UNIVERSITY OF CALIFORNIA
RIVERSIDE

Modeling the Relationship Between Students' Self-Perceptions, Goals, and Achievement Motivation

A Dissertation submitted in partial satisfaction
of the requirements for the degree of

Doctor of Philosophy

in

Psychology

by

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September 2017

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ACKNOWLEDGMENTS

I would like to first express my deepest gratitude to my advisor Carolyn B. Murray for her continuous support of my research, as well as for her motivation, patience, and support these past five years. Your guidance has helped me throughout my entire graduate experience.

Besides my advisor, I would like to thank the rest of my dissertation committee: Dr. Robert Rosenthal and Dr. Kate Sweeny, as well as two people I consider mentors: Dr. James Smith and Dr. Martha Rivas, for their insightful comments and encouragement throughout the dissertation writing process.

Thank you to my fellow graduate students and labmates for the stimulating discussions, and for all your help.

Last but not least, I would like to thank my friends and family: my parents and to my brother and sister for supporting me mentally and spiritually throughout writing this dissertation and my life in general.

ABSTRACT OF THE DISSERTATION

Modeling the Relationship Between Students' Self-Perceptions, Goals, and Achievement Motivation

by

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University of California, Riverside, September 2017
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Research has shown that cognitive theories of motivation play a key role in students' academic motivation and achievement. However, the current literature only tests limited aspects of these cognitive theories, and the findings sometimes contradict the original hypotheses. Therefore, the purpose of the present study is to test a causal model combining seven current cognitive theories of motivation – beliefs about intelligence, academic self-efficacy, goal orientation, stereotype threat, stereotype vulnerability, causal uncertainty, and self-handicapping – in terms of college students' achievement. Such causal modeling methods are important because they allow for testing the complex conceptual model as a whole and go beyond the basic investigation of relationships between two sets of variables.

To determine the relationships between these factors, undergraduate students were chosen as the sample population because the college environment provided an ideal setting for examining the implications of these cognitive theories of motivation for achievement behaviors. Three hundred and sixty-seven undergraduates participated in an online survey designed to measure their self-perceptions of the seven cognitive factors.

Based on the hypothesized model it was predicted that: (1) theories of intelligence (entity and incremental) would directly predict academic self-efficacy, (2) academic self-efficacy would directly predict achievement goal orientations (mastery, performance-approach, and performance-avoidance), (3) performance-avoidance goals would directly predict both causal uncertainty and stereotype vulnerability, (4) stereotype vulnerability and causal uncertainty would directly predict both stereotype threat and self-handicapping, and (5) mastery goals, stereotype threat, and self-handicapping would directly predict students' achievement (i.e. GPA). Also based on the model, it was hypothesized that theories of intelligence would indirectly predict student achievement (i.e., GPA) with academic self-efficacy, goal orientation, stereotype threat, stereotype vulnerability, causal uncertainty, and self-handicapping acting as mediators.

Results from structural equation modeling indicated that these constructs are all appropriate for predicting academic achievement in undergraduate students. Results revealed overall support for the hypothesized model with the exception of two constructs: (1) the mediating effects of academic self-efficacy on entity intelligence beliefs and performance goals, and (2) the adaptive nature of performance-approach goals.

These results, along with other findings from the present study, suggest that college students' beliefs about intelligence, level of academic self-efficacy, goal orientation, susceptibility to stereotype and causal uncertainty, as well as their use of self-handicapping strategies, can predict students' academic performance. Overall, the findings are consistent with those of previous studies that identified two general patterns of achievement motivation, maladaptive and adaptive, patterns, which may encompass these cognitive constructs.

One goal of examining these constructs is to better understand how to help students function and adapt to academic demands. The implications are also of applied significance to practitioners. Recognizing potential discrepancies between the broader implicit theories and the students' personal beliefs can help in the creation of interventions and training.

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CHAPTER I

INTRODUCTION

Background

Imagine a student who struggled throughout his or her science class to end up achieving one of the highest grades in the class. Now imagine another student in the same class who showed early promises of success, but ended up procrastinating, not showing up to class, and eventually having to drop out of the class. The crucial factor that sets these two examples apart is the students' own motivation to learn. Motivation, or a lack thereof, is a vital part throughout a student's educational experience and yet educational reform has focused very little attention on how to motivate students.

Since the early 20th century education policies have instead focused mainly on accountability, national standards, and testing. For example, in 1965 President Johnson enacted the Head Start program, which was intended to give children from disadvantaged families the skills they needed to succeed in elementary school by giving them services to combat poverty. Then in 1989, United States governors assembled at an educational summit to discuss educational goals for the year 2000. These national goals included: increasing the high school graduation rate to a minimum of 90%; defining targets for student competency in core subjects like English and Math; and ensuring that all American adults were literate (Krueger & Rouse, 2001; Ravitch, 2000). In 1994, after becoming president, Bill Clinton enacted the Educate America Act, which directed states

to create a standard set of content and knowledge that students should learn. Eight years later in 2002, President George W. Bush signed a similar educational law known as the No Child Left Behind Act. No Child Left Behind, which also promoted state-wide educational standards and required more accountability from schools to reach student assessment goals (Krueger & Rouse, 2001).

One of the most recent examples of statewide and nationwide efforts to improve instruction is the Common Core State Standards. These standards are designed to provide a clear and common standard of what students are taught and expected to learn (Common Core State Standards Initiative, 2010). Ultimately, the Common Core Initiative, and the policies that came before it, center on standardizing course instruction, knowledge, and skills across the United States. These policies focus on addressing the content of instruction, knowledge and skills, without acknowledging the individual differences in student engagement and interest in the instruction, knowledge and skills. While there may be an emphasis on what students should know and be able to do at the state and national level, there is a lack of emphasis on explaining how to motivate students. Therefore, education reform could benefit from delving into the often ignored, element of student motivation.

As legislators enacted new policies during these early years of standardization, researchers who study academic motivation were interested in understanding the link between a student's own motivation to learn and their academic achievement. By understanding what factors lead to achievement motivation, we as researchers can help

educators and policymakers create positive school environments that may well promote long-lasting student success.

Achievement and motivation have a long history of research in the field of psychology (Atkinson, 1957; McClelland, Atkinson, Clark & Lowell, 1953; Weiner & Kukla, 1970). Over the last four decades much of this work has shown that students' level of achievement may stem from their cognitive beliefs and the attributions they make for their performance (Dweck & Leggett, 1988; Hong, Chiu, Dweck, Lin, & Wan, 1999; Weiner & Kukla, 1970). In fact, a long line of research has consistently shown that students' beliefs are as powerful predictors of achievement as factors such as standardized test scores or previous achievement (Bandura, 1997; Dweck & Leggett, 1988; Hong et al., 1999; Robins & Pals, 2002; Stipek & Gralinski, 1996).

While many different cognitive beliefs relate to academic achievement, as we will see throughout this paper, the belief that has been found to be at the core of so many motivational constructs is the belief a person holds about the nature of their intelligence. According to the social-cognitive theory of motivation proposed by Dweck (Dweck & Leggett, 1988; Dweck, 1999), students adopt one of two different personal "theories" about the nature of ability: either an entity view of intelligence or an incremental view of intelligence. Compared to students with an incremental view, students with an entity view are more prone to believing that abilities are trait-like in that these abilities are a fixed, unchanging entity. In contrast, students who hold an incremental view of intelligence are more likely to believe that abilities are a malleable and controllable quality. Dweck's theory hypothesizes that these beliefs about intelligence determine the way students

approach learning situations, the kinds of goals they adopt, and their achievement.

As stated above, Dweck (1999) proposed that these beliefs have an important impact on the goals that individuals set, meaning that these different intelligence theories can lead to students pursuing very different academic goals. Students who hold an incremental theory of intelligence have goals that focus on acquiring and mastering new skills. In order to meet these mastery goals, they are willing to seek out challenging or difficult situations that promote learning, to expend the necessary effort, and to persist in the face of setbacks. Endorsing an entity or fixed view of intelligence fosters goals that are performance oriented, with a focus on appearing competent to others (i.e., avoiding negative feedback of their abilities by others or demonstrating their competence to others). This pursuit of performance goals leads students to give up easily when faced with challenges, to minimize their effort expenditure, and to generally avoid tasks they might have difficulty mastering (Dweck, 1986; Dweck & Leggett, 1988; Pintrich, 2000).

Years of research have shown that intelligence beliefs play a crucial role in students' motivation and achievement, and are particularly important during periods of transition, such as from high school to college (Robbin & Pals, 2002). Research on implicit theories of intelligence indicates these views have important consequences for students' goal choices, attributions, and a wide range of academic outcomes, including grades and achievement test scores (Aronson, Fried & Good, 2002; Blackwell, Trzesniewski & Dweck, 2007; Robins & Pals, 2002). These implicit self-theories create distinctive frameworks for interpreting and responding to failure. In the face of failure, incremental theorists exhibit a mastery-oriented response pattern, attributing their failure

to insufficient effort (e.g., "I am failing because I did not try hard enough"). Incremental theorists typically demonstrate this mastery orientation because they believe that their ability can improve through effort. As a result, correlational studies have shown that incremental theorists are more likely to seek mastery, increase effort, and engage in self-regulating strategies (Robins & Pals, 2002). Incremental theorists also tend to have high self-efficacy, display higher motivation, make greater use of metacognitive strategies of concentration, and engage in less self-handicapping, which are defined as maladaptive behaviors that may be used by students to provide an excuse for poor performance other than lack of ability (Ommundsen, Haugen, & Thorleif, 2005).

Entity theorists, in contrast, are vulnerable to the helpless response pattern. When confronting failure, helpless individuals make maladaptive self-attributions (e.g., "I am failing because I am dumb."). In addition, they tend to experience negative affect, and disengage from the task to avoid revealing their lack of ability (Diener & Dweck, 1978). As such, correlational studies have found that entity theorists, who believe that intelligence is fixed and determined by innate ability, tend to put forth less effort, are more likely to adopt performance goals (Blackwell, Trzesniewski, & Dweck, 2007), feel helpless (Dweck, 2009), engage in maladaptive behaviors such as self-handicapping behavior, and ultimately lead to underachievement in school (Diener & Dweck, 1978; Rhodewalt, 1994).

Research also indicates that stereotype threat can lead to negative self-evaluations similar to those experienced after setbacks by individuals who hold the helpless response pattern of an entity theory of ability (Good, Aronson, & Inzlicht, 2003). Stereotype threat

occurs when an individual is in a position to potentially confirm a negative stereotype that disparages the ability of members of his or her own social group. Stereotype threat can contribute to the underperformance of individuals belonging to a range of negatively stereotyped groups like women's performance on math tasks (e.g., Inzlicht & Ben-Zeev, 2000) or Latinos and African Americans' performance on intellectual tasks (Gonzales, Blanton, &; Williams, 2002; Steele & Aronson, 1995). Steele and Aronson's (1995) seminal article showed that in an academic context, minority students may obtain lower grades than their white counterparts, in part because of the negative stereotype threatening minority students' intellectual ability.

Therefore, while students who espouse a fixed entity view of ability may be just as capable and could achieve at the same levels as those who hold an incremental theory of ability, the beliefs they hold about the nature of intellectual ability may result in significantly different academic outcomes, especially when students are presented with tough challenges and setbacks.

Statement of the problem

Although there are some studies that have attempted to fully test a causal model combining these prominent social-cognitive constructs relevant to motivation and achievement in an academic context (Aronson et al., 2002; Blackwell et al., 2007; Dweck & Leggett, 1988; Leondari & Gialamas, 2002), most studies separately capture relevant relationships between different motivational factors, sometimes contradicting the original postulates. For instance, in two studies (Dupeyrat & Escribe, 2000; Dupeyrat & Mariné,

2001) the belief in a fixed entity was not related to performance goals, as proposed by Dweck's (1986, Dweck & Leggett,
1988) original social-cognitive model, but instead was negatively correlated with mastery goals. The original model also assumes that incremental beliefs can directly influence achievement though other studies have not been able to replicate these findings (Leondari & Gialamas, 2002).

In addition, there is often little agreement between researchers about the causal ordering of these constructs even though the relations between these constructs and achievement are well established by previous correlational studies. For instance, Skaalvik and Valas (1999) reported two possible models in regards to efficacy and achievement: self-efficacy beliefs may predict achievement or achievement may predicts self-efficacy beliefs. Leondari and Gialamas (2002) on the other hand found support that self-efficacy beliefs moderate the relationship between implicit theories, goal orientations and academic achievement. In regards to goal orientation, others propose a direct relationship between goals orientation and achievement (Pintrich, 2000; Wolters, 2004).

Furthermore, few researchers have examined the relationship between implicit theories, goal orientation and other self-beliefs that have been prominent in the area of academic motivation. Martin and colleagues made a preliminary attempt at integrating implicit theories of intelligence, goal orientation and self-handicapping into a model (Martin, Marsh, & Debus, 2001). The model, begins with motivational predictors like goal orientation, moves to self-worth protection strategies like self-handicapping, and finally to educational outcomes such as persistence and GPA. Support was found for this

model in that performance goals positively predicted self-handicapping and self-handicapping negatively predicted GPA (Martin, Marsh, & Debus, 2001).

Therefore, the main purpose of the present study is to use structural equation modeling to test a model (see Figure 1) combining theories of intelligence, achievement, and several prominent cognitive theories of motivation – academic self-efficacy, goal orientations, causal uncertainty, stereotype vulnerability, stereotype threat, and self-handicapping – that will act as mediators. Such causal modeling procedures are ideal for simultaneously testing the relationships within a complex conceptual model. The testing of mediational effects is also possible with this technique.

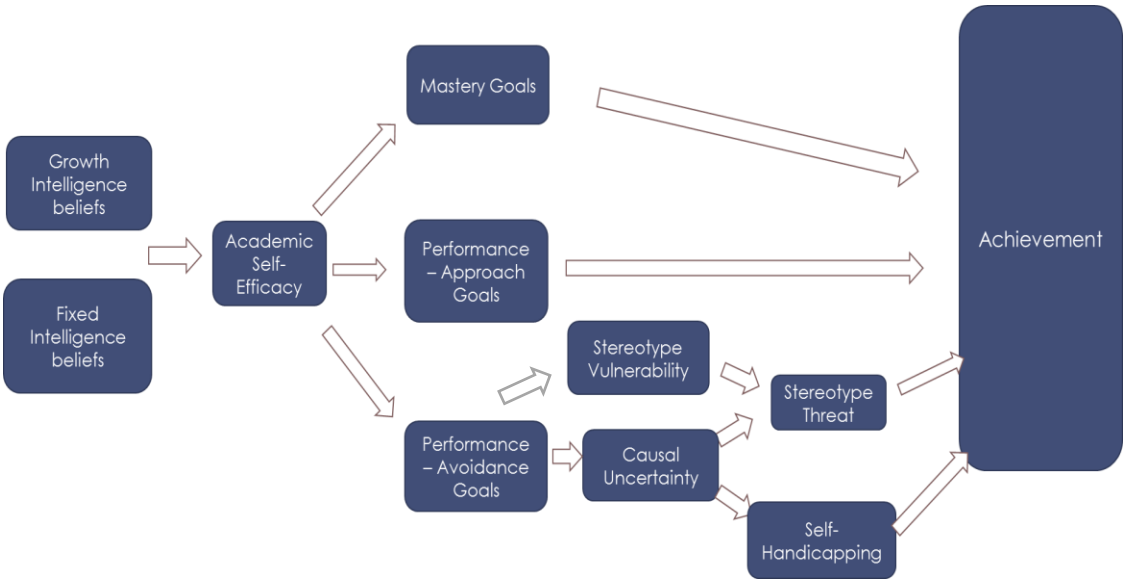
Research Questions

In agreement with the overall purpose of this study, I will attempt to explore the following three points:

1) Examine the relationships between the variables and explore whether any group differences (e.g. gender or ethnicity) exist.
2) Test whether the cognitive constructs proposed (academic self-efficacy, goal orientation, causal uncertainty, self-handicapping, stereotype vulnerability, and stereotype threat) act as mediators between theories of intelligence and achievement.
3) Test the model in terms of the predictive power of theories of intelligence and several other cognitive constructs on each other and academic achievement.

The rationale for the model and the relationships between these variables is summarized in the following section.

Figure 1: Proposed path model



Rationale for current study

It is proposed that theories of intelligence will be related to and predict academic self-efficacy. More specifically, there will be a positive correlation between an incremental theory of intelligence and academic self-efficacy, and a negative correlation between an entity theory of intelligence and academic self-efficacy. This rationale is based on the prior research showing that those who believe they can change their intelligence develop a belief that they have the skills needed to perform (Ommundsen, Haugen, & Thorleif, 2005).

Academic self-efficacy is expected to be related to and predict goal orientation such that there will be a positive relationship between self-efficacy, mastery goals, and performance-approach goals. Meanwhile, a negative relationship is hypothesized between self-efficacy and performance-avoidance goal orientation. Rationale is based on the prior research showing that individuals who are high in self-efficacy set more difficult goals, exert more effort to achieve those goals, and seek to learn from the processes of pursuing those goals (DeGeest & Brown, 2011).

Performance-avoidance goal orientation will be related to and predict causal uncertainty. This reasoning is based on the findings reported earlier demonstrating that causal uncertainty beliefs may be chronically salient for some individuals where uncontrollability or ambiguous causality seems present, or in the case of performance-avoidance orientation, when an individual feels uncertain about one's abilities or potential for success (Trope, 1986; Weary & Edwards, 1994).

The hypothesis that causal uncertainty will be related to and predict self-handicapping is based on the nature of self-handicapping itself. A student is most likely to use self-handicapping strategies when future outcome uncertainty and uncertain self-images are created. So when a student is uncertain of the likelihood of success on a particular academic task, he or she may deliberately sabotage their own performance (Berglas & Jones, 1978).

The hypothesis that both causal uncertainty and stereotype vulnerability will correlate with and predict stereotype threat is based on literature which states that some people may experience more causal uncertainty than others because something about

them adds an extra layer of complexity to the ability attribution process. In this model I am proposing that one such "something" may be stereotype vulnerability, and that these two factors together may lead to the apprehension students experience when they feel that their behavior could confirm a negative stereotype about their group (i.e. stereotype threat).

Finally, it is expected that these maladaptive strategies - self-handicapping, and stereotype threat - will be negatively related to achievement, while the more adaptive behaviors – mastery and performance-approach goals – will be positively related to and predict students' levels of achievement in school. Rationale is based on findings that show that together, all of these qualities of a mastery-oriented response pattern are likely to lead students to persist and put more effort into their academics – ultimately leading to higher academic achievement, while the qualities of a helpless-response pattern are more likely to lead to underachievement (Dweck & Leggett, 1988; Midgley et al., 2000).

Definition of Key Terms

- *Academic Self-Efficacy: One's perceived capabilities to learn or perform actions at designated levels on an academic task or attain a specific academic goal (Bandura, 1997; Eccles & Wigfield, 2002).*
- *Achievement Goal Theory (AGT): Goals or aims an individual pursues within an achievement context. (Schunk, Pintrich, & Meece, 2008).*
- *Achievement Motivation: An individual's need for success or attaining a standard of excellence* (*McClelland, Atkinson, & Clark, 1953).*

- *Causal Uncertainty: Causal uncertainty beliefs involve doubts about one's understanding or detection of the causes of events (Weary & Edwards, 1996).*
- *Entity Theory of Intelligence: The belief that one's intelligence is an internal, unchangeable trait (i.e. one is born with a certain amount of intelligence) (Dweck & Leggett, 1988).*
- *Implicit Theories of Intelligence: One's beliefs about the nature and workings of their intellect (Dweck & Leggett, 1988).*
- *Incremental Theory of Intelligence: The belief that one's intelligence is a quality that is malleable and can develop through their effort and persistence (Dweck & Leggett, 1988).*
- *Mastery Goals: A collection of goals that focus on learning and mastering the task at hand (Elliot & Church, 1997).*
- *Performance Goals: Goals that focus on perceived competence or ability and how ability may be judged relative to others. (Elliot & Church, 1997).*
- *Performance-Approach Goals: Goals in which an individual is focused on demonstrating that they are more competent than other students (i.e., have more ability than others) (Elliot & Church, 1997).*
- *Performance-Avoidance Goals: Goals in which an individual is focused on avoiding appearing incompetent or stupid (Elliot & Church, 1997).*
- *Self-Handicapping: Any action or choice of performance setting that enhances the opportunity to externalize, or excuse, failure and to internalize, accept credit for, success (Berglas & Jones, 1978).*

- *Stereotype Threat: A situational predicament in which people are or feel themselves to be at risk of conforming to stereotypes about their social group (Steele and Aronson, 1995).*
- *Stereotype vulnerability: The tendency to expect, perceive, and be influenced by negative stereotypes about one's social category (Aronson, 2002).*

Social Significance

By now, much empirical evidence has amassed showing the importance of implicit theories of ability and cognitive factors to academic motivation and achievement. The present study has theoretical significance in that I sought to refine and extend the theoretical tenets of various social-cognitive constructs by using path modeling techniques to test hypothesized causal and mediating relationships that have yet to be empirically supported.

One of the ultimate goals of examining these constructs is to understand how to better help students function and adapt to academic demands by understanding students' perceptions of themselves in academic contexts and using this information to predict important outcomes. The studies presented here have demonstrated that positive percepts of the self lead to many desirable outcomes. Strong self-efficacy, a malleable view of intelligence, and goals that emphasize mastery, all lead students to set challenging yet attainable academic goals for themselves, feel less anxious in achievement settings, enjoy their academic work more, persist longer on difficult tasks, and, overall, feel better about themselves as a person and as a student.

Research investigating the relationships between beliefs about ability and beliefs about knowledge and knowing is also of practical significance to teachers and educators. If, as Dweck and Leggett (1988) suggested, students who hold a fixed view of their abilities are likely to develop oversimplified and naive views about knowledge, teachers will want to encourage students that with effort, their abilities can improve. For example, in the area of STEM (science, technology, engineering, and math) subjects, in particular, there has been a concentrated effort by educators to encourage students to think critically about knowledge claims in these and the processes by which scientists arrive at conclusions (Solomon, Duveen, & Scott, 1994).

Lastly, recognizing potential discrepancies between students' broader implicit theories and their personal beliefs is important in the context of interventions and training. Research on implicit theories has repeatedly demonstrated that simple interventions can lead to long-lasting change (Aronson et al., 2002; Good et al., 2003; Blackwell et al., 2007).

In one study, Blackwell et al. (2007) ran an intervention over 8 weeks that taught an incremental theory to middle school students. Students who received this intervention earned higher grades after the 8-weeks compared to those in the control group who did not participate in the incremental workshop. These students were also labeled by their teachers as exhibiting higher levels of motivation in the classroom after having received the intervention (Blackwell et al., 2007).

The impact of implicit theory interventions has also been documented in studies specifically targeting the negative effects of stereotype threat on performance (Aronson et

al., 2002; Good, et al., 2003). In these studies, an intervention encouraging an incremental message of intelligence was able to mitigate potential effects of stereotype threats. Specifically, minority students in the experimental condition had higher levels of engagement and higher standardized test scores compared to those in the control group (Aronson et al., 2002; Good, et al., 2003). These findings indicate that it is possible to teach the incremental theory of intelligence, which may have important implications for the academic success of students especially those from stigmatized groups.

CHAPTER II

LITERATURE REVIEW

This section provides a review of previous research and support for the constructs examined in this study: implicit theories of intelligence, academic self-efficacy, goal orientation, stereotype threat and stereotype vulnerability, self-handicapping, and causal uncertainty. They will be discussed in terms of important outcomes as they pertain to the domain of academic achievement and underachievement.

Implicit theories of intelligence

Dweck's implicit theories of intelligence has gained popularity over the past two decades (Dweck,1986; Dweck & Leggett, 1988). The key concept of the model is the beliefs that individuals hold on the nature of intelligence. According to the theory, there are two types of implicit theories of intelligence a person may hold: the belief that intelligence is a malleable and controllable quality, an incremental or growth theory, or the belief that intelligence is a fixed and uncontrollable trait, an entity or fixed theory. The main postulate of this model is that implicit theories of intelligence determine the way a student tackles learning situations, the kinds of academic goals they adopt, the level of effort expenditure, persistence, and overall achievement in school.

The growth mindset has consistently been shown to have influential effects on student learning, motivation, and academic success. For instance, when teachers and students focus on improvement rather than on proving how smart they are, students tend to learn a lot more (Dweck & Leggett, 1988; Dweck, 1999). These students gain satisfaction from the process of learning and regularly seek out opportunities to

improve. The focus is not on what the outcome will say about them, but rather what they can take away from it, like identifying a useful studying strategy that they can use to succeed in the future. It is these types of students that gravitate towards challenges and are more likely to attribute setbacks to their own efforts or strategies (Hong et al., 1999). Because they believe intelligence can be cultivated, students that have a growth mindset are also less defensive about their shortcomings and show greater engagement, persistence and resilience in the face of setbacks with a focus on learning from their mistakes. An important distinction should be made here in that believing intelligence to be malleable does not mean that all students have exactly the same potential in every domain, or will learn everything given the same amount of effort. It simply means that intellectual ability can always be further developed.

In contrast, when students believe intelligence is fixed, they become more concerned with demonstrating their "fixed" level of ability. Within these students lies a strong need to prove themselves to others by appearing naturally smart and avoid appearing unintelligent. Therefore, striving for success and avoiding failure at all costs becomes their main priority.

Antecedents for shaping a student's view of intelligence usually come from both their parents and teachers' view of intelligence. If parents adopt an incremental mindset, they tend to communicate that belief for their children to absorb. Likewise, teachers who have an incremental theory will believe their students can and will change, which affects their students behaviors through the force of the self-fulfilling prophesy (Lynott & Woolfolk, 1994).

Hence, these two modes of thinking about intelligence can be regarded as two distinct frameworks, or "meaning systems" (Hong et al., 1999), that have important ramifications for students who at some point during their education may face sustained challenges. Compared to entity theorists, incremental theorists have been found (1) to focus more on learning goals, which are goals aimed at increasing their ability, versus performance goals, which are goals aimed at proving their ability to others; (Dweck & Leggett, 1988); (2) to believe in the value of effort (Hong, Chiu, Dweck, Lin, & Wan, 1999); and (3) to display mastery-oriented strategies (e.g. changing one's learning strategy to improve success) versus helpless strategies (e.g. continuing to use the same strategy despite failure) (Robins & Pals, 2002).

Findings from this line of research explore implications for the concepts of self-esteem and motivation in academic achievement settings, revealing how some students are motivated to succeed through hard work and effort, while other students fall into maladaptive behavior such as learned helplessness. Several studies have established this negative associations for an entity view of intelligence. Because success (or failure) is often linked to what is perceived as a fixed amount of intelligence rather than effort (e.g., the belief that "I did poorly because I'm not a smart person"), students may think that failure implies a natural lack of intelligence. As a result, students who adopt a fixed mindset are more likely to display a maladaptive response to challenges such as: making more negative attributions about their abilities (e.g., "if I can't do well on this, I must not be smart") and effort (e.g., "if I have to work hard, then I must be stupid"), experiencing more negative affect, having lower expectations for future performance, and ultimately

underperforming. As a result, they may simply avoid situations or activities that they perceive to be difficult or stop trying altogether.

While students' beliefs about intelligence tend to be relatively stable over time (Robins & Pals, 2002), they can be changed via workshops or interventions. Good, Aronson, and Inzlicht (2003) were able to show significant improvement in seventh graders' test scores who participated in a growth mindset intervention, compared with a control group. Similarly, Aronson, Fried, and Good (2002) taught incremental theory to college students and found they had significant improvements to their achievement test scores compared with a control group. Together, these studies reveal that beliefs about intelligence can be manipulated in a real-world environment and can have a positive impact on academic achievement outcomes.

Individual Differences in Implicit theories of intelligence

Age. Beliefs about intelligence are not seen as inherently dichotomous but rather a continuum of views that are likely to change slightly with age or situational occurrences in life. Research has revealed that children are especially subject to changing views of intelligence and abilities globally as evidenced by data collected from elementary and middle school students (Kurtz-Costes, McCall, Kinlaw, Wiesen, & Joyner, 2005). Though the degree to which change occurs is not constant across published research, one constant has been agreed upon; children are more likely to hold a primarily incremental view of intelligence at an early age and shift slightly during young adolescence to holding more of an entity view of intelligence. This shift can begin as early as the fifth grade (Hendricks, 2012).

Further research suggests that not only do children's views of the malleability of intelligence change with maturity, but the school environment also contributes to the change. Children often receive feedback from school for behavioral, academic, and emotional conduct. As children get older and progress through school, this type of assessment and feedback can alter their intelligence beliefs. For instance, children who are in elementary school are more focused on their abilities in terms of what they think they can do well. As children become older however, their focus shifts to what they can do well in relation to others (Stipek & Tannatt, 1984). By fifth grade, students are not only comparing their academic merits to others, they also are more likely to feel that their abilities are based on a fixed intelligence that cannot be changed.

Ethnicity. Research has increasingly found that intelligence beliefs may matter more for females or students in racial groups that are subject to pervasive negative stereotypes about ability. In studies that included such subjects, it was found that holding a fixed mindset made these groups of students more vulnerable to the detrimental effects of gender or racial stereotypes, compared to those with a growth mindset (Good, Aronson, & Inzlicht, 2003). Therefore, it has been reasoned that stereotype threat plays a significant role in whether an individual adopts a fixed or malleable view of intelligence.

Entity theorists, those who hold a fixed view of intelligence, and individuals targeted by ability stereotypes are believed to adopt a performance goal mind-set when faced with academic difficulty or the possibility of low performance. In other words, individuals who are vulnerable to stereotype threat are more likely to adopt a fixed view of intelligence. Like the entity theorist when faced with a difficult task, students

vulnerable to a stereotype threat situation face essentially the same dilemma, the implication that he or she is intellectually limited, with little or no hope for improvement.

Consistent with this reasoning, past research has shown that stereotype threatened individuals show many of the same responses that distinguish entity theorists from incremental theorists (Dweck, 1999). Like entity theorists, stereotype targets tend to choose easier, success-assuring tasks when their abilities are subject to scrutiny or if their ethnicity or gender is made salient (Aronson & Good, 1999), experience greater performance pressure and anxiety when tasks are both evaluative and challenging (Steele & Aronson, 1995), and may even devalue ability domains in which they have performed poorly (Major & Schmader, 1998).

Academic Self-Efficacy

Self-efficacy refers to a person's belief in their ability to succeed in a particular situation (Bandura, 1977, 1986, 1997). For example, the expectation that one can get an A on a calculus exam is an efficacy judgment (Bandura, 1986). Self-efficacy theory, originally proposed by Bandura, hypothesized that self-efficacy affects an individual's choice of activities, effort, and persistence. In the realm of academia, students who have low self-efficacy in regards to accomplishing an academic task will avoid it, while students who believe they have the capabilities to succeed will participate willingly. Individuals who have high levels of academic self-efficacy have been shown to work harder and persevere more when they encounter difficulties than those who doubt their abilities (Bandura, 1986; Chemers, Hu, & Garcia, 2001). According to self-efficacy theory, the antecedents that determine whether an individual will acquire high or low

self-efficacy beliefs comes from the following three major sources of information: prior experiences, evaluative feedback, and physiological reactions (Bandura, 1997).

One's prior experiences with the task in question or a similar task provide the most reliable source of information for efficacy beliefs. Successes strengthen self-efficacy, whereas repeated failures undermine it. A firm sense of efficacy built on the basis of past successes is believed to withstand temporary failures (Tresolini & Stritter, 1994).

Evaluative feedback from significant others also influence one's judgment of self-efficacy. Evaluative feedback is most effective when people who convey the information are viewed as knowledgeable and credible and when the information is viewed as realistic (Bandura, 1986).

Lastly, an increase in physiological arousals can also affect how people judge their efficacy appraisal. For instance, bodily symptoms like sweating or a quickening heartbeat may signal anxiety which in turn might be construed as having a lack of skills (Bandura, 1997).

While individuals gather information to gauge their self-efficacy from all of these sources, performance on previous tasks seems to be the most reliable source to appraise self-efficacy. Particularly, the attributions or cognitions associated with previous performances seem to be most critical.

Compared to students who doubt their academic abilities, students who believe and have confidence in their ability to learn are more persistent, less anxious, have greater intrinsic interest, set more challenging learning goals, use more effective

cognitive strategies, and ultimately perform better in learning situations (Bandura, 1997; Bouffard-Bouchard, Parent, & Larivee, 1991; Schunk, 1989). Moreover, these findings hold across various ages and grade levels. A meta-analysis contributed the relationship of several psychosocial and study skill factors to college outcomes, including academic self-efficacy. Results revealed efficacy beliefs to be one of the strongest predictors of college retention and GPA (Chemers et al., 2001; Robbins Lauver, Le, Davis, Langley, & Carlstrom, 2004; Vuong, Brown-Welty & Tracz, 2010).

The critical role of academic self-efficacy in successful performance has also been demonstrated in children of low academic ability. In a series of studies with children possessing extreme deficits in math and language, Schunk (1989) found that academic self-efficacy was a better predictor than skill level not only for use of effective cognitive strategies but also for persistence in challenging learning tasks. Moreover, academic self-efficacy contributed to performance above and beyond academic skills, a finding that has been replicated by other studies (Pajares & Kranzler, 1995; Randhawa, Beamer, & Lundberg, 1993).

Within the realm of various social-cognitive theories, self-efficacy perceptions are typically seen as functioning within a larger self-system, in which they interact with other beliefs and self-perceptions to influence motivation and academic performance. One particularly applicable belief may be the aforementioned implicit theories of intelligence (Dweck, 1999).

For entity theorists (i.e. those that believe intelligence or ability is fixed), low levels of academic self-efficacy can be particularly harmful because they can cause

students to give up quickly or to only pursue tasks that are easy. Put together, this makes them vulnerable to negative feedback and prone to academic disengagement when faced with difficult tasks or situations that challenge their abilities.

In contrast, it can be reasoned that the influence of low self-efficacy is not as damaging for incremental theorists (Dweck, 1999). Because incremental theorists view intelligence as a flexible quality, these individuals believe that through persistence they can attain more ability (e.g., if I stick with this, I will get better). Therefore, an adaptive response to challenging tasks is likely to be exhibited.

Individual Differences in Academic Self-Efficacy

Gender. Gender differences in students' academic self-efficacy have been reported but vary by domain. For example, studies have found that males and females reported equal confidence in their mathematics ability during the elementary years, but, by middle school, males began to rate themselves more efficacious (Wigfield, Eccles & Pintrich, 1996). Though in areas related to language arts, male and female students rate themselves with similar confidence despite the fact that the achievement of female students in the domain is usually greater (Schunk & Pajares, 2002).

As is suggested by these differences, it is possible, that males and females show differences in self-efficacy as a result of factors unrelated to the variable. In the area of mathematics, for instance, differences can arise simply as a result of the context in which mathematical tasks and activities are placed. In other words, the low representation found among women in mathematics, science, and engineering could influence why females show lower levels of self-efficacy in these areas (Hyde, Fennema, Ryan, Frost, & Hopp,

1990). Oftentimes women are taught to view mathematics as a male dominated domain, contributing to their feelings that they may not be as capable of continued success in this area as their male colleagues (Bandura, 1997; Zeldin & Pajares, 2000).

Ethnicity. Relative to gender differences, much less research has been done on ethnic differences. Although some research shows that minority students hold lower perceptions of competence than non-minority students, much of the research has confounded ethnicity with social class by comparing middle-class white children with lower class minority children (Graham, 1994). Graham (1994) disentangled this confound by conducting a review of published research on African American students and their achievement motivation. Support was found for the notion that African Americans have lower perceptions of competence than do White students, even after socioeconomic status was controlled.

Goal Orientation

Further exploration into the mechanisms underlying theories of intelligence and self-efficacy could answer questions about the path to the most effective way to encourage motivation, and it is possible that achievement goals could play an important role. Goal orientation theory, in a broad sense, is used to describe an individual's frame of mind in relation to achievement-related goals (Ames, 1992; Elliott & Dweck, 1988). While some people may adopt a particular goal orientation simply based on how they naturally approach school and learning, people typically adopt goal orientations based on the environment or a particular situation (Meece, Anderman, & Anderman, 2006). Indeed, many educational systems throughout the world can be characterized by an

emphasis on exams, grades, and standardized tests. From this it is almost expected that in school, students may find themselves just as driven to perform well as they are to learn or gain knowledge within a particular subject. In this type of environment, success oftentimes means not only mastering the course materials but also demonstrating one's competence or ability by outperforming one's peers.

The original theory proposed two types of goal orientations that an individual could adopt: mastery and performance (Ames, 1992; Dweck, 1986). Mastery goals were defined as a desire to acquire knowledge with a focus on learning and improvement. Students who adopt mastery goals in certain achievement contexts believe that competence develops over time through practice and effort. They assess their own performance in terms of their progress and perceive errors as a normal and even valuable part of learning, ultimately using these errors to further improve performance (Elliot, 1999). Espousing mastery-oriented goals also facilitates the use of self-regulated learning strategies which is the ability for students to monitor their time, concentration, and understanding of course material (Ames & Archer, 1988). In contrast, performance goals were defined as a focus on demonstrating their competence compared to others (Ames, 1992; Dweck, 1986). Performance-oriented students put an emphasis on competition, using their peers as a judgment of comparison, instead of themselves.

When it comes to educational outcomes, their relationship with mastery goals are often consistent and predictable in many important ways. Mastery goals are frequently related to adaptive outcomes such as persistence, increased student engagement, and the use of more effective cognitive strategies (Anderman & Wolters, 2006). The adoption of

mastery goals is also related to an increased likelihood of enrollment in optional courses, beyond what is required of students (e.g., choosing to enroll in additional psychology courses, or major in psychology, after the completion of an introductory course) (Harackiewicz, Barron, Tauer, Cater, & Elliot, 2000). Some studies have even shown a direct relationship between mastery goals and increased academic performance in the form of higher test scores (Coutinho, 2007).

The connections between performance goals and various educational outcomes though, are more complex. Before the mid-1990s, goal orientation theories used a dichotomous framework – performance goals versus mastery goals – in accounting for students' academic motivation. Early research suggested that performance goals in general were associated with negative achievement beliefs that often lead to maladaptive behaviors including less persistence and low academic engagement (Ames & Archer, 1988, Elliot & Dweck, 1988). However, other studies had failed to find these negative effects of performance goals (Covington & Omelich, 1984; Yates, 2000). Furthermore, several studies actually found a positive correlation between performance goals, academic motivation, and performance (Elliot & Church, 1997; Elliot & McGregor, 2001; Harackiewicz et al., 2002; Skaalvik, 1997). It was later suggested that a possible reason for these mixed results was the failure to differentiate between different types of performance goals. Starting in the late 1990s, performance goals were broken down further into approach and avoidant categories, leading to a trichotomous framework (Elliot, 1999). According to this model, performance approach goals are goals in which an individual is motivated by positive outcomes (i.e. outperforming others or gain

positive judgement by demonstrating one's competence). Conversely, performance avoidant goals are goals in which an individual is motivated by the avoidance of a negative outcome (i.e. avoid performing worse than others or avoid negative judgements) (Elliot & Church, 1997; Elliot & Harackiewicz, 1996).

Results typically confirm that performance avoidant goals were related to maladaptive outcomes including low levels of engagement, self-handicapping behavior, and lower achievement (Urdan, Ryan, Anderman, & Gheen, 2002). The relationship between performance-approach goals and educational outcomes have produced more inconsistent results. Studies have found a positive relationship between performance-approach goals, persistence (Elliot, McGregor, & Gable, 1999), the use of deep cognitive strategies (Bouffard, Boisvert, Vezeau, & Larouche, 1995; Wolters, 2004), and achievement (Harackiewicz, Barron, Pintrich, Elliot, & Thrash. 2002). Other research however indicated that the adoption of performance-approach goals were related to maladaptive outcomes, such as the avoidance of help-seeking (Ryan & Pintrich, 1998) and the use of surface learning strategies like memorization. Despite these mixed results, most research found a positive link between performance-approach goals and achievement, most notably in college students (Anderman & Wolters, 2006).

According to Dweck's (1999) social-cognitive theory, different intelligence theories can lead to very different goal orientations. Students who hold an incremental theory of intelligence typically adopt mastery oriented goals as they are mainly focused on improving their ability and mastering novel subjects. In order to fulfill these mastery goals, these students are willing to put in the necessary effort, seek out tasks that

maximize opportunities for learning, and persist to overcome possible setbacks. Students who hold an entity theory of intelligence typically adopt performance oriented goals in order to prove to themselves or others the capacity of their ability. Pursuing performance goals ultimately leads them to downplay the role of effort, persist less when faced with setbacks or challenges, and generally avoid tasks they consider difficult.

Bandura (1997) found that self-efficacy beliefs are a main contributing factor of goal setting. Students form beliefs about what they are capable of doing which in turn then guides how they approach learning. Results from previous studies have consistently found that students who adopt mastery goals tend to have higher self-efficacy (Middleton & Midgley, 1997; Pajares, Britner, & Valiante, 2000) and have been presumed to be a precursor to the adoption of mastery goals (Elliot, 1999). Performance-avoidance goals in contrast were related to low academic self-efficacy and avoidance of help-seeking behavior in the classroom (Elliot, 1999; Middleton & Midgley, 1997; Pajares et al., 2000). Research addressing performance-approach goals, however, has had inconsistent results reported, making it is less clear as to the nature of relations between performance-approach goals and patterns of learning. Some research has reported that having performance-approach goals does not predict self-efficacy (Middleton & Midgley, 1997), and yet others have found a positive relationship between these two concepts (Bong, 2001; Pajares et al., 2000; Wolters, Yu, & Pintrich, 1996).

Individual Differences in Goal Orientation

Age. Theorists who study goal orientations recognize the importance of individual characteristics and how they affect the types of goals that students choose. With respect

to age, results consistently found evidence of decreases in mastery orientation and an increase in performance goals as students age (Dekker, Krabbendam, Lee, Boschloo, de Groot, & Jolles 2013; Wigfield & Cambria, 2010). To counteract this trend, it has been suggested that interventions aimed at promoting these learning goals should be implemented as early as possible, preferably before middle school (Dekker et al., 2013).

Gender. Previous research has shown gender differences in mastery goals such that girls were more likely than boys to endorse mastery goals (Dekker et al., 2013). This is in line with some (Middleton & Midgley, 1997; Steinmayr, Bipp, & Spinath, 2011) but not all (Steinmayr & Spinath, 2008) previous studies. Inconsistencies have been attributed to sample differences (Meece, Glienke, & Burg, 2006; Steinmayr & Spinath, 2008), but may also result from a lack of uniformity in assessment instruments (Wigfield & Cambria, 2010).

Personality. While only a few studies have examined how personality affects the adoption of learning versus performance goal orientation, the findings have highlighted some important differences. The majority of studies that included a personality measure have used the theoretically common model of personality known as the Five Factor Model or the Big Five (Costa & McCrae, 1992). The Big Five refers to the five broad dimensions of the human personality: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Most studies however have only focused on extraversion, consciousness, and neuroticism.

It has been suggested that extraversion and positive affect comprise an approach temperament that relates to the adoption of learning goals. Extraversion can be

characterized by ambition reflecting individual differences in mastery seeking and perseverance (Clark & Watson, 1991), which are two key concepts in learning goal orientation. Studies have consistently found that extraversion was positively correlated with a learning orientation (Chan & Tesluk, 2000; Elliot & Thrash, 2002) and negatively correlated with performance goal orientation (Chan & Tesluk, 2000).

Conscientiousness also incorporates characteristics such as hard work, perseverance and being achievement-oriented (Barrick & Mount, 1991). Studies have found that a learning goal orientation had positive relationships with optimism and the desire to work hard - a characteristic of conscientiousness (Vande Walle, 1997).

Individuals high in neuroticism tend to be defensive and guarded, have a negative view of themselves, worry about others' opinions of them, and tend to make stable, internal, and global attributions about negative events (Clark & Watson, 1991). In support of this, several studies have found that neuroticism was related to performance goal orientations (Chan & Tesluk, 2000; Elliot & Thrash, 2002), indicating that those high in neuroticism are the most vulnerable to negative effects of being performance goal oriented.

Stereotype Threat and Stereotype Vulnerability

Stereotype threat refers to concern about confirming a negative stereotype about one's group (Steele & Aronson, 1995). Steele and Aronson (1995) coined the term and through several experiments found that African American college students performed more poorly on standardized tests compared to White students when their race was emphasized. When race was not made salient, however, African American students

performed as well as their peers. The results revealed that performance in academic contexts can be harmed by the awareness that one's behavior might be judged based on stereotypes about their social group. Antecedents for shaping stereotype-threat beliefs come from the following three major sources: stereotype vulnerability – which consists of stereotype salience and group identity salience, and evaluative feedback.

There are some students that, throughout most of their education, succeed at virtually everything with minimal effort. On the contrary there are students who, despite their best efforts, continue to fail time after time. Because these students experience the same outcome, it is likely that these individuals would have no problem attributing their ability to their performance. Most students however, experience variability in performance, falling somewhere in the middle; and it is these students that at times are likely to experience some form of attributional ambiguity for their performance (Jones, 1989). That is, their interpretations of their past successes and failures, as well as the feedback they receive, will leave room for uncertainty about their ability to succeed on future tasks. While most individuals will experience uncertainty at some point in time, it has been argued that some people experience more uncertainty than others because there are other factors that obscure the ability attribution process (Weary & Edwards, 1994). Research by Aronson has examined one such factor known as stereotype vulnerability, which is defined as the degree to which an individual may be influenced by negative stereotypes about one's gender or ethnic group membership (Aronson, 2002; Aronson & Inzlicht, 2004). Stereotype vulnerability can lead to attributional uncertainty and a fragile self-concept in instances when students experience both successes and failures or when

students experience non-contingent feedback. It is this vulnerability which makes it particularly difficult to maintain a positive perception of one's competency and ability (Aronson & Inzlicht, 2004).

In addition, research also demonstrates that within a stereotyped group, some members may be more vulnerable to its negative consequences than others; factors such as the strength of one's group identification or domain identification has been shown to be related to ones' subsequent vulnerability to stereotype threat (Marx & Stapel, 2006; Marx, Stapel, & Muller, 2005). When one views oneself in terms of a salient group membership (e.g., "I am a woman, women are not expected to be good at math, and this is a difficult math test"), performance can be undermined because of concerns about possibly confirming the negative stereotypes about one's group. Thus, situations that increase the salience of the stereotyped group identity can increase vulnerability to stereotype threat.

Research has shown that stereotype threat can harm the academic performance of any individual for whom the situation invokes a stereotype-based expectation of poor performance. For example, stereotype threat has been shown to harm the academic performance of Hispanics (Gonzales, Blanton, & Williams, 2002), students from low socioeconomic backgrounds (Croizet & Claire, 1998), females in math (Good, Aronson, & Harder, 2008; Inzlicht & Ben-Zeev, 2000; Spencer, Steele, & Quinn, 1999), and even White males when faced with the threat of Asian "superiority" in math (Aronson, Lustina, Good, Keogh, Steele, & Brown, 1999).

Evaluative feedback from others also plays a vital role in evoking stereotype-threat. Situations in which an individual believes that his or her ability in a stereotypic domain will be evaluated can create a strong sense of group identity and stereotype threat. When a test is described as being able to provide reliable and valid information about one's ability, feelings of anxiety and thoughts of failure can arise, harming performance (Marx, Stapel, & Muller, 2005).

Since the notion of stereotype threat was first proposed, it has been speculated that the negative emotional responses it produces could directly interfere with performance. It has been suggested, for example, that the anxiety produced from stereotype threat situations can lead to underperformance even when controlling for cognitive abilities (Croizet & Claire, 1998; Steele & Aronson, 1995). Most studies have focused on performance in academic environments, and such effects have been demonstrated in laboratory studies (Steele & Aronson, 1995) in real classrooms (Good, Aronson, & Harder, 2008), and on statewide standardized tests (Good, Aronson, & Inzlicht, 2003).

Despite the assumed importance of anxiety, the results have often been mixed (Gonzales et al., 2002; Harrison, Stevens, Monty, & Coakley, 2006). Some of the inconsistencies in results may be due to the timing of the measurement of emotions, for instance measuring anxiety before, during, or after a test (Marx & Stapel, 2006) and the overreliance on verbal reports (Bosson, Haymovitz, & Pinel, 2004). Research that takes these factors into account suggests that stereotype threat can produce anxiety in stereotyped individuals prior to performance, negative thoughts during performance, and

frustration following the completion of the task (Cadinu, Maass, Rosabianca, & Kiesner, 2005; Marx & Stapel, 2006).

Individual Differences in Stereotype Threat

In some respects, almost everyone is vulnerable to stereotype threat depending on the circumstances. This is because everyone belongs to at least one group that is characterized by some sort of negative stereotype, and any salient social identity can affect performance on a task that offers the possibility that a stereotype might be confirmed. As mentioned previously, stereotype threat effects have been shown with diverse groups, such as women in math (Spencer, Steele, & Quinn, 1999), students from low compared with high socioeconomic backgrounds on intellectual tasks (Croizet & Claire, 1998; Harrison, Stevens, Monty, & Coakley, 2006), males compared with Asian males in mathematics (e.g., Aronson, Lustina, Good, Keogh, Steele, & Brown, 1999), Whites compared with Blacks on tasks assumed to reflect natural sports ability (Stone, 2002), and young girls whose gender has been highlighted before completing a math task (Ambady, Shih, Kim, & Pittinsky, 2001). High ability does not eliminate the possibility of stereotype threat, and, indeed, high ability individuals can be the most susceptible to stereotype threat (Good, Aronson, & Harder, 2008; Spencer, Steele, & Quinn, 1999). For example, women who are at the upper ends of the ability distribution can experience underperformance on math tests due to stereotype threat (Good et al., 2008).

Stereotype threat can be experienced by anyone in a domain in which one encounters stereotype-based expectations of poor performance. However certain individuals may still be more vulnerable than others, as some groups routinely confront

stereotypes and more domains in which stereotypes exist compared to other groups. In addition, individuals who have multiple identities whose stereotypes imply poor performance (e.g., African American woman in mathematics) might experience more or be particularly affected by stereotype threat to a greater degree than others (Gonzalez, Blanton, & Williams, 2002). Specifically, when a situation highlights one or more of these stereotype-linked identities, one's behavior will typically confirm the highlighted stereotype (Shih, Pittinsky, & Ambady, 1999). These varying results show that membership in a minority or low-status group is not necessarily a prerequisite for experiencing stereotype threat, however, being a member of such a group may expose an individual to stereotype threat more regularly.

Self-Handicapping

The theory of self-handicapping, first proposed by Jones and Berglas (1978), is the assumption that when a person is uncertain about their ability to perform an important task they may sabotage themselves in order to provide an excuse in the case of failure, while enabling them to attribute success to their own personal abilities (Midgley & Urdan, 2001). Self-handicapping is an a priori strategy, not simply a post hoc excuse, typically employed in situations in which self-esteem may be threatened or whenever the fear of failing an important evaluative task is present.

Researchers have identified two types of self-handicapping tendencies: behavioral self-handicapping and claimed self-handicapping. Behavioral self-handicapping involves individuals employing obstacles that impede performance. Examples of behavioral self-handicapping are alcohol and drug consumption, ingesting a performance-inhibiting drug,

or choosing not to practice before a task (Jones & Berglas, 1978; Urdan & Midgley, 2001). Claimed self-handicapping involves an individual merely stating that an obstacle impeded their performance. Examples include claiming an illness (Snyder, Smith, Augelli, & Ingram, 1985), psychological symptoms, or emotional and physical symptoms (Smith, Snyder, & Perkins, 1983).

Antecedents for adopting self-handicapping strategies mainly stem from three sources: non-contingent success, uncertainty about one's ability, and public self-consciousness:

Similar to many of the constructs discussed previously, evaluative feedback from others can also influence the use of self-handicaps. A critical factor associated with the use of self-handicaps is non-contingent success (Berglas, 1990). Studies of self-handicapping behavior have shown that uncertain self-images can be created through exposure to non-contingent success. This is a condition in which the individual receives successful feedback that does not match with actual performance or otherwise excludes individuals from adequately diagnosing the cause of their performance outcome. As a consequence of this chaotic reinforcement, the individual remains uncertain about the causes of their performance outcome, and therefore unable to confidently predict the likelihood of future achievement success. Thus, individuals who received non-contingent feedback, as opposed to those who received contingent feedback, tend to choose an impediment to which they could attribute failure if it occurred on a subsequent task (Berglas, 1990).

Previous research has established that self-handicapping is motivated by uncertainty about one's ability or, more generally, anticipated threats to self-esteem

(Midgley, Arunkumar, & Urdan, 1996). Self-handicapping is far more likely to occur if a threat has been made to the self, particularly one's self-esteem or competency (Midgley et al., 1996; Rhodewalt, 2008). There is evidence to suggest that along with potential threats to the self, based on outside sources, individuals who engage in self-handicapping behaviors hold more general self-doubts about themselves (Coudevylle, Ginis, & Famose, 2008). In addition, Feick and Rhodewalt (1997) found that students with low self-esteem felt better about themselves after being told they performed poorly on an exam if they self-handicap than if they do not. Although there appear to be some esteem-protective effects of handicapping, there is also evidence that handicappers are not fooling themselves when they handicap. For example, self-handicappers tend to have lower self-esteem than non-handicappers have and even when students had convinced others that their performance did not reflect lack of ability, they still claim they self-handicapped, and described themselves in self-deprecatory terms such as "lazy" (Covington, 1992).

These results have led a number of researchers to conclude that self-handicapping motives stem from the self-handicapper wishing to maintain a positive public image (Kolditz & Arkin, 1982). According to this view, it is the individual who has attained a positive public image on the basis of past performance, but is uncertain about his or her ability to replicate the performance, who is most likely to self-handicap. Therefore, self-handicapping is primarily a self-presentation strategy designed to manipulate others' perceptions rather than one's own (Covington, 1992; Snyder, Malin, Dent, & Linnenbrink-Garcia, 2014). Unfortunately, although handicappers are often successful at

diverting the attention of others away from their lack of ability, their behaviors often leads others to develop unfavorable perceptions of their work and personal characteristics (Rhodewalt & Hill, 1995).

In terms of affect regarding self-handicapping, anxiety plays a principal role. Anxiety may be used as an a-priori excuse, a claimed self-handicap. The test-anxious student may be employing a strategy whereby he or she minimizes the self-relevant implications of academic performance – such as intelligence, competence, likelihood of future vocational or academic success – by appealing to a less important personal characteristic (i.e., debilitating anxiety) (Zuckerman & Tsai, 2005). Self-handicapping, in turn, may induce poor coping and lower achievement and, as such, may also elicit additional negative affect. That is, to the extent self-handicapping guards against loss of self-esteem at the expense of effective coping, it may eventually lead to additional disappointment and further distress. Results confirming the reciprocal relation between self-handicapping and negative affect would again support why some students continue to use handicaps, with higher self-handicapping and lower adjustment reinforcing each other (Smith, Sinclair, & Chapman, 2002).

In terms of performance, non-contingent failure is thought to give rise to self-handicapping tendencies. Consistent with this analysis, the majority of studies have shown that self-handicapping is part of a vicious cycle in which handicapping typically leads to lower achievement, thereby creating a greater need to handicap (Garcia, 1995; Zuckerman et al., 1998). Even though self-handicappers experience intermittent success, they may not perform to their full potential because they do not internalize the success,

but rather make unstable attributions related to luck or chance. This in turn leads to a habitual need to rely on excuses and a self-protective framework that undermines performance (Murray & Warden, 1992). As such, self-handicapping has been consistently negatively associated with academic performance (Elliot & Church, 2003; Martin, Marsh & Debus, 2001). In addition, self-handicapping has also been related to other important academic outcomes such as: lower performance expectations, negative attitudes about school, poor study habits, and superficial learning strategies (Murray & Warden, 1992; Thomas & Gadbois, 2007; Warner & Moore, 2004; Zuckerman et al., 1998).

Individual Differences in Self-Handicapping

Age. In considering the use of self-handicapping strategies in school, the age of the students is an important factor of consideration. Most studies involving self-handicapping have used middle, high school, or college students. It was at first reasoned that young children may not be sophisticated enough cognitively to manipulate the attributions related to self-handicapping (Garcia, 1995) as self-handicappers appear to be particularly concerned about the differentiation of ability and effort (Covington, 1992). It was reasoned that to use self-handicapping strategies purposefully, children needed to have reached an age where they have the cognitive capacity to understand this differentiation. During early childhood, children are just beginning to understand the relationship between effort and ability (Nicholls, 1989). Thus, studies of academic self-handicapping may be more appropriate with older students than with elementary school students.

Not only may it be more appropriate, researchers reason that self-handicapping behavior is found more in older students because as students' progress through academia, the school environment becomes increasingly more difficult and competitive and more emphasis is placed on performance demands. In line with this, most studies have in fact found that self-handicapping tendencies increase with age. (Leondari & Gonida, 2007; Schwinger, Wirthwein, Lemmer, & Steinmayr, 2014).

Gender. Of the studies that have directly examined the gender differences of self-handicapping among men and women, the vast majority has found that men behaviorally handicap more than women (Berglas & Jones, 1978; Hirt, McCrea, & Kimble, 2000; McCrea, Hirt, & Milner, 2008). Conversely, women and men equally employ claimed self-handicaps (Arkin & Oleson, 1998). Thus, the overall pattern of results strongly suggests that women are less likely to behaviorally self-handicap. McCrea, Hirt, and Milner (2008) have determined that the reason for this gender difference may be due to the fact that for women, the costs (e.g., performance decrements) of behavioral self-handicapping do not outweigh the benefits since women place more value on putting forth effort than do men. Conversely, men appear willing to use these handicapping strategies because, for them, the costs of using handicaps do not outweigh the possible advantages of protecting their own conceptions of themselves or others' conceptions of their ability (McCrea, Hirt, & Milner, 2008).

Ethnicity. Several studies have addressed the question of whether students belonging to racial minority groups might be more prone to self-handicapping behavior. Urdan and Midgley (2001) argued that stereotype threat among minorities might make

self-handicapping more likely for these racial groups. For example, African American students are often stereotyped as being less intellectually capable when compared to their White counterparts. Thus, they are more likely to be concerned with appearing academically able, especially when faced with the threat of fulfilling a negative stereotype. Therefore, this could result in higher self-handicapping for students from any negatively stereotype-threatened group (Urdan, Midgley, & Anderman, 1998). However, the few studies that have examined the relationship between self-handicapping and ethnicity have not found significant racial differences, presumably because the processes associated with the use of self-handicapping strategies are the same across ethnicities (Midgley, Arunkumar, & Urdan, 1996; Schwinger, Wirthwein, Lemmer, & Steinmayr, 2014).

Personality. Previous studies investigating self-handicapping and personality traits have focused on aspects of neuroticism – self-esteem, depression, and anxiety – and aspects of conscientiousness – self-discipline, competence, and dutifulness. The results from these published studies have reliably found a positive correlation between self-handicapping and the dimension of neuroticism and a negative relationship with conscientiousness (Bobo, Whitaker, & Strunk, 2013; Ross, Canada, & Rausch, 2002). Such findings supports Costa and McCrae's proposition that neuroticism leads to negative affect and is associated with anxiety and low stress tolerance (Costa & McCrae, 1992). For self-handicappers who are faced with an impending ability-diagnostic task, anxiety increases in the face of failure and handicaps are used as ways to cope with the stress of the impending tasks. Similar to neurotic individuals, when under stress self-

handicappers can be expected to focus on the most negative aspects of the stress-provoking situation and retreat from the challenges it represents (Ross, Canada, & Rausch, 2002; Ryska, Yin, & Cooley, 1998). Given the inverse relationship between neuroticism and conscientiousness, these findings indicate that persons endorsing more self-handicapping behavior are likely to lack a sense of self-efficacy (Ross et al., 2002).

Causal Uncertainty

With uncertainty playing such a fundamental role in self-handicapping and many of the other cognitive theories of motivation presented in this chapter, it is useful to examine uncertainty as an individual difference variable. This may help us understand why some students are more likely to engage in maladaptive academic behavior. Research by Weary and Edwards (1994) has focused on individual differences in terms of causal uncertainty, which is defined as one's uncertainty about the causes of events. They argued that some individuals are more likely to attempt to resolve causal uncertainty. Individuals that do not are labeled as having higher causal uncertainty beliefs and these individual differences in uncertainty can have fundamental consequences as evident from the self-handicapping literature (Berglas, 1990; Weary & Edwards, 1996).

Situational variables also play a role in terms of the activation of causal uncertainty beliefs. For instance, uncontrollable situations are likely to increase the activation of beliefs that one does not understand the circumstances or contingencies of events. It then follows that causal uncertainty beliefs are most evident in individuals who experience non-contingent outcomes (Weary & Edwards, 1996).

Summary of Literature Review

So to summarize, in general it is typically best for students to believe that it is their own controllable behavior rather than uncontrollable external circumstances that leads to success or failure (Weiner, 1986). Also, when students have a conviction that they lack ability, it is necessary to take steps to circumvent or overcome this conviction because such students are likely to misattribute the cause of the performance. For example, when they do well, they are likely to have a sincere conviction that they were "just lucky." Changing this attributional reasoning is tantamount to altering the learner's self-concept.

Overall it appears that an overemphasis on performance evaluations and competition between students is likely to impair the learning of many students (Graham, 1984). This is most evident in students who adopt performance goal orientations. Competition will encourage students to persist only to the extent that they believe additional effort will enable them to succeed.

As can be seen through such constructs as self-handicapping, it is extremely hazardous to achievement and motivation for students to fail repeatedly after making a serious effort at academic tasks. When this happens, they will either stop believing they are competent, or stop attributing their failure to lack of effort. Both of these outcomes are likely to reduce persistence at academic tasks and result in lower performance (Carr, Borkowski, & Maxwell, 1991).

These constructs share many of the presumed antecedents such as past experience, social comparison, and reinforcements from significant others. They also share many of

the presumed outcomes related to cognitive, affective, and behavioral functioning as well. Yet the question still remains as to why some students adopt one pattern while others adopt another (e.g., mastery versus performance). It is suggested here that the cognitive constructs a student adopts creates a framework for interpreting and responding to events that occur throughout their education. For example, the same event may have a completely different meaning if it occurs within the context of an incremental versus an entity view of intelligence. A failure that is attributed to a lack of ability will lead to different reactions and future expectations than when failure is attributed to a lack of effort (Weiner, 1979). Students approach a situation with different concerns, different questions, and seek different answers and each construct has a unique way of addressing this information.

Even though each construct provides a unique framework for processing information, there are some basic similarities between the outcomes of maladaptive constructs and the outcomes of adaptive constructs (Martin, 2007). Within the maladaptive constructs, students are largely concerned with measuring their ability and with answering the question of whether their ability is adequate or not. Within such a framework, outcomes will be a chief source of information relevant to this concern and thus failure outcomes may readily elicit the helpless attribution that ability is inadequate (Martin, 2007; Midgley, 2014).

In contrast, adaptive constructs create a concern with increasing one's ability and extending one's mastery and would lead individuals to pose questions which seek to determine the best way to increase one’s ability or achieve mastery. In this case,

outcomes offer information about whether one is pursuing an optimal course and, if not, what else might be necessary (Dweck & Leggett, 1988). In response to failure for example, an individual with an adaptive pattern would learn from their mistakes (e.g. study more for the next exam) and change their previous strategy, as it was not sufficient to deal with the task. In general, high achievers are more likely to associate their knowledge and skills with effort, that is, attribute success to effort, than underachievers (Carr, Borkowski, &. Maxwell, 1991).

CHAPTER III

METHODOLOGY

Study Sample

The sample chosen for this study is college students. A cross-sectional study was planned that included a diverse sample of 1st, 2nd, 3rd, and 4th year college students. This population was chosen because researchers maintains that the contrasted patterns of achievement behaviors should be strongest when students are confronted with challenging or difficult tasks (Dweck & Leggett, 1988). The college environment provides an ideal setting for examining the implications of these cognitive theories of motivation because academic achievement has important consequences for students' self-worth and the attainment of educational goals.

The transition from high school to college typically involves an increased sense of academic challenge and a corresponding heightened threat of failure. Consequently, college may be a time in which these self-theories are particularly implicative for how individuals approach achievement situations. For example, previous research by Robins and Pals (2002) assessed students' implicit theories of intelligence upon entering their first year of college. Over the course of four years, they found several distinctions between entity and incremental theorists. Incremental theorists reported being more concerned with mastering material and less concerned with their grade point averages (GPAs), whereas entity theorists were more concerned about their GPAs. Entity theorists also reported feeling greater distress about their performance and grades than did incremental theorists. College students' implicit theories of intelligence may also have

consequences for other aspects of academic performance, such as reaction to setbacks and motivation (Martin, Marsh, & Debus, 2001; Robins and Pals, 2002).

Participants and Procedure

The current sample included 453 undergraduate students recruited from two different colleges in the Southern California region. Students from one college were recruited from the Introduction to Psychology subject pool for course credit while students from the other college were sent a mass email blast asking for their participation in the study. All participants completed the study survey using the online questionnaire software program Qualtrics. The self-report survey was administered to students during the Winter and Spring academic quarters. Measures were presented in the following order: implicit theories of intelligence; self-efficacy; goal orientation; self-handicapping; stereotype threat, causal uncertainty, stereotype vulnerability, demographics, and self-reported GPA. Participants were informed that the information would be kept confidential and that no one at home or school would see their results. Once consenting to taking the survey, participants were instructed to read each statement carefully and then decide how much they agreed with it. They were assured that participation was completely voluntary and there were no right or wrong answers. Ethics approval for the survey was obtained from the Human Research Review Board (HRRB) for both colleges, and all students had to be 18 years or older to participate.

Measures

Participants completed a larger questionnaire consisting of 122 items developed to assess various aspects of student motivation, academic engagement, and achievement.

The survey also gathered demographic information to determine if correlations exist between these elements and the cognitive factors. The information gathered included gender, race, age, year in school, high school GPA, college GPA, hours spent studying per week, and hours spent working per week. A preliminary version of the questionnaire was tested on a small sample of students in order to check and correct possible ambiguous or difficult item formulations.

Implicit Theories of Intelligence Scale

The Implicit Theories of Intelligence Scale (Dweck, Chiu, & Hong, 1995) was designed to measure one's perception of how much, if at all, intelligence can be changed. The 8-item scale was composed of four incremental items (e.g., "*You can always substantially change how intelligent you are.*") and four entity items (e.g., "*Your intelligence is something about you that you can't change very much.*"). Items for both subscales were scored on a 4-point scale (1="*strongly disagree";* 4="*strongly agree"*) with higher scores indicating stronger endorsement for the incremental or entity theories.

The Implicit Theories of Intelligence Scale has been used with college students and appears to be reliable and valid (Aronson, Fried, and Good, 2002; Braten and Stromso, 2005). Previous studies have shown good reliability estimates for the entity (α = 0.90) and the incremental items (α = 0.92). For this study, Cronbach alphas for the entity and incremental subscales were 0.88 and 0.84 respectively.

Academic Self-Efficacy

The Academic Self-Efficacy Scale (ASES; Chemers, Hu, & Garcia, 2001) was used to measure academic self-efficacy. The scale, which consisted of eight items on a 7-

point Likert-type scale (1="*very untrue*"; 7="*very true*"), asked participants to rate their confidence in their ability to perform certain academic tasks. Higher scores indicated higher, or more positive, academic self-efficacy. Participants were asked questions such as "*I know how to study to perform well on tests."* and "*I am good at research and writing papers*."

This specific measure was chosen because it is meant to predict overall academic performance and thus measures overall self-efficacy beliefs rather than domain-specific (e.g. English or Math) beliefs. The original coefficient alpha that was obtained for the scale was 0.81 (Chemers et al., 2001). Cronbach's alpha reliability coefficient for the current sample was 0.86.

Goal Orientation

Students' academic goal orientation was assessed using the Personal Achievement Goal Orientation Scale (PALS) which measures whether an individual adopts a mastery, performance-approach, or performance-avoidance orientation in school (Midgley, Maehr, Hruda, Anderman, Anderman, Freeman, & Urdan, 2000). The 14-items scale consists of five mastery goal items (e.g. "*It's important to me that I learn a lot of new concepts this year.*"), five performance-approach items (e.g. "*It's important to me that I look smart compared to others in my class*."), and four performance-avoidance goal items (e.g. *It's important to me that my teacher doesn't think that I know less than others in class*."). Responses are evaluated on a 5-point Likert-type scale (1="*not at all true*" to 5="*very true*").

Research has shown that the scale is a reliable measure of achievement goal orientations with adequate internal consistency (Church, Elliot & Gable, 2001; Fryer & Elliot, 2007; McGregor & Elliot, 2002). In this study, all three subscales displayed good reliability (Mastery, $\alpha = 0.87$; Performance approach, $\alpha = 0.93$; Performance avoidance, $\alpha = 0.86$).

Causal Uncertainty

The Causal Uncertainty Scale (Weary & Edwards, 1994) consists of 14 statements that express doubt about one's understanding of why positive and negative events happen to the self and others. The scale can be broken down into two subscales consisting of causal uncertainty about one's own outcomes (e.g. "*When I receive good grades, I usually do not understand why I did so well*."), and causal uncertainty about other people's outcomes ("*When someone I know receives a poor grade, I often cannot determine if they could have done anything to prevent it*."). Items are scored on a 6-point scale (1="*strongly disagree*" to 6="*strongly agree*") with higher scores representing greater causal uncertainty.

Because this study was interested in assessing students' own uncertainty beliefs in relation to their academic motivation and achievement, the decision was made to only include the six items that related to causal uncertainty about one's own outcomes. Cronbach alpha for the current sample was 0.92.

Self-Handicapping

Students' use of self-handicapping strategies was assessed using the self-handicapping subscale from the Patterns of Adaptive Learning Survey (PALS; Midgley,

et al., 1998) which presents examples of self-handicapping strategies and asks whether the individual uses such strategies to influence self-presentation (Midgley, Arunkumar & Urdan, 1996). The scale consists of six items such as, "*Some students put off doing their math work until the last minute. Then if they don't do well, they can say that is the reason. How true is this of you?").* Responses ranged on a 7-point Lickert scale (1="*not at all true of me"* to 7="*very true of me*") with higher scores indicating greater self-handicapping tendencies.

The PALS was used to measure self-handicapping because unlike previous measures, it clearly captures the a-priori nature of self-handicapping (i.e. obstacles or strategies are created or claimed prior to performance), which is separate from post-hoc excuses and attributions. Previous research indicates that the 6-item scale shows good validity and internal consistency ($\alpha = .84$) (Midgley, Arunkumar & Urdan, 1996). Cronbach alpha in the current sample was 0.89.

Stereotype Vulnerability

Stereotype Vulnerability was measured using the Social Identities and Attitudes Scale (SIAS; Picho & Brown, 2011). The scale is a holistic measure that captures the relationship between an individual's social identities and domain efficacy. Specifically, the SIAS includes measures of domain identification, domain self-concept, gender identification, gender stigma consciousness, ethnic identification, and ethnic stigma consciousness. Together, all of these constructs help to measure whether individuals are vulnerable to gender and race stereotypes biases. The original version of the SIAS contained 30 total items, rated on a 7-point Likert scale (1="*strongly disagree*";

7=”*strongly agree*”). The version of the SIAS used for this analysis only contained 18 total items as the decision was made to exclude the domain identification and domain self-concept subscales (due to their similarity with academic self-efficacy).

The scale measured the four factors: four items were related to gender identification (e.g. “*My gender is central to defining who I am”.);* five items were related to gender stigma consciousness (e.g. “*My gender influences how others interpret my behavior*”.); four items were related to ethnicity identification (e.g. “*I feel a strong attachment to my ethnicity*.”); and five items were related to ethnicity stigma consciousness (e.g. “*Most people judge me on the basis of my ethnicity*.”).

Reliability estimates from the original version ranged from 0.81 to 0.95. The revised scale in the present study also showed good internal consistency, with each of the subscales also demonstrating high reliability: academic identification ($\alpha = 0.94$); academic self-concept ($\alpha = 0.89$); gender identification ($\alpha = 0.90$); gender stigma consciousness ($\alpha = 0.92$); ethnic identification ($\alpha = 0.94$); and ethnicity stigma consciousness ($\alpha = 0.91$).

Stereotype threat

Susceptibility to stereotype threat was measured using the Explicit Stereotype Threat Scale (ESTS; Marx & Goff, 2005). The ESTS was adapted from work by Marx and Goff (2005) and designed to measure the subjective experience of stereotype threat in academic domains for African American students. In the present research, the scale was rewritten to correspond to general gender and ethnic stereotypes based on a person’s group membership. The three adapted items were (1) “*I worry that my ability to perform*

well on academic tests in general is affected by my social group membership(s)"; (2) "*I worry that if I perform poorly on academic tests in general, then the persons who administer the tests will attribute my poor performance to my social group membership(s)*"; and (3) "*I worry that, because I know the negative stereotype about my social group membership(s) and academic tests, my anxiety about confirming the stereotype will negatively influence how I perform on the tests*."

Participants rated their agreement with the statements on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher scores reflecting higher levels of susceptibility to stereotype threat. Results from previous reliability analyses indicated that the scale measuring susceptibility to stereotype threat was internally consistent (α = 0.69; Marx & Goff, 2005). The scale for the current study showed high reliability with an alpha coefficient of 0.91.

Academic Achievement

Academic achievement was measured by self-reported Grade Point Average (GPA). Self-reported GPA is often used in research and has been shown to be a reliable and accurate indicator of college students' actual GPA (Kuncel, Credé, & Thomas, 2005). Since it was possible participants did not know their specific GPA, participants were asked for the range in which their GPA fell based on the following categories: 1 = 3.50-4.00; 2 = 3.00-3.49; 3 = 2.50-2.99; 4 = 2.00 – 2.49; 5 = Less than 2.00. All scores were reversed so that a higher score indicated a higher GPA.

Data Analyses

To answer and address the research questions, multiple statistical analyses were conducted, and the following analyses were used to answer each research question, as described below. The statistical programs used were IBM SPSS Statistics version 24, IBM SPSS AMOS version 24, and the Lavaan package in R. Internal consistency of each measure was calculated prior to data analyses.

Correlational Analyses and Mean Comparisons

Research Question 1 attempted to understand the nature of the relationships (i.e. the strength and direction) between the examined variables using correlational analyses. Additional exploratory analyses using a series of one-way ANOVAs were conducted to determine any potential gender and racial group differences in regards to the study variables.

Mediation Analyses

Research Question 2 attempted to answer whether the academic motivation variables act as mediators between theories of intelligence and achievement. In other words, multiple mediational pathways have been suggested in the model including: (1) academic self-efficacy mediating the relation between theories of intelligence (specifically incremental and entity theory) and achievement goal orientations (specifically mastery, performance-approach, and performance-avoidance), (2) stereotype vulnerability mediating the relation between performance-avoidance goals and stereotype threat, (3) causal uncertainty mediating the relation between performance-avoidance goals and stereotype threat, (4) causal uncertainty mediating the relation between

performance-avoidance goals and self-handicapping, (5) mastery goals mediating the relation between academic self-efficacy and GPA, (6) stereotype threat mediating the relation between stereotype vulnerability and GPA, and (7) self-handicapping mediating the relation between causal uncertainty and GPA.

To determine whether each of these individual mediational path models was significant, each individual pathway was tested using the structural equation modeling R package lavaan (Rosseel, 2012) to estimate the size and proportions of potential mediating effects. The package also includes the bootstrapping method, which involves repeatedly randomly sampling observations. This has become a common method to overcome the requirement of the assumptions of normality because over many bootstrap repeated samples, an approximation of the sampling distribution of the indirect effects can be generated and used for hypothesis testing (Preacher & Hayes, 2008).

Structural Equation Modeling

To examine Research Question 3, structural equation modeling (SEM) was proposed to examine the hypothesized model. SEM is a statistical procedure that allows one to investigate theory-driven research questions involving both observable variables and variables that cannot directly be measured (i.e. latent variables) (Teo, Tsai, & Yang, 2013). By using SEM, one can test an entire arrangement of structural pathways simultaneously to determine how well the data would fit the hypothesized model. Structural equation modeling can also provide estimates of error variances for latent variables in order to control or correct for measurement errors. This approach enables

researchers that specify a model a priori, to test multiple mediation effects and complex causal relationships among variables (Teo, Tsai, & Yang, 2013).

These advantages of SEM have been shown to be a powerful and useful statistical procedure used by psychologists and education researchers to examine relationships among variables that may impact student success (In'nami & Rie Koizumi, 2013; Pike, Kuh, & Gonyea, 2003; Teo, Tsai, & Yang, 2013). Intelligence beliefs, self-efficacy, and goal orientations – variables such as the ones being examined in this paper – are difficult to measure and observe directly, so treating them as latent variables provides practical advantages over traditional statistical models (Pike, 1991; Schreiber, Nora, Stage, Barlow, & King, 2006).

According to Byrne (2006), the SEM analysis consists of first performing a Confirmatory Factor Analysis (CFA), which is a theory-driven technique that allows for the validation of the measurement model of latent constructs. Within this step, all constructs must be assessed for adequate validity, reliability, and unidimensionality (i.e. whether the factor loading is acceptable for all the items of a latent construct) before testing the relationship between the constructs using SEM. For this step an initial measurement model is created where all factors are allowed to co-vary. Then a model re-specification might be conducted if the data does not fit the measurement model well. The model re-specification is usually based on modification indices that suggest whether a measurement item should be dropped or whether a path between two items should be added. The re-specification may lead to the redefinition of the latent variable, and subsequently, modify the relation between the variables. However, these possible

improvements to data-model fit should ultimately be driven by the researcher's subjective adjustment based on theoretical evidence (Hancock & Muller, 2006). Once the data fit the measurement model well, one can continue to conduct the next step of SEM to test the fit of the hypothesized structural model.

The structural model measures the extent of the inter-relationships among latent constructs simultaneously. The analysis in essence tests whether the sample covariance matrix is significantly different than the covariance matrix implied by the hypothesized measurement model. If the sample model is consistent with the hypothesized model then the data are considered to have "good fit". If the data are found not to fit the hypothesized structural model, a model re-specification will be employed within the realm of a valid theoretical articulation. Particularly in this study, I used SEM to test the plausibility of the model depicted in Figure 1.

Data Preparation

Once the model is specified, data must be prepared for the analysis. Based on the assumptions of structural equation modeling, three main issues about the data need to be addressed: sample size, normality, and missing data.

Sample Size

Prior to data analysis, attempts were made to determine the necessary appropriate sample size to produce statistically significant results with appropriate power. While sample size is a key consideration in SEM, various researchers have cautioned that there is no consensus as to the appropriate sample size needed (MacCallum, Widaman, Zhang, & Hong, 1999; Mundfrom, Shaw, Ke, 2005). There is, however, some consensus that

structural equation modeling is suitable for analyzing larger sample sizes, although fewer cases may be used in simpler models with fewer parameters (Wolf, Harrington, Clark, & Miller, 2013).

For normally distributed data, Loehlin (2004) has recommended sample sizes of a minimum of 100 cases. However, in the case of slightly non-normal or skewed data, a larger sample size of 200 is considered adequate for evaluating a model (Awang, 2012). Larger sample sizes are also suggested in order to achieve adequate statistical power (Wolf, Harrington, Clark, & Miller, 2013). Based on recommendations from the aforementioned literature, a sample size of 200 was chosen as the minimum sample size needed to run the SEM model for the present study.

Descriptive Analysis/Normality

Most techniques used in SEM assume multivariate normality to obtain robust results. Violating this assumption can be problematic. However, it seems that SEM using maximum likelihood estimation (MLE) is quite robust against the violation of normality (Awang, 2012). Even though maximum likelihood estimates are robust against non-normality, it is still suggested to check whether the data satisfies the assumption of normality by assessing skewness and kurtosis.

A rule-of-thumb suggests that absolute skewness and kurtosis values larger than 2.0 or 7.0 respectively, are considered exceedingly non-normal (In'nami & Rie Koizumi, 2013). If non-normality is severe, remedies should be employed to normalize the distributions by using measures such as non-linear transformations (Kline, 2011).

Accordingly, testing skewness and kurtosis of every variable in the study is a common way to detect whether or not the assumptions for multivariate normality are met.

Descriptive statistics were used to obtain a description of the sample as well as check for data distribution normality. Specifically, skewness and kurtosis were used to determine the normality of each variable. These parameters together helped determine whether the statistical assumptions of normality were met for further statistical analyses (e.g., SEM). In addition, descriptive data analysis was employed to detect for the impact of the missing values.

Missing data

With all statistical analyses it is usually presumed that all variables are measured for all cases. Though in reality, missing data is common and is due to various reasons beyond the researcher's control. Missing data, most notably data that are missing at random, must be addressed as it can create problems for the estimation of models. Conventional methods for handling missing data include listwise and pairwise deletions (Teo, Tsai, & Yang, 2013). Listwise deletion simply deletes all cases with missing data. This method leads to a loss of sample size, which can be detrimental when working with a small sample of participants. Pairwise deletion on the other hand excludes missing cases only when their corresponding variables are involved in a particular analysis. This preserves more of the data but it can lead to the numbers of cases being different for different variables (Kline, 2011). The question is still up to debate as to which method is most suitable, however several researchers have published extensive reviews on the matter (Allison, 2003).

Measuring Model Fit

Once the model has been specified and the data have been prepared for analysis, the model is ready to be tested and evaluated. The objective of evaluation is model fitting to determine whether the specified model fits the data well or should be rejected and re-specified.

Several fit indices have been developed as measures to describe how well the statistical model fits the observed data (Schumacker & Lomax, 2004; Teo, Tsai, & Yang, 2013). The fit indices are typically divided into three categories: absolute fit, incremental fit, and parsimonious fit. SEM scholars recommend the use of at least one fit index from each category (Holmes-Smith, Coote, & Cunningham, 2006). Absolute fit indices are the foundation for measuring structural models as they provide an overall assessment of how the model fits the data (Hooper, Coughlan, & Mullen, 2008). Incremental fit indices, also known as comparative fit indices, assesses whether the hypothesized model is a better fitting model than the null model in which all observed variables are uncorrelated (Teo, Tsai, & Yang, 2013). Lastly, parsimonious fit indices focus on the balance between fit and degrees of freedom (Kelloway, 1998).

The following criteria are generally used to measure absolute model fit (Myers, Gamst, & Guarino, 2013): The chi-square (χ^2) likelihood ratio statistic, the goodness-of-fit index (GFI), the normed fit index (NFI), the comparative fit index (CFI), and the root mean square error of estimation (RMSEA). Among the absolute indices, the χ^2 and Root-Mean-Square Error of Approximation (RMSEA) are the two most commonly reported measures (Jackson, Gillaspy, & Purc-Stephenson, 2009). The chi-square statistics (χ^2)

was the original fit index served to evaluate the difference between the observed model and the expected model, with a non-insignificant chi-square value suggesting the model fits the data well (Hu & Bentler, 1998; Teo, Tsai, & Yang, 2013). However, a chi-square fit index may not be the best indicator because it is sensitive to sample size and as such is almost always significant, indicating the model does not fit the data well (Teo, Tsai, & Yang, 2013). Therefore, alternative measures of fit, are also recommended to be used in conjunction with the chi-square statistic (Hu & Bentler, 1998). The Root Mean Square of Error Approximation (RMSEA) is the one absolute fit index that is highly recommended because it favors the most parsimonious model. In other words, it favors the model with the least number of parameters (Hooper, Coughlan, & Mullen, 2008). Another advantage of RMSEA is that confidence intervals can be calculated to assess the precision of RMSEA value (Hooper, Coughlan, & Mullen, 2008; Teo, Tsai, & Yang, 2013). While the exact cut-off is debatable, a lower RMSEA value represents good fit with acceptable threshold values ranging from < .08 (Awang, 2012) to < .05 (Schumacker & Lomax, 2004).

Unlike absolute indices, comparative fit indices evaluate the hypothesized model with a restrictive baseline model (e.g., the null model). One of the most popular of these indices is the Comparative Fit Index (CFI), which analyzes differences between the sample data and the theoretical model. Recommended values have ranged between .90 and .95 as an acceptable cut-off value (Hu & Bentler, 1999; Teo, Tsai, & Yang, 2013).

Parsimonious indices take into account the complexity of a model, with a simple model (i.e., model with fewer estimated parameters) being superior. Parsimonious indices

are important because even though adding parameters may increase model fit, the improved fit may not justify the added complexity (Teo, Tsai, & Yang, 2013). One example of a parsimonious fit statistic is the relative or normed chi-square ratio, χ^2/df (Wheaton, Muthen, Alwin, & Summers, 1977). Recommended threshold values have ranged from 5.0 (Wheaton, Muthen, Alwin, & Summers, 1977) to as low as 2.0 (Tabachnick & Fidell, 2007; Ullman, 2001).

Based on the literature presented, the following fit indices were chosen as a set of evaluation measures in this study: chi-square, RMSEA, CFI, and the normed chi-square ratio. The selected fit indices and their acceptable thresholds recommendations are demonstrated in Table 1 below.

Table 1

Fit Indices and their level of acceptance

Fit Index	Recommended Level	Reference
X^2	Non-significant p-value	Garson (2009)
X^2/df	≤ 3.0	Kline (1998)
CFI	$.90 \leq$ value $< .95$	Hu & Bentler (1999)
RMSEA	p value $\leq .05$	Schumacker & Lomax, 2004

Model Modification

It is possible that following evaluation, re-specification of the model might be needed. Sources of information helpful in detecting model misspecification are modification indices (Byrne, 2010). Model modification indices (MI) can be conceptualized as χ^2 statistics with one degree of freedom (Byrne, 2010; Jöreskog &

Sörbom, 1993). All freely estimated parameters – values that are unrestrained – have MI values equal to zero (Byrne, 2010; Mulaik, 1972). A large MI suggests that a large improvement can be expected, and by freeing the parameter with the largest modification index, the χ^2 value will drop at least as far as the value of MI (Bagozzi & Yi, 1988). An MI greater than 15.0 suggests model modification might need to be considered (Awang, 2012). However, model modifications based on purely empirical grounds are ill advised (Field, 2000) and discouraged (Hair, Ringle, & Sarstedt, 2011). Instead, models should not be modified unless there is some theoretical and or methodological reason (Bagozzi & Yi, 1988; Hancock & Muller, 2006).

CHAPTER IV

RESULTS

The purpose of the study was to examine a theoretical model of the influence of cognitive motivational factors on college students' achievement. The results for the data collected are presented in this chapter, including the various types of statistical analyses used to examine the data. Descriptive statistics and the results of statistical analyses for each research question are presented below. The statistics program used to analyze all descriptive, scale reliability, and correlational data was IBM SPSS Statistics version 24. The primary statistical program used for the confirmatory factor analyses and structural equation modeling analyses was IBM SPSS AMOS version 24. The primary statistical program used for the mediation analyses was the Lavaan package in R.

Prior to conducting data analyses for the testing of study hypotheses, study data of the 453 participants were examined for missing data. Of the 453 participants, data from 86 were removed due to a large amount of missing data (i.e., > 75% of the survey was incomplete). The resulting study sample size was 367, 81% of the original sample.

Descriptive Statistics

Descriptive statistics were used to obtain a general report of the sample. Table 2 shows the demographic characteristics of the participants (N=367). Of the participants in the study 70% were predominantly female and 28% were male. Almost half of the sample identified as being Latino (49%), followed by Asian American (20%). About forty percent reported being between the ages of 18-19 years old, and almost a third of the sample (29%) were in their first year of college.

Table 2

Demographic Characteristics (N=367)

Variable	N	%
Gender		
Female	258	70.3
Male	104	28.3
Unknown	5	1.4
Ethnicity		
White non-Hispanic	41	11.2
Am. Indian/Native Am.	2	0.5
Asian American	73	19.9
Black/African American	31	8.4
Latino/Hispanic	178	48.5
Two or more Races	24	6.5
Other	16	4.4
Unknown	2	0.6
Age		
18-19	144	39.2
20-21	107	29.2
22 and over	115	31.3
Unknown	1	0.3
Year in School		
1st Year	106	28.9
2nd Year	88	24.0
3rd Year	95	25.9
4th Year	51	13.9
5th Year	27	7.4

Measures for all of the variables in the study were constructed by averaging students' scores on the items in each construct. Higher scores on all variables indicate a stronger endorsement of the construct. Descriptive statistics (means, standard deviations, skewness, and kurtosis) for all factors are shown in Table 3. Overall, undergraduates from the sample were more likely to believe that intelligence is malleable (*M*=3.17) rather than fixed (*M*=1.94). On average, scores on the Academic Self-Efficacy scales leaned towards the higher end of the scale indicating participants had positive efficacy beliefs. They reported endorsing mastery goals the most (*M*=4.29) over performance-avoidance goals (*M*=3.04) and performance-approach goals (*M*=2.55). The sample mean for self-handicapping (*M*=3.05) fell slightly below the scale mean, indicating these strategies were not used frequently. Similarly, the sample means for stereotype threat (*M*=2.07) and causal uncertainty (*M*=2.70) fell slightly below the scale means, signifying that undergraduates in this study did not readily adopt these beliefs. Most students reported feeling neutral in terms of stereotype vulnerability, with the sample mean (*M*=4.31) falling near the median of the scale. Finally, in terms of achievement, on average participants' overall college GPA fell within the B range (*M*=3.68). As indicated by skewness, all study variables were normally distributed (substantial skewness ≥ +/- 1.00).

Table 3

Scale minimum and maximum scores, means, standard deviations, skewness, and kurtosis

Variable	Minimum	Maximum	Mean	SD	Skewness	Kurtosis
Incremental	1.25	4.00	3.17	.60	-.42	-.10
Entity	1.00	4.00	1.94	.67	.62	.38
Efficacy	1.13	7.00	5.13	1.06	-.60	.35
Mastery	1.60	5.00	4.34	.61	-.89	.81
PerformApproach	1.00	5.00	2.55	1.09	.40	-.50
PerformAvoid	1.00	5.00	3.04	1.03	-.14	-.51
Performance Goal	1.00	5.00	2.76	.96	.26	-.22
SH	1.00	7.00	3.05	1.44	.53	-.14
ST	1.00	5.00	2.07	1.02	.77	-.22
CU	1.00	6.00	2.70	1.05	.36	-.05
GI_SIAS	1.00	7.00	4.24	1.71	-.41	-.61
GSC_SIAS	1.00	7.00	4.61	1.65	-.58	-.25
EI_SIAS	1.00	7.00	5.44	1.52	-.96	.38
ESC_SIAS	1.00	7.00	4.12	1.60	-.10	-.64
SV	1.00	7.00	4.31	1.33	-.33	-.15
GPA	1.00	5.00	3.68	1.07	-.46	-.50

Note: SD= Standard Deviation; Incremental= Incremental Theories of Intelligence; Entity= Entity Theories of Intelligence; Efficacy= Academic Self-Efficacy; Mastery= Mastery Goals; PerformApproach= Performance Approach Goals; PerformAvoid= Performance Avoidance Goals; SH= Self-Handicapping; ST= Stereotype Threat; CU= Causal Uncertainty; GI_SIAS= Gender Identity; GSC_SIAS= Gender Stigma Consciousness; EI_SIAS = Ethnic Identity; ESC_SIAS= Ethnicity Stigma Consciousness; SV= Stereotype Vulnerability; GPA= Grade Point Average

Correlational Analysis

To address research questions 1, relations between variables were examined with Pearson product–moment correlations (see Table 4). As expected, incremental theory was positively correlated with academic self-efficacy (r=.32) and mastery goals (r=.27), and negatively correlated with the entity theory of intelligence (r=-.61). Incremental theory also showed high negative correlations with performance goals overall, as well as when they were separated into the two different orientations: performance-approach and performance-avoidance. Entity theory of intelligence on the other hand showed a negative relationship with academic self-efficacy (r=-.20) and mastery goals (r=-.14), but a positive relationship among the performance goal orientation factors and the maladaptive variables including self-handicapping, causal uncertainty, and stereotype threat and vulnerability.

Also consistent with proposed predictions, academic self-efficacy had a moderately positive relationship with mastery goals (r = .43). What was unexpected however was that no significant relationship was found between efficacy and the performance goal orientation factors. Academic self-efficacy was however negatively related to the other maladaptive variables such that the more a student believed in their ability to perform an academic task, the less likely they were to report the use of self-handicapping strategies, feel uncertain about the cause of an academic outcome, or feel threatened about conforming to a negative stereotype about their social group. Correlations between these variables ranged from -.13 to -.30).

Performance goal orientations were significantly related to the maladaptive variables. Specifically, self-handicapping, causal uncertainty, and stereotype threat and vulnerability all were positively related to performance goals overall, as well as when they were separated into the two different orientations: performance-approach and performance-avoidance (with correlations ranging from .17 to .39). While these relationships were expected for performance-avoidance goals, it was surprising to find the maladaptive variables to be positively related to performance-approach goals. A more thorough discussion of these findings will follow in the next chapter.

Table 4

Pearson product-moment correlations among variables (N=367)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Incremental	-															
2. Entity	-.607**	-														
3. Efficacy	.316**	-.198**	-													
4. Mastery	.267**	-.138**	.427**	-												
5. Perform. App	-.155**	.363**	0.015	0.051	-											
6. Perform. Av	-.132*	.274**	0.01	0.047	.625**	-										
7. Perform. Goal	-.161**	.359**	0.014	0.055	.927**	.871**	-									
8. SH	-0.062	.280**	-.241**	-0.079	.276**	.166**	.253**	-								
9. ST	-0.082	.309**	-.127*	-0.063	.378**	.323**	.391**	.402**	-							
10. CU	-0.039	.198**	-.296**	-0.068	.203**	.261**	.252**	.329**	.411**	-						
11. SV	0.043	.109*	.192**	.130*	.329**	.298**	.349**	.184**	.376**	.211**	-					
12. GI	-0.005	.125*	.127*	.177**	.275**	.231**	.283**	.157**	.340**	.224**	.803**	-				
13. GSC	.104*	-0.015	.261**	.117*	.182**	.170**	.195**	0.086	.184**	.103*	.844**	.610**	-			
14. EI	.202**	0.002	.142**	.280**	0.088	0.07	0.089	0.082	.106*	-0.023	.350**	.333**	.214**	-		
15. ESC	0.013	.146**	0.086	0.014	.334**	.302**	.354**	.197**	.378**	.187**	.790**	.379**	.490**	.293**	-	
16. GPA	0.071	-0.063	.490**	.144**	-0.062	-0.023	-0.05	-.220**	-.128*	-.148**	0.078	0.038	.121*	-0.038	0.013	-

** $p < 0.01$ (2-tailed).

* $p < 0.05$ (2-tailed).

Note: Incremental = Incremental Theories of Intelligence; Entity= Entity Theories of Intelligence; Efficacy= Academic Self-Efficacy; Mastery= Mastery Goals; Perform. App= Performance Approach Goals; Perform. Av= Performance Avoidance Goals; Perform. Goals= Performance Goals; SH= Self-Handicapping; ST= Stereotype Threat; CU= Causal Uncertainty; GI_SIAS= Gender Identity; GSC_SIAS= Gender Stigma Consciousness; EI_SIAS = Ethnic Identity; ESC_SIAS= Ethnicity Stigma Consciousness; SV= Stereotype Vulnerability; GPA= Grade Point Average

ANOVA Analysis

To continue addressing research question 1, an analysis of variance was conducted on all variables to examine mean differences based on gender and ethnicity. A significant effect for gender was found such that females (M=5.23, SD=1.07) reported higher academic self-efficacy beliefs than males (M=4.87, SD=0.98), $t(1)=3.11$, $p=.002$. Females were also higher than males in overall stereotype vulnerability and in three out of the four subscales (gender identity, gender stigma consciousness, and ethnic identity). There were no other significant gender differences for the remaining variables.

A significant effect for ethnicity was found only for the ethnic identity $F(3, 321) = 12.19$, $p<.01$ and ethnic stigma consciousness subscales, $F(3, 321) = 10.25$, $p<.01$. When it came to ethnic identity, African American students had a significantly higher group mean followed by Hispanic, Asian, and White students in that order. This indicates that African American students in the sample most strongly believed their ethnicity to be central to their identity. In terms of ethnic stigma consciousness, African Americans again had the highest group means indicating that they were most self-conscious of the stigmas attached to their ethnic group. This group was followed by Asians and Whites, with Latino students reporting the lowest levels of ethnic stigma consciousness. Means, standard deviations, and the results of the independent samples t-test for gender are presented in Table 5. Means, standard deviations, and the results of the ANOVA analysis for ethnicity are presented in Tables 6 and 7.

Table 5

Results of the Independent Samples T-test for Gender

Variable	Gender	N	Mean	Std. Deviation	*t*	*P*
Efficacy	Female	258	5.23	1.07	3.11	.002
	Male	104	4.87	0.98		
GI_SIAS	Female	258	4.37	1.69	2.56	.011
	Male	104	3.86	1.72		
GSC_SIAS	Female	257	4.84	1.55	4.19	.000
	Male	104	4.02	1.75		
EI_SIAS	Female	258	5.55	1.46	2.22	.028
	Male	103	5.14	1.65		
SV	Female	258	4.43	1.30	3.06	.003
	Male	104	3.96	1.35		

Note: Efficacy= Academic Self-Efficacy; GI_SIAS= Gender Identity; GSC_SIAS= Gender Stigma Consciousness; EI_SIAS = Ethnic Identity; ESC_SIAS= Ethnicity Stigma Consciousness; SV= Stereotype Vulnerability

Table 6

Means based on the Analysis of Variance (ANOVA) for Ethnicity

		N	Mean	Std. Deviation
EI_SIAS	Asian	73	5.51	1.27
	Black	31	6.33	.80
	Hispanic	177	5.65	1.43
	White	41	4.48	1.57
	Total	322	5.53	1.43
ESC_SIAS	Asian	73	4.36	1.24
	Black	31	5.45	1.40
	Hispanic	177	3.86	1.61
	White	41	4.15	1.61
	Total	322	4.16	1.58

Table 7

Results of the ANOVA for Ethnicity

		Sum of Squares	df	Mean Square	F	Sig.
EI_SIAS	Between Groups	68.013	3	22.67	12.19	.000
	Within Groups	591.361	318	1.86		
	Total	659.374	321			
ESC_SIAS	Between Groups	70.584	3	23.53	10.25	.000
	Within Groups	730.241	318	2.30		
	Total	800.825	321			

Note: EI_SIAS = Ethnic Identity; ESC_SIAS= Ethnicity Stigma Consciousness

Model Testing

To address research question 3, which attempts to understand how well the data fit the hypothesized model, I first began by running a confirmatory factor analysis, which examines the measurement model in which all latent variables were allowed to covary freely. The measurement models consisted of 69 individual items that comprise ten factors (see Table 8). The analysis also used one measured variable that was not incorporated within factors (i.e., GPA). All internal reliabilities were greater than 0.70.

In an effort to produce a more stable structural model and potentially a better fitting model, this study used the item parceling method (Bagozzi & Edwards, 1998; Bagozzi & Heatherton, 1994). This technique aims to reduce the number of observed components within each measurement model to three or four, thereby increasing model fit. Item parceling is a commonly used technique in research using structural equation modeling (Bandalos & Finney, 2001). Some researchers however, caution against the use of item parcels, particularly with multidimensional constructs, as it could lead to a biased model fit (Bandalos & Finney, 2001; Little, Rhemtulla, Gibson, & Schoemann, 2013). Nonetheless, parcels are thought to be a useful tool as the application of parcels have been shown to result in better fitting models and less bias in parameter estimates when compared to item-based models (Bandalos, 2002; Little, Cunningham, Shahar, & Widaman, 2002; Nasser & Wisenbaker, 2003). Methods for building parcels include randomly assigning items to a parcel, parceling positively worded items with negatively worded items (Little, Oettingen, & Baltes, 1995), and balancing factor loading across the parcels (item-to-construct balance; Little et al., 2002).

For this study, variables with more than six items were summed into 2- and 3-item parcels before constructing measurement models. Item-to-construct-balance parcels were created based on the magnitude of the factor loadings. Using the loadings as a guide, the highest loaded items were used as anchors for the parcels. Then the lowest loaded items were matched in order to create balanced parcels.

To this end, the eight academic self-efficacy items were categorized into four parcels; the six causal uncertainty items was categorized into three parcels. Three parcels representing the gender identification subscale, three parcels representing the gender stigma consciousness subscale, three parcels representing the ethnicity identification subscale, and three parcels representing the ethnicity stigma consciousness subscale indexed stereotype vulnerability; and the six self-handicapping items were indexed by three parcels (see Table 8).

Measurement Model Assessment and Fit

Before testing for a significant relationship in the structural model, the measurement models should be assessed with regard to their reliability and validity (e.g., Fornell & Larcker, 1981; Hair, Ringle, & Sarstedt, 2011). Validity is achieved when an instrument measures what it is supposed to measure for a latent construct. The Average Variance Extracted (AVE) can be computed to verify the validity of the instruments, with a value higher than 0.5 needed to achieve adequate validity. Composite Reliability (CR) measures the internal consistency, with a value higher than 0.6 needed in order to achieve composite reliability for a construct. Examination of factor loading (or, individual-variable reliability), composite reliability (CR), and the average variance extracted (AVE)

from a set of measures of a latent variable are often recommended (Bagozzi & Yi, 1988; Fornell & Larcker, 1981; Hair et al., 2011).

Table 8 shows the results for these indexes. All average variances extracted, as well as the individual and composite reliability values fall within the acceptable range, with the exception of the items pertaining to the ethnic identity subscale of stereotype vulnerability. Thus, the four ethnic identity items were deleted because their factor loadings were lower than the recommended value of 0.6 (Awang, 2012). Nonetheless, it can be concluded that the reliabilities and validities of these measurement model instruments were generally acceptable and, thus proceeded to testing the overall fit of the model.

Table 8

Measurement Model Reliability and Validity

Variable	Factor	Factor Loading	CR	AVE
Incremental (I)	ITOI_8_I	0.738	0.853	0.592
	ITOI_6_I	0.756		
	ITOI_4_I	0.831		
	ITOI_2_I	0.75		
Entity (E)	ITOI_7_E	0.733	0.883	0.654
	ITOI_5_E	0.844		
	ITOI_3_E	0.853		
	ITOI_1_E	0.800		
Academic Self-Efficacy (Eff)	ASES_Parcel1	0.822	0.850	0.587
	ASES_Parcel2	0.77		
	ASES_Parcel3	0.746		
	ASES_Parcel4	0.722		
Mastery Goal (MG)	PAGOS_1_M	0.824	0.870	0.575
	PAGOS_2_M	0.809		
	PAGOS_3_M	0.791		
	PAGOS_4_M	0.678		
	PAGOS_5_M	0.675		
Performance Approach (Papp)	PAGOS_10_PAP	0.925	0.906	0.662
	PAGOS_9_PAP	0.935		

	PAGOS_8_PAP	0.786		
	PAGOS_7_PAP	0.726		
	PAGOS_6_PAP	0.660		
Performance Avoidance (PAv)	PAGOS_14_PAV	0.809	0.860	0.606
	PAGOS_13_PAV	0.828		
	PAGOS_12_PAV	0.771		
	PAGOS_11_PAV	0.701		
Stereotype Vulnerability (SV)	GI_SIAS	0.746	0.759	0.515
	GSC_SIAS	0.791		
	EI_SIAS	0.382 (deleted)		
	ESC_SIAS	0.603		
Stereotype Threat (ST)	ST_1	0.832	0.872	0.695
	ST_2	0.841		
	ST_3	0.828		
Self-Handicapping (SH)	SH_Parcel1	0.862	0.910	0.772
	SH_Parcel2	0.892		
	SH_Parcel3	0.881		
Causal Uncertainty (CU)	CU_Parcel1	0.897	0.846	0.648
	CU_Parcel2	0.76		
	CU_Parcel3	0.75		

Several confirmatory factor analyses were conducted to confirm and refine the measurement model for the data. Each CFA model was first assessed based on the multiple goodness-of-fit indexes to determine how well the CFA model fit the data. Then areas of poor fit were examined and modification indices were reviewed for possible re-specification of the model.

Hypothesized Measurement Model

Table 9 presents a summary of goodness-of-fit statistics for the original hypothesized measurement model. Results indicated the model was a poor fit for the data, $\chi^2 = 1374.76$, $p < .001$. Given that the χ^2 statistic is heavily influenced by sample size (Byrne, 2001), other goodness-of-fit indices were examined to evaluate the hypothesized model ($\chi^2/df = 2.12$, CFI = .92, RMSEA = .06). Because the cutoff value for RMSEA was exceeded, modification indexes were examined to determine what could improve model fit. A close examination of the modification indices (MI) further supported the model's significant misfit. In reference to the MI, the output revealed a large covariance between Error 18 and Error 19 (MI = 107.84), as well as Error 21 and Error 22 (MI = 168.22) on the performance-approach factor. Taking into account the large error covariance, re-specification of the model was pursued.

Table 9

Fit Indices of the Confirmatory Factor Analysis Model (N = 367)

Fit Index	Model 1	Model 2	Recommended Level	Reference
X^2	1374.76, p<.001	1198.12, p<.001	Non-significant p-value	Garson (2009)
X^2/df	2.12	1.86	≤ 3.0	Kline (1998)
CFI	.92	.94	.90 ≤ value < .95	Hu and Bentler (1999)
RMSEA	.06	.05	p value ≤ .05	Schumacker & Lomax, 2004

Model Respecification

Post hoc model adjustments were conducted in an effort to develop a better fitting model. Fit statistics for the hypothesized model discussed earlier and the re-specified model are presented in Table 9 for comparison. A large error covariance between question items 1 and 2 and items 3 and 4 of the performance-approach factor was present. This suggested that allowing the two errors for each pair of question items to correlate would significantly improve model fit. However, Hancock and Muller (2006) cautioned that substantive and theoretical consideration must guide error correlations. Measurement error covariances may derive from characteristics of either of the items in question or the respondents (Aish & Jöreskog, 1990). For example, error correlations may be indicative of item content redundancy. In examining the performance-approach question item 1 ("*It's important to me that other students in my class think I am good at my class work*")

and item 2 ("*One of my goals is to show others that I'm good at my class work*"), it was clear both items were attempting to measure performance-approach goals in terms of the importance of demonstrating one's competence, with the focus being on the self. Similarly, when examining the approach goal oriented item 4 ("*One of my goals is to look smart in comparison to the other students in my class*") and item 5 ("*It's important to me that I look smart compared to others in my class*"), it was clear they both items were attempting to measure approach goals in terms of the importance of demonstrating one's competence in comparison to others. Given the redundancy between these two sets of items, Model 2 was re-specified to allow for the error terms between question items 1 and 2, as well as between items 4 and 5, to covary.

As seen in Table 9, Model 2 (χ^2/df = 1.86, CFI = .94, RMSEA = .05) represents an improvement in model fit over Model 1. Overall, the fit indices indicate an acceptable model fit with the data.

Conceptual Model Assessment and Fit

Next tested was how well the conceptual model fit the sample data. The structural model was evaluated against four criteria: The chi-square (X^2) likelihood ratio statistic, the relative chi-square ratio (X^2/df), the comparative fit index (CFI), and the root mean square error of estimation (RMSEA). Figure 2 shows the full model with standardized path coefficients.

As shown in Table 10, goodness-of-fit tests indicated that the original conceptual model did not provide an acceptable representation of the relationships among the observed variables (X^2 =1698.37; $p < 0.001$; X^2/df =2.35; CFI=.89; RMSEA =.06).

Because the cutoff value for all fit indices did not fall within recommended levels, modification indexes were examined to determine re-specification of the model.

Table 10

Fit Indices of the Observed SEM Model (N = 367)

Fit Index	Model 1	Model 2	Model 3	Recommended Level	Reference
X^2	1698.37, p<.001	1530.75, p<.001	1399.73, p<.001	Non-significant p-value	Garson (2009)
X^2/df	2.35	2.11	1.94	≤ 2.0	Ullman (2001)
CFI	.89	.91	.92	.90 ≤ value < .95	Hu and Bentler (1999)
RMSEA	.06	.06	.05	p-value ≤ .05	Schumacker & Lomax, 2004

In reviewing the MI values, one value of 139.41 was substantially larger than the rest of the estimates, which was for the relationship between performance-approach and performance avoidance goals. Based off of research on goal orientation that continues to question how to conceptualize performance goals (e.g., Elliot & Murayama, 2008; Senko, Hulleman, & Harackiewicz, 2011), as well as, the fact that the both factors showed a similar correlational pattern to the other constructs, the decision was made to treat performance goals as a second-order factor that consisted of performance-approach and performance-avoidance. Therefore, Model 2 was re-specified to allow for a second order factor of performance goal.

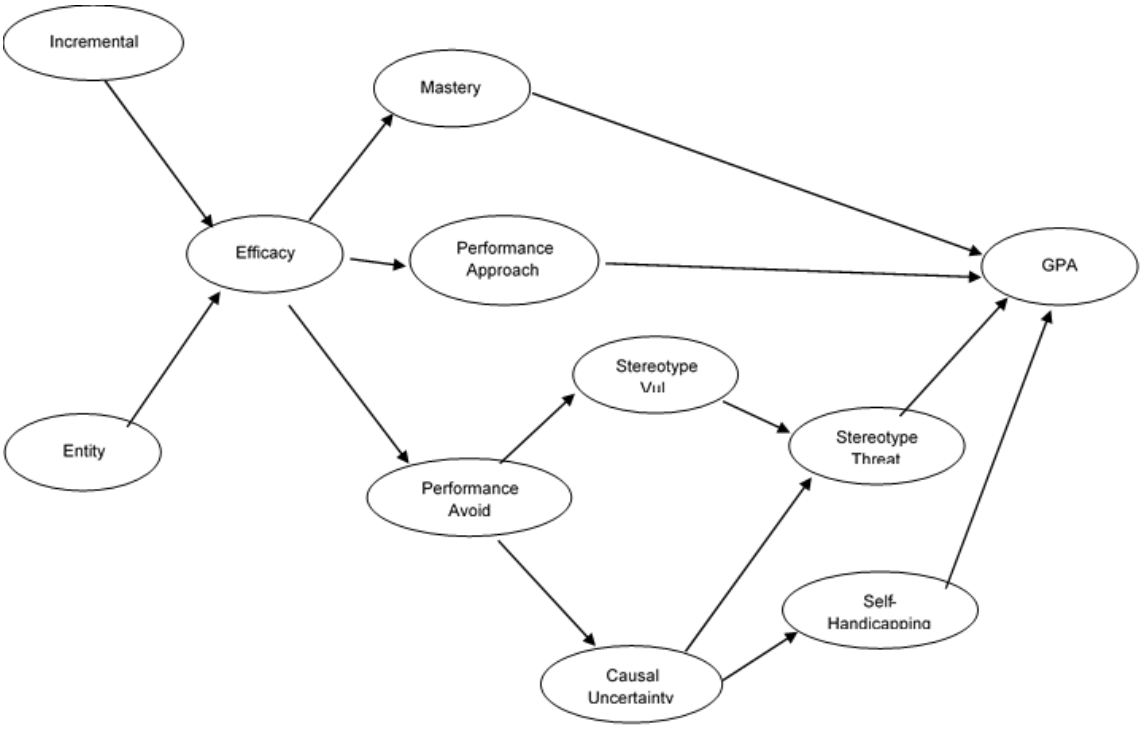


Figure 2: Relationships in the original hypothesized model

As seen in Table 10, Model 2 represents an improvement in model fit over Model 1. However, three out of the four fit indices still did not indicate an acceptable model fit with the data. Once again the modification indices indicated respecification might still be possible by allowing a direct path between academic self-efficacy and GPA (MI=46.00) as well as a direct path between Entity theory of intelligence and performance goal orientation (MI=42.55). Theoretical support, which is provided in the following paragraph, was needed before these paths could be added to the model.

In several studies, self-efficacy has proven to be a robust predictor of achievement, particularly for college students (Bandura & Locke, 2003; Komarraju & Nadler, 2013; Multon, Brown, & Lent, 1991). In terms of the link between entity theory and performance goals, Dweck's (1986) seminal work on the social-cognitive theory of

motivation postulated the relationship between entity beliefs of intelligence and performance oriented goals. Several studies since then have confirmed this relationship (Blackwell et al., 2007; Chen & Pajares, 2010; Roedel & Schraw, 1995) In consideration of these theoretical findings, Model 3 was respecified to allow for these direct paths to be included in the model.

As seen in Table 10, Model 3 (X^2 =1399.73, p<.001; X^2/df =1.94; CFI=.92; RMSEA =.05) represents a substantial improvement in model fit over Model 2. Overall, the fit indices indicate an acceptable model fit with the data. Model 3 is proposed as the best-fit model. This final model, including the standardized coefficients, is presented in Figure 3. Since the respecifications changed the structure of the original model, another confirmatory factor analysis was conducted to make sure that the measurement model was still an acceptable fit. Results of the revised CFA model showed similar fit as the original CFA model, allowing for me to return to testing the conceptual model.

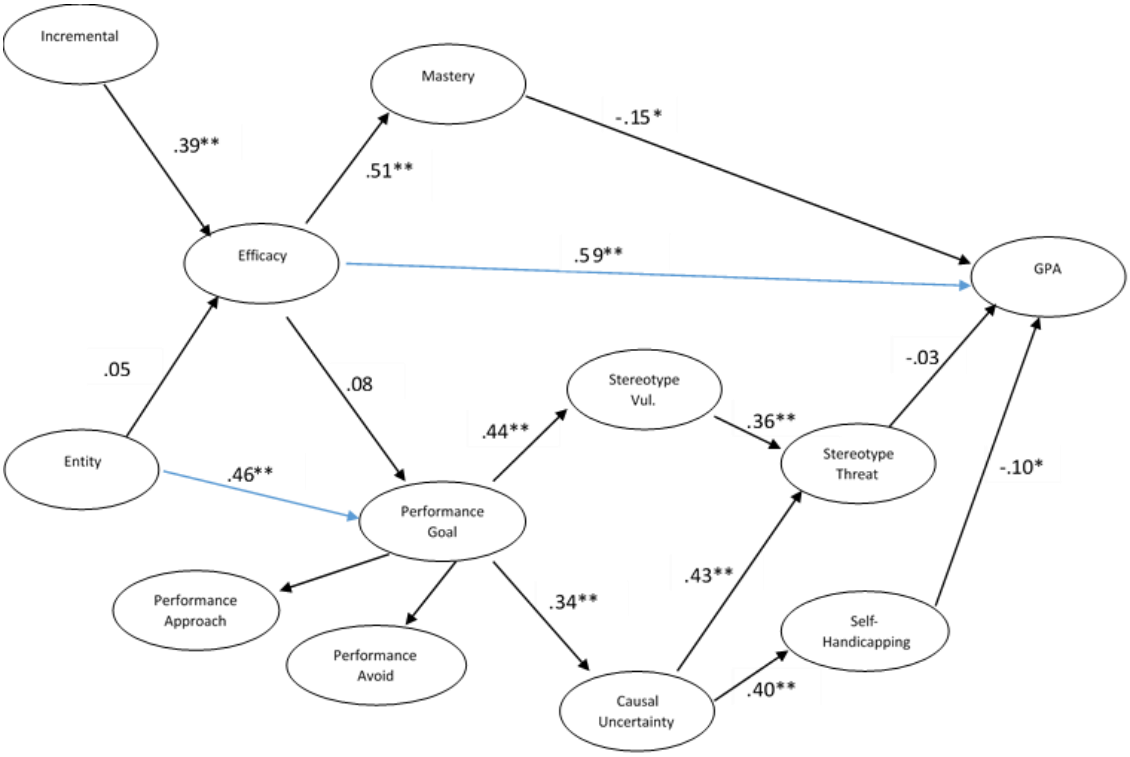


Figure 3: Relationships in the final model

From the direct effects shown in Figure 3, results indicated that incremental theory positively and significantly predicted academic self-efficacy, but entity theory did not. Entity theory did, however significantly and positively predict performance goals, which would be expected. Academic self-efficacy positively and significantly predicted mastery goals and GPA, but did not significantly relate to performance goals. Partially consistent with expectations, performance goals positively and significantly predicted both stereotype vulnerability and causal uncertainty. These two variables in turn had a significant positive effect on stereotype threat while causal uncertainty had a significant positive effect on self-handicapping. Both stereotype threat and self-handicapping predicted GPA in the direction that was expected, however only the relationship between

self-handicapping was significant. Finally, contrary to expectations, mastery goals had a significant negative effect on GPA.

Six factors had an indirect effect on students' GPA. Table 11 provides the direct and indirect effects of the entire model. However the most notable indirect effect was from incremental theory. It does this by strongly influencing academic self-efficacy, which in turn strongly influenced students' GPA. Taken together, this indirect effect along with several small positive effects based on four indirect paths, combined to create a total modest indirect relationship between incremental theory and GPA.

The squared multiple correlation for the final model was $R^2 = 0.228$, meaning the predictors in the model were able to explain 22.8% of the variance in GPA.

Table 11

Direct, Indirect, and Total Effects on Students' GPA

Variable	Direct Effects	Indirect Effects			Total Effects
		Indirect Path	Effect of Indirect Path	Total Indirect Effects	
Self-Handicapping (SH)	0.10				0.10
Stereotype Threat (ST)	0.02				0.02
Mastery Goals (MG)	0.16				0.16
Efficacy (Eff)	0.57				0.57
Causal Uncertainty (CU)		CU-ST-GPA	0.01	0.05	0.05
		CU-SH-GPA	0.04		
Stereotype Vulnerability (SV)		SV-ST-GPA	0.01	0.01	0.01
Performance Avoidance Goals (PG)		PA-SV-ST-GPA	0.00	0.01	0.01
		PA-CU-ST-GPA	0.00		
		PA-CU-SH-GPA	0.01		
Entity (E)		E-Eff-Mastery-GPA	0.00	-0.03	-0.03
		E-Eff-PA-SV-ST-GPA	0.00		
		E-Eff-PA-CU-ST-GPA	0.00		
		E-Eff-PA-CU-SH-GPA	0.00		
		E-Eff-GPA	-0.03		
Incremental (I)		I-Eff-Mastery-GPA	0.03	0.25	0.25
		I-Eff-PA-SV-ST-GPA	0.00		
		I-Eff-PA-CU-ST-GPA	0.00		
		I-Eff-PA-CU-SH-GPA	0.00		
		I-Eff-GPA	0.22		

Test of Mediators

The hypothesized model suggests multiple mediational pathways and while the overall fit of the model suggests that the model reproduces the interrelations among the variables well, it does not tell us whether the individual paths represent significant mediation. Therefore, I used structural equation modeling to answer research question 2 by testing the significance of each mediational pathway in the model. It was hypothesized that (1) academic self-efficacy mediates the relation between theories of intelligence (specifically incremental and entity theory) and achievement goal orientations (specifically mastery and performance goal), (2) stereotype vulnerability mediates the relation between performance goals and stereotype threat, (3) causal uncertainty mediates the relation between performance goals and stereotype threat, (4) causal uncertainty mediates the relation between performance goals and self-handicapping, (5) mastery goals mediate the relation between academic self-efficacy and GPA, (6) stereotype threat mediates the relation between stereotype vulnerability and GPA, and (7) self-handicapping mediates the relation between causal uncertainty and GPA.

Twelve tests were conducted of mediation with academic self-efficacy being used four times as a mediator, performance goals being used twice, and causal uncertainty being used twice. The bootstrapping results are considered statistically significant if the indirect effect does not contain zero within the 95% confidence interval. Table 12 reports the sizes of the indirect effects, the direct effects, the total effects, and the statistical significance of the estimates. All tests of mediation were found to be significant with the

exception of performance goals acting as a mediator between efficacy and stereotype vulnerability and efficacy and causal uncertainty.

More specifically, results indicated that incremental theories of intelligence indirectly predicted mastery goal orientation ($z = 4.64$, $p < .01$) and GPA ($z = -5.09$, $p < .01$) via academic self-efficacy. The direct effects between beliefs about intelligence and mastery ($z = 2.52$, $p < .01$), as well as GPA ($z = 2.39$, $p < .01$), remained significant, suggesting that academic self-efficacy was a partial mediator. When examining the mediating role that efficacy played between entity theory and GPA, the indirect effect was significant ($z = 3.53$, $p < .01$) while the direct effect between entity theory and GPA was not ($z = -1.11$, $p = .27$), suggesting full mediation.

Results from the mediation analysis indicated that academic self-efficacy did not indirectly predict stereotype vulnerability ($z = -0.18$, $p = .86$) or causal uncertainty ($z = -0.10$, $p = .92$) via performance goal orientation as was proposed by the model. However, academic self-efficacy did indirectly predict GPA via mastery goal orientation. Partial mediation was suggested as both the indirect effect ($z = 2.40$, $p < .01$) and the direct effect ($z = -9.68$, $p < .01$) were significant.

In terms of performance goals, results showed that performance goals indirectly predicted stereotype threat via stereotype vulnerability ($z = 3.72$, $p < .01$) and causal uncertainty ($z = 3.82$, $p < .01$). Similarly, performance goals indirectly predicted self-handicapping via causal uncertainty ($z = 3.57$, $p < .01$). Partial mediation was suggested for all three effects as the indirect effects and the direct effects were significant.

Finally, full mediation was found for self-handicapping as a mediator between causal uncertainty and GPA. Only partial mediation was found however, for stereotype threat as a mediator between stereotype vulnerability and GPA.

Table 12

Bootstrapping results for mediation effects

Effect	Bootstrap Estimate			95% Confidence Interval	
	β	*SE*	*Z*	Lower Bound	Upper Bound
Incremental → Efficacy → Mastery					
Direct Effect	0.170**	0.067	2.52	0.038	0.302
Indirect Effect	0.180**	0.039	4.64	0.104	0.256
Total Effect	0.350**	0.069	5.09	0.215	0.484
Entity → Efficacy → Mastery					
Direct Effect	-0.044	0.059	-0.74	-0.161	0.072
Indirect Effect	-0.118**	0.034	-3.44	-0.184	-0.051
Total Effect	-0.162**	0.064	-2.54	-0.286	-0.037
Efficacy → Performance Goal → SV					
Direct Effect	0.347**	0.077	4.50	0.196	0.499
Indirect Effect	-0.005	0.025	-0.18	-0.054	0.045
Total Effect	0.343**	0.081	4.25	0.185	0.501
Efficacy → Performance Goal → CU					
Direct Effect	-0.329**	0.057	-5.74	-0.442	-0.217
Indirect Effect	-0.001	0.015	-0.10	-0.031	0.028
Total Effect	-0.331**	0.059	-5.61	-0.446	-0.215
Performance Goal → SV → ST					
Direct Effect	0.315**	0.061	5.16	0.196	0.435
Indirect Effect	0.113**	0.03	3.72	0.053	0.172
Total Effect	0.428**	0.06	7.18	0.311	0.545
Performance Goal → CU → ST					
Direct Effect	0.332**	0.056	5.94	0.223	0.442
Indirect Effect	0.104**	0.027	3.82	0.051	0.157
Total Effect	0.436**	0.060	7.30	0.319	0.554

Performance Goal → CU → SH					
Direct Effect	0.310**	0.083	3.74	0.148	0.473
Indirect Effect	0.128**	0.036	3.57	0.058	0.198
Total Effect	0.438**	0.085	5.19	0.272	0.604
CU → SH→ GPA					
Direct Effect	-0.087	0.066	1.32	-0.042	0.215
Indirect Effect	-0.083**	0.027	3.07	0.030	0.136
Total Effect	0.17**	0.061	2.78	0.050	0.289
SV → ST → GPA					
Direct Effect	-0.145**	0.056	-2.61	-0.254	-0.036
Indirect Effect	-0.070**	0.024	2.89	0.023	0.118
Total Effect	-0.075	0.050	-1.52	-0.173	0.022
Efficacy → Mastery → GPA					
Direct Effect	0.628**	0.065	-9.68	-0.755	-0.500
Indirect Effect	-0.076	0.032	2.40	0.014	0.139
Total Effect	0.551**	0.054	-10.19	-0.657	-0.445
Incremental → Efficacy → GPA					
Direct Effect	0.236**	0.099	2.38	0.042	0.431
Indirect Effect	0.380**	0.075	-5.09	-0.527	-0.234
Total Effect	0.144	0.104	-1.39	-0.347	0.059
Entity → Efficacy → GPA					
Direct Effect	0.097	0.087	-1.11	-0.268	0.074
Indirect Effect	-0.214**	0.061	3.53	0.095	0.333
Total Effect	-0.117	0.097	1.22	-0.072	0.307

** $p < 0.01$ (2-tailed); * $p < 0.05$ (2-tailed).
Note: Incremental = Incremental Theories of Intelligence; Entity= Entity Theories of Intelligence; Efficacy= Academic Self-Efficacy; Mastery= Mastery Goals; SH= Self-Handicapping; ST= Stereotype Threat; CU= Causal Uncertainty; GI_SIAS= Gender Identity; GSC_SIAS= Gender Stigma Consciousness; EI_SIAS = Ethnic Identity; ESC_SIAS= Ethnicity Stigma Consciousness; SV= Stereotype Vulnerability; GPA= Grade Point Average

This chapter presented the results of the structural equation model for the influence of intelligence and academic self-efficacy beliefs, goal orientation, causal uncertainty, and stereotype threat and vulnerability on student achievement. The validity of the theoretical model was tested using data collected from college students. The study provided overall support for the hypothesized model in all areas but two: (1) the mediating effects of academic self-efficacy on entity intelligence beliefs and performance goals, and (2) the adaptive nature of performance-approach goals. Based on the modification indices, a direct path between academic self-efficacy and achievement (GPA) was also added to the model, making it the strongest predictor of achievement.

The final chapter, which follows, includes a discussion of the major findings and conclusions that were drawn from these results. The chapter closes with the limitations of the study, as well as a brief discussion of recommendations for practice and further research.

CHAPTER V

DISCUSSION

The aim of the present study was to investigate the relationship between intelligence beliefs, academic self-efficacy, achievement goal orientations, causal uncertainty, self-handicapping, stereotype vulnerability and stereotype threat. The study also investigated the relationship between these predictors and academic performance as reflected in self-reported college GPA. In addition, the study used the relationship between all measured variables to examine the proposed path model (Figure 1). What follows is a discussion of the results based on each construct.

Theories of Intelligence

Past research suggested that a student's theory of intelligence is a key belief, one that sets up contrasting patterns of achievement motivation. The present research partially supports this, and begins to show just how these variables may influence motivational and academic outcomes. The expected relationships between a malleable view of intelligence, self-efficacy, achievement goal orientations (mastery and performance-avoid), and students' achievement were generally represented in the correlational matrix and path model. The correlational results from this study found a positive relationship between incremental theory of intelligence, academic self-efficacy, and mastery goals. Results from the path model provided additional support that incremental intelligence beliefs may directly influence mastery goals as well as indirectly through academic self-efficacy. This corroborates previous findings (Dweck & Leggett, 1988; Payne et al. 2007; Robins & Pals, 2002) and is consistent with the theoretical basis of implicit theory of

intelligence. If someone believes they can grow and develop their intelligence, it is logical that they would set learning goals in an effort to develop their knowledge. The relationship between beliefs about intelligence and goal orientation was previously shown to be influenced by self-efficacy (Abdullah, 2008; Payne, Youngcourt, & Beaubien, 2007). Individuals who believe that intelligence is malleable (incremental theory) and that they are capable of acting to develop that intelligence (self-efficacy) are more likely to set mastery oriented goals (Payne et al. 2007). The model provides more justification for the idea that students who believe intelligence is malleable are more likely to have more confidence in their perceived academic ability (Wood & Bandura, 1989).

The impact of a malleable view of intelligence on achievement was supported by the positive relationship between incremental theory and GPA. However, the path model showed that this effect was indirect, operating through academic self-efficacy beliefs. Research by Bandura (1997) has supported this idea that high achievement requires not only the belief that one's capacity can be expanded (incremental belief of intelligence), but also the belief that one has the abilities necessary to meet the demands of the academic situation (academic self-efficacy).

The relationships between a fixed view of intelligence, self-efficacy, achievement goal orientations, and students' achievement were less consistent. As expected, entity intelligence beliefs were positively related to performance goals and negatively related to mastery goals and academic self-efficacy. This supports previous findings that students who espoused the view that their abilities were static tended to display performance oriented behaviors such as showing off how smart they are or choosing not to do a task

altogether to avoid looking incompetent (Blackwell et al., 2007; Dweck & Sorich, 1999; Dweck & Leggett, 1988; Robins & Pals, 2002).

However, the results of the path model did not support the hypothesis that self-efficacy mediated the relationship between entity beliefs and performance goals. Instead, a strong direct effect was found between entity beliefs and performance goals. The absence of a significant direct effect of entity theory on self-efficacy in the final model may have been due to the distribution of shared variance with incremental theory. Another possible explanation that was not examined in this study could be task difficulty. In other words, we may see academic self-efficacy beliefs influence the relationship between entity beliefs and performance goals when a student faces a difficult task. When a task is challenging, students who believe their ability is fixed may become frustrated and lose their confidence. Students may then turn to performance-oriented goals in which their focus is on avoiding demonstrating their incompetence. More research may need to be conducted to further examine entity beliefs and its relationship with various motivational factors, using different moderators such as task difficulty.

Finally, as was found with the incremental theory, the impact of a fixed view of intelligence on achievement was supported by the negative relationship between incremental theory and GPA. However, the path model showed that this effect was indirect, operating through academic self-efficacy beliefs. Again, this finding reiterates the important role that both intelligence and efficacy beliefs play in student achievement outcomes.

Academic Self-Efficacy

It was originally hypothesized that academic self-efficacy will be related to and predict goal orientation such that there will be a negative relationship between self-efficacy and performance-avoidance goal orientation. Contrary to expectations, the results of this study did not find any significant relationship between academic self-efficacy and performance goals. Early research which examined the interaction between self-efficacy and performance goals proposed students that adopt performance oriented goals are more vulnerable to maladaptive learning patterns (Elliott & Dweck, 1988). Performance-oriented students who also have low-efficacy are particularly susceptible compared to those with high-self efficacy (Butler, 1993; Elliott & Dweck, 1988). Therefore, Elliott and Dweck (1988) originally suggested that students' adoption of performance-type goals were highly dependent on efficacy beliefs. This relationship however, has not been replicated by other researchers (Harackiewicz et al., 1997; Kaplan & Midgley, 1997; Miller, Behrens, Greene, & Newman, 1993). Koseoglu (2015) has even argued against this relationship between self-efficacy and performance goals, stating students with low self-efficacy who feel they cannot succeed in school may disassociate from the academic realm altogether, making it less likely for these students to target any kind of goal, mastery or performance. Therefore, the inconsistent results found between the present study and previous research highlight the need for further examination of the complex relationships between a student's beliefs about intelligence, the level of self-efficacy, and their inclinations in choosing a performance goal orientation.

As predicted, the correlation between self-efficacy and mastery goal orientation was positively significant. While not originally hypothesized, I also found both self-efficacy and mastery goals to be significantly related to students' GPA. This finding is consistent with the findings from previous research studies investigating relationships between self-efficacy and mastery goal orientation (Al-Harthy, Was, & Isaacson, 2010; Midgley et al., 1998; Skaalvik, 1997; Wolters, Yu, & Pintrich, 1996). It also supports predictions from self-efficacy and goal orientations theories which have found that students with high precepts of self-efficacy tend to persist longer, choose more challenging tasks, view failures as learning opportunities, and ultimately have higher academic performance (Al-Harthy et al., 2010; Bandura, 1986; Deemer, 2004).

The path model analysis also revealed significant indirect effects of self-efficacy on GPA through mastery goals, which is in line with previous findings. One-way that self-efficacy contributes to students' motivation is through goals (Bandura, 1993; Barkley, 2006). More specifically, self-efficacy beliefs determine the goals students' set for themselves. The empirical support for this argument comes from several experimental studies that found determination of goals depended on students' efficacy beliefs (Al-Harthy et al., 2010). Specifically, students with high self-efficacy adopted mastery goals, whereas those with low self-efficacy adapted performance-avoidant goals. The idea that self-efficacy indirectly affects students' performance by influencing the academic goals students adopt seems to correspond with previous research findings (Al-Harthy & Was, 2013; Al-Harthy et al., 2010; Barkley, 2006; Zimmerman, 2000). The findings of the

present study continue to support the efforts to encourage not only students, but also teachers to promote and adopt mastery goals in the classroom (Al-Harthy & Was, 2013).

Evidence for the direct link found between efficacy and achievement can be seen through Bandura's (1997) social cognition model of motivation, which emphasized the role of perceptions of efficacy in determining individuals' need for academic success. Bandura proposed that self-efficacy beliefs are one of the major determinants of goal setting, task choice, effort expenditure, and persistence. Students end up forming beliefs about what they can do, and this guides their learning and achievement. In fact, research has indicated that self-efficacy has a stronger effect on academic performance than other motivational variables – like self-regulation for example (Kitsantas & Zimmerman, 2009; Pintrich & De Groot, 1990; Pintrich & Schunk, 1996, 2002).

Lastly, group differences were found for academic self-efficacy as evident from the significant gender results found from the ANOVA analysis. Female students were found to have significantly greater academic self-efficacy beliefs than their male peers. While no a-priori hypothesis was made, this finding is inconsistent with several studies that have shown that boys were often found to have higher efficacy beliefs than girls (Pajares & Miller, 1994; Schunk & Pajares, 2002; Wigfield, Eccles, & Pintrich, 1996). However, a meta-analysis on gender differences in academic self-efficacy identified that content domain was a significant moderator in explaining effect size variation in gender (Huang, 2013). Specifically, females displayed higher language arts self-efficacy than males. Meanwhile, males exhibited higher mathematics, computer, and social sciences self-efficacy than females (Huang, 2013). The current study did not look at domain

specific (i.e. Math or English) self-efficacy beliefs but the relevance of gender differences to academic self-efficacy may be based on domains, specifically in gender-stereotypical ways.

Goal Orientation

The results for goal orientation from this study lead to some different conclusions than those of the original trichotomous framework originally proposed by Elliot and his colleagues (Elliot & Church, 1997; Elliot & Harackiewicz, 1996). Empirical research for the theoretical framework had found support for the approach/avoidance distinction, showing that only performance-avoid goals were found to be maladaptive while both performance-approach and mastery goals facilitated student motivation and achievement (Elliot & Church, 1997; Elliot & McGregor, 2001). While the correlational analysis revealed a positive relationship between mastery goals and achievement (GPA) as was expected, performance-approach goals were unrelated to achievement as hypothesized. In fact, performance-approach goals overall were not found to be facilitative as the trichotomous framework proposed. Instead. both performance-approach and performance-avoid goal orientations were positively related to causal uncertainty, stereotype vulnerability, stereotype threat, and self-handicapping. Furthermore, the original model fit was poor when the approach/avoidance dimensions were separated; thus the decision was made to aggregate the two dimensions into the second order construct performance goal orientation. Rather than the approach/avoidance distinction highlighted in the trichotomous framework, these results indicate that it is the distinction between mastery and performance goals that is influential. Our results confirm a basic

principle of goal orientation theory – the relative saliency of the task versus the saliency of the self. The two components of a performance orientation both focus on the self. The preoccupation with the self, relative to others, regardless of whether it is to demonstrate ability or hide lack of ability, characterizes both goals.

From the revised structural equation model, performance goals were found to positively predict causal uncertainty. This finding can be explained through a limited amount of research examining the link between performance goal orientation and causal uncertainty. Darnon and her colleagues examined uncertainty as a moderator of the effect of performance-approach goals on performance (Darnon, Harackiewicz, Butera, Mugny, & Quiamzade, 2007). Results from their two experiments showed that when participants felt uncertain about their abilities, performance-approach goals did not facilitate performance. It should be noted that uncertainty in Darnon et al (2007) was operationalized in terms of performance goals (i.e., uncertainty of whether one could perform well relative to others) while the present study measured causal uncertainty (i.e. uncertainty about their ability to understand and detect cause-and-effect relationships). Nonetheless, it is evident that as soon as students become uncertain, performance-approach goals mimic performance-avoidance goals and become less adaptive.

Another predicted parameter in the model was between mastery goals and achievement. Contrary to existing theory, mastery goal orientation negatively predicted GPA. To understand this discrepant finding, one should take into consideration the interactions between the predictor variables. Specifically, if we look at the correlation between mastery goal, self-efficacy, self-handicapping, and stereotype threat with GPA

we can see that it is in line with normative theory; mastery goal orientation and self-efficacy were positively related to GPA while self-handicapping and stereotype threat were negatively related to it. Moreover, self-efficacy was positively related to mastery goals, and negatively related to self-handicapping and stereotype threat. These relations prove to be important because the relationship between mastery goal and GPA became negative once academic self-efficacy was entered in the regression analysis. When mastery goal is entered as a predictor by itself, we in fact do see the expected relationship; mastery goal positively predicts GPA (β=.25, p=.006). Considering the possible multicollinearity effects (an issue that arises when two or more predictors in a model are moderately or highly correlated), further research is needed to reveal the generality of the finding and the mechanism underlying it.

Stereotype Threat and Stereotype Vulnerability

It was originally predicted that because performance-avoidance goals emphasize social comparisons, students of stereotyped groups (particularly those who closely identify or are self-conscious of their stigmatized status) might feel particularly uncertain about their performance because it may confirm to themselves, other people, or both the negative performance expectations about the group. In other words, the original structural model proposed that both stereotype vulnerability and causal uncertainty would mediate the relationship between performance goals and stereotype threat. Preliminary correlational analyzes indicated a significant positive relationship between all four factors, providing initial support for my hypothesis. From the revised structural equation model that combined the approach/avoidance goal orientation into a second order factor

of performance goals, both stereotype vulnerability and causal uncertainty were confirmed, and in fact, act as mediators between performance goal orientation and stereotype threat.

The effects of performance goals and stereotype threat have been examined previously, particularly for students of color and women in math (Fischer, 2010; Smith, 2006; Smith, Sansone, & White, 2007). Studies have found a link between anxiety, uncertainty, fear of failure, and negative evaluations of self-competence, all of which can impair performance. Findings from this study may reveal how the effects of stereotype threat, in part, contribute to the pervasive achievement gap by which minority students continue to underperform compared to non-minority students. Students, who are concerned about negative self-evaluations from others, may be particularly susceptible to the fear of conforming to a negative stereotype. These concerns, fears, and pressures can ultimately impair performance, leading to lower achievement (Fischer, 2010).

Based on the significant results found from the ANOVA analysis, gender and ethnic differences were found for the subscales of stereotype vulnerability. While no a-priori hypothesis was made, it was not surprising to find that African American students reported the highest level of ethnic stigma consciousness out of all the ethnic groups such that African American students were more likely to believe that they are judged based on their ethnicity rather than on their academic performance alone. In addition, female students in this study reported higher gender and ethnic identity than males, as well as higher feelings of gender stigma consciousness (the extent to which an individual is

chronically aware of her/his gender's stigmatized status). In other words, female students were more likely to believe that they are judged based on their gender.

Evidence as to why African American students and female students were more vulnerable to these stigmas may stem from traditional stereotypes about blacks and women. Negative stereotypes still exist about African Americans scholastic intelligence and women's intellectual inferiority particularly in the math and science fields. Because of these pervasive stigmas, African American and female students' performance often suffer, resulting in achievement gaps (Hedges & Nowell 1995; Hyde, Fennema, & Lamon, 1990; Hyde & Kling, 2001; Steele, 1997). Thus, in certain academic domains, gender and ethnic stigma consciousness may impact females and African American students more than others students (Cokley, Awad, Smith, & Stone, 2015; Pinel, 1999). The need for techniques or interventions to combat these negative stereotypes and reduce stigmas is evident based on their influence on student achievement through stereotype threat.

Self-Handicapping

It was originally hypothesized that self-handicapping would be a direct predictor of achievement and would also act as a mediator between causal uncertainty and achievement. The results of this study not only demonstrated that self-handicapping was a negative predictor of achievement but that causal uncertainty indirectly affects achievement through self-handicapping behavior.

This is supported by links made between attribution theory, causal uncertainty, and self-handicapping behaviors (Thompson & Dinnel, 2003). Self-handicapping is

grounded in attribution theory, whereby the certainty with which a cause can be attributed to an effect is dependent on the number of alternative possible causes (Weiner, 1974). For example, if a student performs poorly on an exam, it is highly plausible that the student's parents, peers, or teachers will attribute the academic performance to low intellectual ability. This is particularly true if the student studied for the exam because it removes lack of effort as an explanation for poor performance. Individuals, therefore, self-sabotage and engage in handicapping behaviors when they feel they cannot meet expectations for future performance. These pre-evaluative attributions are most likely to occur in situations of causal uncertainty, in which individuals are unable to ascertain the cause of a past event (Thompson & Hepburn, 2003; Thompson & Richardson, 2001). To this end, self-handicapping attempts to mitigate uncertain self-images that the individuals then seek to protect by intentionally sabotaging their performance, in so doing rendering the cause of their poor performance obscure (Thompson & Dinnel, 2003; Thompson et al., 1995),

Based on the path model as well as the significant positive correlation found between self-handicapping and performance goals, we can see that self-handicapping is primarily grounded in avoidance motivation. This lack of motivation to achievement, may in part explain why self-handicappers are willing to sabotage their success in specific achievement situations. Similar to the motivation behind performance goals, for self-handicappers, the pressure to avoid appearing incompetent takes precedence, making success something that can be sacrificed if needed (Rhodewalt, 1994; Urdan & Midgley, 2001). Ultimately, self-presentation is more important than actual success or competence.

In line with previous and current findings, the consequences of such behavior include low performance attainment and achievement (Elliot & Church, 2003; Jones & Berglas, 1978), furthering the need for future research to consider ways in which these behaviors can be mitigated.

Summary

By now, much empirical evidence has amassed showing the importance of implicit theories of intelligence and other self-beliefs in predicting academic motivation and achievement. The present study has theoretical significance in that it sought to combine and refine the theoretical tenets of several bodies of work (e.g. social-cognitive theory, achievement goal theory, stereotype threat) by using path modeling techniques.

In sum, the structural equation model in the current study suggests that college students' beliefs about intelligence, level of academic self-efficacy, goal orientation, susceptibility to stereotype and causal uncertainty, as well as their use of self-handicapping strategies, can all work together to predict their academic performance. Overall these findings are consistent with those of previous studies that identified two general patterns of achievement motivation that these cognitive constructs can fall under: *maladaptive and adaptive patterns* of motivation (Dweck & Leggett, 1988).

Entity theories of intelligence, low academic self-efficacy, performance goal orientation, stereotype threat, causal uncertainty, and self-handicapping explain maladaptive achievement behavioral patterns. In turn, incremental theories of intelligence, high self-efficacy, and mastery goal orientation explain adaptive achievement related behaviors. Challenges and obstacles are a normal part of academia

and no matter the students' goals (e.g., passing a class, graduating with honors; learning a skill) they will at some point be presented with dilemmas, face risks, and have to overcome these barriers. The helpless response as a characteristic style can be considered maladaptive because it deters individuals from confronting obstacles. On the other hand, the mastery-oriented pattern, relates to seeking challenging tasks and the adoption of effective strategies in the face of obstacles. This enjoyment of challenge and willingness to sustain engagement with difficult tasks is conducive to academic success. The ability to maintain commitment through periods of difficulty will maximize the chances of a student accomplishing future tasks and ultimately fulfilling their long-term educational goals.

Limitations of the Study

One limitation of this study is its reliance on self-report data, particularly with self-reported GPA. While self-report methods of data collection have the advantage of providing respondents' own perspective, one disadvantage is the potential for producing a social desirability response bias, in which participants present themselves more favorably. Therefore, respondents may not provide accurate information out of a desire for social desirability. One solution to this problem is comparing the self-reported data with actual data (e.g. official school transcripts) or data obtained through direct observation (Barker, Pistrang, and Elliott, 2002).

In addition, the use of the self-reported items introduces a potential problem with the temporal ordering of some measured variables in the study. The study assumes, for example, that students' opinions of stereotype threat precede academic performance.

Other studies have suggested that individuals are unable to retrospectively report on their feelings once the threat has passed (Brodish & Devine, 2009; Pennington, Heim, Levy, Larkin, 2016). This emphasizes the importance of utilizing experimental evidence along with self-report measures (Pennington, Heim, Levy, Larkin, 2016).

Conclusion

In conclusion, the results presented here revealed that beliefs about the self (i.e., intelligence beliefs, self-efficacy), goal orientation, self-handicapping, and stereotype threat are all appropriate for predicting academic achievement in undergraduate students. Indeed, the study provided overall support for the hypothesized model in all areas but two: (1) the mediating effects of academic self-efficacy on entity intelligence beliefs and performance goals, and (2) the adaptive nature of performance-approach goals. Future research may further elucidate the significance of the model by also considering the role of other moderators such as task difficulty, effort, or persistence revealed as important determinants of learning behavior and outcome in other studies (e.g., Elliot, 1999; Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002).

One of the ultimate goals of examining these constructs was to understand how to better help students function and adapt to academic demands. Researchers try to do so by understanding students' perceptions of themselves in academic contexts and using this information to predict important outcomes. The studies presented here have demonstrated that positive percepts of the self, lead to many desirable outcomes. Strong self-efficacy, a malleable view of intelligence, and goals that emphasize mastery, all lead students to set challenging yet attainable academic goals for themselves, feel less anxious in

achievement settings, enjoy their academic work more, persist longer on difficult tasks, and, overall, feel better about themselves as a person and as a student (Dweck & Leggett, 1988). To this end, providing a classroom and campus environment that facilitates a mastery-oriented motivational climate, as well as an emphasis on building student's academic efficacy may prove to be effective (Ommundsen, 2001). In addition, the current study helps to clarify the processes by which individuals within stereotyped groups or those who engage in self-handicapping underperform, highlighting to continued need to develop techniques, interventions, and programs designed to improve performance outcomes for such individuals.

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APPENDIX A

SURVEY INSTRUMENTS

The following questions are exploring students' ideas about intelligence. There are no right or wrong answers. We are just interested in your views. Using the scale below, please indicate the extent to which you agree or disagree with the following statements.

The Implicit Theories of Intelligence Scale	Strongly Disagree	Disagree	Agree	Strongly Agree
You have a certain amount of intelligence, and you can't really do much to change it.	1	2	3	4
No matter who you are, you can significantly change your intelligence level.	1	2	3	4
Your intelligence is something about you that you can't change very much.	1	2	3	4
You can always substantially change how intelligent you are.	1	2	3	4
To be honest, you can't really change how intelligent you are.	1	2	3	4
No matter how much intelligence you have you can always change it quite a bit.	1	2	3	4
You can learn new things, but you can't really change your basic intelligence.	1	2	3	4
You can change even your basic intelligence level considerably.	1	2	3	4

Using the scale below, please indicate the extent to which the following statements are true or untrue of you.

Academic Self-Efficacy Scale	Very Untrue						Very True
1. I know how to schedule my time to accomplish my tasks.	1	2	3	4	5	6	7
I know how to take notes.	1	2	3	4	5	6	7
I know how to study to perform well on tests.	1	2	3	4	5	6	7
I am good at research and writing papers.	1	2	3	4	5	6	7
I am a very good student.	1	2	3	4	5	6	7
I usually do very well in school and at academic tasks.	1	2	3	4	5	6	7
I find my college academic work interesting and absorbing	1	2	3	4	5	6	7
I am very capable of succeeding at the college.	1	2	3	4	5	6	7

Here are some questions about yourself as a student. Using the scale below, please indicate the extent to which the following statements are very true or not at all true of you.

Personal Achievement Goal Orientation Scale	Not at all True				Very True
1. It's important to me that I learn a lot of new concepts this year.	1	2	3	4	5
One of my goals in class is to learn as much as I can.	1	2	3	4	5
One of my goals is to master a lot of new skills this year.	1	2	3	4	5
It's important to me that I thoroughly understand my class work.	1	2	3	4	5
It's important to me that I improve my skills this year.	1	2	3	4	5
It's important to me that other students in my class think I am good at my class work	1	2	3	4	5
One of my goals is to show others that I'm good at my class work.	1	2	3	4	5
One of my goals is to show others that class work is easy for me.	1	2	3	4	5
One of my goals is to look smart in comparison to the other students in my class.	1	2	3	4	5
It's important to me that I look smart compared to others in my class.	1	2	3	4	5
It's important to me that I don't look stupid in class.	1	2	3	4	5
One of my goals is to keep others from thinking I'm not smart in class.	1	2	3	4	5
It's important to me that my teacher doesn't think that I know less than others in class.	1	2	3	4	5
One of my goals in class is to avoid looking like I have trouble doing the work.	1	2	3	4	5

Using the scale below, please indicate the extent to which the following statements are very true or not at all true of you.

Academic Self-Handicapping Scale	Not at all True						Very True
1. Some students put off doing their math work until the last minute. Then if they don't do well, they can say that is the reason. How true is this of you?	1	2	3	4	5	6	7
Some students purposely don't try hard in math. Then if they don't do well, they can say it's because they didn't try. How true is this of you?	1	2	3	4	5	6	7

Some students fool around the night before a math test. Then if they don't do well, they can say that is the reason. How true is this of you?	1	2	3	4	5	6	7
Some students purposely get involved in lots of activities. Then if they don't do well in math, they can say it is because they were involved with other things. How true is this of you?	1	2	3	4	5	6	7
Some students let their friends keep them from paying attention during math or from doing their math homework. Then if they don't do well, they can say their friends kept them from working. How true is this of you?	1	2	3	4	5	6	7
Some students look for reasons to keep them from studying math (e.g., not feeling well, having to help their parents, taking care of a brother or sister, etc.). Then if they don't do well on their math work, they can say this is the reason. How true is this of you?	1	2	3	4	5	6	7

Here are some questions about yourself as a student. Using the scale below, please indicate the extent to which you agree or disagree with the following statements.

Stereotype Threat Scale	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1. I worry that my ability to perform well on academic tests in general is affected by my group membership(s)) (e.g. ethnicity or gender).	1	2	3	4	5
I worry that if I perform poorly on academic tests in general, then the persons who administer the tests will attribute my poor performance to my group membership(s) (e.g. ethnicity or gender).	1	2	3	4	5
I worry that, because I know the negative stereotype about my group membership(s) (e.g. ethnicity or gender) and academic tests, my anxiety about confirming the stereotype will negatively influence how I perform on the test.	1	2	3	4	5

Click on the response below that best expresses how much you agree or disagree with the statement.

Causal Uncertainty Scale	**Strongly Disagree**					**Strongly Agree**
1. When I receive good grades, I usually do not understand why I did so well.	1	2	3	4	5	6
When I receive poor grades, I usually do not understand why I did so poorly.	1	2	3	4	5	6
I do not understand what causes most of the good things that happen to me.	1	2	3	4	5	6
When things go right, I generally do not know what to do to keep them that way.	1	2	3	4	5	6

When bad things happen, I generally do not know why.	1	2	3	4	5	6
I do not know what it takes to get along well with others.	1	2	3	4	5	6

Click on the response below that best expresses how much you agree or disagree with the statement.

Social Identities and Attitudes Scale	**Strongly Disagree**			**Neutral**			**Strongly Agree**
1. My gender contributes to my self-confidence.	1	2	3	4	5	6	7
My gender influences how I feel about myself.	1	2	3	4	5	6	7
My gender is central to defining who I am.	1	2	3	4	5	6	7
My identity is strongly tied to my gender.	1	2	3	4	5	6	7
My gender influences how others interpret my behavior.	1	2	3	4	5	6	7
Most people judge me on the basis of my gender.	1	2	3	4	5	6	7
My gender affects how people treat me.	1	2	3	4	5	6	7
My gender affects how people act towards me.	1	2	3	4	5	6	7
I value my ethnic background.	1	2	3	4	5	6	7
I feel a strong attachment to my ethnicity.	1	2	3	4	5	6	7
My ethnicity is an important reflection of who I am.	1	2	3	4	5	6	7
I am connected to my ethnic heritage.	1	2	3	4	5	6	7
Most people judge me on the basis of my ethnicity.	1	2	3	4	5	6	7
My ethnicity affects how my peers interact with me.	1	2	3	4	5	6	7
My ethnicity affects how I interact with people of other ethnicities.	1	2	3	4	5	6	7
People from other ethnic groups interpret my behavior based on my ethnicity.	1	2	3	4	5	6	7
My ethnicity influences how authority figures interact with me.	1	2	3	4	5	6	7

Please click on the item that best describes you.

Demographic Survey Items	
Gender	Male
	Female
Age	18-19
	20-21
	22 and over
Racial/Ethnic Group	Asian/Pacific Islander
	Black or African American
	Hispanic/Latino
	Native American/American Indian
	White (non-Hispanic)
	More than two races/ethnicities
	Other
Year in School	1st Year
	2nd Year
	3rd Year
	4th Year
	5th Year and above
What is your cumulative GPA?	Less than 2.0
	2.0-2.4
	2.5-2.9
	3.0-3.5
	3.6-4.0

APPENDIX B

CONSENT FORMS

Consent to Participate

Purpose: This study involves participation in a research-based survey. The online survey that follows is designed to examine how college students think and feel about their academic experience. This could be beneficial to future students, because programs for student success could use this information to be more effective.

Procedure: Participation in this study involves answering statements about your thoughts, feelings, and academic goals as a college student, as well as demographic information (e.g. gender, ethnicity, grade level, GPA, and student ID). The survey should take between 15 and 20 minutes to complete. In addition to you completing this survey, the research team will also collect information for the study that is a part of your usual academic requirements. This will include your official grade point average (GPA) as reported by Registrar's Office at UC Riverside.

Compensation & Costs/Alternative to Participation: Everyone, regardless of participation, will also be included in a lottery for a $50 Amazon gift card. Those that complete the survey will also receive one (1.0) credit if enrolled in Psychology 1 or 2 at UC Riverside. If you do not want to participate but want to be included in the lottery drawing, please contact the primary researcher. Also as an alternative to earning research credit for participating, you may attend a research lecture as described in the UCR introductory Psychology Research Participation Requirement.

Risks & Benefits/Withdrawal from study: Participation is completely voluntary and there are no right or wrong answers. Possible benefits include increasing our understanding of differences between students in how they approach education, and this information can then inform teachers and educators on how to enhance the classroom experience for all students. To minimize any discomfort some participants may experience answering personal survey questions, you may skip any question that makes you feel uncomfortable or discontinue participation completely at any time without penalty or loss of benefits. If you want to completely withdraw from the study, you can email the primary researcher and all your data will be destroyed. You will not be penalized in any way should you decide not to participate or to withdraw from this study.

Confidentiality: All identifying information, including your name and student ID, will be deleted after linking it to your GPA and survey responses. In its place we will assign a numerical code to each participant so that all participants' responses remain completely anonymous. All results will be reported in aggregate form and will not be identifiable. We expect to recruit 200 students for this study.

Contact Information: If you have any questions or would like to later withdraw your participation from the study, please feel free to contact the primary researcher, Melissa Christian, or the research faculty advisor affiliated at the University of California, Riverside, Dr. Carolyn Murray. If you have questions about your rights or complaints as a research subject, please

contact the IRB Chairperson at (951) 827 - 4802 during business hours, or to contact them by email at irb@ucr.edu.

Consent: By clicking the box below, you acknowledge that you understand the information given to you and that you accept the provisions in this form. You must be 18 years of age or older to participate. You must click this box (which represents your signature) to participate in the survey.