matches or mismatches approach or withdrawal behavior. The authors hypothesized that anger-approach would be associated with left frontal EEG asymmetry while anger-withdrawal would not demonstrate this activation pattern. They further hypothesized that fear-withdrawal, but not fear-approach, would be associated with relative right anterior EEG asymmetry.

In a between-subjects, quasi-experimental design, participants included 109, German, adult male soccer players. After informed consent, baseline EEG was recorded for all participants. While still being assessed by EEG, participants were read scripts about anger or fear-inducing soccer situations and were asked to imagine themselves as the protagonist in the situation. Afterwards, their emotion and motivational direction were assessed by self-report questionnaires.

Focusing on the Alpha 1 band, results demonstrated greater relative left lateralized asymmetry in the anger-approach group than in the control group and fear-withdrawal group. No significant results were found for greater relative right anterior asymmetry in either of the fear

groups. These results provided partial credence for the preference model. However, the results also provided support for idea of goal conflict in the revised RST theory (Gray & McNaughton, 2000), such that participants with greater goal conflict (e.g., the experience of conflict when a behavior is mismatched with an emotion, for example, anger-withdrawal, since anger is typically coupled with approach) demonstrated greater relative right EEG asymmetry and participants with lower goal conflict demonstrated greater relative left EEG asymmetry.

In a pilot study with similar EEG findings, Muller and colleagues (2018) sought to research the relationship between two achievement motives and resting frontal and parietal asymmetry using EEG. The achievement motive was divided into two components, an approach motive (termed *hope for success*) and an avoidance motive (termed *fear of failure*). Each of these motives was measured explicitly and implicitly. Participants included 29 undergraduate students at a German university. After informed consent, resting state EEG data for frontal and parietal sites was gathered, along with demographic data. Then, implicit motives (achievement, power, affiliation) were assessed by a multi-motive-grid (MMG) in which 94 drawing-statement pairs were presented to each participant on a screen. Participants rated whether or not the drawing applied to them. Explicit achievement motivation was measured by a 10-item self-report questionnaire to assess participants' level of approach motive or avoidance motive. Results indicated a positive correlation between frontal alpha asymmetry and the implicit difference score. Specifically, individuals who scored higher on approach motivation, or hope for success, demonstrated greater relative left than right baseline frontal EEG asymmetry. There were no other significant findings.

**Performance avoidance, goal conflict, and revised RST.** To further explore the concept of performance-avoidance, it can be helpful to view it as either goal conflict/risk

assessment (BIS) or approach motivation (BAS). Performance-avoidance may be viewed either as an individual who is not actively withdrawing from a situation but is performing an action while experiencing "cognitive conflict" or risk assessment (BIS). Stated another way, it seems that individuals who utilize performance avoidance goals are performing an action in a conflictual manner since they are attempting to become competent in a way that seeks to avoid appearing incompetent. This concept of "conflict" or risk assessment was posited in the revised version of the RST and has been associated with greater relative right than left anterior EEG asymmetry (Wacker et al., 2003). However, the Wacker and colleagues (2003) went on to explain the revised RST theory in terms which mirror the concept of performance-avoidance. They assert that:

> Left frontal activation happens, regardless of motivational direction, when the goal is to actively avoid an aversive event by acting in a way that promises success, that is, when behavior is motivated by the prospect that punishment can be avoided and when the BAS is engaged. (p. 170)

This quote seems to define performance-avoidance and asserts that such behavior is associated with approach motivation and left frontal baseline asymmetry. Continuing with this line of thinking, performance avoidance can be interpreted as a complex approach behavior. For example, performance avoidance, especially in a university academic setting, can be thought of as an approach behavior (BAS) insofar as the individual is attending university and pursuing a reward (e.g., a degree).

Two competing models of the relationship between frontal EEG asymmetry and emotion-motivation (e.g., revised RST and preference model) exist. Relatedly, these models can be intuitively applied to subjective interpretations of the achievement goal orientation component of

performance avoidance. Thus, given the research outlining the somewhat opposing data regarding baseline frontal EEG asymmetry, emotion-motivation, and performance avoidance, it makes sense to further study the potentially complex relationships between each of these concepts.

**First-Generation College Students**

Despite increased social and economic contention about the value of post-secondary education, obtaining a bachelor's degree remains salient for upward financial and social mobility (Garriott et al., 2015; Jury et al., 2015; Pew Research Center, 2014; Wibrowski et al., 2017). In 2014, the Pew Research Center surveyed over 2000 American individuals, aged 25-32 (e.g., "millennials"), regarding their economic and life satisfaction after attending or not attending college. Data suggested that college graduates reported more satisfaction with both their jobs or careers and their financial situations in comparison to high school graduates. They also earned considerably more money, on average, than those who did not attend college (e.g., greater than $15,000 annually; Garriott et al., 2015).

Attending university, however, is not a right in the United States and college attainment is not uniformly distributed among students. In fact, the opportunity to attend college can be uniquely challenging for first-generation college students. Depending on the resource used, first-generation college students can be defined as students enrolled in post-secondary education whose parent(s) or guardian(s) does not have a bachelor's degree (Garriott et al., 2015; Pew Research Center, 2014). Another definition includes college students whose parents have no post-secondary educational experience. For purposes of this study, the former definition will be used. Conversely, continuing-generation students are students who are enrolled in post-secondary education who have at least one parent or guardian who has obtained a bachelor's

degree or higher. Research has indicated that parents who are college graduates are often better equipped to provide financial and social capital to their children than parents who do not have a bachelor's degree. The prevalence of first-generation college students in America is growing. Historically, they were underrepresented compared to continuing-generation students. For example, according to a report by the U.S. Department of Education, in 2012, approximately 24% of a national sample of university students were first-generation college students whose parents had no college experience, while 34% of the sample were first-generation students whose parents did not have a bachelor's degree, and 42% of the sample were continuing-generation students (Redford & Hoyer, 2017). However, these numbers have increased more recently. According to a different report by the U.S. Department of Education, in 2016, 24% of a national sample of 89,000 undergraduate students had parents with no post-secondary education, while 56% of the sample were first-generation college students whose parents did not have a bachelor's degree (RTI International, 2019).

Extant research has highlighted many other differences between first-generation and continuing-generation college students. Some of these differences include lower levels of college readiness for first-generation students, lower rates of completion of college entrance exams, less academic persistence while in school, lower self-efficacy, higher loan borrowing amounts, less family support, and lower rates of retention (DeAngelo & Franke, 2015; Garriott et al., 2015; Wibrowski et al., 2017; Wohn et al., 2013). Other challenges for first-generation students include ambivalence about attending college, navigating the college landscape with little information provided by parents or guardians, and psychological difficulties adjusting to the cultural differences of college (Davis, 2012; DeAngelo & Franke, 2015; Jury et al., 2015). For example, first-generation college students may find more emphasis on independence in college, a cultural

value that may stand in contrast to interdependent dynamics in one's family. Also, attending college likely involves development of one's social identity, especially for first-generation college students. Changing social identities is a time of psychological growth which requires social support and coping strategies. For first-generation college students, parental support during this developmental period may be hampered by parent's limited knowledge of college norms and culture (Jury et al., 2015). Justly, this group of students can be considered a unique group in the university setting.

To further study the uniqueness of this group, Garriott and colleagues (2015) assessed well-being in a sample of first-generation and continuing-generation college students. They examined the goodness-of-fit of Lent's (2004) social-cognitive model of life satisfaction and psychosocial adjustment in each of these groups. The previously posited model explores how components of personality characteristics, social-cognition, goals, and progress contribute to life satisfaction. The authors used the model to assess the relationships between the variables of environmental support, affect, self-efficacy, academic outcome expectations, and academic progress to understand their contribution to academic and general life satisfaction in the proposed groups.

Participants included 414 college students from two universities, one in the Midwestern area of the U.S. and one in the Rocky Mountain area of the U.S. More than half of the sample (52%) identified as first-generation college students. Participants came from every year of undergraduate education with almost even distribution. Participants were contacted through a campus-wide student listserv and self-selected into study. They filled out measures which assessed demographics, including generational status, academic goal progress, academic satisfaction, college outcome expectations, college self-efficacy, environmental supports,

intrinsic motivation, life satisfaction, perceived importance of college, and positive affect. Structural equation modeling was used to assess goodness of fit of the model, including mediation and moderation analyses to test the original hypothesized paths of the model. Results indicated that the model provided a partial, adequate fit for first-generation and continuing-generation students. Specifically, for both groups, environmental supports predicted self-efficacy while outcome expectations predicted academic satisfaction. Also, self-efficacy was found to be a mediator between positive affect and academic satisfaction for both groups, such that increased positive affect likely increased confidence with college tasks which lead to higher academic satisfaction. Lastly, a small, though significant, three-way interaction of generational status was found which moderated the relationship between intrinsic motivation and life satisfaction. Specifically, when academic satisfaction was high, the relationship between intrinsic motivation and life satisfaction was weaker for first-generation students compared to continuing-generation students. The authors suggested that, for first-generation college students, the results may be explained by the potential personal costs of attending and graduating college. For example, being distanced, geographically and psychologically, from friends and family, taking on significant debt, and feeling "out of place" in college or in their relationships may hamper general life satisfaction for motivated, academically talented first-generation college students. Conversely, the authors suggested that such proposed costs may not be evident for continuing-generation students because high intrinsic motivation and academic satisfaction likely lead to increased life satisfaction in a group where college attendance and graduation are often valued and expected.

Despite the personal, social, and economic challenges associated with attending college for first-generation students, the long-term economic and social benefits of a bachelor's degree remain enticing. It is not surprising then that the pursuit of college remains a desire of many,

including those who have historically lacked access or found it difficult to pursue university education.

**Performance-avoidance.** Many researchers have studied achievement goal orientation in first-generation college students. Wibrowski and colleagues (2017) studied the longitudinal effects of an interventional skills learning support program (SLSP) on the motivation, academic achievement, and self-regulatory strategies of first-generation college students from disadvantaged backgrounds. Data regarding participants' goal orientations was also gathered. In total, 876 students from a university in the northeast United States participated in the study. Of those students, 137 took part in the SLSP intervention while 739 students acted as a control group and did not participate in the intervention. The authors reported that majority of the participants in the intervention group were first-generation college students from ethnically diverse and disadvantaged backgrounds, although the specific numberof participants, including their demographics, was not reported in the study.

Participants were given pre and post-intervention measures which assessed motivational beliefs and learning strategies, as well as goal orientation. Academic achievement was measured by three factors: GPA (post-intervention and at the completion of university), and completed credits. Participants received direct services in the areas of financial aid, academic enrichment, and counseling. They were also assigned an academic advisor who aided them until they obtained 30 credits. The SLSP also consisted of an intensive, 6-week summer workshop, five days per week for seven hours per day, prior to their entrance into college. The workshop focused on preparatory coursework, including reading and critical thinking, tutoring, study skills advice, information on physical health and mental well-being, and individual and group counseling. The SLSP continued for the following two semesters during which participants were

enrolled in one course which provided similar information. The authors hypothesized that after the end of their freshmen year, students enrolled in the SLSP would report increased self-regulation strategies and academic motivation. They also hypothesized that students in the intervention group would show higher levels of graduation rates and achievement in comparison to the control group of freshmen students.

Results partially supported the hypotheses. Students enrolled in the SLSP reported increased academic motivation, self-regulation strategies, and resource utilization. Regarding goal orientation, students who participated in the intervention reported an increase in performance avoidance and anxiety from pre- to post-intervention. The authors suggested that these increases may have been due to pre-existing unrealistic expectations about university-level academics and general college life. Results further indicated that although SLSP students had similar end of first-year cumulative GPAs in comparison to the control group, SLSP students achieved at significantly higher levels than regularly admitted students because they started with lower high school GPAs and lower SAT scores. However, contrary to one study hypothesis, longitudinal results indicated that students in the SLSP group graduated at similar rates in comparison to those in the control group. The results of this study indicated that despite improved academic achievement throughout their freshman year and generous academic, social, and personal support prior to entering college, first-generation college students reported an increase in performance-avoidance and anxiety at the conclusion of their freshman year.

Jury and colleagues (2015) conjectured that some groups of college students may be particularly vulnerable to adopting performance avoidance goals. Specifically, the authors wondered if sociocultural factors, such as generational status and social class, might contribute to utilization of performance avoidance goals in college. Therefore, the authors assessed

generational status and academic performance to see if these variables could predict university psychology students' adoption of performance avoidance goals. The authors used three separate studies to test the hypothesis that as first-generation college students' academic performance increases, the more they will endorse performance avoidance goals.

The first study assessed the students' general studies, as measured by their high school completion exam, performance avoidance, and generational status. Participants included 216 first-year psychology students at a French university who answered questionnaires about the variables during a lecture at the start of fall semester. Of these participants, 94 were first-generation students. Results indicated that first-generation college students endorsed higher levels of performance avoidance than continuing-generation students. Further, as academic performance increased, first-generation college students endorsed higher levels of performance avoidance in comparison to continuing-generation students. This finding suggests that despite the first-generation students' achievement trajectory, they utilize more performance-avoidance strategies than their continuing-generation student counterparts.

The second study assessed one of the students' classes, as measured by their fall semester grade, performance avoidance, and generational status. Participants included 257 first-year students enrolled in a social psychology course at a French university. Of these participants, 104 were first-generation students. All participants answered questionnaires about the variables during a spring semester social psychology class. The results were again significant such that for high achievers, first-generation students endorsed higher levels of performance avoidance compared to continuing-generation students. This difference in the endorsement of performance avoidance was not found for low-achieving students in each of the groups.

The last study assessed the relationship between one exam, a psychology exam taken during the fall semester, performance avoidance, and generational status. Participants included 286 first-year students enrolled in a psychology class at a French university, of which 124 were first-generation college students. Results were similar to the first two studies, such that as academic achievement increased, first-generation students endorsed more performance avoidance goals compared to continuing generation students. The authors suggest that these findings add social class, operationalized by generational status, as a variable to consider when predicting the utilization of performance avoidance goals, especially for first-generation college students who are high achievers.

## The Present Study

**Purpose of the present study.** The purpose of this study was to explore the relationships between achievement goal orientation, neurocognition, and neurophysiology. More specifically, the overall aim of the study was an exploratory analysis of how these concepts motivate and influence the academic success of first-generation college students (e.g., undergraduate students whose parent(s) or guardian(s) does not have a bachelor's degree). Moreover, the variables of performance avoidance, a component of achievement goal orientation, neurocognition, and neurophysiology, along with aspects of personality and emotion, were assessed in both first-generation and continuing-generation college students, with a particular focus on the experience of the former group. Few studies have researched performance avoidance, neurocognition, and neurophysiology in either of these populations. Thus, knowledge about possible interrelationships between variables in first-generation college students is scarce.

While there is extensive literature focusing on the relationship between motivational direction (e.g., approach or avoidance), psychophysiology, and emotion, little research has been

conducted which applies these variables to achievement goal orientation. Moreover, despite an intuitive relationship, neural and physiological underpinnings of achievement goal orientation are largely unexplored (Muller et al., 2018). The results may help to guide academic, social, and psychological interventions with first-generation college students to improve their academic progress and general well-being.

**Proposed Aims, Hypotheses, and Statistical Analyses**

**Aim one.** The primary aim of the study was to explore the relationship between performance avoidance and academic achievement in first-generation college students.

***Hypothesis one.*** It was hypothesized that performance avoidance would be negatively correlated with high school and college GPA in first-generation college students. Moreover, first-generation college students would report lower high school and college GPAs than continuing-generation students.

***Analysis of hypothesis one.*** A correlation analysis would be used to explore relationships between performance avoidance, high school GPA, and college GPA in first-generation college students. If significant correlations were found between the variables, further examination would utilize a multiple regression analysis to predict performance avoidance from high school GPA and college GPA in this group. Additionally, a moderation analysis would be conducted to understand the effect of generational status on significant correlations. Lastly, independent sample, one-tailed *t*-tests would be conducted to compare the means of high school and college GPAs between first-generation and continuing-generation college students.

**Aim two**. Explore the relationship between performance avoidance and neurocognition in first-generation college students.

***Hypothesis two.*** Performance avoidance would be positively correlated with behavioral inhibition in first-generation college students. Moreover, first-generation college students would report higher levels of behavioral inhibition in comparison to continuing-generation college students.

***Analysis of hypothesis two.*** A correlation analysis would be used to explore the relationship between performance avoidance and behavioral inhibition in first-generation college students. Also, a moderation analysis would be conducted to understand the effect of generational status on variables in this hypothesis. Lastly, an independent sample, one-tailed *t*-test would be conducted to compare the means of behavioral inhibition between first-generation and continuing-generation college students.

***Hypothesis three.*** Performance avoidance would be positively correlated with behavioral activation in first-generation college students. Moreover, first-generation college students would report higher levels of behavioral activation in comparison to continuing-generation college students.

***Analysis of hypothesis three.*** A correlation analysis would be used to explore the relationship between performance avoidance and behavioral activation in first-generation college students. Also, a moderation analysis would be conducted to understand the effect of generational status on variables in this hypothesis. Lastly, an independent sample, one-tailed *t*-test would be conducted to compare the means of behavioral activation between first-generation and continuing-generation college students.

***Hypothesis four.*** Performance avoidance would be positively correlated with neuroticism in first-generation college students. Moreover, first-generation college students would report higher levels of neuroticism than continuing-generation college students.

***Analysis of hypothesis four.*** A correlation analysis would be used to explore relationships between performance avoidance and neuroticism in first-generation college students. If significant correlations were found between these variables, as well as between the variables of performance avoidance, behavioral inhibition (hypothesis two), and behavioral activation (hypothesis three), a multiple regression analysis would be utilized to predict performance avoidance in first-generation college students using all the variables in hypotheses two through four. Also, a moderation analysis would be conducted to understand the effect of generational status on variables in this hypothesis. Lastly, an independent sample, one-tailed *t*-test would be conducted to compare the means of neuroticism between first-generation and continuing-generation college students.

***Hypothesis five.*** Performance avoidance would be positively correlated with perceived executive dysfunction in first-generation college students. Moreover, first-generation college students would report higher levels of perceived executive dysfunction in comparison to continuing-generation college students.

***Analysis of hypothesis five.*** A correlation analysis would be used to explore relationships between performance avoidance and perceived executive dysfunction in first-generation college students. Also, a moderation analysis would be conducted to understand the effect of generational status on variables in this hypothesis. Lastly, an independent sample, one-tailed *t*-test would be conducted to compare the means of perceived executive dysfunction between first-generation and continuing-generation college students.

***Hypothesis six.*** Performance avoidance would be associated with diminished attention in first-generation college students. Moreover, first-generation college students would report more difficulties with attention than continuing-generation college students.

***Analysis of hypothesis six.*** A correlation analysis would be used to explore relationships between performance avoidance and attention in first-generation college students. Also, a moderation analysis would be conducted to understand the effect of generational status on variables in this hypothesis. Lastly, independent sample, one-tailed *t*-tests would be conducted to compare the means of attention between first-generation and continuing-generation college students.

***Hypothesis seven.*** Performance avoidance would be negatively correlated with working memory in first-generation college students. Moreover, first-generation college students would report/demonstrate lower working memory in comparison to continuing-generation students.

***Analysis of hypothesis seven.*** A correlation analysis would be used to explore relationships between performance avoidance and working memory in first-generation college students. Also, if significant correlations were found between these variables, as well as between the variables of performance avoidance and perceived executive dysfunction (hypothesis five), and attention (hypothesis six), a multiple regression analysis would be utilized to predict performance avoidance in first-generation college students using all the variables in hypotheses five through seven. Also, a moderation analysis would be conducted to understand the effect of generational status on variables in this hypothesis. Lastly, an independent sample, one-tailed *t*-test would be conducted to compare the means of working memory between first-generation and continuing-generation college students.

**Aim three**. Explore the relationship between performance avoidance and psychophysiology in first-generation college students.

***Hypothesis eight.*** Performance avoidance would be positively correlated with perceived arousal in first-generation college students. Moreover, first-generation college students would report higher levels of perceived arousal in comparison to continuing-generation college students.

***Analysis of hypothesis eight.*** A correlation analysis would be used to explore relationships between performance avoidance and perceived arousal in first-generation college students. Also, a moderation analysis would be conducted to understand the effect of generational status on variables in this hypothesis. Lastly, an independent sample, one-tailed *t*-test would be conducted to compare the means of perceived arousal between first-generation and continuing-generation college students.

# Chapter 3: Research Methods

## Participants

The current study sought to examine a data set consisting of at least 128 participants. Participants were gathered from two sources: the undergraduate research pool at East Carolina University and from a random sample of 250 East Carolina University undergraduate students' email addresses provided by Institutional Planning, Assessment, and Research (IPAR). The ECU undergraduate pool consists primarily of students enrolled in introductory psychology and introductory neuroscience courses who voluntarily participate in university research for respective course credit. At ECU, IPAR assists in collecting, analyzing, and disseminating data about the university. They were contacted as a second resource to provide a random sample of potential ECU students from which to draw the study's sample. Amazon's MTurk was originally proposed as a second recruitment source; however, after consultation with departmental faculty and further research into the web-based crowdsourcing platform, the decision was made to forego the source given its high cost and potential difficulties with recruiting the correct population. Eligibility requirements for the study included being at least 18 years of age, attendance at East Carolina University, right-handedness, normal or corrected vision, and no history of head trauma.

Two a priori statistical power analyses were performed using G*Power v. 3.1.9.2 to estimate necessary sample size for correlational tests and independent *t*-tests. For the correlational tests, the power analysis indicated that a sample size of 84 would provide 80% power for detecting a medium effect size. For the independent *t*-tests, the power analysis indicated that a sample size of 128 would provide 80% power for detecting a medium effect size. Thus, the proposed sample size of $N = 128$ was adequate for the main aims of this study.

**Comment regarding Coronavirus pandemic.** Given the current coronavirus pandemic, considerable limitations were placed on in-person data collection. Thus, this methodology was significantly abbreviated in its form. This included an abbreviated number of neurocognitive measures, since many measures must be administered in-person (e.g., processing speed). Also, there was no ability to collect objective neurophysiological data via electroencephalogram (EEG) at the time of the study's proposal.

## Measures and Questionnaires

**Demographics questionnaire.** This questionnaire gathered information regarding date of birth, age, handedness, current academic year, major/intended major, race/ethnicity, sex, and gender identity. Other variables included first-generation college student status, including a definition of this status, final high school GPA (or GED status if a diploma was not obtained), current college GPA, current employment status, including number of weekly work hours, and questions related to the coronavirus pandemic. Lastly, participants were asked to list any current or past physical and/or mental health conditions.

**Achievement goal orientation questionnaire.** An array of measures assessing goal orientation have been created across the subdisciplines of educational, industrial-organizational, sports, and social psychology. Elliot and McGregor (2001), working in the academic achievement setting, applied the approach-avoidance spectrum to the mastery-performance goal orientations to create a measure assessing four components of achievement goal orientation, the revised version of which was administered to participants in this study.

***Achievement Goal Questionnaire-Revised (AGQ-R).*** The Achievement Goal Questionnaire-Revised (Elliot & Murayama, 2008) is a self-report questionnaire which measures an individual's beliefs about how their behavior aligns with the four components of achievement

goal orientation: mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance. The original Achievement Goal Questionnaire (AGQ; Elliot & McGregor, 2001) was critiqued and adjusted by Elliot and Murayama (2008) to create the revised version with items that focused less on explicit affective content. The revised version contains 12-items with three items each which assess the four components of achievement goal orientation. Respondents use a 5-point Likert scale to indicate the extent to which they agree with statements, such that a rating of 1 indicates "strongly disagree" and 5 indicates "strongly agree". Scores are averaged for each of the four component scales to produce four index score, with higher scores indicating more agreement. Internal consistency is acceptable as Cronbach's alpha is greater than 0.70 (Elliot & Murayama, 2008)

**Neurocognitive questionnaires.** Participants were administered brief measures assessing multiple domains of neurocognition, motivation and personality characteristics, executive functioning, attention, and working memory.

***BIS/BAS Scales.*** The BIS/BAS Scale (Behavioral Inhibition System, Behavioral Activation System) assesses individual differences in motivational behavior to punishing or rewarding stimuli using 20 items in a self-report format (Carver & White, 1994). The authors developed the measure to capture the behavioral manifestation of the neurophysiological aspects of the Reinforcement Sensitivity Theory (RST). Originally, the questionnaire consisted of four scales: a single BIS scale and three BAS subscales in which BIS and BAS were conceptualized to represent independent components of affect and behavior. The BIS scale contains seven items regarding anticipation of punishment with resultant withdrawal behavior. Since the revision of the RST (Gray & McNaughton, 2000), research highlighted the need to bifurcate the solitary BIS scale into two subscales of anxiety and fear. The subscale of BIS-Anxiety encompassed four

items while the BIS-Fear subscale encompassed three items (Corr & McNaughton, 2008; Heym et al., 2008; Johnson et al., 2003; Smillie et al., 2006), with a total BIS score being the sum of the two subscales. The BAS continues to have three subscales which contain 13 items related to anticipation of reward and resultant approach behavior. A total BAS score is the sum of the three subscales of Reward Responsiveness (BAS-RR; 5 items), Drive (BAS-D; 4 items), and Fun-Seeking (BAS-FS; 4 items). Reward-Responsiveness items pertain to positive reactions to the anticipation and incidence of reward. The Drive scale items assess continual pursuit of chosen goals. The Fun-Seeking scale assesses the desire for novel rewards and the inclination to spontaneously approach a potentially rewarding event. Each item response of the measure uses a 4-point, Likert-type scale with 1 indicating "strongly agree" and 4 indicating "strongly disagree", with higher responses suggestive of more sensitivity to a scale. For example, an individual may score high on BIS and low on BAS, which suggests that they are likely to be motivated by fear of failure or negative consequences, with little concern about reward or positive consequences. The scales have high internal consistency and adequate reliability ranging from 0.66 to 0.76 (Carver & White, 1994; Sutton & Davidson, 1997). Further, the scales have been supported in use with clinical populations, namely with those experiencing anxiety and depression, suggesting that higher levels of BIS are related to both disorders (Campbell-Sills et al., 2004).

***Mini-IPIP.*** The Mini-IPIP is a self-report measure which consists of 20-items assessing the personality factors of neuroticism, extraversion, intellect/imagination, agreeableness, and conscientiousness. It is an abbreviated version of the 50-item International Personality Item Pool (IPIP), which was developed based on the Big Five trait factor model of personality (McCrae & Costa, 1992). The shortened personality measure was developed as a more feasible, quicker option for situations in which administration of the full IPIP was not possible or recommended.

Participants read 20 statements regarding people's behavior and rate whether there is a high or low level of agreement or disagreement with their own personality and behavior. Participants rate each statement using a 5-point Likert scale with responses ranging from '1' – *Disagree Strongly*, to '7' – *Agree Strongly*; higher scores indicate more agreement with each scale. The Mini-IPIP has demonstrated valid and reliable results which measure the five factors of personality, with internal consistency at or greater than .60 (Donnellan et al., 2006).

***Behavioral Rating Inventory of Executive Function-Adult (BRIEF-A).*** The original BRIEF (Gioia et al., 2000), a child neuropsychological measure, was extended to create the BRIEF-A version (BRIEF-A; Roth et al., 2005), which applies to adults aged 18-90. There is a self- and informant-report form, the former of which was utilized for this study. The self-report questionnaire assesses an individual's perceived difficulty with executive function in daily situations using 75-items that are each scored on a 3-point Likert scale. Individuals are asked to report how often each situation has been a problem for them over the past month ('1' – *never,* '2' – *sometimes,* '3' – *always*). The measure is comprised of nine scales which sum to create two index scores (BRI – Behavioral Regulation Index; MCI – Metacognition Index) and an overall score (Global Executive Composite). The BRI contains four scales (Inhibit, Shift, Emotional Control, and Self-Monitor) which assess the ability to regulate emotional responses and behavior. The MCI contains five scales (Working Memory, Plan/Organize, Initiate, Task Monitor, and Organization of Material) which assess the ability to obtain systematic solutions using cognitive and organizational skills. The measure also contains three validity scales: Infrequency, Inconsistency, and Negativity. The Infrequency scale reflects item choices that are not typically reflected in normative samples or individuals with clinical executive dysfunction. The Inconsistency scale reflects discrepancy between similar item choices while the Negativity

scale reflects a tendency to respond in a negative manner. Raw scores are converted to age-corrected T-scores with higher scores reflecting poorer perceived executive function.

Normative data for the BRIEF-A was collected from approximately 1050 individuals with sociodemographic variables which mirrored the 2002 US Census (Roth et al., 2013). Internal consistency for the three main indices is very high, ranging from 0.93 to 0.96 using Cronbach's alpha, while 1-month test-retest reliability for the indices ranges from $r$ = .93 to .94 (Roth et al., 2005). It has been widely researched in an array of clinical and non-clinical populations, including medical conditions/diseases and mental health populations. Such populations include adults with obesity, cancer survivors, and patients with neurological difficulties, as well as adults with ADHD, pathological gambling behavior, and patients with neuropsychiatric symptoms (Grane et al., 2014; Lovstad et al., 2016; Reid et al., 2012; Rouel et al., 2016; Tamnes et al., 2015). Self-report data on everyday executive functioning can provide beneficial information on challenges since individuals with normal or mostly normal neuropsychological profiles can have significant executive difficulties in academic, social, leisure, or professional domains (Zald & Andreotti, 2010)

***Everyday Life Attention Scale (ELAS).*** The ELAS (Groen et al., 2019) is a recent self-report measure that assesses attentional capacities across nine situations in everyday life. It was developed because the authors saw a need for a measure which assesses situational specificity that is not reliant on individual perception of impairment where terms such as "difficult" or "often" are potentially ambiguous. Rather, impairment is determined by the clinician by comparing the individual's responses to normative data. The scale was originally written in Dutch and developed in The Netherlands with initial normative data collected from over 1,200 Dutch participants in both clinical and non-clinical populations. The measure was then translated

into English and German by members of the research team who were native speakers of the respective languages.

In the ELAS, respondents read nine sketches of typical activities (Reading, Movie, Activity, Lecture, Conversation, Assignment, Cooking, Cleaning up, and Driving) and rate their sustained attention ("How long can you carry this out without having a break or without your mind wandering?"), focused attention ("How well can you focus on this?"), selective attention ("How well can you focus on this if there is distraction around you?"), and divided attention ("How well can you concentrate if you have to do something else at the same time?"), as well as their motivation ("How motivated are you to perform the task well?") and effort ("How much effort does it cost you to perform well in this situation?") on an average week or day when they might encounter the situation. Rating of attention is indicated on an 11-point Likert scale ranging from 0 to 100% with steps of 10%, with 0% meaning no focus/concentration/effort/motivation, 50% meaning 50% of focus/concentration/effort/motivation, and 100% meaning full focus/concentration/effort/motivation. For sustained attention questions (minus the category of Cooking), respondents are asked to provide the duration of their unbroken attention in minutes ranging from 0 to 120 minutes. This score is then calculated into a percentage of total time using the formula ((score/120)x100). Internal consistency of the scales, after the effort items were excluded, was acceptable with a range of 0.77 to 0.87. The overall scale reliability, excluding the effort items, was good at 0.93 for Cronbach's alpha. Test-retest reliability after 28 days was acceptable, ranging from $r$ = .51 to .67 for seven of the nine scales.

***Working Memory Questionnaire (WMQ).*** The WMQ (Vallat-Azouvi et al., 2012) is a self-report measure that assesses three aspects of working memory: short-term storage of information, attention, and executive aspects. The questionnaire contains 30 items with 10

questions in each domain of working memory. Each item is scored on a 5-point Likert scale with responses ranging from 0 to 4. A rating of 0 indicates "not at all" and 4 indicates "extremely". There are four scores, three domain scores corresponding to the three different aspects of working memory and a total score. The maximum score of each domain is 40 with the total score maximum being 120. Higher scores indicate more perceived difficulty with working memory. Internal reliability was high, with Cronbach's alpha ranging from 0.89 to 0.94 for healthy respondents and patients with brain injury (which included patients with traumatic brain injury and stroke), respectively. Further, the questionnaire was sensitive enough to discriminate between these two groups. Lastly, convergent validity was demonstrated by a significant correlation between the WMQ total score and neuropsychological measures of visual working memory and short-term memory with an interference trial.

**Neurophysiological questionnaire.** Without the opportunity to collect objective physiological data, a self-report questionnaire was used to assess participants' perceived arousal.

***Perceived Arousal Scale (PAS).*** The PAS (Anderson et al., 1995) is a 24-item questionnaire which measures self-reported arousal. Respondents use a 5-point Likert scale to rate 24 adjectives, indicating "to what extent they feel this way right now, that is, at the present moment". A rating of 1 indicates "very slightly or not at all" while a rating of 5 indicates "extremely". Ten items are high arousal adjectives (e.g., *excited, powerful*), and 14 items are low/no arousal adjectives (e.g., *drowsy, inactive*). Low arousal items encompass one subscale and are reversed-scored and then summed with the second subscale of summed high arousal items. These two subscales are summed to produce a total arousal score. Total scores range from 24 to 120 with higher scores indicating greater perceived arousal. The three scales have high internal consistency at 0.92 (Anderson et al., 1995).

Constructed by Anderson and colleagues (1995), the measure was originally implemented in two studies which investigated the relationship between temperature and aggression. Specifically, the authors sought to assess the relationships between brief exposure to a temperature increase, physiological arousal (as measured by heart rate), perceived arousal, hostile affect, and hostile cognition (Anderson et al., 1995). Participants included over 100 undergraduate students who played a challenging video game in one of three randomly assigned, temperature-controlled rooms. Results suggested that as temperature increased, heart rate, hostile cognition, and hostile affect increased, while perceived arousal decreased.

**Procedure**

Participants were enrolled from two sources, East Carolina University's undergraduate research pool and IPAR's random email sampling of 250 East Carolina University students. The research pool were undergraduate students who are currently enrolled in an introductory psychology or neuroscience course at East Carolina University. The other group consisted of 250 ECU students whose emails were randomly selected by IPAR. Email addresses were emailed through Qualtrics with informed consent procedures and a study link. Students who enrolled through the research pool received course credit based on study participation time. Such participation-credit allocations are determined by ECU's Department of Psychology such that a student earns .25 credit for each 15-minute interval of research participation. Completion of the study was proposed to take approximately 45 minutes. Students who enrolled through IPAR were uncompensated. All study procedures took place online given significant challenges with collecting face-to-face data due to the coronavirus pandemic and related university research limitations. Before participating in the study, each participant reviewed the informed consent document in their email, or in Qualtrics, and completed the study utilizing Qualtrics online

survey and data collection software. The informed consent documents were approved by the University Policy and Review Committee on Human Research of East Carolina University. Once each participant electronically signed the Qualtrics consent document giving approval to participate in the study, they were administered a demographics questionnaire and a battery of measures which assessed achievement goal orientation, neurocognition, and perceived physiology. The demographics questionnaire addressed participants' subjective biographical and academic information. Achievement goal orientation, neurocognitive, and perceived physiological measures addressed their respective domains, as explained in the previous section. After data collection was completed, participants were provided with a brief debriefing document. The researchers' contact information, including email and phone number, were provided in the event that participants had questions which needed addressing. Data were processed through the Qualtrics online data collection platform and exported to a password-protected Microsoft Excel file on a password-protected computer owned by the main researcher.

## Chapter 4: Results

Statistical analyses were conducted using IBM SPSS Statistics, Version 28.0.1.1 (IBM Corporation, 2021) and a macro for SPSS, PROCESS v4.2 (Andrew F. Hayes, 2017). Data were inspected for validity, missing information, and normality. Of the 660 participants who signed up for the study in Experimentrak, 617 participated. Of the 250 participants who were emailed using a random sampling of student email addresses provided by IPAR, two participants responded and participated in the Qualtrics study. Valid, complete data were available for $N = 375$ participants, while valid, partial data were available for $N = 17$ participants; thus, the total sample size for the study is $N = 392$. To participate in the study, individuals needed to meet the following inclusion criteria: 18 years of age or older, right-handedness, an undergraduate enrolled at East Carolina University, normal/corrected vision to complete the online questionnaire, and no history of head injury. In terms of exclusion criteria, 225 participants were excluded because they either did not meet inclusion criteria or their data were deemed invalid. Fifty-one total participants were excluded due to handedness, including left-handedness ($N = 32$) and ambidextrousness ($N = 19$). Data from 10 participants were missing for this item. Additionally, 59 participants were excluded due to a self-reported history of head injury. Data from 142 participants were missing for this item. Next, 71 participants were excluded because they reported that they did not have normal or corrected vision to complete the survey. Data from 62 participants were missing for this item. Additionally, 21 participants were filtered out of the complete data set due to improperly answering the main variable of interest, generational status. Specifically, 14 participants answered “yes” to being both a first-generation and a continuing generation college student, while seven participants answered “no” to being either a first-generation or a continuing

generation college student. Therefore, these 21 participants were filtered out since these are dichotomous variables.

In terms of validity, there were 5 validity items interspersed throughout the survey to confirm valid responding and adequate, forthright participation (e.g., "Respond 2 for this statement," "Respond 3 for this statement," "I have been to Mars," "Respond 'Very Accurate' to this statement," and "Respond 'Never' to this statement"). Of these validity items, 29 participants answered one validity item incorrectly, seven participants answered two validity items incorrectly, and two participants answered three validity items incorrectly. No participants answered four or five validity items incorrectly. Given the limited amount of validity items, it was decided that answering one or more validity items incorrectly was reason to suspect invalid responding and/or inadequate, insincere participation. Thus, all participants with one or more invalid responses were excluded from statistical analyses.

In terms of completion rates of the study, 17 participants partially completed the study. Five participants only completed up to the first quartile of the study (0-25%). Two participants completed between the first and second quartile of the study (25-50%). Seven participants completed between the second and third quartile of the study (50-75%). Three participants completed between the third and fourth quartile of the study (75-100%). Thus, the total sample size for the study is $N = 392$.

**Demographic Characteristics of Participants**

Table 1 displays demographic characteristics for participants included in statistical analyses.

Table 1. *Demographic Characteristics of Participants*

| Variable | Total Sample (*N* = 392) | | First-Generation Students (*N* = 136) | | Continuing-Generation Students (*N* = 256) | |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Age | 19.48 | 5.32 | 20.46 | 7.46 | 18.97 | 3.62 |
| Current GPA | 3.43 | .50 | 3.39 | .50 | 3.46 | .50 |
| High School GPA | 3.64 | .47 | 3.58 | .46 | 3.67 | .47 |
| | *N* | % | *N* | % | *N* | % |
| Sex | | | | | | |
| Male | 151 | 38.5 | 48 | 35.3 | 103 | 40.2 |
| Female | 240 | 61.2 | 88 | 64.7 | 152 | 59.4 |
| Prefer Not to Answer | 1 | 0.3 | - | - | 1 | 0.4 |
| Gender Identity | | | | | | |
| Man | 151 | 38.5 | 48 | 35.3 | 103 | 40.2 |
| Woman | 236 | 60.2 | 85 | 62.5 | 151 | 59.0 |
| Genderqueer | 1 | 0.3 | - | - | 1 | 0.4 |
| Transgender | 4 | 1.0 | 3 | 2.2 | 1 | 0.4 |
| Race/Ethnicity | | | | | | |
| White | 261 | 66.6 | 73 | 53.7 | 188 | 73.4 |
| Black | 69 | 17.6 | 27 | 19.9 | 42 | 16.4 |
| Asian | 10 | 2.6 | 2 | 1.5 | 8 | 3.1 |
| Latinx/Hispanic | 35 | 8.9 | 25 | 18.4 | 10 | 3.9 |
| Native American | 1 | 0.3 | - | - | 1 | 0.4 |
| Pacific Islander | 1 | 0.3 | 1 | 0.7 | - | - |
| Biracial | 12 | 3.1 | 7 | 5.1 | 5 | 2.0 |
| Multiracial | 3 | 0.8 | 1 | 0.7 | 2 | 0.8 |
| Year in School | | | | | | |
| Freshmen | 294 | 75.0 | 95 | 69.8 | 199 | 77.7 |
| Sophomore | 40 | 10.2 | 12 | 8.8 | 28 | 10.9 |
| Junior | 35 | 8.9 | 15 | 11 | 20 | 7.8 |
| Senior | 8 | 2.0 | 5 | 3.6 | 3 | 1.2 |
| Employment | | | | | | |
| Unemployed | 274 | 69.9 | 96 | 70.6 | 178 | 69.5 |
| Employed PT (<30 hrs) | 81 | 20.7 | 19 | 14.0 | 62 | 24.2 |
| Employed FT (≥30 hrs) | 37 | 8.7 | 21 | 15.4 | 16 | 6.3 |
| Student loans | | | | | | |
| Yes | 195 | 49.7 | 82 | 60.3 | 113 | 44.1 |
| No | 197 | 50.3 | 54 | 39.7 | 143 | 55.9 |
| Financial Situation | | | | | | |
| Live Comfortably | 215 | 54.8 | 52 | 38.2 | 163 | 63.7 |
| Meet Needs with Little Left | 112 | 28.6 | 49 | 36.0 | 63 | 24.6 |
| Just Meet Basic Needs | 55 | 14.0 | 30 | 22.1 | 25 | 9.8 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Don't Meet Basic Needs | 10 | 2.6 | 5 | 3.7 | 5 | 2.0 |
| Mental Health Conditions | | | | | | |
| Current | | | | | | |
| Depression | 39 | 9.9 | 13 | 9.6 | 26 | 10.2 |
| Anxiety | 73 | 18.6 | 25 | 18.4 | 48 | 18.8 |
| ADHD | 25 | 6.4 | 8 | 5.9 | 17 | 6.6 |
| Other | 18 | 4.6 | 9 | 6.6 | 9 | 3.5 |
| Past | | | | | | |
| Depression | 20 | 5.1 | 14 | 10.3 | 6 | 2.3 |
| Anxiety | 7 | 1.8 | 3 | 2.2 | 4 | 1.6 |
| ADHD | 7 | 1.8 | 2 | 1.5 | 5 | 2.0 |
| Other | 8 | 2.0 | 3 | 2.2 | 5 | 2.0 |
| Mental Health Frequency | | | | | | |
| Current | | | | | | |
| One Condition | 54 | 13.8 | 19 | 14.0 | 35 | 13.7 |
| Two Conditions | 34 | 8.7 | 9 | 6.6 | 25 | 9.8 |
| > Two Conditions | 13 | 3.3 | 7 | 5.1 | 6 | 2.3 |
| Past | | | | | | |
| One Condition | 23 | 5.9 | 13 | 9.6 | 10 | 3.9 |
| Two Conditions | 7 | 1.8 | 4 | 2.9 | 3 | 1.8 |
| > Two Conditions | 1 | 0.3 | - | - | 1 | 0.4 |
| Medical Condition | | | | | | |
| Current | | | | | | |
| Respiratory | 24 | 6.1 | 9 | 6.6 | 15 | 5.9 |
| Endocrinological | 7 | 1.8 | 2 | 1.5 | 5 | 2.0 |
| Neurological | 3 | 0.8 | 1 | 0.7 | 2 | 0.8 |
| Cardiovascular | 9 | 2.3 | 4 | 2.9 | 5 | 2.0 |
| Other | 23 | 5.9 | 13 | 9.6 | 10 | 3.9 |
| Past | | | | | | |
| Respiratory | 9 | 2.3 | 4 | 2.9 | 5 | 2.0 |
| Endocrinological | - | - | - | - | - | - |
| Neurological | 1 | 0.3 | - | - | 1 | 0.4 |
| Cardiovascular | - | - | - | - | - | - |
| Other | 14 | 3.6 | 8 | 5.9 | 6 | 2.3 |
| Medical Condition Frequency | | | | | | |
| Current | | | | | | |
| One Condition | 41 | 10.5 | 10 | 7.4 | 31 | 12.1 |
| Two Conditions | 9 | 2.3 | 6 | 4.4 | 3 | 1.2 |
| > Two Conditions | 3 | 0.8 | 2 | 1.5 | 1 | 0.4 |
| Past | | | | | | |
| One Condition | 20 | 5.1 | 10 | 7.4 | 10 | 3.9 |
| Two Conditions | 3 | 0.8 | 2 | 1.5 | 1 | 0.4 |
| > Two Conditions | - | - | - | - | - | - |
| COVID-19 | | | | | | |
| Yes | 182 | 46.4 | 59 | 43.4 | 123 | 48.0 |
| No | 210 | 53.6 | 77 | 56.6 | 133 | 52.0 |

**Generational status.** Of the 392 participants, 136 participants identified as first-generation college students and 256 identified as continuing-generation college students.

**Other demographic characteristics.** Of the 392 total participants, the mean age was 19.5 years *(SD* = 5.3). Of the first-generation college students, the mean age was 20.5 years (*SD* = 7.5); of the continuing-generation college students, the mean age was 19.0 years (*SD* = 3.6). The current GPA of the total participants was 3.43 on a 4.0 scale (*SD* = 0.5) while the current GPA of first-generation college students was 3.39 on a 4.0 scale (*SD* = 0.5) and the current GPA of continuing-generation college students was 3.46 on a 4.0 scale (*SD* = .50). The final high school GPA of the total sample was 3.64 on a 4.0 scale (*SD* = 0.47) while the final high school GPA of first-generation college students was 3.58 on a 4.0 scale (*SD* = 0.46) and the final high school GPA of continuing-generation college students was 3.67 on a 4.0 scale (*SD* = 0.47).

In terms of sex characteristics and gender identity, one hundred fifty-one total participants (38.5%) were male while 240 total participants (61.2%) were female. One participant (0.3%), a continuing-generation college student, preferred not to answer this item. Forty-eight participants (35.3%) from the group of first-generation college students were male while 88 participants (64.7%) from the group were female. One hundred three (40.2%) participants from the group of continuing-generation college students were male while 152 participants (59.4%) from the group were female. In terms of gender identity, one hundred fifty-one (38.5%) total participants identified as men while 236 total participants (60.2%) identified as women. One participant (0.3%) identified as genderqueer/fluid and four participants (1.0%) identified as transgender. Forty-eight participants (35.3%) from the group of first-generation college students identified as men while 85 participants (62.5%) from the group identified as women and three participants (2.2%) identified as transgender. One hundred three participants

(40.2%) from the group of continuing-generation college students identified as men while 151 participants (59.0%) from the group identified as women; one participant (0.4%) from the group identified as genderqueer and one participant (0.4%) identified as transgender.

In terms of racial and ethnic identity, 261 total participants (66.6%) identified as White, 69 participants (17.6%) identified as Black, 10 participants (2.6%) identified as Asian, 35 participants (89%) identified as Latinx/Hispanic, one participant (0.3%) identified as Native American, one participant (0.3%) identified as Pacific Islander, 12 participants (3.1%) identified as biracial, and three participants (0.8%) identified as multiracial. Of the group of first-generation college students, 73 participants (53.7%) identified as White, 27 participants (19.9%) identified as Black, two participants (1.5%) identified as Asian, 25 participants (18.4%) identified as Latinx/Hispanic, one participant (0.7%) identified as Pacific Islander, seven participants (5.1%) identified as biracial, and one participant (0.7%) identified as multiracial. Of the group of continuing-generation college students, 188 participants (73.4%) identified as White, 42 participants (16.4%) identified as Black, eight participants (3.1%) identified as Asian, 10 participants (3.9%) identified as Latinx/Hispanic, one participant (0.4%) identified as Native American, five participants (2.0%) identified as biracial, and two participants (0.8%) identified as multiracial.

In terms of current academic year in school, 294 total participants (75.0%) were in their freshmen year, 40 participants (10.2%) were in their sophomore year, 35 participants (8.9%) were in their junior year, and eight participants (2.0%) were in their senior year. Of the group of first-generation college students, 95 participants (69.8%) were in their freshmen year, 12 participants (8.8%) were in their sophomore year, 15 participants (11.0%) were in their junior year, and five participants (3.6%) were in their senior year. Of the group of continuing-

generation college students, 199 participants (77.7%) were in their freshmen year, 28 participants (10.9%) were in their sophomore year, 20 participants (7.8%) were in their junior year, and three participants (1.2%) were in their senior year.

The next section of demographics includes employment, student loan borrowing, and personal financial situation. Employment, which included federal work-study, was separated into three categories: unemployed, part-time employment, and full-time employment. According to the US Department of Labor's Fair Labor Standards Act (FLSA), there is no definition of full or part-time employment as this is typically determined by the employer (https://www.dol.gov/general/topic/workhours/full-time). However, according to the Internal Revenue Service (IRS), a full-time employee is defined as an employee who works an average of at least 30 hours per week (https://www.irs.gov/affordable-care-act/employers/identifying-full-time-employees). Therefore, the IRS definition of working 30 or more hours per week was used to separate participants into full or part-time employees. Of the total sample, 274 participants (69.9%) were unemployed, 81 participants (20.7%) were employed part-time, and 37 participants (8.7%) were employed full-time. Of the group of first-generation college students, 96 participants (70.6%) were unemployed, 19 participants (14.0%) were employed part-time, and 21 participants (15.4%) were employed full-time. Of the group of continuing-generation students, 178 participants (69.5%) were unemployed, 62 participants (24.2%) were employed part-time, and 16 participants (6.3%) were employed full-time.

In terms of student loan borrowing, 195 total participants (49.7%) endorsed borrowing student loans while 197 participants (50.3%) denied borrowing student loans. Of the group of first-generation college students, 82 participants (60.3%) endorsed borrowing student loans while 54 participants (39.7%) denied borrowing student loans. Of the group of continuing-generation

college students, 113 participants (44.1%) endorsed borrowing student loans while 143 participants (55.9%) denied borrowing student loans. In terms of their personal financial situation, which was defined as personal income and financial assistance from anyone who helps them, 215 total participants (54.8%) reported personal finances which helped them live comfortably, 112 participants (28.6%) reported personal finances which helped them meet their needs with little left, 55 participants (14.0%) reported personal finances which just met their basic needs, and 10 participants (2.6%) reported personal finances which did not meet their basic needs. Of the group of first-generation college students, 52 participants (38.2%) reported personal finances which helped them live comfortably, 49 participants (36.0%) reported personal finances which met their needs with little left, 30 participants (22.1%) reported personal finances which just met their basic needs, and 5 participants (3.7%) reported personal finances which did not meet their basic needs. Of the group of continuing-generation college students, 163 participants (63.7%) reported personal finances which helped them live comfortably, 63 participants (24.6%) reported personal finances which met their needs with little left, 25 participants (9.8%) reported personal finances which just met their basic needs, and 5 participants (2.0%) reported personal finances which did not meet their basic needs.

Participants were also asked about current and past psychological and medical conditions, including whether they, or a close relative, had tested positive for COVID-19. The mental health conditions were separated into four descriptive categories which were based on frequency of reporting; namely, participants self-reported depression, anxiety, and ADHD, as well as various other mental health conditions which were categorized as "Other," which included Post-Traumatic Stress Disorder (PTSD), Obsessive-Compulsive Disorder (OCD), Bipolar Disorder, Borderline Personality Disorder (BPD), eating disorders, and chronic pain. These same data were

also categorized based on frequency, to illustrate comorbidity which can indicate the burden of mental health. Categories were defined as one, two, or more than two conditions. The medical conditions were also separated into both descriptive and frequency categories. More specifically, they were separated into five, broadly descriptive categories which were based on self-reported conditions. They were labelled as respiratory, endocrinological, neurological, cardiovascular, and "other" conditions, which included cancer, gastrointestinal, reproductive, and immunological conditions. Similarly to the frequency categorization of psychological conditions, the medical conditions were separated into one, two, or more than two conditions to illustrate comorbidity and disease burden.

For the descriptive categorization of psychological conditions, 39 total participants (9.9%) reported currently experiencing depression, 73 total participants (18.6%) reported currently experiencing anxiety, 25 total participants (6.4%) reported currently experiencing ADHD, and 18 total participants (4.6%) reported currently experiencing "Other" mental health conditions. Of the group of first-generation college students, 13 participants (9.6%) reported currently experiencing depression, 25 participants (18.4%) reported currently experiencing anxiety, 8 participants (5.9%) reported currently experiencing ADHD, and 9 participants (6.6%) reported currently experiencing "Other" mental health conditions. Of the group of continuing-generation college students, 26 participants (10.2%) reported currently experiencing depression, 48 participants (18.8%) reported currently experiencing anxiety, 17 participants (6.6%) reported currently experiencing ADHD, and 9 participants (3.5%) reported currently experiencing "Other" mental health conditions. In terms of past mental health conditions, 20 total participants (5.1%) reported experiencing depression in the past, seven participants (1.8%) reported experiencing anxiety in the past, seven participants (1.8%) reported experiencing ADHD in the

past, and eight participants (2.0%) reported experiencing "Other" mental health conditions in the past. Of the group of first-generation college students, 14 participants (10.3%) reported experiencing depression in the past, three participants (2.2%) reported experiencing anxiety in the past, two participants (1.5%) reported experiencing ADHD in the past, and three participants (2.2%) reported experiencing "Other" mental health conditions in the past. Of the group of continuing-generation college students, six participants (2.3%) reported experiencing depression in the past, four participants (1.6%) reported experiencing anxiety in the past, five participants (2.0%) reported experiencing ADHD in the past, and five participants (2.0%) reported experiencing "Other" mental health conditions in the past.

Psychological data were then presented differently to illustrate the frequency of mental health conditions experienced by individual participants. In the total sample, 54 participants (13.8%) reported currently experiencing one psychological condition, 34 participants (8.7%) reported currently experiencing two psychological conditions, and 13 participants (3.3%) reported currently experiencing more than two psychological conditions. Of the group of first-generation college students, 19 participants (14.0%) reported currently experiencing one psychological condition, nine participants (6.6%) reported currently experiencing two psychological conditions, and seven participants (5.1%) reported currently experiencing more than two psychological conditions. Of the group of continuing-generation students, 35 participants (13.7%) reported currently experiencing one psychological condition, 25 participants (9.8%) reported currently experiencing two psychological conditions, and six participants (5.1%) reported currently experiencing more than two psychological conditions. In terms of past mental health conditions, no past time frame was specified in the questionnaire; therefore, comorbidity of conditions cannot be ascertained. Data only indicate whether participants experienced one,

two, or more than two conditions at any time in the past. Twenty-three total participants (5.9%) reported experiencing one psychological condition in the past, seven participants (1.8%) reported experiencing two psychological conditions in the past, and one participant (0.3%) reported experiencing more than two psychological conditions in the past. Of the group of first-generation college students, 13 participants (9.6%) reported experiencing one psychological condition in the past, four participants (2.9%) reported experiencing two psychological conditions in the past, and no participants reported experiencing more than two psychological conditions in the past. Of the group of continuing-generation college students, 10 participants (3.9%) reported experiencing one psychological condition in the past, three participants (1.8%) reported experiencing two psychological conditions in the past, and one participant (0.4%) reported experiencing more than two psychological conditions in the past.

For the descriptive categorization of medical conditions, 24 total participants (6.1%) reported currently experiencing a respiratory condition, seven total participants (1.8%) reported currently experiencing an endocrinological condition, three total participants (0.8%) reported currently experiencing a neurological condition, nine total participants (2.3%) reported currently experiencing a cardiovascular condition, and 23 total participants (5.9%) reported currently experiencing "Other" medical conditions. Of the group of first-generation college students, nine participants (6.6%) reported currently experiencing a respiratory condition, two participants (1.5%) reported currently experiencing an endocrinological condition, one participant (0.7%) reported currently experiencing a neurological condition, four participants (2.9%) reported currently experiencing a cardiovascular condition, and 13 participants (5.9%) reported currently experiencing "Other" medical conditions. Of the group of continuing-generation students, 15 participants (5.9%) reported currently experiencing a respiratory condition, five participants

(2.0%) reported currently experiencing an endocrinological condition, two participants (0.8%) reported currently experiencing a neurological condition, five participants (2.0%) reported currently experiencing a cardiovascular condition, and 10 participants (3.9%) reported currently experiencing "Other" medical conditions. In terms of past medical conditions, nine total participants (2.3%) reported experiencing a respiratory condition in the past, one participant (0.3%) reported experiencing a neurological condition in the past, and 14 participants (3.6%) reported experiencing "Other" medical conditions in the past. Of the group of first-generation college students, four participants (2.9%) reported experiencing a respiratory condition in the past, and eight participants (5.9%) reported experiencing "Other" medical conditions in the past. Of the group of continuing-generation students, five participants (2.0%) reported experiencing a respiratory condition in the past, one participant (0.4%) reported experiencing a neurological condition in the past, and six participants (2.3%) reported experiencing "Other" medical conditions in the past.

Data were then presented differently to illustrate the frequency of medical conditions experienced by individual participants. In the total sample, 41 participants (10.5%) reported currently experiencing one medical condition, nine total participants (2.3%) reported currently experiencing two medical conditions, and three total participants (0.8%) reported currently experiencing more than two medical conditions. Of the group of first-generation college students, 10 participants (7.4%) reported currently experiencing one medical condition, six participants (4.4%) reported currently experiencing two medical conditions, and two participants (1.5%) reported currently experiencing more than two medical conditions. Of the group of continuing-generation college students, 31 participants (12.1%) reported currently experiencing one medical condition, three participants (1.2%) reported currently experiencing two medical

conditions, and one participant (0.4%) reported currently experiencing more than two medical conditions. In terms of past medical conditions, no past time frame was specified in the questionnaire; therefore, comorbidity of conditions cannot be ascertained. Data only indicate whether participants experienced one, two, or more than two conditions at any time in the past. Twenty total participants (5.1%) reported experiencing only one medical condition in the past, and 10 participants (7.4%) reported experiencing two medical conditions in the past. No participants reported experiencing more than two medical conditions in the past. Of the group of first-generation college students, 10 participants (7.4%) reported experiencing only one medical condition in the past, and two participants (1.5%) reported experiencing two medical conditions in the past. Of the group of continuing-generation college students, 10 participants (3.9%) reported experiencing only one medical condition in the past, and one participant (0.4%) reported experiencing two medical conditions in the past.

Given that data were collected from January 2021 to October 2021, the height of the global coronavirus pandemic, participants were asked if they, or a close relative, had ever tested positive for COVID-19. One hundred eighty-two total participants (46.4%) reported that they, or a close relative, had tested positive for coronavirus while 210 participants (53.6%) reported that they, or a close relative, had not. Of the group of first-generation college students, 59 participants (43.4%) reported that they, or a close relative, had tested positive for coronavirus while 77 participants (56.6%) reported that they, or a close relative, had not. Of the group of continuing-generation college students, 123 participants (48.0%) reported that they, or a close relative, had tested positive for coronavirus while 133 participants (52.0%) reported that they, or a close relative, had not.

**Statistical Analyses**

## Hypothesis One

**Correlational analyses.** Zero-order correlational analyses were performed to determine the relationships between performance avoidance and final high school and current college GPA in both first- and continuing-generation college students. Complete data for the variable of performance avoidance was available for 383 participants. Complete data for the variable of final high school GPA was available for 370 participants while complete data for the variable of current college GPA was available for 289 participants. Of note, 47 data points for the variable of current college GPA were replaced with "missing" variables given that these participants listed ".00" as their current college GPA. It is assumed that this was either an incorrect assertion, a mistype, or perhaps, these individuals were first-semester college freshmen who had yet to receive their college GPA. Additionally, one data point for the variable of current college GPA was listed as "35.00"; given that this is an inaccurate GPA, it was also replaced with a "missing" variable.

Hypothesis one predicted that performance avoidance would be negatively correlated with final high school and current college GPA in first-generation college students. Moreover, first-generation college students would report lower high school and college GPAs than continuing-generation students. Descriptive statistics revealed that the variables of performance avoidance (AGQ-R-PAV) and current college GPA were not normally distributed; thus, log transformations were performed, as represented in Tables 2 and 3, respectively. In Table 2, AGQ-R-PAV represents the raw data before the variable was reflected and transformed. Range of scores vary from 1.00 to 5.00 with skewness (g1) = -1.554. AGQ-R-PAV_R represents the reflected scores, which were each subtracted from 6.00. The skewness is now positive although its magnitude remains the same. AGQ-R-PAV_R_log10 is a base 10 log transformation of the

reflected scores, which reduced the level of skewness. A square-root transformation of the reflected scores, as represented by Sqrt_AGQ-R-PAV, was applied to determine if skewness could be further reduced from the base 10 log transformation; however, this resulted in increased skewness from the base 10 log transformation. Therefore, it was decided that the base 10 log transformation of the variable was the best to use.

Table 2. *Log Transformation of Performance Avoidance*

| | N | Minimum | Maximum | Mean | Std. Deviation | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| AGQ-R-PAV | 383 | 1.00 | 5.00 | 4.2393 | .87481 | -1.554 | .125 | 2.671 | .249 |
| AGQ-R-PAV_R | 383 | 1.00 | 5.00 | 1.7607 | .87481 | 1.554 | .125 | 2.671 | .249 |
| AGQ-R-PAV_Rlog10 | 383 | .00 | .70 | .2015 | .18916 | .592 | .125 | -.529 | .249 |
| Sqrt_AGQ-R-PAV | 383 | 1.00 | 2.24 | 1.2926 | .30032 | 1.014 | .125 | .643 | .249 |
| Valid N (listwise) | 383 | | | | | | | | |

In Table 3, current college GPA represented the raw data before the variable was reflected and transformed. Range of scores varied from 1.38 to 5.00 with skewness (g1) = -.757. Current GPA_R represents the reflected scores, which were each subtracted from 6.00. The skewness was then positive although its magnitude remained the same. Current GPA_Rlog10 is a base 10 log transformation of the reflected scores, which solved the problem of non-normal skewness.

Table 3. *Log Transformation of Current GPA*

| | N | Minimum | Maximum | Mean | Std. Deviation | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| Current GPA | 289 | 1.38 | 5.00 | 3.43 | .49779 | -.757 | .143 | 1.422 | .286 |
| Current GPA_R | 289 | 1.00 | 4.62 | 2.5667 | .49779 | .757 | .143 | 1.422 | .286 |
| Current GPA_Rlog10 | 289 | .00 | .66 | .4015 | .08300 | -.044 | .143 | 1.320 | .286 |
| Valid N (listwise) | 289 | | | | | | | | |

Table 4 shows descriptive statistics and zero-order correlations for the hypothesized variables, including sample sizes relevant to each correlation. Correlational analyses revealed no statistically significant relationships between the hypothesized variables of final high school GPA, current college GPA, and performance avoidance. However, analyses demonstrated that in first-generation college students, self-reported current college GPA ($M$ = 3.43, $SD$ = .50) was significantly, positively correlated with self-reported final high school GPA ($M$ = 3.61, $SD$ = .47), $r$ = .29, $n$ = 92, $p$ < .01, 95% CI [0.091, 0.468]. This suggests that first-generation college students who endorsed higher college GPAs also endorsed higher self-reported final high school GPAs. Similarly, the analysis demonstrated that in continuing-generation students, self-reported current college GPA ($M$ = 3.43, $SD$ = .50) was significantly, positively correlated with self-reported final high school GPA ($M$ = 3.61, $SD$ = .47), $r$ = .32, $n$ = 189, $p$ < .01, 95% CI [0.188, 0.444]. This suggests that continuing-generation college students who endorsed higher college GPAs also endorsed higher self-reported final high school GPAs.

Table 4. *Zero-Order Correlations and Descriptive Statistics for Measures of Generational Status, Performance Avoidance, Current College GPA, and Final High School GPA*

| Generational Status | | Zero-Order Correlations | | |
|---|---|---|---|---|
| First-Generation Students | | AGQ-R-PAV | Current College GPA | Final HS GPA |
| | Current College GPA | -.115 ($N$ = 93) | | |
| | Final HS GPA | -.060 ($N$ = 124) | .291** ($N$ = 92) | |
| Continuing-Generation Students | Current College GPA | -.090 ($N$ = 189) | | |
| | Final HS GPA | .037 ($N$ = 240) | .322** ($N$ = 189) | |
| *M* | | .21 | 3.43 | 3.61 |
| *SD* | | .19 | .50 | .47 |

*$p$ <.05, **$p$ <.01 (2-tailed)
Note: AGQ-R-PAV = log transformed Achievement Goal Questionnaire-Revised-Performance Avoidance subscale; Current College GPA = log transformed current college GPA

**Predicting performance avoidance.** It was previously proposed that a simultaneous multiple regression analysis would be performed to predict performance avoidance from final high school and current college GPA. However, given that there were no statistically significant correlational relationships between these variables, performing the multiple regression analysis was unnecessary.

**Moderating effect of generational status.** Two simple moderation analyses were performed using PROCESS v4.2 to investigate both the moderating effect of generational status on the relationship between the predictor variable of final high school GPA and the outcome variable of performance avoidance, and to investigate the moderating effect of generational status on the relationship between the predictor variable of current college GPA and the outcome variable of performance avoidance. As displayed in Table 5, the initial moderation analysis demonstrated that the main effects of final high school GPA and generational status were not statistically significant, $b$ = -.126, $t$(360) = -1.035, $p$ = .301, 95% CI [-.364, .113], and $b$ = -.632,

$t(360) = -.824$, $p = .411$, 95% CI [-2.14, .877], respectively. Additionally, the interaction between final high school GPA and generational status was not statistically significant, $b = .188$, $t(360) = .892$, $p = .373$, 95% CI [-.227, .602]. These results suggest that generational status does not moderate the relationship between final high school GPA and performance avoidance.

Table 5. *Moderation Model Coefficients for Generational Status, Final High School GPA, and Performance Avoidance*

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 4.683 | .450 | 10.401 | .000 | 3.797 | 5.568 |
| FinalHSGPA | -.126 | .121 | -1.035 | .301 | -.364 | .113 |
| FirstGent | -.632 | .767 | -.824 | .411 | -2.140 | .877 |
| Int_1 | .188 | .211 | .892 | .373 | -.227 | .602 |

*$p$ <.05, **$p$ <.01
Note: FinalHSGPA = Final High School GPA (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = FinalHSGPA x FirstGent (interaction variable)

In Table 6, the second moderation analysis demonstrated that the main effects of current college GPA and generational status were not statistically significant, $b = .073$, $t(278) = .561$, $p = .575$, 95% CI [-.184, .331], and $b = -.471$, $t(278) = -.605$, $p = .546$, 95% CI [-2.004, .1.062], respectively. Additionally, the interaction between current college GPA and generational status was not statistically significant, $b = .165$, $t(278) = .730$, $p = .466$, 95% CI [-.280, .610]. These results suggest that generational status does not moderate the relationship between current college GPA and performance avoidance.

Table 6. *Moderation Model Coefficients for Generational Status, Current College GPA, and Performance Avoidance*

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 3.944 | .458 | 8.617 | .000 | 3.043 | 4.845 |
| CurrentGPA | .073 | .131 | .561 | .575 | -.184 | .331 |
| FirstGent | -.471 | .779 | -.605 | .546 | -2.004 | 1.062 |
| Int_1 | .165 | .226 | .730 | .466 | -.280 | .610 |

*$p$ <.05, **$p$ <.01
Note: CurrentGPA = Current College GPA (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = CurrentGPA x FirstGent (interaction variable)

**Comparing means.** Hypothesis one also predicted that first-generation college students would report lower high school and college GPAs than continuing-generation students. This component of the hypothesis was partially supported. An independent sample *t*-test revealed a statistically significant difference in mean final high school GPA between first-generation ($M$ = 3.58, $SD$ = .46) and continuing-generation college students ($M$ = 3.68, $SD$ = .47), $t(368) = 1.969$, $p < .05$ (one-tailed). The average final high school GPA for first-generation college students was 0.1 less than the average final high school GPA for continuing-generation students. However, there was no significant difference in mean current college GPA between first-generation ($M$ = 3.39, $SD$ = .50) and continuing-generation college students ($M$ = 3.46, $SD$ = .50), $t(287) = 1.15$, $p$ = .13 (one-tailed).

**Hypothesis Two**

**Correlational analyses.** Zero-order correlational analyses were performed to determine the relationships between performance avoidance and behavioral inhibition in both first- and continuing-generation college students. Complete data for the variable of performance avoidance was available for 383 participants. Complete data for the variable of behavioral inhibition (BIS)

was available for 387 participants. Hypothesis two predicted that performance avoidance would be positively correlated with behavioral inhibition in first-generation college students.

Table 7 shows descriptive statistics and zero-order correlations for the aforementioned variables (as well as variables for hypotheses three and four), including relevant sample sizes. Descriptive statistics revealed that the variable of behavioral inhibition was normally distributed. The correlational analysis for hypothesis two further demonstrated a statistically significant, negative correlation between performance avoidance and behavioral inhibition in first-generation college students ($M$ = .20, $SD$ = .19), $r$ = -.21, $n$ = 132, $p$ < .05, 95% CI [-0.367, 0.040]. Therefore, the hypothesis was not supported. These findings suggest that in first-generation college students, higher levels of performance avoidance were associated with lower levels of behavioral inhibition. Of note, the correlational analysis also revealed a statistically significant relationship between behavioral inhibition and neuroticism in first-generation colleges students ($M$ = 21.63, $SD$ = 3.65), $r$ = .39, $n$ = 130, $p$ < .01, 95% CI [.238, .530]. This finding suggests that in first-generation college students, higher levels of behavioral inhibition were associated with higher levels of neuroticism. The extant literature about behavioral inhibition often demonstrates a positive correlational relationship with neuroticism; this finding is replicated in this study's sample.

Table 7. *Zero-Order Correlations and Descriptive Statistics for Measures of Performance Avoidance and Personality in First-Generation College Students*

| Generational Status | | Zero-Order Correlations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| First-Generation Students | | AGQ-R-PAV | BIS-Total | BAS-D | BAS-FS | BAS-RR | BAS-Total | Neuro |
| | BIS-Total | -.209* ($N$ = 132) | | | | | | |
| | BAS-D | -.178* ($N$ = 132) | -.108 ($N$ = 135) | | | | | |
| | BAS-FS | -.217* ($N$ = 132) | -.019 ($N$ = 135) | .460** ($N$ = 135) | | | | |
| | BAS-RR | -.271** ($N$ = 132) | .258** ($N$ = 135) | .432** ($N$ = 135) | .432** ($N$ = 135) | | | |
| | BAS-Total | -.277** ($N$ = 132) | .045 ($N$ = 135) | .807** ($N$ = 135) | .802** ($N$ = 135) | .766** ($N$ = 135) | | |
| | Neuro | .057 ($N$ = 130) | .394** ($N$ = 130) | .069 ($N$ = 130) | .075 ($N$ = 130) | .118 ($N$ = 130) | .109 ($N$ = 130) | |
| *M* | | .20 | 21.63 | 11.13 | 12.21 | 17.65 | 41.00 | 12.55 |
| *SD* | | .19 | 3.65 | 2.24 | 2.18 | 1.98 | 5.07 | 2.79 |

*$p$ <.05, **$p$ <.01 (2-tailed)

Note: AGQ-R-PAV = log transformed Achievement Goal Questionnaire-Revised-Performance Avoidance subscale; BIS-Total = Behavioral Inhibition System Total Score; BAS-D = Behavioral Activation System – Drive subscale; BAS-FS = Behavioral Activation System – Fun-Seeking subscale; BAS-RR = Behavioral Activation System – Reward Responsiveness subscale; BAS-Total: Behavioral Activation System Total Score; Neuro = Mini-IPIP Neuroticism subscale

Table 8. *Zero-Order Correlations and Descriptive Statistics for Measures of Performance Avoidance and Personality in Continuing-Generation College Students*

| Generational Status | | Zero-Order Correlations | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Continuing-Generation Students | | AGQ-R-PAV | BIS-Total | BAS-D | BAS-FS | BAS-RR | BAS-Total | Neuro |
| | BIS-Total | -.074 ($N$ = 251) | | | | | | |
| | BAS-D | -.133* ($N$ = 251) | -.218** ($N$ = 252) | | | | | |
| | BAS-FS | -.111 ($N$ = 251) | -.097 ($N$ = 252) | .505** ($N$ = 252) | | | | |
| | BAS-RR | -.178** ($N$ = 251) | .094 ($N$ = 252) | .498** ($N$ = 252) | .506** ($N$ = 252) | | | |
| | BAS-Total | -.170** ($N$ = 251) | -.101 ($N$ = 252) | .832** ($N$ = 252) | .822** ($N$ = 252) | .798** ($N$ = 252) | | |
| | Neuro | -.042 ($N$ = 251) | .482** ($N$ = 251) | -.157* ($N$ = 251) | -.118 ($N$ = 251) | -.108 ($N$ = 251) | -.158* ($N$ = 251) | |
| *M* | | .20 | 21.38 | 11.45 | 12.62 | 17.83 | 41.90 | 12.06 |
| *SD* | | .19 | 3.41 | 2.23 | 2.10 | 1.88 | 5.09 | 2.97 |

*$p$ <.05, **$p$ <.01 (2-tailed)

Note: AGQ-R-PAV = log transformed Achievement Goal Questionnaire-Revised-Performance Avoidance subscale; BIS-Total = Behavioral Inhibition System Total Score; BAS-D = Behavioral Activation System – Drive subscale; BAS-FS = Behavioral Activation System – Fun-Seeking subscale; BAS-RR = Behavioral Activation System – Reward Responsiveness subscale; BAS-Total: Behavioral Activation System Total Score; Neuro = Mini-IPIP Neuroticism subscale

**Predicting performance avoidance.** It was previously proposed that the variable of behavioral inhibition would be added to a larger simultaneous multiple regression analysis which included the variables in hypothesis three (BAS, or behavioral activation) and hypothesis four (neuroticism, from the Mini-IPIP). Therefore, the results of that simultaneous multiple regression analysis can be viewed under hypothesis four in Table 12.

**Moderating effects of generational status.** A simple moderation analysis was performed using PROCESS v4.2 to investigate the moderating effect of generational status on the relationship between the predictor variable of behavioral inhibition and the outcome variable of performance avoidance. As displayed in Table 9, the moderation analysis demonstrated that the main effects of behavioral inhibition and generational status were not statistically significant, $b = .012$, $t(379) = .772$, $p = .441$, 95% CI [-.019, .044], and $b = -.600$, $t(379) = -1.043$, $p = .297$, 95% CI [-1.731, .531], respectively. Additionally, the interaction between behavioral inhibition and generational status was not statistically significant, $b = .030$, $t(379) = 1.146$, $p = .253$, 95% CI [-.022, .082]. These results suggest that generational status does not moderate the relationship between behavioral inhibition and performance avoidance.

Table 9. *Moderation Model Coefficients for Generational Status, Behavioral Inhibition, and Performance Avoidance*

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 3.953 | .350 | 11.298 | .000 | 3.265 | 4.641 |
| BISTOTAL | .012 | .016 | .772 | .441 | -.019 | .044 |
| FirstGent | -.600 | .575 | -1.043 | .297 | -1.731 | .531 |
| Int_1 | .030 | .026 | 1.146 | .253 | -.022 | .082 |

*$p$ <.05, **$p$ <.01
Note: BISTOTAL = Behavioral Inhibition Scale (BIS/BAS) - Total (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = BISTOTAL x FirstGent (interaction variable)

**Comparing means.** Hypothesis two also predicted that first-generation college students would report higher levels of behavioral inhibition compared to continuing-generation college students. This component of the hypothesis was not supported. An independent sample *t*-test revealed no significant difference in mean self-reported behavioral inhibition between first-generation ($M$ = 21.63, $SD$ = 3.65) and continuing-generation college students ($M$ = 21.38, $SD$ = 3.41), $t(385) = -.678$, $p = .25$ (one-tailed).

**Hypothesis Three**

**Correlational analyses.** Zero-order correlational analyses were performed to determine the relationship between performance avoidance and behavioral activation in both first- and continuing-generation college students. Complete data for the variable of performance avoidance was available for 383 participants. Complete data for the variable of behavioral activation was available for 383 participants. Hypothesis three predicted that performance avoidance would be positive correlated with behavioral activation in first-generation college students.

Table 7 shows descriptive statistics and zero-order correlations for the aforementioned variables (as well as variables for hypotheses two and four), including relevant sample sizes. Descriptive statistics revealed that the variables of total behavioral activation (BAS-Total), behavioral activation-drive subscale (BAS-D), behavioral activation-fun seeking subscale (BAS-FS), and behavioral activation-reward responsivity subscale (BAS-RR) were normally distributed. The correlational analysis for hypothesis three demonstrated a statistically significant, negative correlation between performance avoidance and total behavioral activation (BAS-Total) in first-generation college students ($M$ = 41.00, $SD$ = 5.07), $r = -.28$, $n = 132$, $p < .01$, 95% CI [-0.428, -0.111]. Therefore, the hypothesis was not supported. These findings

suggest that in first-generation college students, higher levels of performance avoidance were associated with lower levels of total behavioral activation.

Of note, the correlational analysis listed in Table 7 also revealed statistically significant, negative correlations between performance avoidance and the subscales of behavioral activation in first-generation college students, including behavioral activation-drive (BAS-D; $M$ = 11.13, $SD$ = 2.24)), $r$ = -.178, $n$ = 132, $p$ < .05, 95% CI [-.339, -.007], behavioral activation-fun seeking (BAS-FS; $M$ = 12.21, $SD$ = 2.18)), $r$ = -.217, $n$ = 132, $p$ < .05, 95% CI [-.374, -.048], and behavioral activation-reward responsivity (BAS-RR; $M$ = 17.65, $SD$ = 1.98)), $r$ = -.271, $n$ = 132, $p$ < .01, 95% CI [-.423, -.105]. These finding suggests that in first-generation college students, higher levels of performance avoidance were associated with lower levels of drive, fun-seeking, and reward responsivity.

**Predicting performance avoidance.** It was previously proposed that the variable of behavioral activation would be added to a larger simultaneous multiple regression analysis which included the variables in hypothesis two (behavioral inhibition) and hypothesis four (neuroticism). Therefore, the results of that simultaneous multiple regression analysis can be viewed under hypothesis four in Table 12.

**Moderating effects of generational status.** A simple moderation analysis was performed using PROCESS v4.2 to investigate the moderating effect of generational status on the relationship between the predictor variable of behavioral activation and the outcome variable of performance avoidance. As displayed in Table 10, the overall model was statistically significant, $F(3, 379) = 4.209$, $p < .01$, $R^2 = .032$. This suggests that, taken together, the predictors of behavioral activation (BAS-Total), generational status (FirstGen), and the interaction of behavioral activation and generational status accounted for 3.2% of the variance in

the model. The moderation analysis also demonstrated that the main effect of behavioral activation was statistically significant, $b = .028$, $t(379) = 2.622$, $p = .009$, 95% CI [.007, .049], such that for every one unit increase in behavioral activation, there was a .028 unit increase in performance avoidance. However, the main effect of generational status was not statistically significant, $b = -.183$, $t(379) = -.240$, $p = .811$, 95% CI [-1.687, 1.320]. Additionally, the interaction between behavioral activation and generational status was not statistically significant, $b = .006$, $t(379) = .347$, $p = .729$, 95% CI [-.030, .042]. These results suggest that generational status does not moderate the relationship between behavioral activation and performance avoidance.

Table 10. *Moderation Model Coefficients for Generational Status, Behavioral Activation, and Performance Avoidance*

Model Summary

| *R* | $R^2$ | *F* | *df1* | *df2* | *p* |
|---|---|---|---|---|---|
| .180 | .032 | 4.209 | 3.000 | 379.000 | .006 |

Coefficient Model

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 3.041 | .453 | 6.712 | .000 | 2.150 | 3.932 |
| BASTOTAL | .028 | .011 | 2.622 | .009 | .007 | .049 |
| FirstGent | -.183 | .764 | -.240 | .811 | -1.687 | 1.320 |
| Int_1 | .006 | .018 | .347 | .729 | -.030 | .042 |

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

Note: BASTOTAL = Behavioral Activation Scale (BIS/BAS) - Total (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = BASTOTAL x FirstGent (interaction variable)

**Comparing means.** Hypothesis three also predicted that first-generation college students would report higher levels of behavioral activation in comparison to continuing-generation college students. Results revealed that this component of the hypothesis was opposite of what was hypothesized. An independent sample *t*-test revealed a statistically significant difference in mean behavioral activation between first-generation ($M = 41.00$, $SD = 5.07$) and continuing-

generation college students ($M = 41.90$, $SD = 5.09$), $t(385) = 1.669$, $p < .05$ (one-tailed). The mean self-reported behavioral activation for first-generation college students was 0.9 less than the mean self-reported behavioral activation for continuing-generation students.

**Hypothesis Four**

**Correlational analyses.** Zero-order correlational analyses were performed to determine the relationships between performance avoidance and neuroticism in both first- and continuing-generation college students. Complete data for the variable of performance avoidance was available for 383 participants. Complete data for the variable of neuroticism was available for 381 participants. Hypothesis four predicted that performance avoidance would be positively correlated with neuroticism in first-generation college students.

Table 7 shows descriptive statistics and zero-order correlations for the aforementioned variables (as well as variables for hypotheses two and three), including relevant sample sizes. Descriptive statistics revealed that the variable of neuroticism was normally distributed. Correlational analysis revealed no statistically significant relationships between the hypothesized variables of performance avoidance and neuroticism. Therefore, the hypothesis was not supported. These findings suggest there is not a statistically significant correlational relationship between performance avoidance and neuroticism in first-generation college students.

**Predicting performance avoidance.** It was previously proposed that a simultaneous multiple regression analysis would be performed to predict performance avoidance from neuroticism, BIS (hypothesis two), and BAS (hypothesis three), in first-generation colleges students. Before running the regression, the assumptions of normality, homoscedasticity, and the absence of multicollinearity were assessed; all assumptions were met. In Figure 1, a Predicted Probability plot (P-P plot) demonstrates that in the data for first-generation college students, the

residuals deviate only slightly from the line of normality. In Figure 2, a scatterplot of the residuals demonstrates that the data for first-generation college students is mostly homoscedastic. In Table 11, the variance inflation factor (VIF) values assess multicollinearity. The variable of BAS-Total demonstrated high correlation with the subscales of BAS (e.g., BAS-D, BAS-FS, BAS-RR) and therefore was assumed to have high collinearity with them; therefore, BAS-Total was not used in the regression model. Also, neuroticism was not added to the multiple regression analysis given that it did not demonstrate a statistically significant correlation with the outcome variable. Lastly, the VIF values for the other four predictor variables demonstrated low correlation.

Figure 1. *Normal P-P Plot of Regression Standardized Residuals for Performance Avoidance and Variables of BIS/BAS in First-Generation College Students*

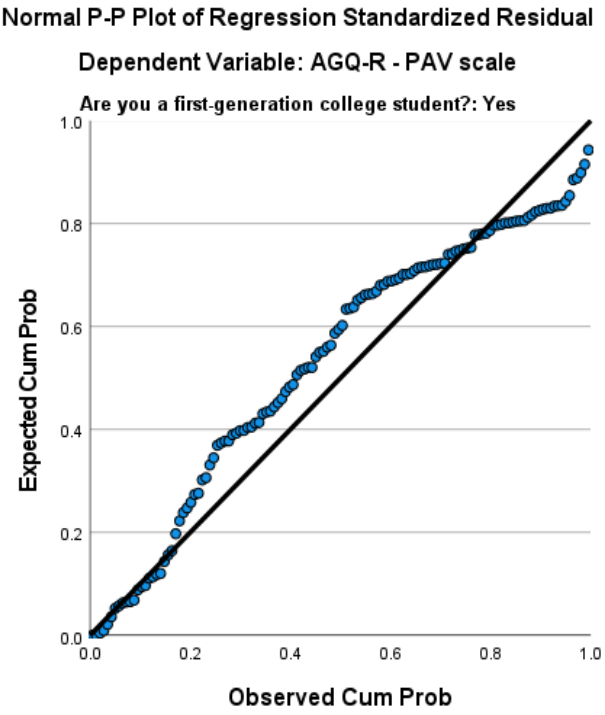

Figure 2. *Scatterplot of Homoscedasticity for Performance Avoidance and Variables of BIS/BAS in First-Generation College Students*

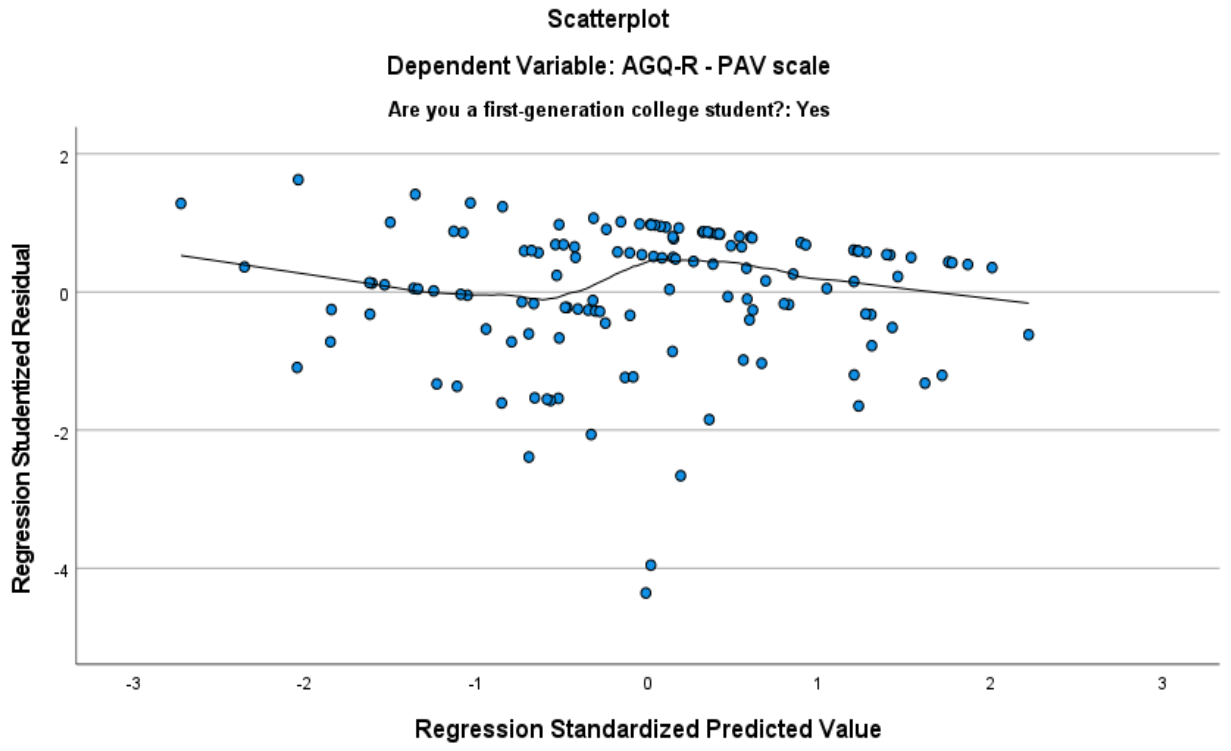


Table 11. *Assessment of Multicollinearity in Predictor Variables in First-Generation College Students*

| | Coefficients | | | | | | |
|---|---|---|---|---|---|---|---|
| | Unstandardized Coefficients | | Standardized Coefficients | | | Collinearity Statistics | |
| | B | Std. Error | Beta | t | Sig. | Tolerance | VIF |
| (Constant) | 2.031 | .669 | | 3.035 | .003 | | |
| BIS-Total | .039 | .019 | .182 | 2.009 | .047 | .873 | 1.145 |
| BAS-D | .018 | .036 | .051 | .499 | .619 | .690 | 1.450 |
| BAS-FS | .044 | .036 | .123 | 1.224 | .223 | .706 | 1.416 |
| BAS-RR | .038 | .042 | .096 | .909 | .365 | .645 | 1.551 |

Given that the assumptions of normality were met, a simultaneous multiple regression analysis was conducted to determine whether behavioral inhibition (BIS-Total), behavioral approach-drive (BAS-D), behavioral approach-fun seeking (BAS-FS), and behavioral approach-reward responsivity (BAS-RR) could predict self-reported levels of performance avoidance (AGQ-R-PAV). The overall regression model was statistically significant, $F$ (4, 127) = 3.05, $p < .05$, $R^2 = .088$. This suggests that, taken together, the predictors of BIS-Total, BAS-D, BAS-FS, and BAS-RR accounted for 8.8% of the variance in self-reported performance avoidance in first-generation college students. Further, the results indicated that BIS-Total was the only unique, statistically significant predictors of performance avoidance. BIS-Total explained a statistically significant amount of unique variance ($\beta = .18$, $p < .05$), such that each standard deviation increase in BIS-Total resulted in a .18 *SD* increase in performance avoidance, when BAS-D, BAS-FS, and BAS-RR were controlled. The predictors of BAS-D, BAS-FS, and BAS-RR were not unique, statistically significant predictors. Table 12 shows zero-order correlations and the unique effects of the predictor variables of the multiple regression analysis for predicting performance avoidance in first-generation college students.

Table 12. *Multiple Regression for Predicting Performance Avoidance in First-Generation College Students*

| Predictor | Zero-order *r* | *β* | *p* |
|---|---|---|---|
| BIS-Total | -.209 | .18* | .047 |
| BAS-D | -.178 | .05 | .619 |
| BAS-FS | -.217 | .12 | .223 |
| BAS-RR | -.271 | .09 | .365 |

*$p$ <.05, **$p$ <.01
Note: Exact $p$ values are for the unique effects of the predictors; BIS-Total = Behavioral Inhibition System-Total; BAS-D = Behavioral Activation System-Drive Subscale; BAS-FS = Behavioral Activation System-Fun Seeking Subscale; BAS-RR = Behavioral Activation System-Reward Responsivity Subscale

**Moderating effects of generational status.** A simple moderation analysis was performed using PROCESS v4.2 to investigate the moderating effect of generational status on the relationship between the predictor variable of neuroticism and the outcome variable of performance avoidance. As displayed in Table 13, the moderation analysis demonstrated that the main effects of neuroticism and generational status were not statistically significant, $b = .006$, $t(377) = .348$, $p = .728$, 95% CI [-.030, .043], and $b = .282$, $t(377) = .673$, $p = .502$, 95% CI [-.543, 1.108], respectively. Additionally, the interaction between neuroticism and generational status was not statistically significant, $b = -.016$, $t(377) = -.494$, $p = .621$, 95% CI [-.081, .049]. These results suggest that generational status does not moderate the relationship between neuroticism and performance avoidance.

Table 13. *Moderation Model Coefficients for Generational Status, Neuroticism, and Performance Avoidance*

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 4.143 | .229 | 18.063 | .000 | 3.692 | 4.593 |
| Neuroticism | .006 | .018 | .348 | .728 | -.030 | .043 |
| FirstGent | .282 | .420 | .673 | .502 | -.543 | 1.108 |
| Int_1 | -.016 | .033 | -.494 | .621 | -.081 | .049 |

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

Note: Neuroticism = Neuroticism subscale – Mini-IPIP (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = Neuroticism x FirstGent (interaction variable)

**Comparing means.** Hypothesis four also predicted that first-generation college students would report higher levels of neuroticism than continuing-generation college students. This component of the hypothesis was not supported. An independent sample *t*-test revealed that the difference in mean neuroticism between first-generation ($M = 12.55$, $SD = 2.79$) and continuing-generation college students ($M = 12.06$, $SD = 2.97$) was approaching statistical significance, $t(379) = -1.535$, $p = .06$ (one-tailed).

## Hypothesis Five

**Correlational analyses.** Zero-order correlational analyses were performed to determine the relationships between performance avoidance and perceived executive dysfunction. Complete data for both variables was available for 380 participants. Hypothesis five predicted that performance avoidance would be positively correlated with perceived executive dysfunction in first-generation college students.

Table 14 shows descriptive statistics and zero-order correlations for the aforementioned variables, including sample sizes relevant to each correlation. Descriptive statistics revealed that the variables of global executive composite (GEC), behavioral regulation index (BRI; a sub-index of GEC), and metacognitive index (MI; a sub-index of GEC) were normally distributed. Correlational analyses revealed no statistically significant relationships between the hypothesized, and explored, variables. Therefore, the hypothesis was not supported. These findings suggest that there is no statistically significant correlational relationship between performance avoidance and perceived executive dysfunction in first-generation college students.

Table 14. *Zero-Order Correlations and Descriptive Statistics for Measures of Generational Status, Performance Avoidance, and Executive Functioning*

| Generational Status | | Zero-Order Correlations | | | |
|---|---|---|---|---|---|
| | | AGQ-R-PAV | BRI | MI | GEC |
| First-Generation Students ($N = 130$) | BRI | .017 | | | |
| | MI | .058 | .760** | | |
| | GEC | .043 | .918** | .956** | |
| Continuing-Generation Students ($N = 250$) | BRI | .011 | | | |
| | MI | .044 | .777** | | |
| | GEC | .032 | .921** | .960** | |
| *M* | | .20 | 51.62 | 68.48 | 120.10 |
| *SD* | | .19 | 11.10 | 15.33 | 24.92 |

*$p$ <.05, **$p$ <.01 (2-tailed)

Note: AGQ-R-PAV = log transformed Achievement Goal Questionnaire-Revised-Performance Avoidance subscale; BRI = Behavior Rating Inventory of Executive Function for Adults (BRIEF-A) - Behavioral Regulation Index; MI = Behavior Rating Inventory of Executive Function for Adults (BRIEF-A) - Metacognitive Index; GEC = Behavior Rating Inventory of Executive Function for Adults (BRIEF-A) – Global Executive Composite

**Predicting performance avoidance.** It was previously proposed that the variable of perceived executive dysfunction would be added to a larger simultaneous multiple regression analysis which included variables of attention (hypothesis six) and working memory (hypothesis seven). Therefore, the results of that simultaneous multiple regression analysis can be viewed under hypothesis seven in Table 31.

**Moderating effects of generational status.** A simple moderation analysis was performed using PROCESS v4.2 to investigate the moderating effect of generational status on the relationship between the predictor variable of perceived global executive dysfunction and the outcome variable of performance avoidance. As displayed in Table 15, the moderation analysis demonstrated that the main effects of perceived global executive dysfunction and generational status were not statistically significant, $b = -.001$, $t(376) = -.238$, $p = .812$, 95% CI [-.005, .004], and $b = .230$, $t(376) = .484$, $p = .629$, 95% CI [-.706, 1.166], respectively. Additionally, the

interaction between perceived global executive dysfunction and generational status was not statistically significant, $b$ = -.001, $t(376)$ = -.311, $p$ = .756, 95% CI [-.009, .006]. These results suggest that generational status does not moderate the relationship between perceived global executive dysfunction and performance avoidance.

Table 15. *Moderation Model Coefficients for Generational Status, Executive Dysfunction, and Performance Avoidance*

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | T | p | Lower | Upper |
| (Constant) | 4.278 | .263 | 16.275 | .000 | 3.761 | 4.795 |
| GEC | -.001 | .002 | -.238 | .812 | -.005 | .004 |
| FirstGent | .230 | .476 | .484 | .629 | -.706 | 1.166 |
| Int_1 | -.001 | .004 | -.311 | .756 | -.009 | .006 |

*$p$ <.05, **$p$ <.01
Note: GEC = Global Executive Composite from BRIEF-A (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = GEC x FirstGent (interaction variable)

**Comparing means.** Hypothesis five also predicted that first-generation college students would report higher levels of perceived executive dysfunction in comparison to continuing-generation college students. This component of the hypothesis was not supported. An independent sample $t$-test revealed no significant difference in mean perceived global executive dysfunction between first-generation ($M$ = 121.13, $SD$ = 23.72) and continuing-generation college students ($M$ = 119.56, $SD$ = 25.54), $t(378)$ = -.581, $p$ = .28 (one-tailed).

**Hypothesis Six**

**Correlational analyses.** Zero-order correlational analyses were performed to determine the relationships between performance avoidance and various situations of self-reported attention. Given that there is not a total score for attention on the ELAS, each situation score (Situation Score A – Situation Score I) was used as a correlational variable. Complete data for the variable of performance avoidance was available for 383 participants. Complete data for all

situation score variables was available for 373 participants. Hypothesis six predicted that performance avoidance would be negatively correlated with attention in first-generation college students.

Descriptive statistics revealed that the attention variables of Situation Score G (Preparing a Meal) and Situation Score I (Driving a Car) were not normally distributed; thus, square-root transformations were performed to correct skewnees, as represented in Tables 16 and 17, respectively. All other attention variables were normally distributed.

Table 16. *Square-Root Transformation of Situation Score G (Preparing a Meal)*

| | N | Minimum | Maximum | Mean | Std. Deviation | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| Situation Score G | 373 | 10 | 100 | 77.90 | 17.590 | -.969 | .126 | .546 | .252 |
| SitScore_G_R | 373 | 1.00 | 91.00 | 23.10 | 17.590 | .969 | .126 | .546 | .252 |
| SitScore_G_Rlog10 | 373 | .00 | 1.96 | 1.188 | .464 | -1.071 | .126 | .794 | .252 |
| SqRt_SitScore_G_R | 373 | 1.00 | 9.54 | 4.421 | 1.890 | .101 | .126 | -.557 | .252 |
| Valid N (listwise) | 373 | | | | | | | | |

Situation Score G represents the raw data before the variable was reflected and transformed. Range of scores vary from 10 to 100 with skewness (g1) = -.969, which represents a non-normal distribution. Thus, a log transformation was applied. SitScoreG_R represents the reflected scores, which were each subtracted from 101. The skewness is now positive although its magnitude remains the same. SitScore_R_log10 is a base 10 log transformation of the reflected scores, which resulted in increased negative skewness. Therefore, a second transformation was used, square root, represented by SqRt_SitScore_G_R which resolved the problem of non-normal skewness.

Table 17. *Square-Root Transformation of Situation Score I (Driving a Car)*

| | N | Minimum | Maximum | Mean | Std. Deviation | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| Situation Score I | 373 | 2 | 100 | 82.77 | 16.99 | -1.234 | .126 | 1.589 | .252 |
| SitScoreI_R | 373 | 1.00 | 99.00 | 18.23 | 16.99 | 1.234 | .126 | 1.589 | .252 |
| SitScoreI_Rlog10 | 373 | .00 | 2.00 | .986 | .580 | -.612 | .125 | -.853 | .252 |
| SqRt_SitScoreI_R | 373 | 1.00 | 9.95 | 3.757 | 2.031 | .275 | .126 | -.737 | .252 |
| Valid N (listwise) | 373 | | | | | | | | |

Situation Score I represents the raw data before the variable was reflected and transformed. Range of scores vary from 2 to 100 with skewness (g1) = -1.234, which represents a non-normal distribution. Thus, a log transformation was applied. SitScoreI_R represents the reflected scores, which were each subtracted from 101. The skewness is now positive although its magnitude remains the same. SitScoreI_R_log10 is a base 10 log transformation of the reflected scores, which did not resolve the problem of non-normal skewness, (g1) = -.612. Therefore, a second transformation was used, square root, represented by SqRt_SitScoreI_R, which resolved the problem of non-normal skewness.

Table 18 displays descriptive statistics and zero-order correlations for the aforementioned variables, including sample sizes relevant to each generational status. The analysis demonstrated that in first-generation college students, performance avoidance ($M$ = .20, $SD$ = .17) was significantly, negatively correlated with Situation Score C (Performing an Indoor Activity) ($M$ = 60.14, $SD$ = 19.65), $r$ = -.239, $n$ = 126, $p$ < .01, 95% CI [-.397, -.067]. Additionally, the analysis demonstrated that in first-generation college students, performance avoidance ($M$ = .20, $SD$ = .17) was significantly, positively correlated with Situation Score I (Driving a Car), ($M$ = 83.77, $SD$ = 15.50), $r$ = .259, $n$ = 126, $p$ < .01, 95% CI [0.088, 0.415]. No other statistically significant correlations were demonstrated between performance avoidance and variables of attention.

Therefore, the hypothesis was partially supported. These findings suggest that, in first-generation college students, higher levels of performance avoidance are associated with lower levels of attention when performing an indoor activity, and higher levels of attention when driving a car.

Table 18. *Zero-Order Correlations and Descriptive Statistics for Measures of Performance Avoidance and Attention in First-Generation College Students*

| Generational Status | | Zero-Order Correlations | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| First-Generation Students ($N = 126$) | | AGQ-R-PAV | Sit A | Sit B | Sit C | Sit D | Sit E | Sit F | Sit G | Sit H | Sit I |
| | Sit A | -.127 | | | | | | | | | |
| | Sit B | -.154 | .477** | | | | | | | | |
| | Sit C | -.239** | .430** | .545** | | | | | | | |
| | Sit D | -.126 | .528** | .510** | .450** | | | | | | |
| | Sit E | -.134 | .374** | .536** | .453** | .494** | | | | | |
| | Sit F | -.129 | .558** | .468** | .507** | .686** | .517** | | | | |
| | Sit G | .113 | -.208* | -.453** | -.380** | -.324** | -.504** | -.342** | | | |
| | Sit H | -.107 | .295** | .290** | .467** | .347** | .251** | .312** | -.303** | | |
| | Sit I | .259** | -.169 | -.389** | -.278** | -.235** | -.445** | -.334** | .432** | -.208* | |
| *M* | | .20 | 50.56 | 63.92 | 60.14 | 53.02 | 66.00 | 57.88 | 79.15 | 66.78 | 83.77 |
| *SD* | | .17 | 17.82 | 19.89 | 19.65 | 19.40 | 19.77 | 20.29 | 16.98 | 22.16 | 15.50 |

*$p$ <.05, **$p$ <.01 (2-tailed)

Note: AGQ-R-PAV = log transformed Achievement Goal Questionnaire-Revised-Performance Avoidance subscale; Sit A = Everyday Life in Attention Scale (ELAS)-Situation Score A (Reading a Book); Sit B = ELAS-Situation Score B (Watching a Movie/Documentary); Sit C = ELAS-Situation Score C (Performing an Indoor Activity); Sit D = ELAS-Situation Score D (Attending Lecture or Open Evening); Sit E = ELAS-Situation Score E (Having a Conversation); Sit F = ELAS - Situation Score F (Doing an Assignment/Administration); Sit G = square root transformed ELAS-Situation Score G (Preparing a Meal); Sit H = ELAS-Situation Score H (Cleaning Up); Sit I = square root transformed ELAS-Situation Score I (Driving a Car)

Table 19. *Zero-Order Correlations and Descriptive Statistics for Measures of Performance Avoidance and Attention in Continuing-Generation College Students*

| Generational Status | | Zero-Order Correlations | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Continuing-Generation Students ($N = 247$) | | AGQ-R-PAV | Sit A | Sit B | Sit C | Sit D | Sit E | Sit F | Sit G | Sit H | Sit I |
| | Sit A | -.061 | | | | | | | | | |
| | Sit B | -.079 | .424** | | | | | | | | |
| | Sit C | -.039 | .393** | .433** | | | | | | | |
| | Sit D | -.062 | .513** | .403** | .403** | | | | | | |
| | Sit E | -.144* | .283** | .483** | .499** | .359** | | | | | |
| | Sit F | -.015 | .438** | .429** | .499** | .624** | .510** | | | | |
| | Sit G | .030 | -.244** | -.315** | -.383** | -.235** | -.506** | -.481** | | | |
| | Sit H | -.074 | .321** | .390** | .276** | .361** | .416** | .420** | -.340** | | |
| | Sit I | .103 | -.224** | -.339** | -.160** | -.281** | -.378** | -.369** | .429** | -.346* | |
| *M* | | .20 | 48.95 | 62.20 | 57.57 | 48.65 | 64.76 | 57.04 | 77.26 | 63.08 | 82.26 |
| *SD* | | .20 | 18.97 | 19.45 | 20.27 | 18.76 | 19.95 | 18.97 | 17.89 | 21.44 | 17.72 |

*$p$ <.05, **$p$ <.01 (2-tailed)

Note: AGQ-R-PAV = log transformed Achievement Goal Questionnaire-Revised-Performance Avoidance subscale; Sit A = Everyday Life in Attention Scale (ELAS)-Situation Score A (Reading a Book); Sit B = ELAS-Situation Score B (Watching a Movie/Documentary); Sit C = ELAS-Situation Score C (Performing an Indoor Activity); Sit D = ELAS-Situation Score D (Attending Lecture or Open Evening); Sit E = ELAS-Situation Score E (Having a Conversation); Sit F = ELAS - Situation Score F (Doing an Assignment/Administration); Sit G = square root transformed ELAS-Situation Score G (Preparing a Meal); Sit H = ELAS-Situation Score H (Cleaning Up); Sit I = square root transformed ELAS-Situation Score I (Driving a Car)

**Predicting performance avoidance.** It was previously proposed that the various variables of attention would be added to a larger simultaneous multiple regression analysis which included variables of executive dysfunction (hypothesis five) and working memory (hypothesis eight). Therefore, the results of that simultaneous multiple regression analysis can be viewed under hypothesis eight in Table 31.

**Moderating effect of generational status.** Multiple simple moderation analyses were performed using PROCESS v4.2 to investigate the moderating effect of generational status on the relationships between the predictor variables of attention and the outcome variable of performance avoidance. Each Situation Score from the ELAS was used as a predictor variable to assess moderation and will be reported separately.

As displayed in Table 20, the moderation analysis using Situation Score A (Reading a book) demonstrated that the main effects of Situation Score A and generational status were not statistically significant, $b = .002$, $t(373) = .802$, $p = .432$, 95% CI [-.003, .008], and $b = .008$, $t(373) = .028$, $p = .978$, 95% CI [-.543, .558], respectively. Additionally, the interaction between Situation Score A and generational status was not statistically significant, $b = .001$, $t(373) = .274$, $p = .784$, 95% CI [-.009, .012]. These results suggest that generational status does not moderate the relationship between paying attention to reading a book and performance avoidance.

Table 20. *Moderation Model Coefficients for Generational Status, Attention, and Performance Avoidance – Situation Score A (Reading a Book)*

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 4.098 | .153 | 26.704 | .000 | 3.796 | 4.400 |
| SitScore_A | .002 | .003 | .802 | .423 | -.003 | .008 |
| FirstGent | .008 | .280 | .028 | .978 | -.543 | .558 |
| Int_1 | .001 | .005 | .274 | .784 | -.009 | .012 |

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

Note: SitScore_A – Situation Score A (Reading a Book) from ELAS (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = SitScore_A x FirstGent (interaction variable)

As displayed in Table 21, the moderation analysis using Situation Score B (Watching a movie/documentary) demonstrated that the main effects of Situation Score B and generational status were not statistically significant, $b$ = .004, $t$(369) = 1.450, $p$ = .148, 95% CI [-.001, .010], and $b$ = .022, $t$(369) = .069, $p$ = .945, 95% CI [-.607, .651], respectively. Additionally, the interaction between Situation Score B and generational status was not statistically significant, $b$ = .001, $t$(369) = .179, $p$ = .858, 95% CI [-.009, .010]. These results suggest that generational status does not moderate the relationship between paying attention when watching a movie/documentary and performance avoidance.

Table 21. *Moderation Model Coefficients for Generational Status, Attention, and Performance Avoidance – Situation Score B (Watching a Movie/Documentary)*

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 3.957 | .185 | 21.366 | .000 | 3.592 | 4.321 |
| SitScore_B | .004 | .003 | 1.450 | .148 | -.001 | .010 |
| FirstGent | .022 | .320 | .069 | .945 | -.607 | .651 |
| Int_1 | .001 | .005 | .179 | .858 | -.009 | .010 |

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

Note: SitScore_B – Situation Score B (Watching a movie/documentary) from ELAS (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = SitScore_B x FirstGent (interaction variable)

As displayed in Table 22, the moderation analysis using Situation Score C (Performing an Indoor Activity) demonstrated that the main effects of Situation Score C and generational status were not statistically significant, $b = .001$, $t(369) = .351$, $p = .726$, 95% CI [-.004, .006], and $b = -.326$, $t(369) = -1.087$, $p = .278$, 95% CI [-.916, .264], respectively. Additionally, the interaction between Situation Score C and generational status was not statistically significant, $b = .007$, $t(369) = 1.414$, $p = .158$, 95% CI [-.003, .016]. These results suggest that generational status does not moderate the relationship between paying attention to performing an indoor activity and performance avoidance.

Table 22. *Moderation Model Coefficients for Generational Status, Attention, and Performance Avoidance – Situation Score C*

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 4.158 | .166 | 24.989 | .000 | 3.830 | 4.485 |
| SitScore_C | .001 | .003 | .351 | .726 | -.004 | .006 |
| FirstGent | -.326 | .300 | -1.087 | .278 | -.916 | .264 |
| Int_1 | .007 | .005 | 1.414 | .158 | -.003 | .016 |

*$p$ <.05, **$p$ <.01
Note: SitScore_C – Situation Score C (Performing an Indoor Activity) from ELAS (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = SitScore_C x FirstGent (interaction variable)

As displayed in Table 23, the moderation analysis using Situation Score D (Attending a lecture or open evening) demonstrated that the main effects of Situation Score D and generational status were not statistically significant, $b = .000$, $t(369) = .128$, $p = .899$, 95% CI [-.005, .006], and $b = -.086$, $t(369) = -.314$, $p = .754$, 95% CI [-.625, .453], respectively. Additionally, the interaction between Situation Score D and generational status was not statistically significant, $b = .003$, $t(369) = .638$, $p = .524$, 95% CI [-.007, .013]. These results suggest that generational status does not moderate the relationship between paying attention during a lecture or open evening and performance avoidance.

Table 23. *Moderation Model Coefficients for Generational Status, Attention, and Performance Avoidance – Situation Score D*

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 4.194 | .154 | 27.197 | .000 | 3.891 | 4.498 |
| SitScore_D | .000 | .003 | .128 | .899 | -.005 | .006 |
| FirstGent | -.086 | .274 | -.314 | .754 | -.625 | .453 |
| Int_1 | .003 | .005 | .638 | .524 | -.007 | .013 |

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

Note: SitScore_D – Situation Score D (Attending a lecture or open evening) from ELAS (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = SitScore_D x FirstGent (interaction variable)

As displayed in Table 24, the moderation analysis using Situation Score E (Having a conversation) demonstrated that the overall model was statistically significant, $F(3, 369) = 2.906$, $p < .05$, $R^2 = .023$. This suggests that, taken together, the predictors of paying attention to a conversation (Situation Score E), generational status (FirstGen), and the interaction of these two variables accounted for 2.3% of the variance in the model. Additionally, the moderation demonstrated that the main effect of Situation Score E was statistically significant, $b = .007$, $t(369) = 2.559$, $p = .011$, 95% CI [.002, .012], such that for every one unit increase in paying attention to a conversation, there was a .007 unit increase in performance avoidance. However, the main effect of generational status was not statistically significant, $b = .239$, $t(369) = .732$, $p = .465$, 95% CI [-.404, .883]. Additionally, the interaction between Situation Score E and generational status was not statistically significant, $b = -.002$, $t(369) = -.520$, $p = .604$, 95% CI [-.012, .007]. These results suggest that generational status does not moderate the relationship between paying attention to a conversation and performance avoidance.

Table 24. *Moderation Model Coefficients for Generational Status, Attention, and Performance Avoidance – Situation Score E*

Model Summary

| *R* | $R^2$ | *F* | *df1* | *df2* | *p* |
|---|---|---|---|---|---|
| .152 | .023 | 2.906 | 3.000 | 369.000 | .035 |

Coefficient Model

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 3.756 | .187 | 20.120 | .000 | 3.389 | 4.123 |
| SitScore_E | .007 | .003 | 2.559 | .011 | .002 | .012 |
| FirstGent | .239 | .327 | .732 | .465 | -.404 | .883 |
| Int_1 | -.002 | .005 | -.520 | .604 | -.012 | .007 |

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

Note: SitScore_E = Situation Score E (Having a conversation) from ELAS (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = SitScore_E x FirstGent (interaction variable)

As displayed in Table 25, the moderation analysis using Situation Score F (Doing an assignment/administration) demonstrated that the main effects of Situation Score F and generational status were not statistically significant, $b$ = .000, $t$(369) = .038, $p$ = .969, 95% CI [-.006, .006], and $b$ = -.117, $t$(369) = -.398, $p$ = .691, 95% CI [-.694, .461], respectively. Additionally, the interaction between Situation Score F and generational status was not statistically significant, $b$ = .003, $t$(369) = .720, $p$ = .472, 95% CI [-.006, .013]. These results suggest that generational status does not moderate the relationship between paying attention to doing an assignment/administration and performance avoidance.

Table 25. *Moderation Model Coefficients for Generational Status, Attention, and Performance Avoidance – Situation Score F*

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 4.206 | .176 | 23.916 | .000 | 3.861 | 4.552 |
| SitScore_F | .000 | .003 | .038 | .969 | -.006 | .006 |
| FirstGent | -.117 | .294 | -.398 | .691 | -.694 | .461 |
| Int_1 | .003 | .005 | .720 | .472 | -.006 | .013 |

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

Note: SitScore_F – Situation Score F (Doing an Assignment/Administration) from ELAS (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = SitScore_F x FirstGent (interaction variable)

As displayed in Table 26, the moderation analysis using Situation Score G (Preparing a meal) demonstrated that the main effects of Situation Score G and generational status were not statistically significant, $b$ = .000, $t$(369) = .068, $p$ = .946, 95% CI [-.006, .006], and $b$ = -.224, $t$(369) = -.504, $p$ = .615, 95% CI [-1.100, .651], respectively. Additionally, the interaction between Situation Score G and generational status was not statistically significant, $b$ = .004, $t$(369) = .704, $p$ = .482, 95% CI [-.007, .015]. These results suggest that generational status does not moderate the relationship between paying attention to preparing a meal and performance avoidance.

Table 26. *Moderation Model Coefficients for Generational Status, Attention, and Performance Avoidance – Situation Score G*

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 4.196 | .246 | 17.058 | .000 | 3.713 | 4.680 |
| SitScore_G | .000 | .003 | .068 | .946 | -.006 | .006 |
| FirstGent | -.224 | .445 | -.504 | .615 | -1.100 | .651 |
| Int_1 | .004 | .006 | .704 | .482 | -.007 | .015 |

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

Note: SitScore_G – Situation Score G (Preparing a Meal) from ELAS (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = SitScore_G x FirstGent (interaction variable)

As displayed in Table 27, the moderation analysis using Situation Score H (Cleaning up) demonstrated that the main effects of Situation Score H and generational status were not statistically significant, $b$ = .003, $t(369)$ = 1.022, $p$ = .308, 95% CI [-.002, .008], and $b$ = -.009, $t(369)$ = -.029, $p$ = .976, 95% CI [-.600, .583], respectively. Additionally, the interaction between Situation Score H and generational status was not statistically significant, $b$ = .001, $t(369)$ = .287, $p$ = .774, 95% CI [-.007, .010]. These results suggest that generational status does not moderate the relationship between paying attention to cleaning up and performance avoidance.

Table 27. *Moderation Model Coefficients for Generational Status, Attention, and Performance Avoidance – Situation Score H*

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 4.046 | .172 | 23.513 | .000 | 3.708 | 4.385 |
| SitScore_G | .003 | .003 | 1.022 | .308 | -.002 | .008 |
| FirstGent | -.009 | .301 | -.029 | .976 | -.600 | .583 |
| Int_1 | .001 | .004 | .287 | .774 | -.007 | .010 |

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

Note: SitScore_H – Situation Score H (Cleaning up) from ELAS (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = SitScore_H x FirstGent (interaction variable)

As displayed in Table 28, the moderation analysis using Situation Score I (Driving a car) demonstrated that the overall model was statistically significant, $F(3, 369) = 3.312$, $p < .05$, $R^2$ =

.026. This suggests that, taken together, the predictors of paying attention while driving a car (Situation Score I), generational status (FirstGent), and the interaction of these two variables accounted for 2.6% of the variance in the model. However, the moderation analysis also demonstrated that the main effects of Situation Score I and generational status were not statistically significant, $b = .003$, $t(369) = 1.076$, $p = .283$, 95% CI [-.003, .009], and $b = -.817$, $t(369) = -1.644$, $p = .101$, 95% CI [-1.795, .160], respectively. Additionally, the interaction between Situation Score I and generational status was nearly statistically significant, $b = .011$, $t(369) = 1.827$, $p = .068$, 95% CI [-.001, .022]. These results suggest that generational status does not moderate the relationship between paying attention to driving a car and performance avoidance.

Table 28. *Moderation Model Coefficients for Generational Status, Attention, and Performance Avoidance – Situation Score I*

Model Summary

| *R* | $R^2$ | *F* | *df1* | *df2* | *p* |
|---|---|---|---|---|---|
| .162 | .026 | 3.312 | 3.000 | 369.000 | .020 |

Coefficient Model

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 3.939 | .261 | 15.108 | .000 | 3.426 | 4.451 |
| SitScore_I | .003 | .003 | 1.076 | .283 | -.003 | .009 |
| FirstGent | -.817 | .497 | -1.644 | .101 | -1.795 | .160 |
| Int_1 | -.011 | .006 | 1.827 | .068 | -.001 | .022 |

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

Note: SitScore_I = Situation Score I (Driving a car) from ELAS (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = SitScore_I x FirstGent (interaction variable)

**Comparing means**. Hypothesis six also predicted that first-generation college students would report more difficulties with attention than continuing-generation college students. With regards to Situation Score D (Attending a lecture or open evening), results revealed that this component of the hypothesis was opposite to what was predicted. An independent sample t-test

revealed a statistically significant difference in mean attention while attending a lecture or open evening between first-generation (*M* = 53.02, *SD* = 19.40) and continuing-generation college students (*M* = 48.65, *SD* = 18.76), t(371) = -2.104, p < .05 (one-tailed). The mean attention while attending a lecture or open evening for first-generation college students was 4.37 minutes longer than the mean attention while attending a lecture or open evening for continuing-generation students. The analysis revealed no other significant differences in mean attention scores, which are listed as follows: for Situation Score A, between first-generation (*M* = 50.56, *SD* = 17.81) and continuing-generation college students (*M* = 48.95, *SD* = 18.97), *t*(371) = -.795, *p* = .21 (one-tailed); for Situation Score B, between first-generation (*M* = 63.92, *SD* = 19.89) and continuing-generation college students (*M* = 62.20, *SD* = 19.45), *t*(371) = -.803, *p* = .21 (one-tailed); for Situation Score C, between first-generation (*M* = 60.14, *SD* = 19.65) and continuing-generation college students (*M* = 57.57, *SD* = 20.27), *t*(371) = -1.17, *p* = .12 (one-tailed); for Situation Score E, between first-generation (*M* = 66.00, *SD* = 19.77) and continuing-generation college students (*M* = 64.76, *SD* = 19.95), *t*(371) = -.572, *p* = .28 (one-tailed); for Situation Score F, between first-generation (*M* = 57.88, *SD* = 20.29) and continuing-generation college students (*M* = 57.04, *SD* = 18.97), *t*(371) = -.395, *p* = .35 (one-tailed); for Situation Score G, between first-generation (*M* = 4.27, *SD* = 1.91) and continuing-generation college students (*M* = 4.49, *SD* = 1.88), *t*(371) = 1.10, *p* = .14 (one-tailed); for Situation Score H, between first-generation (*M* = 66.78, *SD* = 22.16) and continuing-generation college students (*M* = 63.08, *SD* = 21.44), *t*(371) = -1.56, *p* = .06 (one-tailed); and for Situation Score I, between first-generation (*M* = 3.64, *SD* = 2.00) and continuing-generation college students (*M* = 3.82, *SD* = 2.05), *t*(371) = .803, *p* = .21 (one-tailed).

**Hypothesis Seven**

**Correlational analyses.** Zero-order correlational analyses were performed to determine the relationships between performance avoidance and working memory. Complete data for the variables of total working memory, as well as for the subscales of working memory – storage, working memory – attention, and working memory – executive was available for 370 participants. Hypothesis seven predicted that performance avoidance would be negatively correlated with total working memory in first-generation college students.

Table 29 displays descriptive statistics and zero-order correlations for the aforementioned variables, including sample sizes relevant to each generational status. Descriptive statistics revealed that all the variables of working memory were normally distributed. Correlational analyses revealed no statistically significant relationships between the hypothesized variables. Therefore, the hypothesis was not supported. These findings suggest that performance avoidance is not statistically significantly correlated with working memory in first-generation college students.

Table 29. *Zero-Order Correlations and Descriptive Statistics for Measures of Generational Status, Performance Avoidance, and Working Memory*

| Generational Status | | Zero-Order Correlations | | | | |
|---|---|---|---|---|---|---|
| First-Generation Students ($N = 130$) | | AGQ-R-PAV | Storage | Attention | Executive | Total |
| | Storage | .044 | | | | |
| | Attention | .031 | .734** | | | |
| | Executive | -.001 | .932** | .832** | | |
| | Total | .022 | .944** | .897** | .985** | |
| Continuing-Generation Students ($N = 250$) | Storage | .056 | | | | |
| | Attention | -.013 | .827** | | | |
| | Executive | .038 | .957** | .869** | | |
| | Total | .031 | .969** | .922** | .988** | |
| *M* | | .20 | 13.44 | 13.66 | 24.47 | 51.57 |
| *SD* | | .19 | 7.50 | 7.07 | 12.46 | 25.96 |

*$p$ <.05, **$p$ <.01 (2-tailed)

Note: AGQ-R-PAV = log transformed Achievement Goal Questionnaire-Revised-Performance Avoidance subscale; Storage = Working Memory Questionnaire-Storage domain; Attention = Working Memory Questionnaire-Attention domain; Executive = Working Memory Questionnaire-Executive domain; Total = Working Memory Questionnaire-Total domain

**Predicting performance avoidance.** It was previously proposed that a simultaneous multiple regression analysis would be performed to determine if perceived working memory, perceived executive dysfunction (hypothesis five), and variables of attention (hypothesis six), could predict performance avoidance in first-generation college students. However, no significant zero-order correlations were found in this group between performance avoidance and perceived executive dysfunction, nor between performance avoidance and working memory. Significant zero-order correlations were only found in this group between performance avoidance and the attention variables of Situation Score C (Performing an Indoor Activity) and Situation Score I (Driving a Car). Therefore, only Situation Score C and Situation Score I were added to the multiple regression model as predictor variables. Before running the regression, the assumptions of normality, homoscedasticity, and the absence of multicollinearity were assessed;

all assumptions were met. In Figure 3, a Predicted Probability plot (P-P plot) demonstrates that in the data for first-generation college students, the residuals deviate only slightly from the line of normality. In Figure 4, a scatterplot of the residuals demonstrates that the data for first-generation college students is mostly homoscedastic. In Table 30, the variance inflation factor (VIF) values assess multicollinearity. The VIF values for the two predictor variables demonstrated minimal multicollinearity.

Figure 3. *Normal P-P Plot of Regression Standardized Residuals for Performance Avoidance and Variables of Attention in First-Generation College Students*

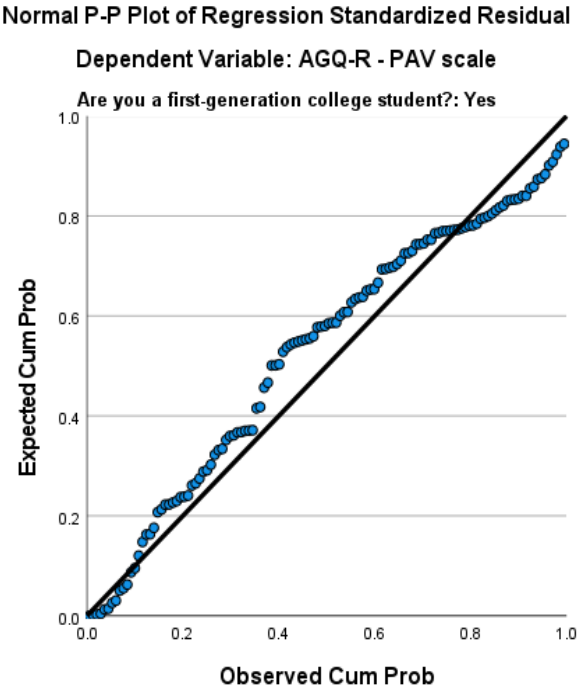

Figure 4. *Scatterplot of Homoscedasticity for Performance Avoidance and Variables of Attention in First-Generation College Students*

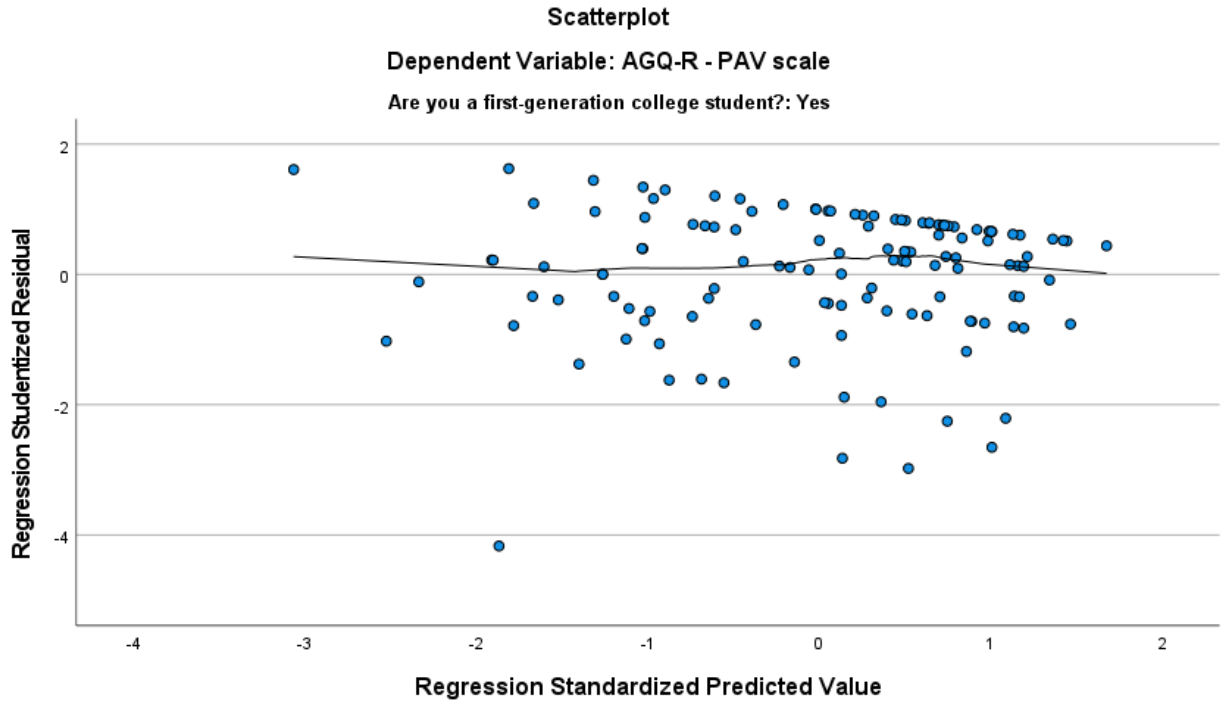


Table 30. *Assessment of Multicollinearity for Predictor Variables of Attention in First-Generation College Students*

| | Coefficients | | | | | | |
|---|---|---|---|---|---|---|---|
| | Unstandardized Coefficients | | Standardized Coefficients | | | Collinearity Statistics | |
| | B | Std. Error | Beta | t | Sig. | Tolerance | VIF |
| (Constant) | 2.974 | .363 | | 8.181 | <.001 | | |
| Situation Score C | .005 | .003 | .131 | 1.474 | .143 | .918 | 1.090 |
| Situation Score I | .012 | .004 | .255 | 2.856 | .005 | .918 | 1.090 |

Given that the assumptions of normality were met, a simultaneous multiple regression analysis was conducted to determine whether variables of attention, namely Situation Score C (Performing an Indoor Activity) and Situation Score I (Driving a Car), could predict self-

reported levels of performance avoidance in first-generation college students. The overall regression model was statistically significant, $F$ (2, 123) = 6.94, $p$ = .001, $R^2$ = .101. This suggests that, taken together, the predictors of Situation Score C and Situation Score I accounted for 10.1% of the variance in self-reported performance avoidance in first-generation college students. Further, the results indicated that Situation Score I was the only unique, statistically significant predictor of performance avoidance. This variable explained a statistically significant amount of unique variance ($\beta$ = .26, $p$ < .01), such that each standard deviation (*SD*) increase in Situation Score I resulted in a .26 *SD* increase in performance avoidance, when Situation Score C was controlled. The predictor of Situation Score C was not a unique, statistically significant predictor. Table 31 displays zero-order correlations and the unique effects of the predictor variables of the multiple regression analysis for predicting performance avoidance in first-generation college students.

Table 31. *Multiple Regression for Predicting Performance Avoidance in First-Generation College Students*

| Predictor | Zero-order *r* | $\beta$ | *p* |
|---|---|---|---|
| Situation Score C | -.239 | .131 | .143 |
| Situation Score I | .259 | .255** | .005 |

*$p$ <.05, **$p$ <.01
Note: Exact $p$ values are for the unique effects of the predictors; Situation Score C = Everyday Life in Attention Scale – Situation Score C (Performing an Indoor Activity); Situation Score I = Everyday Life in Attention Scale – Situation Score I (Driving a Car)

**Moderating effects of generational status.** A simple moderation analysis was performed using PROCESS v4.2 to investigate the moderating effect of generational status on the relationship between the predictor variable of total working memory and the outcome variable of performance avoidance. As displayed in Table 32, the moderation analysis demonstrated that the main effects of total working memory and generational status were not

statistically significant, $b$ = -.001, $t(366)$ = -.337, $p$ = .736, 95% CI [-.005, .003], and $b$ = .074, $t(366)$ = .216, $p$ = .730, 95% CI [-.350, .499], respectively. Additionally, the interaction between total working memory and generational status was not statistically significant, $b$ = .000, $t(366)$ = .063, $p$ = .950, 95% CI [-.007, .008]. These results suggest that generational status does not moderate the relationship between total working memory and performance avoidance.

Table 32. *Moderation Model Coefficients for Generational Status, Working Memory, and Performance Avoidance*

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 4.247 | .123 | 34.436 | .000 | 4.004 | 4.490 |
| WMQTotal | -.001 | .002 | -.337 | .736 | -.005 | .003 |
| FirstGent | .074 | .216 | .345 | .730 | -.350 | .499 |
| Int_1 | .000 | .004 | .063 | .950 | -.007 | .008 |

*$p$ <.05, **$p$ <.01
Note: WMQTotal – Working Memory Questionnaire - Total (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = WMQTotal x FirstGent (interaction variable)

**Comparing means**. Hypothesis seven also predicted that first-generation college students would report lower working memory in comparison to continuing-generation students. This component of the hypothesis was not supported. An independent sample t-test revealed no significant differences in mean working memory scores between first-generation ($M$ = 51.04, $SD$ = 25.10) and continuing-generation college students ($M$ = 51.84, $SD$ = 26.44), $t(368)$ = .282, $p$ = .39 (one-tailed).

**Hypothesis Eight**

**Correlational analyses.** Zero-order correlational analyses were performed to determine the relationships between performance avoidance and perceived arousal in first-generation college students. Complete data for the variables of total perceived arousal (PAS Total), low perceived arousal (PAS – Low), and high perceived arousal (PAS – High) were available for 382

participants. Hypothesis eight predicted that performance avoidance would be positively correlated with perceived arousal in first-generation college students.

Descriptive statistics were run to assess for normality of variables and revealed that PAS – Low was not normally distributed. Table 33 displays the transformation of the variable. Low Arousal represents the raw data before the variable was reflected and transformed. Range of scores vary from 14 to 70 with skewness (g1) = -.635, which represents a non-normal distribution. Thus, a log transformation was applied. Low Arousal_R represents the reflected scores, which were each subtracted from 71. The skewness is now positive although its magnitude remains the same. Low Arousal_Rlog10 is a base 10 log transformation of the reflected scores, which increased the skewness. Therefore, a second transformation was used, square root, represented by SqRt_SitScoreI_R, which resolved the problem of non-normal skewness.

Table 33. *Transformation of Perceived Low Arousal*

| | N | Min | Max | Mean | Std. Deviation | Skewness | | Kurtosis | |
|---|---|---|---|---|---|---|---|---|---|
| | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| Low Arousal | 382 | 14 | 70 | 50.75 | 12.097 | -.635 | .125 | -.076 | .249 |
| Low Arousal_R | 382 | 1.00 | 57.00 | 20.25 | 12.097 | .635 | .125 | -.076 | .249 |
| Low Arousal_Rlog10 | 382 | .00 | 1.76 | 1.21 | .336 | -1.10 | .125 | 1.447 | .249 |
| SqRt_Low Arousal_R | 382 | 1.00 | 7.55 | 4.28 | 1.405 | -.078 | .125 | -.498 | .249 |
| Valid N (listwise) | 382 | | | | | | | | |

Table 34 displays descriptive statistics and zero-order correlations for the aforementioned variables, including sample sizes relevant to each generational status. Correlational analyses revealed no statistically significant relationships between hypothesized variables. Therefore, the hypothesis was not supported. These findings suggest that there is not a statistically significant

correlation between performance avoidance and perceived arousal in first-generation college students.

Table 34. *Zero-Order Correlations and Descriptive Statistics for Measures of Generational Status, Performance Avoidance, and Perceived Arousal*

| Generational Status | | Zero-Order Correlations | | | |
|---|---|---|---|---|---|
| First-Generation Students ($N = 131$) | | AGQ-R-PAV | Low | High | Total |
| | Low | .131 | | | |
| | High | -.159 | -.320** | | |
| | Total | -.164 | -.882** | .711** | |
| Continuing-Generation Students ($N = 251$) | Low | .024 | | | |
| | High | -.093 | -.347** | | |
| | Total | -.066 | -.858** | .761** | |
| *M* | | .20 | 50.75 | 26.03 | 76.78 |
| *SD* | | .19 | 12.10 | 8.44 | 16.99 |

*$p$ <.05, **$p$ <.01 (2-tailed)
Note: AGQ-R-PAV = log transformed Achievement Goal Questionnaire-Revised-Performance Avoidance subscale; Low = Perceived Arousal Scale (PAS)-Low subscale; High = Perceived Arousal Scale (PAS)-High subscale; Total = Perceived Arousal Scale (PAS)-Total Scale

**Predicting performance avoidance.** It was previously proposed that a simultaneous multiple regression analysis would be performed to predict performance avoidance from perceived arousal. However, given that there were no statistically significant correlational relationships between these variables, performing the multiple regression analysis was unnecessary.

**Moderating effects of generational status.** A simple moderation analysis was performed using PROCESS v4.2 to investigate the moderating effect of generational status on the relationship between the predictor variable of perceived arousal and the outcome variable of performance avoidance. As displayed in Table 35, the moderation analysis demonstrated that the main effects of perceived arousal and generational status were not statistically significant, $b$ = -

.004, $t(378) = 1.150$, $p = .251$, 95% CI [-.003, .010], and $b = -.260$, $t(378) = -.604$, $p = .546$, 95% CI [-1.106, .586], respectively. Additionally, the interaction between perceived arousal and generational status was not statistically significant, $b = .004$, $t(378) = .788$, $p = .431$, 95% CI [-.007, .015]. These results suggest that generational status does not moderate the relationship between perceived arousal and performance avoidance.

Table 35. *Moderation Model Coefficients for Generational Status, Perceived Arousal, and Performance Avoidance*

| | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| Variable | Coefficients | se | t | p | Lower | Upper |
| (Constant) | 3.927 | .261 | 15.052 | .000 | 3.414 | 4.440 |
| PASTotal | .004 | .003 | 1.150 | .251 | -.003 | .010 |
| FirstGent | -.260 | .430 | -.604 | .546 | -1.106 | .586 |
| Int_1 | .004 | .006 | .788 | .431 | -.007 | .015 |

*$p$ <.05, **$p$ <.01
Note: PASTotal – Perceived Arousal Scale - Total (predictor variable); FirstGent = generational status (Moderator variable); Int_1 = PASTotal x FirstGent (interaction variable)

**Comparing means**. Hypothesis eight also predicted that first-generation college students would report higher levels of perceived arousal in comparison to continuing-generation college students. This component of the hypothesis was not supported. An independent sample t-test revealed no significant differences in mean perceived arousal scores between first-generation ($M = 75.23$, $SD = 17.29$) and continuing-generation college students ($M = 77.59$, $SD = 16.81$), $t(380) = 1.29$, $p = .10$ (one-tailed)

# Chapter 5: Discussion

## Summary of Results and Relevant Implications

This study sought to examine potential relationships between the disparate, though overlapping, literatures of achievement goal orientation, neurocognition, and neurophysiology. The overall focus was an exploration of how these concepts relate to, and influence, the undergraduate experience of first-generation college students (e.g., undergraduate students whose parent(s) or guardian(s) does not have a bachelor's degree). More specifically, performance avoidance, a component of achievement goal orientation whereby an individual seeks to gain competence by avoiding performing worse than others, was a main variable of interest given that first-generation college students may adopt this orientation when pursuing university education. Despite its adoption, extant literature demonstrates that performance avoidance is associated with negative outcomes, such as neuroticism, avoidance behavior, fear of failure, low GPA, disorganization, and anxiety (Bipp et al., 2008; Elliot & Church, 1997; Huang, 2012). Few studies have assessed the relationships between performance avoidance, neurocognition, and neurophysiology in first-generation college students; thus, the area was rife for exploration. Study hypotheses investigated correlational, predictive, and moderating relationships between the variables.

**Participants and demographics.** The study included a total of 392 participants, 136 who identified as first-generation college students and 256 who identified as continuing-generation students. While the two groups demonstrated similar prevalence on variables of sex, gender identity, year in school, and components of employment, some aspects of race/ethnicity, student loan borrowing, full-time employment, and mental health conditions were in contrast. For instance, 8.9% of the total sample identified as Latinx/Hispanic, but there was a large difference

between the makeup of this demographic when categorized by generational status. More specifically, 18.4% of first-generation college students identified as Latinx/Hispanic whereas 3.9% of continuing-generation college students identified as Latinx/Hispanic. This evoked considerations about whether the prevalence of Latinx/Hispanic participants in the study is similar to the prevalence of this group's enrollment at ECU, and nationally. According to East Carolina University (2022), Hispanic students comprised 7.9% of total student enrollment in Fall 2021, a similar prevalence to this study. Additionally, according to the U.S. Department of Education's National Center for Education Statistics (2017), undergraduate enrollment of Hispanics increased from 10 to 19 percent from 2000 to 2016; therefore, the percentage of Latinx/Hispanic-identifying participants in this study's total sample was not reflective of the national prevalence of undergraduate enrollment. It seems, however, that the prevalence of this group in the study's first-generation college student sample was similar to the national prevalence of Latinx/Hispanic individuals attending university. This is a notable finding of this study, despite the uncertain reason(s) for the similarities and discrepancies between this study and national participant demographics. Lastly, another inquiry about this study statistic was whether the prevalence of Latinx/Hispanic individuals was reflective of other samples of first-generation college students. According to a different report written for the U.S. Department of Education by Cataldi and colleagues (2018), approximately 33% of first-generation college students enrolled in the United States in the 2015-2016 academic year identified as Latino. Thus, this study's sample was below that statistic.

Student loan borrowing and lower SES/financial need were also interesting demographic findings of the study. For example, there was a large percentage difference between first-generation college students and continuing generation college students on the demographic

question of student loan borrowing. Specifically, 60.3% of first-generation college students endorsed using student loans compared to 44.1% of continuing-generation students. Moreover, 38.2% of first-generation students reported "living comfortably" on the financial situation item, compared to 63.7% of continuing-generation students. These findings are reflective of the U.S. population of undergraduate students, such that first-generation students have lower median household incomes, higher loan borrowing amounts, and more unmet financial needs than continuing-generation students (Cataldi et al., 2018; DeAngelo & Franke, 2015; Garriott et al., 2015; Wibrowski et al., 2017). This suggests that the first-generation college students at ECU are similar to the larger U.S. population of first-generation college students in terms of financial need and utilization of school loans.

**Hypotheses and Aims**

**Aim one.** The primary aim was to explore the relationships between performance avoidance and academic achievement, as measured by GPA, in first-generation college students.

***Hypothesis one*.** Hypothesis one explored the correlational, predictive, and moderating relationships between performance avoidance, final high school GPA, and current college GPA, in first-generation college students. It was hypothesized that performance avoidance would be negatively correlated with final high school and current college GPA. The moderation analysis investigated the effect of generational status on the variables. Statistical analyses demonstrated no statistically significant correlational relationships between the variables. Similarly, a moderation analysis examining the effects of generational status on these variables demonstrated no statistically significant relationships.

The results of this hypothesis were unexpected given that previous research has demonstrated that utilization of performance avoidance goals has been positively correlated with

GPA in first-generation college students (Jury et al., 2015), and negatively predicted GPA in continuing- and first-generation college students (Elliot & Church, 1997; Huang, 2012; Wibrowski et al. 2017). A lack of significant findings may have been related to selection bias. For example, undergraduate students with low GPAs, including first-generation students, may not have completed the ECU research requirement or signed up to participate in this particular study. Additionally, the variables may have not demonstrated a statistically significant relationship because although first-generation students are attending university and may also utilize performance avoidance goals, high academic achievement and upward mobility can come with social costs and identity changes which are difficult to handle, especially in relation to their parents who have not attended university. Relatedly, previous research has demonstrated less academic persistence in this group, as compared to continuing-generation students (Garriott et al., 2015; Wibrowski et al., 2017; Wohn et al., 2013)**.** Conversely, a significant relationship may not have been evidenced between these variables because low academic achievement might put the hard-won goal of college attendance at risk.

**Aim two.** The secondary aim was to explore the relationships between performance avoidance and neurocognition in first-generation college students.

***Hypothesis two*.** Hypothesis two explored the correlational, predictive, and moderating relationships between performance avoidance and behavioral inhibition in first-generation college students. It was hypothesized that performance avoidance would be positively correlated with behavioral inhibition. The moderation analysis investigated the effect of generational status on these variables.

The correlational analysis revealed the opposite of what was hypothesized; performance avoidance and behavioral inhibition demonstrated a statistically significant, negative

correlational relationship. Performance avoidance and behavioral inhibition are similar in that they are both conceptualized to be based in a fear of failure or a desire to avoid aversive events; this thinking informed the direction of the initial hypothesis. However, one possible explanation for the opposite finding may be that although the variables are conceptually related with shared fear of failure, they likely measure different behavioral constructs. More specifically, performance avoidance can be conceptualized as behavioral approach towards competence, albeit through avoiding performing worse than others, whereas behavioral inhibition results in avoidance behavior. Another possible explanation of the results relates to findings from a study by Janssen and Prins (2007) wherein performance avoidance was positively correlated with seeking self-improvement information. The unexpected finding involved a sample of medical residents at a Dutch University who sought self-improvement information from knowledgeable others despite adopting performance avoidance goals. The authors posited that a fear of failure likely influenced the medical residents to seek out information that would help improve their performance and competence. This explanation may also apply to the findings in hypothesis two, such that perhaps the group of first-generation college students regulated their fear of failure by improving their competence via approach behavior.

The correlational analysis also demonstrated a statistically significant, positive relationship between behavioral inhibition and neuroticism in first-generation college students. The positive correlational relationship among these variables in first-generation college students replicates much of the literature on the relationship between behavioral inhibition and neuroticism, such that higher levels of behavioral inhibition are often associated with higher levels of neuroticism. For example, it has been theorized that higher levels of behavioral inhibition may precede the development of the personality characteristic of neuroticism, even as

young as the age of two-years-old in human models (Barlow et al., 2014). This relationship may warrant further exploration in the population of first-generation college students given that each of these characteristics can predispose individuals to develop emotional disorders, such as anxiety disorders or depressive disorders (Barlow et al., 2014).

Next, the variable of behavioral inhibition was added to a multiple regression analysis to determine if behavioral inhibition, along with other variables, could predict performance-avoidance in first-generation college students. The regression analysis included other variables of the behavioral activation subscales of drive (BAS-D), fun-seeking (BAS-FS), and reward responsivity (BAS-RR). The overall model was significant, such that the variables, taken together, predicted a portion of the variance in self-reported performance avoidance in first-generation college students. Additionally, behavioral inhibition was the only significant, unique predictor of performance avoidance. This suggests that for first-generation college students, behavioral inhibition, behavioral activation in the forms of drive, fun-seeking, and reward-responsivity account for a small portion of self-reported performance avoidance. And further, behavioral inhibition independently predicts performance avoidance in this group. These seemingly discrepant results may be related to the theoretical constructs of BIS/BAS, such that the systems of behavioral inhibition and behavioral activation are theorized to be separate; however, the systems could potentially overlap in individuals. In other words, individuals may exhibit both behavioral inhibition and behavioral activation, especially given contextual factors. And these factors, taken together, may predict performance avoidance given that it is also a complex behavior which involves avoidant tendencies coupled with approach behavior.

Lastly, the moderation analysis assessed whether there were differential effects of behavioral inhibition on performance avoidance for first-generation and continuing-generation

college students. However, the analysis produced no statistical evidence to suggest that generational status affected the relationship between behavioral inhibition and performance avoidance. One potential explanation for this is that the variable of generational status is not what impacts the relationship between behavioral inhibition and performance avoidance. While there was a demonstrated significant correlational relationship between behavioral inhibition and performance avoidance in first-generation college students that was not found in continuing-generational college students, there is not a specific explanation for why this correlation exists in one group versus the other. There is likely a confounding variable, or several, which moderate the relationship between these variables in first-generation college students. Perhaps, as was posited in this hypothesis' discussion of the significant findings of the correlational relationship, a moderator variable could be emotion regulation. More specifically, some first-generation students could have the ability to regulate their emotions and use approach behavior to gain competence despite adopting performance-avoidance goals, while others in the group may not demonstrate this ability (Janssen & Prins, 2007). Regardless of the specifics of the moderator variable, there is a demonstrated difference in the relationship between behavioral inhibition and performance avoidance between these two groups, but the difference is not based on generational status.

***Hypothesis three.*** Hypothesis three explored the correlational, predictive, and moderating relationships between performance avoidance and behavioral activation in first-generation college students. It was hypothesized that performance avoidance would be positively correlated with behavioral activation in first-generation college students. Further, the moderation analysis investigated the effect of generational status on these variables.

The results of the correlational analysis did not support the hypothesis; in fact, the analysis revealed the opposite of what was hypothesized, such that in first-generation college students, there was a statistically significant, negative correlation between performance avoidance and total behavioral activation. The direction of the hypothesis was originally conceptualized based on the idea that performance avoidance can be viewed as a complex, approach orientation, especially in an academic setting insofar as the individual is approaching the reward of a college degree (Janssen & Prins, 2007; Wacker et al., 2003). However, the results of the analysis make more sense on the surface than the original hypothesis. Specifically, it seems intuitive that if individuals are behaviorally oriented towards activation and approach, they likely do not experience intense fear of failure and thus, utilize minimal performance-avoidance goals. Moreover, in the group of first-generation college students, this assertion could perhaps be true in that as they approach tasks in academia and potentially gain competence, they no longer need to hold performance-avoidance goals. In other words, if they experience success after being motivated to approach tasks, they might naturally experience less fear of failure, and subsequently, use fewer performance-avoidance goals.

Additionally, the correlational analysis demonstrated unplanned, statistically significant, negative correlations between performance avoidance and the subscales of behavioral activation, namely, the drive, fun-seeking, and reward responsivity subscales, in first-generation college students. The negative correlational relationship between the drive subscale and performance-avoidance appears mostly intuitive, however, both are measuring constructs of goal pursuit. One possible explanation for the negative correlation might relate to a mediating variable. For example, if an individual continually pursues their chosen goals (e.g., BAS-D), they could gain confidence or self-efficacy (e.g., mediating variable) if they meet those goals, and their

inclination to pursue competence by avoiding appearing worse than others (e.g., performance-avoidance) might subsequently decrease. Another possible explanation for these findings, as it relates to the subscales of fun-seeking and reward responsivity, may perhaps be that, in this group of students, as their use of performance-avoidance goals increases, and their fear of failure increases, they are less oriented towards fun-seeking and reward responsivity because they are spending their time attempting to gain competence and avoid failure (Bruno et al., 2019; Jury et al., 2015).

As was mentioned in hypothesis two regarding the multiple regression analysis, the subscales of behavioral activation (BAS-D, BAS-FS, and BAS-RR) were added to a multiple regression analysis, along with behavioral inhibition, to determine if these variables could predict performance-avoidance in first-generation college students. The overall model was significant; when taken together, all the variables predicted a portion of the variance in self-reported performance avoidance in first-generation college students. However, none of the behavioral activation subscales were statistically significant, unique predictors of performance avoidance in this group. The significant, predictive value of the overall model could perhaps be explained by the fact that performance avoidance may be conceptualized as a complex approach behavior based in avoidant tendencies.

Lastly, the moderation analysis assessed whether generational status affected the relationship between behavioral activation and performance avoidance. The overall model of the moderation analysis was statistically significant, such that the combination of predictor variables of total behavioral activation, generational status, and the interaction variable accounted for a small portion of variance in the model. However, total behavioral activation was the only variable that demonstrated a statistically significant main effect, such that as total behavioral

activation increases, so does performance avoidance, regardless of the level of the other variables. Additionally, the interaction variable demonstrated no statistically significant effect, such that generational status does not moderate the relationship between behavioral activation and performance avoidance. The lack of moderating effect may perhaps be explained by the fact that the variables of behavioral activation and performance avoidance are not mutually exclusive, and further, their overlap is not dependent upon generational status. In other words, a desire to avoid incompetence when being compared to others can be the basis for an individual's approach behavior, which is irrespective of the individual's generational status (Darnon et al., 2018; Jury et al., 2015).

***Hypothesis four.*** Hypothesis four explored the correlational, predictive, and moderating relationships between performance avoidance and neuroticism in first-generation college students. It was hypothesized that performance avoidance would be positively correlated with neuroticism in this group of students. Additionally, a moderation analysis investigated the effect of generational status on these variables.

The results of the correlational analysis did not support the hypothesis; there was no statistically significant relationship between performance avoidance and neuroticism in first-generation college students. The hypothesis was originally based on research by Bipp and colleagues (2008) which asserted that the personality characteristic of neuroticism may precede the adoption of performance avoidance goals. However, the lack of significant findings in this hypothesis may have been due to differences in psychosocial variables of each study's participants. More specifically, Bipp and colleagues (2008) performed their study with third-year undergraduates majoring in education in Germany, and generational status was not assessed. Therefore, nationality and year in school may partially explain the discrepant findings between

the studies. More specifically, there are important structural differences between higher education in Europe and America, differences which may contribute to levels of neuroticism and adoption of performance avoidance goals in undergraduates. For example, according to U.S. News and World Report (Durrani, 2022), one difference is that students in European universities typically study for three years versus the general four-year requirement of American universities. In Bipp's study, the students were approaching graduation. High levels of neuroticism and performance-avoidance goals seem understandable in a group of students who are presumably about to enter their profession. In this study, majority of students were college freshmen, and while this group might exhibit neuroticism and adoption of performance avoidance goals given that they are new to higher education, the levels were not high enough to warrant correlational significance. Another potential explanation for the discrepant findings might relate to European areas of study. According to the same report (Durrani, 2022), students in European universities must apply to a specific area of study before beginning their degree, a stark difference from American universities where students typically are allowed more time to explore different majors and electives. Having to choose a specific area of study prior to entering university could contribute to this correlational relationship insofar as students may feel neurotic about potentially having chosen an incorrect, or ill-fitting, path. This, in turn, could lead to fear of failure and adoption of performance avoidance goals.

It was originally proposed that a simultaneous multiple regression analysis would be used to determine the predictive relationship between these two variables; however, the statistical analysis was not conducted because neuroticism and performance-avoidance were not significantly correlated. However, a moderation analysis assessed whether generational status affected the relationship between these two variables. The overall model was not significant and

there were no statistically significant main effects of neuroticism or generational status. Additionally, the interaction variable was not significant, demonstrating that generational status does not moderate the relationship between neuroticism and performance-avoidance. The lack of significant findings using the moderation analysis may perhaps be explained by the idea that multiple variables may impact and moderate the relationship between neuroticism and performance avoidance. For example, context could influence the relationship between neuroticism and performance-avoidance goals, irrespective of generational status. Contextually, pursuit of higher education, university-level academic achievement, and graduating with a bachelor's degree are considerably difficult tasks, regardless of generational status. In fact, according to the U.S. Census Bureau (2021), 23.5% of people aged 25 and older in the United States had a bachelor's degree as their highest educational attainment. Thus, according to this statistic, a large percentage of people aged 25 or older in the United States do not attain this feat. It seems intuitively understandable then, that a challenging context, versus a context with lower stakes (e.g., enjoyment, pleasure), might impact the relationship between neuroticism and performance-avoidance goals. Relatedly, according to the literature on the adoption of performance avoidance goals, such factors as self-handicapping (Lovejoy and Durik, 2010), low help-seeking (Roussel et al., 2011), and low intrinsic motivation (Van Yperen et al., 2014), may moderate the relationship between neuroticism and performance-avoidance, characteristics and behaviors which, arguably, all college students may experience regardless of generational status.

***Hypothesis five.*** Hypothesis five explored the correlational, predictive, and moderating relationships between performance avoidance and neuroticism in first-generation college students. It was hypothesized that performance avoidance would be positively correlated with

perceived executive dysfunction in this group of students. Additionally, a moderation analysis investigated the effect of generational status on these variables.

The hypothesis was not supported; the results of the correlational analysis demonstrated no statistically significant relationship between the variables of performance-avoidance and perceived executive dysfunction in first-generation college students. The hypothesis was originally conceived from the idea that previous literature has associated goal orientation, and specifically performance avoidance, with attention, a prominent feature of executive functioning based in the frontal lobe function (Fuster, 1997; Naismith & Lajoie, 2018; Pekrun et al., 2006, 2009). By proxy then, it was thought that perceived executive dysfunction would also be related to performance avoidance. However, attention is only one component of executive functioning, albeit prominent; the construct also features components of initiation, inhibitory and emotional control, self and task monitoring, and planning and organization (Fuster, 1997; Roth et al., 2005). Perhaps these other components of executive functioning, as opposed to the whole construct, are more closely related to performance avoidance, which may explain the lack of correlational findings in this hypothesis.

Given that the variables of perceived executive dysfunction and performance avoidance were not significantly correlated, the relationship was not assessed using a multiple regression analysis. However, a moderation analysis assessed whether generational status affected the relationship between these two variables. The overall model was not significant, nor were the main effects of the predictor variables of perceived global executive dysfunction and generational status. Moreover, the interaction variable was not significant, indicating that generational status does not moderate the relationship between perceived global dysfunction and performance avoidance. The lack of significant findings using the moderation analysis may

perhaps be explained by another variable, such as emotion regulation, a component of executive and emotional functioning which affects all individuals, regardless of academic or generational status. Emotion regulation can be defined as, "conscious or unconscious processes of monitoring, evaluating, modulating, and managing emotional experiences and expression of emotion in terms of intensity, form, and duration of feelings, emotion-related physiological states and behaviors" (Kok, 2020; p. 1281). In other words, this is an individual's ability to effectively respond to, and manage, their emotional experience(s). Thus, given that fear of failure is posited to be the basis of performance avoidance goals, perhaps difficulty with regulating this emotion might moderate the relationship between perceived executive dysfunction and performance avoidance. Regardless of generational status, the relationship between executive dysfunction and performance avoidance may be different based on one's ability to manage their emotional response effectively or ineffectively.

***Hypothesis six.*** Hypothesis six explored the correlational, predictive, and moderating relationships between performance avoidance and various attentional situations in first-generation college students. It was hypothesized that performance avoidance would be negatively correlated with attention in this group of students. Additionally, a multiple regression analysis was used to assess whether various attentional situations could predict performance avoidance. Lastly, a moderation analysis investigated the effect of generational status on each of these variables.

The hypothesis was partially supported; the results of the correlational analysis demonstrated a statistically significant, negative correlation between performance avoidance and attention when performing an indoor activity (Situation Score C), in first-generation college students. It also demonstrated a statistically significant, positive correlation between performance

avoidance and attention when driving a car (Situation Score I), in first-generation college students. The significant negative correlation between performance avoidance and attending to an indoor activity (Situation Score C) may have multiple explanations. For example, depending on the indoor activity, the student(s) may not be concerned with avoiding failure in comparison to others, especially if the activity does not require goal setting (e.g., leisure activity). As another example, if the indoor activity is performed, and thus attended to, in solitude, the students may have decreased desire to avoid performing worse than others. Nevertheless, it would be interesting to know which type of indoor activity participants were referencing, because the direction of the correlation could perhaps change if the indoor activity required goal setting and/or the presence of others (e.g., group studying for an academic exam). As for second significant correlation between attention to driving a car and performance avoidance, the positive relationship could potentially be explained by the importance of safety when driving a car. More specifically, driving a car requires attention and vigilance, so it makes intuitive sense to have performance avoidance goals during this task insofar as one would want to avoid performing worse than others while driving to avoid a collision. However, the relationship may also be explained by a confounding variable. For example, perhaps high levels of anxiety increase levels of performance avoidance and increase attention to driving a car.

Next, the two attention variables were added to a simultaneous multiple regression analysis to determine if they could predict performance avoidance in first-generation college students. The overall model was significant; when taken together, the variables predicted a small portion of the variance in self-reported performance avoidance in this group of students. Also, paying attention to driving a car (Situation Score I) was the only statistically significant, unique predictor of performance avoidance. The significant, predictive value of the overall model could

perhaps be explained by extant literature which posits that attention is a component of achievement goal orientation, especially the adoption of performance-avoidance goals, in undergraduate students (Naismith & Lajoie, 2018; Pekrun et al., 2006; 2009; Tyson et al., 2009). Much literature suggests that the use of performance-avoidance goals either reduces or increases attention via negative emotions, such as fear, anxiety, or shame, because emotions typically direct our attention.

Lastly, multiple moderation analyses assessed whether generational status affected the relationship between various variables of attention and performance avoidance. Of the nine attention variables (Situation Scores A-I), only two moderation analyses demonstrated statistically significant results, paying attention to a conversation (Situation Score E) and paying attention to driving a car (Situation Score I). Each of these moderation analyses will be discussed separately.

The overall model of the moderation analysis for paying attention to a conversation (Situation Score E) was statistically significant, such that the combination of predictor variables of paying attention to a conversation, generational status, and the interaction variable accounted for a small portion of variance in the model. Additionally, the predictor variable of attention to a conversation demonstrated a statistically significant main effect, such that as attention to a conversation increased, so did performance avoidance, regardless of the level of the other variables. Lastly, the interaction variable demonstrated no statistically significant effect, such that generational status did not moderate the relationship between attention to a conversation and performance avoidance. As was discussed before, attention is a demonstrated component of performance-avoidance goals in academic settings (Naismith & LaJoie, 2018; Tyson et al., 2009). The combination of paying attention to a conversation, generational status, and the

interaction of the two variables, may perhaps explain a portion of performance avoidance because these predictor variables are likely major components of university life, both academically and socially. More specifically, avoiding performing worse than other students, however performance is defined in this instance, likely involves paying attention to conversations with faculty, whether formally or informally, as well as paying attention to conversations with peers, whether in the classroom or in social settings. Lastly, a moderating relationship between paying attention to a conversation and performance avoidance may perhaps be better explained by other factors than generational status. Moreover, the lack of a moderating effect of generational status may perhaps be explained by the fact that many students, regardless of generational status, want to keep abreast of important information that is passed along during conversations and thus, paying attention is critical to avoiding performing worse than others. Additionally, an individual may be viewed poorly for not paying attention during conversations; such opinions could affect social or academic standing, regardless of generational status, and contribute to attempts to avoid incompetence.

Next, the overall model of the moderation analysis for paying attention to driving a car (Situation Score I) was statistically significant, such that the combination of predictor variables of paying attention to driving a car, generational status, and the interaction variable accounted for a portion of variance in this model. However, the analysis demonstrated no statistically significant main effects nor was there a statistically significant effect of the interaction variable. Therefore, generational status did not moderate the relationship between paying attention to driving a car and performance avoidance. In terms of the significance of the overall model, as was discussed before, performance-avoidance goals utilize attentional focus. Attentional focus is also imperative for the complex cognitive task of driving, a task which also requires visuospatial

scanning and planning, short and long-term memory, sensory perceptual abilities, and motor control (Ledger et al., 2019). It makes intuitive sense then, that attention used for driving a car comprises a portion of the variable of performance avoidance, another demanding cognitive task, whether conscious or automatic.

***Hypothesis seven.*** Hypothesis seven explored the correlational, predictive, and moderating relationships between performance avoidance and total working memory in first-generation college students. It was hypothesized that performance avoidance would be negatively correlated with total working memory in this group of students. Also, a moderation analysis investigated the effect of generational status on each of these variables.

The hypothesis was not supported; the results of the correlational analysis demonstrated no significant relationships between performance avoidance and working memory in first-generation college students. This hypothesis was originally based in literature which demonstrates a complex relationship between performance avoidance and attention. Working memory and attention are conceptually related in that attention is posited as an initial component of working memory (Alderson et al., 2013; Oberauer, 2019); therefore, it was believed that working memory would also be related to performance avoidance. A possible explanation for the lack of correlational findings in this group could relate to conscious thought and behavior. For example, working memory has historically been posited to involve conscious aspects of cognitive processing (Baddeley, 1992; Persuh et al., 2018). In other words, it has been theorized to utilize, and maintain, consciously perceived information, such as briefly remembering and rehearsing a phone number or passcode in one's mind before entering it into a technological device. However, the behavior of performance-avoidance may be considerably less of a conscious act, especially as it relates to negative emotion (Vandewalle et al., 2019).

It was previously proposed that a simultaneous multiple regression analysis would be performed to determine if perceived working memory, along with other variables, could predict performance avoidance in first-generation college students. However, given that no significant correlations were demonstrated in this group between these variables, the regression analysis was not conducted. However, a simple moderation analysis investigated the moderating effect of generational status on the relationship between the variables. The moderation analysis revealed that the overall model was not significant; additionally, there were no significant main effects of the predictor variables, and no significant effect of the interaction variable. Therefore, generational status did not moderate the relationship between total working memory and performance avoidance. The lack of significant findings could perhaps be explained by the fact that either generational group of college students could experience difficulties with working memory and difficulties with performance avoidance; therefore, the moderator variable would not impact the relationship between the predictor and outcome variable. Additionally, college students as a whole, given their high academic achievement in relation to the general population, may not have substantial, long-standing difficulties with working memory to demonstrate a statistical effect, regardless of generational status. However, if college students have ADHD, a learning or developmental disability, or an injury/illness which impacts working memory (e.g., a traumatic brain injury, cardiovascular disease) and behavior, such variables could evidence moderating effects on the relationship between working memory and performance avoidance in this sample (Alderson et al., 2013; Gropper et al., 2014).

***Hypothesis eight.*** Hypothesis eight explored the correlational, predictive, and moderating relationships between performance avoidance and perceived arousal in first-generation college students. It was predicted that performance avoidance would be positively correlated with

perceived arousal in this group. Also, a moderation analysis investigated the effect of generational status on each of these variables.

The hypothesis was not supported; the results of the correlational analysis demonstrated no statistically significant relationships between performance avoidance and perceived arousal in first-generation college students. This hypothesis was originally based in thinking about the relationship between emotional intensity and performance avoidance, a construct that has important emotional bases. More specifically, the literature suggests that fear of failure is one emotional basis of performance avoidance goals, especially in first-generation college students (Elliot & Murayama, 2008; Huang, 2012; Hulleman et al., 2010; Jury et al., 2015). Fear, a concern about imminent, actual danger, is often the basis for panic, a behavioral outcome related to hyperarousal and self-protective behaviors (Mineka and Oehlberg, 2008; Bandelow et al., 2016). However, the literature also suggests that performance avoidance is related to other negative emotional states, such as sadness and shame, emotional experiences typically associated with physiological outcomes such as psychomotor retardation, muscle tension, and fatigue, or low arousal states (Bandelow et al., 2016; Smith et al., 2016). Therefore, given that both high and low arousal relate to the complex emotional underpinnings of performance avoidance, the relationship between performance avoidance and total physiological arousal may have not demonstrated a significant correlational effect in this study's population.

It was previously proposed that a simultaneous multiple regression analysis would be conducted using perceived arousal as a predictor variable. However, the analysis was not conducted since perceived arousal and performance avoidance were not statistically significantly correlated. A simple moderation analysis investigated the moderating effect of generational status on the relationship between the variables. The moderation analysis revealed that the

overall model was not significant; additionally, there were no significant main effects of the predictor variables, and no significant effect of the interaction variable. Therefore, generational status did not moderate the relationship between perceived arousal and performance avoidance. The lack of significant findings in this analysis may perhaps be explained by the fact that all college students, regardless of generational status but purely by nature of being human, likely experience different levels of physiological arousal. Moreover, college is often a period fraught with stress, including, but not limited to, increased academic and social responsibility, increased personal freedoms, and changes in sleeping habits, all of which require good time management skills (Jamieson et al., 2016; Ketonen et al., 2022). Relatedly, the experience of stress does not unequivocally equate to physiological low or high arousal, especially as individuals differ in their presentations of stress (e.g., internalizing versus externalizing; Achenbach et al., 2016). As such, other moderators which may have demonstrated a significant effect on the relationship between perceived arousal and performance-avoidance were gender, level of stress, or even, mental health diagnoses (e.g., Generalized Anxiety Disorder, Major Depressive Disorder, ADHD).

**General Limitations and Future Directions**

This study was an exploratory investigation of the relationships between performance avoidance, academic achievement, neurocognition, and neurophysiology in first-generation and continuing-generation college students, with particular focus on the former group (e.g., undergraduate students whose parent(s) or guardian(s) does not have a bachelor's degree). The previously stated findings, though extensive, should be considered in light of the study's limitations. One major limitation of the study was the lack of objective measurement for the neurocognitive and neurophysiological variables. As this study was developed and proposed

during the initial phases of the coronavirus pandemic, university-level restrictions precluded the collection of face-to-face, objective data. Despite utilizing a healthy, non-clinical sample of undergraduate students wherein neurocognitive function is likely to be within normal limits, objective data would have provided a more robust picture of participants' cognition and baseline electrical brain activity and likely contributed to an increase in statistically significant findings. Relatedly, extant literature has demonstrated that subjective data from self-report questionnaires does not often align with objective neurocognitive functioning, despite providing valuable insight into individuals' self-perceptions (Fuermaier et al., 2014; Groen et al., 2019; Rohling et al., 2002). This limitation provides a future opportunity to conduct a similar study using objective neurocognitive and neurophysiological data.

Another limitation of the study relates to the study sample. The majority of participants were recruited from the undergraduate research participant pool within the Department of Psychology at one university in a small region of the southern United States. While an attempt was made to recruit participants from across the local university, only two participants resulted from that email attempt. Therefore, results of the study may be specific to this university and region and may not be generalizable to other university samples in other regions of the U.S. or internationally. That said, conducting a similar study in other university settings provides an opportunity to replicate and compare the findings to this study, especially as first-generation college students continue to enroll in university-level education.

The use of newly normed questionnaires (e.g., ELAS, WMQ) is another limitation of the current study. The ELAS was created four years ago and normed only on Dutch participants (albeit with clinical and non-clinical samples); additionally, the WMS is a relatively new measure (2012). Significant differences in sociocultural milieus between Dutch and American

individuals may limit the type and quality of data collected from the current population. Also, the originality of a questionnaire can limit its comparative and predictive value. Be that as it may, data from this study provides an opportunity to validate the questionnaire in a sample of first- and continuing-generation college students in the southern region of the United States.

**Concluding Remarks**

As compared to continuing-generation college students, first-generation college students face distinct economic, academic, and psychosocial challenges when pursuing, and participating in, higher education. The present study provides rare bridging and analyses of multiple domains of research by assessing relationships between performance avoidance, neurocognition, and physiological arousal in this unique demographic of college students. Previous literature documents that some first-generation college students adopt performance avoidance goals, or a goal orientation that seeks to avoid performing worse than others, while attending university. This study sought to extend that literature by further assessment of performance avoidance's relationship with academic performance, cognition, and physiological arousal in a group of college students at a university in the southern region of the United States. The findings suggest several differences and similarities between first-generation and continuing-generation college students on the study's variables.

First, there were differences between first-generation and continuing-generation college students in prevalence rates of Latinx/Hispanic-identifying individuals, student loan borrowing amounts, and full-time employment. More specifically, a considerably higher amount of first-generation college students identified as Latinx/Hispanic compared to continuing-generation college students. While this is a large difference in this study, the amount of first-generation, Latinx/Hispanic-identifying individuals at this university was lower than the national average of

undergraduate, first-generation, Latinx/Hispanic-identifying individuals attending college. Relatedly, the first-generation college students of this study were similar to the larger U.S. population of first-generation college students in terms of lower median household incomes, higher financial need, higher utilization of school loans, and higher rates of full-time work compared to continuing-generation college students. The findings of this study replicate the specifics of ethnic variables and the importance of socioeconomic considerations for first-generation college students who attend American universities.

The findings also extend the literature by demonstrating that in first-generation college students, performance avoidance was related to final high school GPA, behavioral inhibition, behavioral approach, and attention to specific activities (e.g., an indoor activity, driving), although not always in the hypothesized direction. Additionally, the findings demonstrate that in first-generation college students, performance avoidance is unrelated to current college GPA, neuroticism, perceived executive dysfunction, working memory, and physiological arousal. Future studies should consider whether, and through which mechanisms, the complex behavioral construct of performance avoidance further manifests itself in this group of students.

Lastly, it is hopeful that the findings from this study will support the academic, psychological, and economic improvement of first-generation college students, during their university years and beyond. Additionally, the findings may help guide educational and psychological interventions which are tailored to the particular needs of this multifaceted, dynamic group of students.

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# Appendix A: IRB Approval

**EAST CAROLINA UNIVERSITY**
**University & Medical Center Institutional Review Board**
4N-64 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** ·
rede.ecu.edu/umcirb/

## Notification of Exempt Certification

From: Social/Behavioral IRB
To: Andrea Winters
CC: Daniel Everhart
Date: 9/9/2020
Re: UMCIRB 20-002002
Performance Avoidance, Neurocognition, and Neurophysiology in First-Generation College Students

I am pleased to inform you that your research submission has been certified as exempt on 9/9/2020. This study is eligible for Exempt Certification under category # 2b.

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

| Document | Description |
|---|---|
| Andrea Winters' Dissertation Proposal(0.01) | Study Protocol or Grant Application |
| Demographics questionnaire(0.01) | Data Collection Sheet |
| Online Consent Form_Winters(0.03) | Consent Forms |
| Recruitment script(0.01) | Recruitment Documents/Scripts |
| Winters' Dissertation Measures(0.01) | Surveys and Questionnaires |

For research studies where a waiver or alteration of HIPAA Authorization has been approved, the IRB states that each of the waiver criteria in 45 CFR 164.512(i)(1)(i)(A) and (2)(i) through (v) have been met. Additionally, the elements of PHI to be collected as described in items 1 and 2 of the Application for Waiver of Authorization have been determined to be the minimal necessary for the specified research.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

## Appendix B: Demographics Questionnaire

BACKGROUND INFORMATION

1. Date of Birth: _____ Age: _____
2. Sex: Male / Female
3. Gender Identity: Man / Woman / Genderqueer / Androgynous / Transgender / Other
4. Race: White / Black / Asian / Hispanic / Native American / Pacific Islander / Biracial / Multiracial / Other
5. Handedness (writing hand, eating hand, throwing hand): Right / Left / Ambidextrous
    - If left, skip to end survey
6. Do you have normal vision or are you wearing corrective lenses or glasses and can read this document and a computer screen without impairment? Yes / No
    - If No, skip to end survey

ACADEMIC INFORMATION

7. Current year in school: _____ 8. Current GPA: _____
9. Final high school GPA: _____ 10. Major/Intended Major: _____
11. Are you a first-generation college student? Yes / No
    - If neither of your parents (or guardians) has a bachelor's degree, you are considered to be a first-generation college student.
12. Are you a continuing-generation college student? Yes / No
    - If one or more of your parents (or guardians) has a bachelor's degree, you are considered to be a continuing-generation college student.

FINANCIAL INFORMATION

13. Are you currently employed? Yes / No If yes, how many hours per week? _____
14. Do you have student loans? Yes / No

15. Considering your own income and the income from any other people who help you, how would you describe your overall personal financial situation?

    Live comfortably / Meet needs with a little left / Just meet basic expenses / Don't meet basic expenses

PHYSICAL & MENTAL HEALTH INFORMATION

16. Have you ever had a head injury? Yes / No
    - If yes, skip to end of survey

17. Have you or a close family member tested positive for coronavirus? Yes / No

18. Do you have any current or past mental health concerns (such as ADHD, depression, anxiety disorder, sleep disorder, schizophrenia, PTSD, or any other mental illness)?

    Yes / No If yes, please list: _____

19. Do you have any current or past medical condition(s) or disease(s)?

    Yes / No If yes, please list: _____

## Appendix C: Achievement Goal Questionnaire-Revised (AGQ-R)

**Instructions**: Here are 12 statements. While thinking about a specific class in which you are currently enrolled, please use the scale below to indicate the extent to which you agree with each statement. Also, please list the specific class name and course number, if you know it, that you have in mind:

_____

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly Disagree | Moderately Disagree | Neither Disagree nor Agree | Moderately Agree | Strongly Agree |

1. My aim is completely master the material presented in this class. _____
2. I am striving to do well compared to other students. _____
3. My goal is to learn as much as possible. _____
4. My aim is to perform well relative to other students. _____
5. My aim is to avoid learning less than I possibly could. _____
6. My goal is to avoid performing poorly compared to others. _____
7. I am striving to understand the content as thoroughly as possible. _____
8. My goal is to perform better than the other students. _____
9. My goal is to avoid learning less than it is possible to learn. _____
10. I am striving to avoid performing worse than others. _____
11. I am striving to avoid an incomplete understanding of the course material. _____
12. My aim is to avoid doing worse than other students. _____

**Scoring:** Average the following items to determine the score for each index scale. Higher scores indicate more agreement with that scale.

- Mastery-approach goal scale: items 1, 3, 7
- Mastery-avoidance goal scale: items 5, 9, 11
- Performance-approach goal scale: items 2, 4, 8
- Performance-avoidance goal scale: items 6, 10, 12

## Appendix D: BIS/BAS Scales

**Instructions:** Each item of this questionnaire is a statement that a person may either agree or disagree with. For each item, indicate how much you agree or disagree with what the item says. Please respond to all the items; do not leave any blank. Choose only one response to each statement. Please be as accurate and honest as you can be. Respond to each item as if it were the only item. That is, don't worry about being "consistent" in your responses. Choose from the following four response options:

1 = very true for me

2 = somewhat true for me

3 = somewhat false for me

4 = very false for me

1. A person's family is the most important thing in life. _____
2. Even if something bad is about to happen to me, I rarely experience fear or nervousness. _____
3. I go out of my way to get things I want. _____
4. When I'm doing well at something, I love to keep at it. _____
5. I'm always willing to try something new if I think it will be fun. _____
6. How I dress is important to me. _____
7. When I get something I want, I feel excited and energized. _____
8. Criticism or scolding hurts me quite a bit. _____
9. When I want something, I usually go all-out to get it. _____
10. I will often do things for no other reason than that they might be fun. _____
11. It's hard for me to find the time to do things such as get a haircut. _____
12. If I see a chance to get something, I want I move on it right away. _____
13. I feel pretty worried or upset when I think or know somebody is angry at me. _____
14. When I see an opportunity for something, I like I get excited right away. _____

15. I often act on the spur of the moment. _____

16. If I think something unpleasant is going to happen, I usually get pretty “worked up”. _____

17. I often wonder why people act the way they do. _____

18. When good things happen to me, it affects me strongly. _____

19. I feel worried when I think I’ve done poorly at something important. _____

20. I crave excitement and new sensations. _____

21. When I go after something, I use a “no holds barred” approach. _____

22. I have very few fears compared to my friends. _____

23. It would excite me to win a contest. _____

24. I worry about making mistakes. _____

**Scoring:**

Items other than 2 and 22 are reverse-scored.

BAS DRIVE: 3, 9, 12, 21

BAS FUN SEEKING: 5, 10, 15, 20

BAS REWARD RESPONSIVENESS: 4, 7, 14, 18, 23

BIS: 2, 8, 13, 16, 19, 22, 24

Items: 1, 6, 11, and 17 are fillers.

## Appendix E: Mini-IPIP

**Instructions**: Here are 20 statements; please evaluate the extent to which you agree with them. Please answer honestly with regard to how you see yourself in the present moment, not how you would like to be in the future. There are no incorrect answers nor any answers that are inherently more desirable than others.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Very Inaccurate | Moderately Inaccurate | Neither Inaccurate nor Accurate | Moderately Accurate | Very Accurate |

1. I am the life of the party. _____
2. I sympathize with others' feelings. _____
3. I get chores done right away. _____
4. I have frequent mood swings. _____
5. I have a vivid imagination. _____
6. I don't talk a lot. _____
7. I am not interested in other people's problems. _____
8. I often forget to put things back in their proper place. _____
9. I am relaxed most of the time. _____
10. I am not interested in abstract ideas. _____
11. I talk to a lot of different people at parties. _____
12. I feel others' emotions. _____
13. I like order. _____
14. I get upset easily. _____
15. I have difficulty understanding abstract ideas. _____
16. I keep in the background. _____

17. I am not really interested in others. _____

18. I make a mess of things. _____

19. I seldom feel blue. _____

20. I do not have a good imagination. _____

**Scoring:**

Factor One: Extraversion

(+) Keyed: 1, 11

Reverse Keyed: 6, 16

Factor Two: Agreeableness

(+) Keyed: 2, 12

Reversed Keyed: 7, 17

Factor Three: Conscientiousness

(+) Keyed: 3, 13

Reverse Keyed: 8, 18

Factor Four: Neuroticism

(+) Keyed: 4, 14

Reverse Keyed: 9, 19

Factor Five: Intellect/Imagination

(+) Keyed: 5

Reverse Keyed: 10, 15, 20

## Appendix F: Behavior Rating Inventory of Executive Function – Adult (BRIEF-A)

# BRIEF®-A

# Behavior Rating Inventory of Executive Function®– Adult Version

## SELF-REPORT FORM

Robert M. Roth, PhD, Peter K. Isquith, PhD, and Gerard A. Gioia, PhD

**Instructions**

On the following pages is a list of statements. We would like to know if you have had problems with these behaviors over the past month. Please answer all the items the best that you can. Please DO NOT SKIP ANY ITEMS. Indicate your response by circling

| | | |
|---|---|---|
| **N** | if the behavior is | **Never** a problem |
| **S** | if the behavior is | **Sometimes** a problem |
| **O** | if the behavior is | **Often** a problem |

For example, if you **never** have trouble making decisions, you would circle **N** for this item:

I have trouble making decisions (N) S O

If you make a mistake or want to change your answer, DO NOT ERASE. Draw an "X" through the answer you want to change, and then circle the correct answer:

I have trouble making decisions (X) (S) O

Before you begin answering the items, please fill in the name, gender, age, date of birth, today's date, and years and level of education in the spaces provided at the top of the next page.

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Your Name_____ Today's Date____/____/____

Gender ☐ Male ☐ Female Age_____ Date of Birth____/____/____

Years of Education:_____ Level of Education: ☐ Less than High School ☐ High School ☐ College ☐ Master's degree ☐ Doctorate ☐ Other

During the past month, how often has each of the following behaviors been a *problem*?

**N = Never S = Sometimes O = Often**

| | | | |
|---|---|---|---|
| 1. I have angry outbursts | N | S | O |
| 2. I make careless errors when completing tasks | N | S | O |
| 3. I am disorganized | N | S | O |
| 4. I have trouble concentrating on tasks (such as chores, reading, or work) | N | S | O |
| 5. I tap my fingers or bounce my legs | N | S | O |
| 6. I need to be reminded to begin a task even when I am willing | N | S | O |
| 7. I have a messy closet | N | S | O |
| 8. I have trouble changing from one activity or task to another | N | S | O |
| 9. I get overwhelmed by large tasks | N | S | O |
| 10. I forget my name | N | S | O |
| 11. I have trouble with jobs or tasks that have more than one step | N | S | O |
| 12. I overreact emotionally | N | S | O |
| 13. I don't notice when I cause others to feel bad or get mad until it is too late | N | S | O |
| 14. I have trouble getting ready for the day | N | S | O |
| 15. I have trouble prioritizing activities | N | S | O |
| 16. I have trouble sitting still | N | S | O |
| 17. I forget what I am doing in the middle of things | N | S | O |
| 18. I don't check my work for mistakes | N | S | O |
| 19. I have emotional outbursts for little reason | N | S | O |
| 20. I lie around the house a lot | N | S | O |
| 21. I start tasks (such as cooking, projects) without the right materials | N | S | O |
| 22. I have trouble accepting different ways to solve problems with work, friends, or tasks | N | S | O |
| 23. I talk at the wrong time | N | S | O |
| 24. I misjudge how difficult or easy tasks will be | N | S | O |
| 25. I have problems getting started on my own | N | S | O |
| 26. I have trouble staying on the same topic when talking | N | S | O |
| 27. I get tired | N | S | O |
| 28. I react more emotionally to situations than my friends | N | S | O |
| 29. I have problems waiting my turn | N | S | O |
| 30. People say that I am disorganized | N | S | O |
| 31. I lose things (such as keys, money, wallet, homework, etc.) | N | S | O |
| 32. I have trouble thinking of a different way to solve a problem when stuck | N | S | O |
| 33. I overreact to small problems | N | S | O |
| 34. I don't plan ahead for future activities | N | S | O |
| 35. I have a short attention span | N | S | O |
| 36. I make inappropriate sexual comments | N | S | O |
| 37. When people seem upset with me, I don't understand why | N | S | O |
| 38. I have trouble counting to three | N | S | O |

During the past month, how often has each of the following behaviors been a *problem*?

**N = Never S = Sometimes O = Often**

| | | | | |
|---|---|---|---|---|
| 39. | I have unrealistic goals | N | S | O |
| 40. | I leave the bathroom a mess | N | S | O |
| 41. | I make careless mistakes | N | S | O |
| 42. | I get emotionally upset easily | N | S | O |
| 43. | I make decisions that get me into trouble (legally, financially, socially) | N | S | O |
| 44. | I am bothered by having to deal with changes | N | S | O |
| 45. | I have difficulty getting excited about things | N | S | O |
| 46. | I forget instructions easily | N | S | O |
| 47. | I have good ideas but cannot get them on paper | N | S | O |
| 48. | I make mistakes | N | S | O |
| 49. | I have trouble getting started on tasks | N | S | O |
| 50. | I say things without thinking | N | S | O |
| 51. | My anger is intense but ends quickly | N | S | O |
| 52. | I have trouble finishing tasks (such as chores, work) | N | S | O |
| 53. | I start things at the last minute (such as assignments, chores, tasks) | N | S | O |
| 54. | I have difficulty finishing a task on my own | N | S | O |
| 55. | People say that I am easily distracted | N | S | O |
| 56. | I have trouble remembering things, even for a few minutes (such as directions, phone numbers) | N | S | O |
| 57. | People say that I am too emotional | N | S | O |
| 58. | I rush through things | N | S | O |
| 59. | I get annoyed | N | S | O |
| 60. | I leave my room or home a mess | N | S | O |
| 61. | I get disturbed by unexpected changes in my daily routine | N | S | O |
| 62. | I have trouble coming up with ideas for what to do with my free time | N | S | O |
| 63. | I don't plan ahead for tasks | N | S | O |
| 64. | People say that I don't think before acting | N | S | O |
| 65. | I have trouble finding things in my room, closet, or desk | N | S | O |
| 66. | I have problems organizing activities | N | S | O |
| 67. | After having a problem, I don't get over it easily | N | S | O |
| 68. | I have trouble doing more than one thing at a time | N | S | O |
| 69. | My mood changes frequently | N | S | O |
| 70. | I don't think about consequences before doing something | N | S | O |
| 71. | I have trouble organizing work | N | S | O |
| 72. | I get upset quickly or easily over little things | N | S | O |
| 73. | I am impulsive | N | S | O |
| 74. | I don't pick up after myself | N | S | O |
| 75. | I have problems completing my work | N | S | O |

# BRIEF-A Self-Report Scoring Summary

Today's Date ___/___/___

Name _____ Gender _____ Age _____ Date of Birth ___/___/___

## Scoring Summary Table

| Scale/Index | Raw score | *T* score | %ile | 90% CI |
|---|---|---|---|---|
| Inhibit | | | | ___ – ___ |
| Shift | | | | ___ – ___ |
| Emotional Control | | | | ___ – ___ |
| Self-Monitor | | | | ___ – ___ |
| *BRI* | | | | ___ – ___ |
| Initiate | | | | ___ – ___ |
| Working Memory | | | | ___ – ___ |
| Plan/Organize | | | | ___ – ___ |
| Task Monitor | | | | ___ – ___ |
| Organization of Materials | | | | ___ – ___ |
| *MI* | | | | ___ – ___ |
| *GEC* (*BRI* + *MI*) | | | | ___ – ___ |

## Scoring Instructions

1. Remove the perforated strips from the Self-Report Form and detach the top part of the carbonless answer sheet to reveal the scoring sheet.
2. Transfer the circled item score for each item to the box provided in that item row.
3. Sum the item scores in each column and enter the subtotal in the box at the bottom of the column.
4. Transfer the scale subtotals for Items 1-38 to the appropriate box in the row titled Subtotals (Items 1-38) at the bottom of the facing page.
5. Sum the two subtotals for each scale and enter the total in the Total scale raw score box.
6. Transfer each scale raw score to the Raw score column in the Scoring Summary Table to the left of these instructions.
7. Sum the raw scores for the Inhibit, Shift, Emotional Control, and Self-Monitor scales to obtain the raw score for the Behavioral Regulation Index (*BRI*).
8. Sum the raw scores for the Initiate, Working Memory, Plan/Organize, Task Monitor, and Organization of Materials scales to obtain the raw score for the Metacognition Index (*MI*).
9. Sum the raw scores for the *BRI* and the *MI* to obtain the raw score for the Global Executive Composite (*GEC*).
10. Locate the appropriate age-normative comparison group in the appendix tables of the BRIEF-A Professional Manual. Find the raw score for each scale and index and the *GEC* in the Raw score column and read across the row to find the corresponding *T* score and percentile. Enter each *T* score and percentile in the appropriate boxes in the Scoring Summary Table.
11. Locate the 90% confidence interval (CI) value for each scale and index and the *GEC* at the bottom of the appropriate column, calculate the low end (subtract the CI value from the *T* score) and high end (add the CI value to the *T* score) of the interval, and enter those values in the appropriate boxes in the Scoring Summary Table.

## Negativity Scale

1. Negativity items are indicated by [N] in the margin of the scoring sheet. For each Negativity item with a score of 3, circle that item number in the column to the right.
2. Count the number of circled item numbers to determine the **Negativity score**.
3. Using the Negativity score table below, circle the appropriate protocol classification corresponding to that score.

| Negativity score | Cumulative % | Protocol classification |
|---|---|---|
| 0-5 | 0-98.3 | Acceptable |
| ≥ 6 | 99.4-100 | Elevated |

| Item no. |
|---|
| 1. |
| 8. |
| 19. |
| 21. |
| 22. |
| 23. |
| 29. |
| 36. |
| 39. |
| 40. |
| **Negativity score** |

## Infrequency Scale

1. Infrequency items are indicated by [F] in the margin of the scoring sheet. For each Infrequency item with a **bolded** score enclosed in a box, circle that item number in the column to the right.
2. Count the circled item numbers to determine the **Infrequency score**.
3. Using the Infrequency score table below, circle the appropriate protocol classification corresponding to that score.

| Infrequency score | Cumulative % | Protocol classification |
|---|---|---|
| 0-2 | 0-97.3 | Acceptable |
| ≥ 3 | 100 | Infrequent |

| Item no. |
|---|
| 10. |
| 27. |
| 38. |
| 48. |
| 59. |
| **Infrequency score** |

## Inconsistency Scale

For each item pair:

1. Transfer the item score for each item (marked (I) in the margin of the scoring sheet) to the appropriate item pairs boxes to the right. Be sure to review the item scores recorded.
2. Subtract the ***lesser*** number from the ***greater*** number and enter the result in the *Difference* column.
3. Sum the numbers in the *Difference* column to obtain the **Inconsistency score**. Circle the appropriate protocol classification corresponding to that score in the table below.

| Inconsistency score | Cumulative % | Protocol classification |
|---|---|---|
| 0-7 | 0-99.2 | Acceptable |
| ≥ 8 | 99.8-100 | Inconsistent |

| Item no. | Score | Item no. | Score | | Difference |
|---|---|---|---|---|---|
| 2. | | 41. | | → | |
| 25. | | 49. | | → | |
| 28. | | 42. | | → | |
| 33. | | 72. | | → | |
| 34. | | 63. | | → | |
| 44. | | 61. | | → | |
| 46. | | 56. | | → | |
| 52. | | 75. | | → | |
| 60. | | 74. | | → | |
| 64. | | 70. | | → | |
| | | | | **Inconsistency score** | |

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# Appendix G: Everyday Life in Attention Scale (ELAS)

## Everyday Life Attention Scale

This questionnaire sketches nine situations in everyday life: reading a book, watching a movie or documentary, performing an indoor activity, attending a lecture or open evening, having a conversation, doing an assignment/ administration, preparing a meal, tidying up the house, and driving a car.

When reading the description of the situation, please imagine an average week or day on which you come across a similar situation.

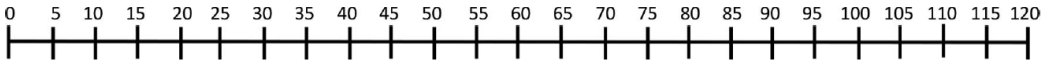
The questions beneath each described situation are about that specific situation. Whenever a new situation is described, all the questions pertain to the new situation.

We ask you to mentally visualize the situations as much as you can and to fill out an answer even if you do not regularly experience a situation.

### *Situation A: Reading a book*

**You are reading a book of average interest (if you never read a book imagine reading something else like an abstract, manual or guidelines) and have two hours to do some reading.**

A1. How long can you carry this out without having a break (so without a break or mind wandering)? (Please mark the correct number of minutes)




A2. How well can you focus on this?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

A3. How well can you focus on this if there is distraction around you (e.g., children playing)?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

A5. How motivated are you to perform the task well (so to take in all details)?

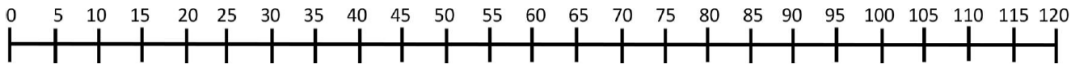
0 = no motivation to perform well
50 = motivated to perform the task for 50% correctly
100 = motivated to perform the task for 100% correctly

0 10 20 30 40 50 60 70 80 90 100

### *Situation B: Watching a movie/documentary*

**You want to see a movie or documentary of average interest that lasts for two hours.**

B1. How long can you carry this out without having a break (so without a break or mind wandering)? (Please mark the correct number of minutes.)




B2. How well can you focus on this?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

B3. How well can you focus on this if there is distraction around you (e.g., children playing)?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

B4. How well can you concentrate if you have to do something else at the same time (e.g., talking to a friend about a different subject)?

0 = no concentration on the task
50 = 50% of concentration on the task
100 = 100% of concentration on the task

0 10 20 30 40 50 60 70 80 90 100

B5. How motivated are you to perform the task well (so to take in all details)?

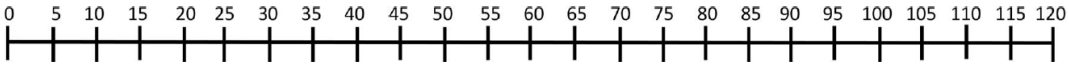
0 = no motivation to perform well
50 = motivated to perform the task for 50% correctly
100 = motivated to perform the task for 100% correctly

0 10 20 30 40 50 60 70 80 90 100

### *Situation C: Performing an indoor activity*

**You have two hours to perform an indoor activity of average interest (e.g., board game, handcrafting, solving a puzzle).**

C1. How long can you carry this out without having a break (so without a break or mind wandering)? (Please mark the correct number of minutes.)




C2. How well can you focus on this?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

C3. How well can you focus on this if there is distraction around you (e.g., children playing)?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

C4. How well can you concentrate if you have to do something else at the same time (e.g., talking to a friend about a different subject)?

0 = no concentration on the task
50 = 50% of concentration on the task
100 = 100% of concentration on the task

0 10 20 30 40 50 60 70 80 90 100

C5. How motivated are you to perform the task well (so to take in all details)?

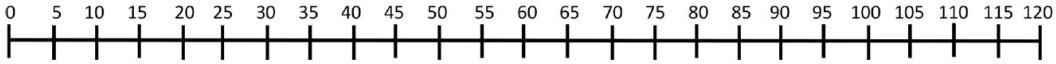
0 = no motivation to perform well
50 = motivated to perform the task for 50% correctly
100 = motivated to perform the task for 100% correctly

0 10 20 30 40 50 60 70 80 90 100

### *Situation D: Attending lecture or open evening*

**You are attending a lecture or open evening of average interest which lasts for two hours.**

D1. How long can you carry this out without having a break (so without mind wandering or doing something else)? (Please mark the correct number of minutes.)




D2. How well can you focus on this?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

D3. How well can you focus on this if there is distraction around you (e.g., other people talking to each other)?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

D4. How well can you concentrate if you have to do something else at the same time (e.g., texting a friend)?

0 = no concentration on the task
50 = 50% of concentration on the task
100 = 100% of concentration on the task

0 10 20 30 40 50 60 70 80 90 100

D5. How motivated are you to perform the task well (so to take in all details)?

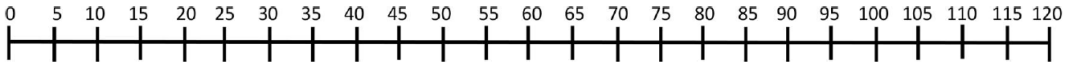
0 = no motivation to perform well
50 = motivated to perform the task for 50% correctly
100 = motivated to perform the task for 100% correctly

0 10 20 30 40 50 60 70 80 90 100

### *Situation E: Having a conversation*

**You are having a conversation with a person of average interest for which you have two hours of time.**

E1. How long can you carry this out without having a break (so without a break or mind wandering)? (Please mark the correct number of minutes.)




E2. How well can you focus on this?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

E3. How well can you focus on this if there is distraction around you (e.g., children playing)?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

E4. How well can you concentrate if you have to do something else at the same time (e.g., texting a friend)?

0 = no concentration on the task
50 = 50% of concentration on the task
100 = 100% of concentration on the task

0 10 20 30 40 50 60 70 80 90 100

E5. How motivated are you to perform the task well (so to take in all details)?

0 = no motivation to perform well
50 = motivated to perform the task for 50% correctly
100 = motivated to perform the task for 100% correctly

0 10 20 30 40 50 60 70 80 90 100

### *Situation F: doing an assignment/administration*

**You have two hours to work on an assignment of average interest, consisting of several steps and for which you have to think (e.g., administration or an assignment for a training).**

F1. How long can you carry this out without having a break (so without a break or mind wandering)? (Please mark the correct number of minutes.)

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120

F2. How well can you focus on this?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

F3. How well can you focus on this if there is distraction around you (e.g., children playing)?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

F4. How well can you concentrate if you have to do something else at the same time (e.g., texting a friend)?

0 = no concentration on the task
50 = 50% of concentration on the task
100 = 100% of concentration on the task

0 10 20 30 40 50 60 70 80 90 100

F5. How motivated are you to perform the task well (so to take in all details)?

0 = no motivation to perform well
50 = motivated to perform the task for 50% correctly
100 = motivated to perform the task for 100% correctly

0 10 20 30 40 50 60 70 80 90 100

### *Situation G: Preparing a meal*

You are preparing a meal for some people visiting you (meat/vegetables/potatoes).

G2. How well can you focus on this?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

G3. How well can you focus on this if there is distraction around you (e.g., children playing)?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

G5. How motivated are you to perform the task well (so to take in all details)?

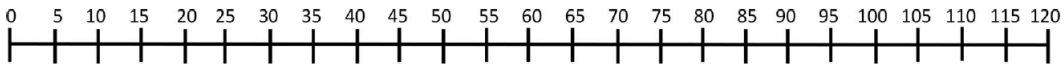
0 = no concentration on the task
50 = 50% of concentration on the task
100 = 100% of concentration on the task

0 10 20 30 40 50 60 70 80 90 100

### *Situation H: Cleaning up*

**Your home is a mess and you decide it's time to start cleaning up. You have two hours.**

H1. How long can you carry this out without having a break (so without a break or mind wandering)? (Please mark the correct number of minutes.)




H2. How well can you focus on this?

0 = no motivation to perform well
50 = motivated to perform the task for 50% correctly
100 = motivated to perform the task for 100% correctly

0 10 20 30 40 50 60 70 80 90 100

H3. How well can you focus on this if there is distraction around you (e.g., children playing)?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

H4. How well can you concentrate if you have to do something else at the same time (e.g., texting a friend)?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

H5. How motivated are you to perform the task well (so to take in all details)?

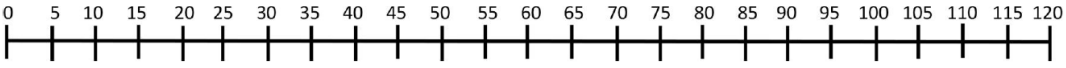
0 = no concentration on the task
50 = 50% of concentration on the task
100 = 100% of concentration on the task

0 10 20 30 40 50 60 70 80 90 100

### *Situation I: Driving a car*

**You are driving a car and are on your way to a destination where you have never been before. The drive takes two hours.**

I1. How long can you carry this out without having a break (so without a break or mind wandering)? (Please mark the correct number of minutes.)




I2. How well can you focus on this?

0 = no motivation to perform well
50 = motivated to perform the task for 50% correctly
100 = motivated to perform the task for 100% correctly

0 10 20 30 40 50 60 70 80 90 100

I3. How well can you focus on this if there is distraction around you (e.g., people talking to each other in the back of the car)?

0 = no focus on the task
50 = 50% of your focus on the task
100 = 100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

I4. How well can you concentrate if you have to do something else at the same time (e.g., talking to your passenger about a different subject)?

0 =no focus on the task
50 =50% of your focus on the task
100 =100% of your focus on the task

0 10 20 30 40 50 60 70 80 90 100

I5. How motivated are you to perform the task well (so to take in all details)?

0 = no concentration on the task
50 = 50% of concentration on the task
100 = 100% of concentration on the task

0 10 20 30 40 50 60 70 80 90 100

Everyday Life Attention Scale (**ELAS) Scoring and Norm forms**

Step 1: Calculate the situation scores

| Item | A *Reading* | B *Movie* | C *Activity* | D *Lecture* | E *Conversation* | F *Assignment* | G *Cooking* | H *Cleaning up* | I *Driving* |
|---|---|---|---|---|---|---|---|---|---|
| 1_minutes | /1,2 = | /1,2 = | /1,2 = | /1,2 = | /1,2 = | /1,2 = | | /1,2 = | /1,2 = |
| 1_% (1_minutes divided by 1,2) | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| 4 | | | | | | | | | |
| 5 | | | | | | | | | |
| Sum (add up grey cells 1_% + 2 + 3 +4 + 5) | /4 = | /5 = | /5 = | /5 = | /5 = | /5 = | /4 = | /5 = | /5 = |
| **Situation score** (divide sum by number of items) | | | | | | | | | |

*Note.* The raw item scores of A1 to I1 have to be converted from minutes to percentages by dividing the raw item score by 1,2. The black cells indicate that these items were omitted from the questionnaire because they did not fit the situation. The sum has to be calculated to get a total situation score, which has to be divided by the number of items to calculate the mean situation score.

## Appendix H: Working Memory Questionnaire (WMQ)

**Instructions:** For each question, please choose one of the following responses:

| 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Not at all | A little | Moderately | A lot | Extremely |

1. Do you feel that you tire quickly during the day? _____
2. Do you find it difficult to carry out a project such as choosing and organizing your vacation? _____
3. Do you have problems with remembering sequences of numbers, for example, when you have to write down a telephone number? _____
4. Do you need to make an effort to concentrate in order to follow a conversation in which you are participating with many other people? _____
5. Do you find it difficult to remember the name of a person who has just been introduced to you?
6. When you shop, do you often spend more than the budget you set for yourself? _____
7. Do you have difficulty remembering what you have read? _____
8. When you are interrupted during an activity by a loud noise (door slam, car horn) do you have difficulty in getting back to the activity? _____
9. Do you find it difficult to carry out an activity with chronological steps (cooking, sewing, DIY)? _____
10. Do nearby conversations disturb you during a conversation with another person? _____
11. Do you need to re-read a sentence several times to understand a simple text? _____
12. Do you have difficulty in organizing your time with regard to appointments and your daily activities? _____
13. Do you find it difficult to do two (or several) things at the same time, such as: _____
    - DIY and listening to the radio at the same time?
    - Cooking and listening to the radio at the same time?
14. When you are carrying out an activity, if you realize that you are making a mistake, do you find it difficult to change strategy? _____
15. Do you have difficulty understanding what you read? _____
16. Do you feel that fatigue excessively reduces your concentration? _____
17. When you pay cash for an item, do you have difficulty in realizing if you have been given the correct change? _____

18. Do you find it difficult to follow the different steps of a user's guide (putting a kit of furniture together, installing a new electrical device)? _____
19. Do you find it difficult to carry out an activity in the presence of background noise (traffic, radio or television)? _____
20. Are you particularly disturbed if an unexpected event interrupts your day or what you are in the process of doing? _____
21. If a character in a text is designated in different ways (he, him), do you have difficulty in understanding the story? _____
22. Do you feel embarrassed when you have a conversation with an unfamiliar person? _____
23. Do you find that you hesitate for a long time before buying even a common item? _____
24. Do you feel that you are very slow to carry out your usual activities? _____
25. Do you have to look at a written phone number many times before dialing a number that you don't know by heart? _____
26. Do you have difficulty in managing your paperwork, sending social security papers, paying bills, etc.? _____
27. If somebody speaks quickly to you, do you find it difficult to remember what you were told or asked? _____
28. Do you find that you tire quickly during an activity which demands a lot of attention (for example, reading)? _____
29. After doing your shopping, are you surprised to find that you have bought many useless items? _____
30. Do you find it difficult to participate in a conversation with several people at once? _____

**Scoring:**

Sum the item totals for each domain to create three domain scores. Then, sum the domain scores to create a total score.

Storage domain: Questions 3,5,7,11,15,17,21,25,27,30

Attention domain: Questions 1,4,8,10,13,16,19,22,24,28

Executive domain: Questions 2,6,9,12,14,18,20,23,26,29

Total Score domain: Total sum of storage, attention, and executive domain scores.

## Appendix I: Perceived Arousal Scale (PAS)

Different people react very differently to the same situations. Indicate to what extent you feel this way right now, that is, at the present moment. Use the following 5-point rating scale. Write the number corresponding to your rating on the blank line next to each word.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| very slightly or not at all | a little | moderately | quite a bit | extremely |

| | | | |
|---|---|---|---|
| _____active | ____alert | _____aroused | _____depressed |
| _____drowsy | _____dull | _____energetic | _____excited |
| _____exhausted | _____fatigued | ____forceful | _____inactive |
| _____lively | ____powerful | _____quiet | _____sharp |
| _____sleepy | _____slow | _____sluggish | ____tired |
| _____vigorous | _____weak | _____weary | ____worn-out |

Scoring:

*Item needs to be reverse scored

Low arousal scale: After reverse-scoring items with an *, sum the total.

High arousal scale: Sum the total of all items without an *.

Total arousal: Sum the totals from low arousal scale and high arousal scale.

| 1<br>very slightly or not at all | 2<br>a little | 3<br>moderately | 4<br>quite a bit | 5<br>extremely |
|---|---|---|---|---|
| _____active | ____alert | _____aroused | _____depressed* | |
| _____drowsy* | _____dull* | _____energetic | _____excited | |
| _____exhausted* | _____fatigued* | ____forceful | _____inactive* | |
| _____lively | ____powerful | _____quiet* | _____sharp | |
| _____sleepy* | _____slow* | _____sluggish* | ____tired* | |
| _____vigorous | _____weak* | _____weary* | ____worn-out* | |