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Relationships Between Motivation, Self-Efficacy, Mindsets, Attributions, And Learning Strategies: An Exploratory Study

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Motivation, self-efficacy, beliefs about intelligence, and attributions about academic performance all play important roles in student success. To determine the relationships between these factors and the influence of demographics upon them, an online quantitative survey was taken of college students measuring their self-perceptions of these factors. The survey was comprised of items from three existing surveys: the Motivated Strategies for Learning Questionnaire (MSLQ), the Implicit Theories of Intelligence Scale, and the Revised Causal Dimension Scale. First- and second-year students, generally at the highest risk of attrition, were targeted in order to explore whether these factors could shed light on persistence. One hundred fifty-three surveys were returned, with 149 mostly completed and 116 fully completed.

Results generally, though not always, supported prior research regarding correlations between the factors measured. Additional relationships were shown between previously-uncombined factors, such as beliefs about intelligence and attributions. In numerous instances, small demographic groups made large

differences in the analysis of the overall demographic, showing the need to carefully examine the different perceptions of such groups if one is to get an accurate picture of a variety of students. These and other significant findings are discussed in the context of this study, of prior research, and of professional practice, and recommendations for future research are given.

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I would like to thank my committee, my family, and of course, my “partner in crime” for the incredible support they have shown during this process. It has made the journey far more enjoyable and rewarding.

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CHAPTER I

THE PROBLEM AND ITS BACKGROUND

Introduction

Motivation, self-efficacy, mindsets, attributions, and learning strategies all play important roles in academic achievement. This study explores the distribution of these factors in college students through a survey. Correlations may emerge among these factors as well as between these factors and student demographics. Such correlations may prove valuable to inform interventions designed to maximize student academic success.

Many studies have addressed the component parts outlined above, including studies on motivation found in Deci & Flaste (1995); on self-efficacy in Bandura (1997); on mindsets in Dweck (2000); on attributions in Weiner (1986, 2006); and on self-regulated learning in Schunk & Zimmerman, eds. (1994, 1998) and Bembenutty, ed. (2011). These studies have generally shown significant correlations between these factors and academic success, persistence with challenges, student enjoyment and well-being, and retention in academic programs.

Various questionnaires have been developed to ascertain the component factors. These include the Motivated Strategies for Learning Questionnaire or MSLQ, covering motivation/goal orientation, self-efficacy, and learning strategies,

among other factors (Pintrich, Smith, Garcia, & McKeachie, 1991); the Implicit Theories of Intelligence Scale, covering intelligence mindsets (Dweck, Chiu, & Hong, 1995); and the Causal Dimension Scales I and II, covering attributions (Russel, 1982; McAuley, Duncan, & Russell, 1992). The current study combines elements from each of these questionnaires into one survey instrument to determine what correlations may exist among them.

Because these and other factors are constantly in flux, it might seem difficult to capture and use this information to help students. However, research has indicated that many of these factors correlate consistently and can be modified through education and skills programs, such as first-year "College 101" courses (Schunk & Zimmerman, 1998; Wagner & Szamoskozi, 2012) or interventions intended to adjust student perceptions (Dweck, 2000; Perry, Hall, & Ruthig, 2005; Haynes et al., 2009). If we assume that academic advisors, instructors, and students are concerned about academic success, then these stakeholders in the education system may be interested in identifying causes for failure and success and how can they intervene most effectively with students.

Statement of the Problem

Student academic success, as measured by GPA and retention levels, is predicted to varying degrees by all of the above factors. For example, one meta-analysis of 109 studies showed that academic self-efficacy was the strongest predictor of cumulative GPA and the second strongest predictor of academic retention, even after high school GPA, standardized achievement tests, and socioeconomic status were accounted for (Robbins, S. B., Lauver, K., Le, H.,

Davis, D., Langley, R., & Carlstrom, A. 2004). Given this, one could argue that being aware of one's academic self-efficacy could be an important diagnostic tool, because this could predict or explain certain behaviors such as persistence in difficult courses. As another example, Dweck (2000) showed in a number of studies that students with what she termed *incremental mindsets* (the belief that intelligence and ability can be increased through effort) persisted through setbacks and failures significantly more than students with *fixed mindsets* (the belief that intelligence and ability are largely inborn and cannot be increased appreciably), and subsequently performed better on a number of measures. Students with incremental mindsets also tended to choose more challenging learning tasks and to attribute success and failure to effort rather than to ability, which has important implications for their future performance and persistence (Weiner, 1986; Bandura, 1997; Dweck, 2000; VanderStoep & Pintrich, 2008).

In addition to these factors contributing to academic success or failure, relatively simple, inexpensive interventions to address various student weaknesses have been shown to be effective in modifying student perceptions toward positive ends (Dweck, 2000; Perry et al., 2005; VanderStoep & Pintrich, 2008; Haynes, Perry, Stupinsky, & Daniels, 2009). Given this information, one could argue that using student profiles to target weak areas through interventions would be an excellent use of college or university resources, as this could pay substantial dividends in the future through increased graduation and retention rates, not to mention the non-financial benefits of increased student success, engagement, and enjoyment.

Retention rates, defined as first-year students returning for their second year, have fallen slightly in the last 20 years, from 74.9% in 1991 to 72.0% in 2012 (ACT, 2012, combined public and private institution rates); the National Center for Higher Education Management Systems (NCHEMS) puts the 2010 overall United States retention rate at 77.1% (NCHEMS retention rates, 2014). At the same time, the average retention rate goal (for the two-thirds of surveyed institutions who have specific retention rate goals) was 78.8% (ACT, 2010). While the gap between the goal and the actual rates is relatively small, it is likely that most institutions would like to raise retention rates wherever possible, especially given the negative consequences for institutions with low retention.

Similarly, the percent of students who graduate within five years of entry has fallen slightly over the past 20 years, from 54.4% in 1991 to 51.9% in 2012 (ACT 2012, combining public and private institution rates); NCHEMS puts the 2009 six-year graduation rate at 55.5% for the United States overall (NCHEMS graduation rates, 2014). (Note the differing number of years to graduation in each reference). In the 2010 ACT survey, institutions were asked about their six-year degree-completion rate, rather than five; the average rate was 50.1%, while the desired rate (for the 52.7% of surveyed institutions who have specific six-year degree-completion rate goals) was 56.0%. Again, although this gap is relatively minor, the overall trend may be troubling to colleges and universities, and according to those institutions with specific rate goals, the rates could use improvement.

So what are some ways these rates could be improved? The ACT (2010) survey included 42 student and institutional characteristics, which can affect attrition and asked respondents to rate the degree, on a scale from 1 to 5, to which they affected attrition at their school. The top ten attrition factors included four that directly relate to the factors in this study: student study skills (#3, mean 3.80); level of student motivation to succeed (#5, mean 3.64); level of student commitment to earning a degree (#6, mean 3.56); and student educational aspirations and goals (#9, mean 3.36). In contrast, there was only one factor in the bottom ten which relates to the factors in this study: relevancy of curricula (#32, mean 2.59, related to the Task Value questions). Given the perceived importance of the factors on the list, one could argue that knowing student profiles corresponding to these factors could prove beneficial for institutions, as students with troubling responses could be encouraged to participate in targeted intervention programs to address those specific factors. Indeed, a recommendation from ACT (2004) states:

> Implement an early alert, assessment, and monitoring system based on high school GPA, ACT Assessment scores, course placement tests, first semester college GPA, socioeconomic information, attendance records, *and non-academic information derived from formal college surveys and college student inventories* to identify and build comprehensive profiles of students at risk of dropping out (italics added).

Despite this recommendation, implementation of such profiling and subsequent interventions is inconsistent. ACT (2010) included a list of 94 programs, services,

curricular offerings, and interventions, each of which could potentially affect student retention. If a practice was offered at a given institution (yes/no), respondents were asked to rate their perception of the degree to which the practice affected retention on a five-point scale. Both the incidence rate and the perceived degree of effect are noteworthy, because although an institution may have a program in place, it may not be regarded as effective; on the other hand, a program may be highly regarded but not implemented. Three practices related to this study were listed in the highly-rated and high-incidence category: advising interventions with selected student populations, a credit-bearing freshman seminar/university 101, and a study skills course/program/center. While there were no details about what these practices included, one could reason that the kind of profiling used in this study could have been included in some manner within all of these programs. At the same time, interest, values, and personality assessments were among the lowest-rated practices. It is possible that some programs do in fact use these assessments and that respondents simply are unaware of this; if so, the low rating is unfounded, because it is part of an otherwise highly-rated program.

One important factor to consider when exploring student academic performance is *underachievement*. Underachievement is an issue related to self-efficacy, motivation, and attributions. It occurs when a given student has ability greater than that which is generally exhibited through behaviors, whether in a specific subject or in general academic settings. Because underachievement can cause significant negative repercussions in one's academic and work careers

(McCall et al, 1992), and because many of the factors addressed in this study predict underachievement, identifying these factors in particular students is crucial.

Purpose of the Study

This study aims to obtain student profiles across the dimensions outlined above through a questionnaire. It is hypothesized that significant correlations will emerge between the factors as well as between the factors and student demographics. If such correlations are found, that information could prove beneficial for three major stakeholders in the academic success of students:

1. The students themselves: An understanding of one's personal profile and its strengths and weaknesses can be used to regulate study efforts and choose appropriate strategies (Schunk & Zimmerman, 1998; VanderStoep & Pintrich, 2008).

2. Academic advisors: With access to the profiles of students, and an understanding of the importance of the factors (especially regarding course preference, persistence, and retention in academia), advisors would have information with which to start important discussions with students entering the college or university (Landry, 2003).

3. Course instructors: With access to the profiles of students, and an understanding of the importance of the factors (especially regarding persistence in courses and understanding of coursework), instructors could make adjustments to their courses in order to promote learning and efficacy simultaneously (Schunk, 1994; Landry, 2003). Instructors could also provide

specific interventions (either themselves or by allowing class time for others to administer them) to boost negative cognitive and academic perceptions held by students. Even though these interventions are low-cost and take little time, they have demonstrated significant increases in student performance (Dweck, 2000; Perry et al., 2005; Haynes et al., 2009).

Theoretical Framework

The main conceptual framework of this study is *self-determination theory* or SDT. SDT holds that three main elements are necessary for learners to self-actualize in the learning process: competence, autonomy, and relatedness (Deci & Ryan, 1985). While significant and enjoyable learning can occur with less than adequate amounts of these three elements, it will still be lacking in comparison to what is possible when all three are present, and students will not attain or retain the same level of motivation or persistence. This is why it is important for students and instructors alike to understand how these three elements are (or are not) encouraged in the classroom. Regarding motivation or goal orientation, SDT posits a spectrum of extrinsic motivation, ranging from externally controlled to internalized, based upon the perceived locus of control and the valuation of the activity (Ryan & Deci, 2000). Understanding this range is important for educators because many typical classroom tasks are not inherently interesting or enjoyable; therefore, “knowing how to promote more active and volitional (versus passive and controlling) forms of extrinsic motivation becomes an essential strategy for successful teaching” (p. 55). There are also separate categories for intrinsic motivation (which implies an inherent interest and enjoyment in an activity) and

for amotivation (which implies low perceived competence, relevance, and/or contingency regarding the activity). Important to SDT theory are numerous experimental results which show that performance-contingent rewards, threats, deadlines, directives, and competition pressure nearly always diminish intrinsic motivation, because there is a sense of one's behavior being controlled by them. Because many of these elements are present in college classrooms, it is important to consider their possible ramifications regarding effective learning and student engagement.

A natural derivative of SDT is *self-regulated learning* (SRL) theory, which focuses upon the learning process more specifically. SRL theory makes the assumption that learners are active participants who construct their own meanings from information received as well as that which is available internally (Pintrich, 2004). Learners also construct their own unique goals and strategies from these internal and external resources. Another important assumption of SRL is that "self-regulatory activities are *mediators between personal and contextual characteristics and actual achievement or performance"* (Pintrich, 2004, italics in original). That is, we know that demographic and personality characteristics have an effect on learning, as do the contextual factors of the learning environment; however, the self-regulatory activities exhibited by students (based upon their personal characteristics and moderated by the environment) also play a crucial role in eventual achievement. Additional assumptions include the possibility of control of cognition, motivation, and behavior by learners; and the existence of criteria against which the learning process is measured and evaluated (Pintrich,

2004). Generally speaking, “self-regulation affects motivation, emotions, selection of strategies, and effort regulation and leads to increases in self-efficacy and improved academic achievement” (Bembenutty, 2011, p. 4). Because this framework encompasses so many cognitive factors as well as learning strategies, it was an appropriate choice for this study.

In practice, SRL refers to the numerous strategies that successful students employ. These strategies include those familiar to most students, such as organization, rehearsal, and elaboration, but also include a number of metacognitive strategies which help students keep perspective on their progress, understand where their weaknesses are, predict how to get to their learning goals, ask appropriate people for help when needed, track their motivation and efficacy levels, and so on. Bandura (1997) elaborates upon the self-efficacy component of SRL by saying “A high sense of self-regulatory efficacy contributes to mastery of academic subject matter by building a sense of cognitive efficacy and raising academic aspirations in those domains” (pp. 174-5). In this definition, self-efficacy refers to the utilization of the self-regulatory processes themselves—and similarly to other areas of self-efficacy, is considered a perceptual, changeable attribute by the theory.

SRL posits an overall model of learning which includes four phases, each of which has four areas in which regulation can occur: cognition, motivation/affect, behavior, and context (Pintrich, 2004). In phase one, goals are set and prior knowledge is activated; in phase two, motivation, affect, effort, and context are monitored; in phase three, strategies for learning, thinking,

motivation, and affect are selected; and in phase four, cognitive and evaluative judgments about the event and one's participation in the event are formed, thereby allowing adaptation for the next learning event through reflection. In each phase there are multiple factors at work, including internal ones (such as goal orientation, self-efficacy, and attributions) and external ones (classroom environment, social interaction, resources, and teacher interventions). As is evident, students make many choices throughout the phases of any given learning event. Which choices they make and how they reflect upon the outcomes of those choices can vary significantly between students or between learning events for the same student. At any given step in the event or process, there are a number of strategies and interventions possible which can redirect or modify a student's cognitive processes and therefore (potentially) their choices and behaviors (Schunk & Zimmerman, 1998; Stipek, 2002; Pintrich, 2004; Perry et al., 2005; Lyke & Young, 2006; Stupinsky, Perry, Renaud, & Hladkyj, 2013; DiBenedetto & Bembenutty, 2013; Mouratidis, Vansteenkiste, Michou, & Lens, 2013). This is the underlying reason for both students and instructors to be aware of regulatory strategies and to take notice when potentially negative attributions are exhibited through behavior or speech: with the right feedback (including self-feedback), an otherwise self-defeating spiral can be interrupted or reversed, thereby bolstering efficacy, motivation, and learning effectiveness.

What are the characteristics of poor self-regulation in students? Zusho & Edwards (2011) state that “failures in self-regulation are likely to occur when students are unable to accurately assess task characteristics and demands; have

limited knowledge about the task, domain, and/or strategies; and either over- or underestimate their skills to complete the task" (p. 27). There are thus a number of areas in which students must self-regulate in order to be successful; skills courses and other interventions should therefore take a multifaceted approach to address self-regulation adequately, covering various domains such as task identification, learning strategies, self-monitoring, and self-reflection in addition to other important cognitive factors such as motivation, goal-setting, self-efficacy, and attributions.

The effects of poor self-regulation on academic achievement can be considerable:

> ...there is evidence that a major cause of underachievement is the inability of students to self-control themselves effectively...underachievers are more impulsive, have lower academic goals, and are less accurate in assessing their abilities; furthermore, they are more self-critical and less self-efficacious about their performance and tend to give up more easily than achievers...these students are more anxious, have a lower self-esteem, have a higher need for approval, and are more influenced by extrinsic factors than achievers. (Schunk & Zimmerman, 1994, p. 5)

Because of the potential for such detrimental outcomes due to poor self-regulated learning, it is important to assess student levels of self-regulation and to identify and address weaknesses wherever possible, whether through intervention programs, instructor feedback, or meetings with academic advisors. One of the instruments designed to assess many of the elements of SRL is the

MSLQ, detailed in the Methodology section and utilized (in part) in this study. This, along with questions from a mindset and an attributions instrument, will allow the building of student cognitive profiles illustrating a variety of perceptions of their academic abilities, including self-regulated learning. When combined with demographics and analyzed, it is hypothesized that correlations and patterns will emerge. These results can inform future students, instructors, and advisors concerned with student academic success.

Research Questions

The following research questions will guide this study:

RQ1. Are there significant correlations between motivation, self-efficacy, mindsets, attributions, and learning strategies?

RQ2. How do the various student demographic variables and groups correlate with the factors?

RQ3. How do the mindset and attribution categories relate to the other factors?

Term Definitions

Cognitive factor: Any of the 13 factors under investigation, as found in the MSLQ, the Implicit Theories of Intelligence Scale, and the Revised Causal Dimension Scale.

Intervention: Any interaction with a student by an instructor, advisor, or other individual with the specific purpose of advancing that student's academic potential. This study particularly concerns itself with interactions based upon an

understanding of the cognitive factors under investigation. Interventions can be of any duration or intensity.

Learning Strategy: Any skill employed by students for the purpose of absorbing, organizing, understanding, or otherwise mastering academic material.

Delimitations and Limitations

This study recruited participants from one large Midwest university. Therefore, it may not be generalizable to universities located in different areas or with different student populations. However, the findings may inform future investigations of these factors by providing a comparison sample.

One limitation of the study is the recruitment method for the sample. Participants were recruited through two means: 1) instructors who grant permission for me to describe the research to their classes, and post the online link to the survey; and 2) instructors who agree to announce the research themselves, and provide the link to their classes. Therefore, there are many students at the university who will not be informed about the survey, as there is no straightforward way to contact the entire population.

Additional limitations include the kind of data collected. The survey was quantitative, and while every effort was made to utilize existing instruments and include adequate representation of each factor, it is possible that certain factors may be over- or under-represented. In addition, some items required alteration (as explained in Chapter 3—Methodology) such that they address general academic coursework rather than addressing a specific course, which was their original purpose. This may have repercussions upon the survey's reliability

and/or validity because students may hold different perceptions and/or utilize different learning strategies in different courses (Pintrich, 2004).

Significance of the Study

The study can add to scholarly research in several ways. Reliability analyses of the various instruments provided data to support or not support the various instruments used. Correlations emerged between the various factors (and/or demographics) which were not previously measured simultaneously. These correlations may help describe the factors through their relationships; future research could target specific correlations and expand upon them through replication with different populations, in different field or experimental settings, and by using pre- and post-test interventions designed to change the perceptions under consideration.

The study can improve practice in education in several ways. Because these personality constructs can have such a dramatic impact upon student success, understanding them could be very beneficial to students, instructors, and academic advisors. If profiles of students are known (assuming students are willing to divulge this information), these parties can work in their various domains to develop student strengths while addressing potential weaknesses (Schunk, 1994; Landry, 2003; Vanderstoep & Pintrich, 2008). Aggregate profiles of students in a class may offer insight for instructors while keeping information private; while knowing specific profiles might offer better targeting of individual student needs, that same knowledge could introduce bias in grading, so how student profiles are used would need to be considered carefully. Students can

also make use of their own profile information by leveraging their strengths while ensuring that they “stretch” themselves to address and develop their weaker areas. In this scenario, students could keep their profiles private if they wish.

Lastly, this study can improve educational policymaking in several ways as well. If correlations between the factors under consideration are found, interventions can be refined appropriately, thereby possibly increasing their effectiveness. Colleges and universities could invest in these programs to help students succeed and remain enrolled. Such intervention programs (even brief, inexpensive ones) have been shown to increase student achievement, well-being, and retention, particularly with students who have a low sense of academic control (Perry et al., 2005; Haynes et al., 2009). Given the substantial number of students who withdraw from college, it would seem prudent for higher-education institutions to invest in such inexpensive, easily-administered intervention programs and in extra training for instructors and advisors to participate.

CHAPTER II

LITERATURE REVIEW

This section provides definitions, background research, and support for the attributes under consideration in this study: motivation/goal orientation, self-efficacy, attributions, and a set of learning strategies addressed on the MSLQ. Each attribute has correlating questions on the survey, as described in the Methodology section. There are of course many overlaps between the attributes, such as between intrinsic motivation and self-efficacy, or between mindsets and attributions. Statistical correlations may indicate the existence and strength of such overlaps; one key task of the data analysis is to determine where such overlaps occur.

For many of the attributes described in this study, it can be difficult to determine “which comes first,” because the causes and symptoms may feed back upon each other. For example, low interest clearly leads to low motivation, but one can imagine the opposite also being true: having low motivation may indicate that one is not interested. Furthermore, one can use the “low-interest” claim to justify low motivation and/or low performance (Dweck, 2000). As another example, having high self-efficacy typically leads to increased persistence in a difficult task, because one believes that if one works hard enough, success will come. However, the reverse may also be true: if one persists in a difficult task

and succeeds, one's self-efficacy for the task will likely rise. The inverse for each of these scenarios can also be true: low self-efficacy leads to low persistence and low persistence leads to failing at a task, thereby lowering one's perception of self-efficacy (Bandura, 1997; Stipek, 2002).

Motivation

Edward Deci compiled several decades of research on motivation. The central distinction of motivation, according to Deci, is whether behaviors are autonomous or controlled, whether one feels free in one's actions or feels pressured to act in a certain way. If one feels pressured or controlled, "their behavior is not an expression of the self, for the self has been subjugated to the controls" (Deci, 1995, p. 2). This is also called the *locus* of action, and the perception of where this locus resides (under one's control or under the control of others) can have important ramifications upon behavior and attributions (Perry, 2005).

Deci further divides controlled behavior into two types: compliance and defiance. "Compliance and defiance exist in an unstable partnership representing the complementary responses to control" (Deci, 1995, p. 3). As the research demonstrates, the underlying reasons for a given response often are complex, with multiple elements affecting the eventual behavior. Indeed, while many studies have found that intrinsic motivation correlates more strongly with successful academic outcomes than extrinsic motivation does, there are many situations in which extrinsic motivation can be beneficial: "...for some college students, particularly those with little or no intrinsic interest in or value for the

course...extrinsic goals of getting a good grade are 'beneficial' in the sense that these goals lead uninterested students to become somewhat more cognitively involved in the course" (Pintrich et al., 1994, p. 124). And, "We must recognize that the best learning likely depends on both intrinsic and extrinsic motives, and that the potential for intrinsic involvement coexists in all of us right alongside a potential for responsiveness to external rewards" (p. 180). One of the aims of this study is to compare intrinsic and extrinsic motivation or goal orientations, through specific questions pertaining to each, and to determine how these correlate with other factors. Intrinsic goal orientations have been shown to correlate with deeper learning strategies such as elaboration, making analogies and connections, and expanding on material that has been presented (Lyke & Young, 2006). Given this, students and instructors both could benefit from an understanding of the differences between the two kinds of motivation or goal-setting, and the methods in which intrinsic motivation can be fostered.

As an example of how intrinsic and extrinsic motivation differ, in a number of studies, Deci (1995) examined how much participants continued to engage with a task after the supposed "experiment" had concluded. The task was typically the so-called "Soma" puzzle, which consisted of a set of variously-shaped blocks which can be assembled in numerous ways, and which was enjoyable in its own right to most participants. Those in the control groups were simply given the task and allowed to engage with it as much or as little as they wanted, whereas those in the experimental groups were paid a token amount for solving the puzzle in various ways. Both groups had alternatives in the room,

such as magazines, with which to engage. The idea was to see how long each group continued to engage with the puzzles after the experimenter left, supposedly to “enter data into a computer and to get a questionnaire.” In reality, the experimenter left for precisely eight minutes and the participants were observed through one-way glass.

In study after study, participants who were paid to solve the puzzle rapidly lost interest once the experimenter left, whereas the control participants continued to engage with the puzzle. The vast majority of participants found the puzzle engaging in and of itself, at least initially. However, once a reward was offered for performance, the intrinsic motivation to engage with the puzzle dropped, as evidenced by the loss of interest once the experimenter left the room. But if no reward was ever offered, the participants continued to engage with the puzzle, thus demonstrating that their intrinsic motivation persisted. If intrinsic motivation was initially the same with both groups, why did offering rewards stifle it after the rewards were removed? One might imagine that offering a reward in addition to an already-engaging activity would only promote engagement, yet the research contradicts this.

Kohn (1993) references numerous studies in which the damaging effects of rewards upon intrinsic motivation were evident. These rewards (such as money, gold stars, pizza parties, etc.) were offered to increase motivation for various tasks. One might expect that the opportunity to receive a reward would increase motivation to complete tasks which were intrinsically motivating as well as not, and in the short term, this was generally true. However, after the reward

was removed, the motivation for both kinds of tasks dropped significantly below the original baseline motivation level (Kohn, 1993; Stipek, 2002). One explanation for this is that offering a reward had the effect of taking the perceived locus of control away from the participant, thereby making subsequent effort contingent upon that reward (Deci, 1995; Pink, 2009). If the effort was then directed towards that end, the participant would feel controlled by the situation or the individuals controlling the situation. In either case, if the reward was removed, the motivation for completing the task disappeared, because it was confounded with being controlled.

In the case of tasks that are not intrinsically motivating, using rewarding schemas might be considered appropriate, because one gets participants to do the task. Even if one then has to continue offering the reward to get compliance, it may be worth it for the result. Tasks which are simple or repetitive are well-suited for such rewards (Pink, 2009). However, in virtually every study, offering rewards in tasks that were already intrinsically motivating, required complex thought, or had a strong creative component had a devastating effect upon future perceptions of the task—students no longer had nearly the level of engagement as before. In these cases, the introduction of a reward backfired completely, because the underlying goal of getting students engaged in learning was overshadowed by the superficial reward.

More disturbing still, those offered rewards tend to choose less-challenging tasks, and the products of these tasks tend to be “more stereotyped and less creative than the work of comparable non-rewarded subjects working on

the same problems" (Condry, 1977, p. 471-2). This is particularly true when the tasks require novel thinking, as the push for a quick solution (to get the reward) often overshadows the creativity needed to solve the task (Pink, 2009). Kohn (1993) concurs: "At least ten studies have found just that, with preschoolers working for toys, older children working for grades, and adults working for money all trying to avoid anything challenging" (p. 65). In other words, if you are promised a reward for doing a task, your attitude towards the task will change: rather than seeing it as valuable in and of itself, you will see it as an obstacle to overcome in order to get your reward. Thus, environments which use reward schemas for performance have the effect of discouraging creative thinking and risk-taking, because these strategies may not get the task done in the quickest and easiest way possible. The implications for students are disturbingly clear. Many (if not most) college-level courses are graded, and many grading methods provide no room for individual differences or subjectivity, such as tests with multiple-choice, true-false, matching, or fill-in-the-blank questions. In such cases, one would expect many students to "study to the test" and not put in extra effort to learn for the sake of learning, because anything superfluous to receiving as high a grade as possible may be seen as unnecessary or even wasteful of limited time. Such attitudes reflect a *performance approach* rather than a *mastery approach*, and have numerous ramifications, including superficial engagement with material and lower-level cognitive strategies (Dweck, 2000; Lyke & Young, 2006).

Some factors of intrinsic versus extrinsic motivation orientations parallel learning-based versus performance-based goal-setting, but the parallels are not always straightforward or complete. For example, one may be intrinsically motivated to perform well on a task, even when nobody else witnesses it or ever knows about it. By the same token, one who is extrinsically motivated to achieve a goal may understand and appreciate that learning along the way is necessary to reach the goal, and may derive enjoyment from the learning itself, perhaps separately from whether they succeed in reaching the goal.

Bain (2004) investigated the many traits and practices of highly-effective college educators. In one section he focused upon motivation, and in particular, the interactions between intrinsic and extrinsic motivation, echoing other researchers with his explanation that “people lose much of their motivation if they think they are being manipulated by the external reward, if they lose what the psychologists have called their sense of the ‘locus of causality’ of their behavior” (Bain, 2004, p. 33). In fact, both motivation and performance have been shown to drop in many reward-driven situations, and these effects can persist long after the extrinsic rewards are gone (Deci, 1995; Kohn, 1993). Furthermore, if students are extrinsically rather than intrinsically motivated, which in a college course usually means getting the best grade possible (performance approach) or avoiding a bad grade (performance avoidance), the result is often that they will lose or eschew problem-solving and analysis abilities, thereby failing to develop deep connections with the material. This process can produce strategic learners

who focus primarily upon performance outcomes, avoiding challenges that could harm their academic record (Bain, 2004).

The parallels between types of motivation and other related factors such as self-efficacy are not always direct or complete. An individual can have combinations of both types of motivation and various levels of efficacy, and the resulting attitudes and behaviors will differ. However, studies have shown that intrinsic motivation and goal orientation typically foster so-called “deep learning,” defined as using elaboration and organization strategies, while extrinsic motivation typically fosters “shallow learning,” defined as using rehearsal and memorization strategies (Lyke & Young, 2006). Therefore, assessing levels of student intrinsic and extrinsic motivation can give valuable insight into student behaviors and provide instructors with information that can be used to adjust both their course design (perhaps by changing their grading methods or assignment types) and delivery (perhaps by providing motivational feedback or emphasizing mastery over performance). Such changes can make a substantial difference in overall student engagement and learning effectiveness (Perry et al., 2005; Lyke & Young, 2006). In this study, intrinsic and extrinsic goal orientations are measured by two subscales of the MSLQ.

Self-Efficacy

Albert Bandura (1997) defined self-efficacy as the belief “in one's capabilities to organize and execute the courses of action required to produce given attainments” (p. 3). According to Bandura and many others, a person's level of self-efficacy can have dramatic impacts upon what they choose to do,

how long they persist in the face of challenges or failures, how they react to praise and criticism, and expectancy of success or failure in future endeavors. In fact, perceived self-efficacy can affect everything from small decisions to major ones such as occupational interests and consideration of one's career path, perhaps causing one to follow a second-choice career track because of a lack of efficacy for success in the preferred path. This can have important ramifications not only in which majors and courses one chooses, but also in levels of persistence in the chosen path. These effects of self-efficacy has been verified in "stringent empirical tests that control for the effects of actual ability, prior preparation and achievement, and level of interest" (Bandura, 1997, p. 427).

Because of this significant contribution, it seems logical that students would want to know what their perceived self-efficacy is, especially if it might be "dragging them down." Compared to the time and effort expended in other areas, determining this is straightforward and could pay significant dividends down the road concerning course, major, or career choice, among other decisions. If instructors were aware of the perceived self-efficacy of their students, they could modify delivery, assignments, and feedback to foster student self-efficacy, which translates into increased performance (Bandura, 1997; Stipek, 2002; Lyke & Young, 2006). If advisors were aware of student self-efficacy, and could recognize some common symptoms of low self-efficacy, they would be attuned to the conversational and behavioral "red flags" which students exhibit, and could then address these issues through appropriate interventions—even informal,

conversational ones, in which the advisor may steer the dialogue in an appropriate direction or suggest a specific course of action.

In education, self-efficacy clearly plays a significant role in student success. Robbins et al. (2004) performed a meta-analysis of 109 studies across nine psychosocial and study skills constructs, finding that academic self-efficacy was the strongest predictor of cumulative GPA and the second strongest predictor of academic retention. Prat-Sala & Redford (2010) found that “students classified as high in self-efficacy (reading and writing) were more likely to adopt a deep or strategic approach to studying, while students classified as low in self-efficacy (reading and writing) were more likely to adopt a surface approach” (p. 283). This study also examined intrinsic and extrinsic motivation orientations and found similar correlations between these and approaches to studying.

High levels of academic self-efficacy can prompt students to persist when facing difficult challenges, whereas low levels can prompt students to give up quickly or to pursue less-challenging alternatives (Bandura, 1997). While such decisions are not necessarily “bad” for a student in the long run, and such an assessment depends on a number of factors, common sense indicates that making an informed choice is preferable to making a choice based upon fear of failure. Such consequences may or may not reduce a given student's overall happiness or fulfillment in life, but a compelling argument can be made that the reasons for making such decisions are not optimal.

Self-efficacy is sometimes confused with *self-concept*, *self-esteem*, or *confidence*. While these concepts can have similarities in some cases, at their

cores they address different specifics. Self-concept refers to the integrated view of the attributes, abilities, and attitudes that make us who we are (Woolfolk & Perry, 2012). Bandura (1997) adds “The self-concept is a composite view of oneself that is presumed to be formed through direct experience and evaluations adopted from significant others. Self-concepts are measured by having people rate how well descriptive statements of different attributes apply to themselves.” (p. 10) Self-esteem/self-worth refers to the value attached to one's self-concept (Woolfolk & Perry, 2012). Bandura (1997) adds “Perceived self-efficacy is concerned with judgments of personal capability, whereas self-esteem is concerned with judgments of self-worth. There is no fixed relationship between beliefs about one's capabilities and whether one likes or dislikes oneself.” (p. 11) Confidence refers to “...a nondescript term that refers to strength of belief but does not necessarily specify what the certainty is about.” (Bandura, 1997, p. 382).

Such distinctions are important when identifying predictors and causes of behavior. It is entirely possible to have high self-efficacy in one area, yet have a low self-esteem in the same area; in other words, one can be skilled at something which one finds malevolent (Bandura, 1997). As predictors of future persistence, but not necessarily success, such combinations can have opposite influences. This depends on the task, the perceived worth of the effort (including moral considerations), and the potential rewards for success. Believing a task has questionable value or worth also affects motivation and persistence,

sometimes independently of one's ability or performance (Sansone & Harackiewicz, 2000; Stipek, 2002).

Important distinctions regarding student ability levels can be overlooked when considering grades, particularly if a given grade is based on performance outcomes rather than effort. A high grade does not necessarily mean the student learned the material at a deep level, expended much effort, has any interest in the course, believes the material in the course has value, or will continue to succeed in similar courses. Similarly, a lower grade does not necessarily imply the opposites of these outcomes. However, if the grade does not reflect the student's perception of how hard they tried or how effective they believe themselves to be at the task, this can affect perceived self-efficacy, which can have a domino effect upon future effort, persistence, and interest, particularly if the grade is skewed negatively (Kohn, 1995; Stipek, 2002).

Clearly, understanding one's perceived self-efficacy can be a valuable tool for self-reflection and decision-making, given the significant impact that self-efficacy can have upon intrinsic motivation, performance, retention, attributions, and choices (and the effects which these, in turn, have upon self-efficacy). Therefore, understanding how self-efficacy relates to these other cognitive and behavioral factors is an essential part of this study.

Mindsets

Dweck (2000) showed in a number of studies that one's *mindset* has a significant effect upon persistence, particularly in the face of challenges. She defines two mindsets concerning intelligence: fixed and growth.

Individuals with a *fixed* mindset believe intelligence is more or less constant, largely inherited, and cannot be changed substantially. This is also called *entity theory*. Bandura (1997) elaborates upon this mindset by saying that people who regard ability as inherent tend to regard performance levels as an indicator of that inherent capacity. Therefore, such individuals tend to avoid difficult tasks and take on easier ones, as they can demonstrate their ability and avoid showing weaknesses (including high levels of effort), even though this comes at the expense of real learning.

As discussed in the Motivation section, performance-based approaches to learning have a number of potentially negative consequences, such as shallow learning and avoidance of challenges or risks. That said, some studies have shown positive outcomes from performance-approach goals, at least regarding grades (Church, Elliot, & Gable, 2001; Mouratidis et al., 2013). However, performance-avoid goals tend to produce negative outcomes regarding grades, engagement, and persistence (Bernacki, Byrnes, & Cromley, 2012; Lyke & Young, 2006).

In contrast, individuals with a *growth* mindset believe intelligence, though naturally different among people, can be cultivated and improved through learning. This is also called *incremental theory*. In this mindset, high effort is not indicative of compensating for low ability; rather, it indicates a desire for individual growth. The successes or setbacks of others do not factor into one's persistence or level of effort; only the individual's personal progress matters. Bandura (1997) adds that people who regard ability as an acquirable skill also tend to frame

mistakes and setbacks “not as personal failures but as learning experiences indicating that greater effort or better strategies are needed to succeed” (p. 118). Liu & Noppe-Brandon (2009), in their book on creativity and imagination, stress the importance of having an incremental mindset for persistence, especially in creative or challenging endeavors, because of the number of potential setbacks one can encounter: “...imagining yourself to be limited makes you limited—because you give up trying or practicing when you hit the first obstacle or get your first negative outcome” (p. 87). However, imagining the opposite—that you can improve your abilities, no matter where you start—can also be self-fulfilling. Note that “abilities” can refer to a wide variety of skills or habits of mind, including subject-area knowledge, study strategies, research methods, time management, finding appropriate help, and so on. It is also possible that a given student will have different mindsets about different abilities—for example, feeling that their math ability is relatively fixed, whereas their time management skills can be improved. Furthermore, the same student may hold different mindsets at different times even in the same general area of ability, due to feedback about performance, variations in what is being asked of them, or other reasons. This is why one should be cautious not to read too many conclusions into a single, general result; however, for this study, the value of the general mindset rating is mainly the ways it correlates with other perceptual values, which could lead to more detailed, specific studies about the attributes in question.

In a number of studies, Dweck demonstrated significantly different outcomes resulting from having each mindset when encountering challenges.

She separated individuals into two groups based on the results of a short mindset questionnaire, then posed a variety of tasks (or in some studies, allowed participants to choose tasks at various levels of difficulty). She then assessed performance, perceptions about performance, levels of helplessness, persistence, reactions to criticism, choice of task, and other factors, depending on the focus of the particular study. The results were consistent across studies and showed important outcomes for each mindset. Persons with fixed mindsets were more likely to choose easy tasks, avoid difficult ones, and attribute success and failure to ability or lack of ability; they showed helpless behaviors in the face of setbacks, often carrying these behaviors to tasks in which they had previously succeeded; and they put more emphasis upon performance and competition, even to the point of falsifying self-reported scores on a task. In contrast, persons with incremental mindsets were more likely to choose challenging tasks which prompted learning and to attribute success and failure to effort or lack of effort; they showed mastery-oriented behaviors in the face of setbacks, thus persisting through difficulties; and they put more emphasis upon effort and growth rather than competition, believing that improving their learning was most important, not how they compared with others.

Another major area of Dweck's research investigated the use of certain types of praise and criticism. Results from a collection of related studies (Mueller & Dweck, 1998, performing a total of six studies) demonstrated the care needed when giving either one: it supports future student achievement much more if one bases one's evaluations on effort than on ability, e.g., “You really worked hard on

this” instead of “You must be really smart”. Praising intelligence or ability can have a detrimental effect, tending to steer the recipient towards a fixed mindset. Although such praise might feel good to the recipient in the short term, it can backfire dramatically when a future setback occurs—it can make the person believe the setback happened due to a lack of ability or intellect (Dweck, 2000; Kohn, 1993). By the same token, it can make the person believe that any *success* is also based upon their ability, thus rendering their worth “conditional” and creating a strong desire to protect this perceived worth at any cost, such as choosing unchallenging activities or falsely reporting or exaggerating one's performance. In contrast, praising effort has the tendency to promote persistence and keeps the performance separated from the individual's ability, e.g., “I didn't do well, but it's because I didn't spend enough time working on it”. The case is even stronger to exercise caution when wording criticism, as ability-based negative comments can be devastating to learners, especially younger, more impressionable ones.

A further ramification of Dweck's work involves the learning theories held by instructors. Kozeracki (2005) posits that “Educators are also entity theorists or incremental theorists, and their views influence how they assess students' abilities” (p. 56). Traditional, “top-down” approaches to education (such as the “one-size-fits-all” lecture model) can have a bias towards entity theory, as little or none of the grade is typically based upon effort if the assessments are mainly objective examinations. In one sense, this acts as an equalizer, as all students are held to the same objective standard, and therefore could be considered the

most fair. But in another sense, this grading system acts as a homogenizer, because students are expected to fit a certain pre-defined standard and to perform similarly. Because the level of effort it takes for a given student to get a certain grade is irrelevant, this system could be seen as the *least* fair, because based upon ability level, some students will have a much harder time than others to achieve the same grade. The advantages and disadvantages to such an approach are for another discussion, but it is clear that some students succeed in one style and not the other, even given similar course content, student aptitude, and student interest in the subject. It is also worth noting that different students may view the same grade differently, which in turn may be drawn from their ideas about intelligence, effort, the importance of grades, and so on. They may also view feedback differently—some may see it as a means to improve, others may see it as highlighting their inadequacies, and still others may ignore it and focus only upon the grade itself, not bothering to use it for improvement on the next assessment. This begs the question of how such approaches to assessment might be modified to reach the existing variety of students more effectively, and a number of researchers have offered strategies in this regard (Bandura, 1997; Landry, 2003; Perry et al., 2005; Lyke & Young, 2006; Zusho & Edwards, 2011).

Instructional methods can support incremental learning through a number of techniques, including self-reflection on progress or re-submission of assignments after feedback. Such techniques allow students to explain their efforts or to have a “second chance” at assignments, both of which increase their sense of control in the course (Landry, 2003; Perry et al., 2005; Zusho &

Edwards, 2011). This increased sense of control leads to deeper engagement (Lyke & Young, 2006) and higher levels of enjoyment (Perry et al., 2005).

The consistency of Dweck's results, combined with the range of life endeavors in which these mindsets produce such different outcomes, makes these studies highly important. If one is able to identify student mindsets, then appropriate changes to learning environments and teaching methods can be made to address potential challenges. In fact, simply informing students that "intelligence is incremental" (through a short presentation or having students read an authoritative article on the subject) can have substantial positive impact upon student performance, regardless of prior perceptions (Dweck, 2000).

Attributions

Weiner (1986) investigated the attributions people place on success and failure. He identified three perceptual dimensions which influence attributions: stability, locus, and control.

Stability refers to whether a situation or cause remains constant over time.

Locus indicates whether a situation or cause is internal or external.

Control means whether a situation or cause can be controlled or affected by one's actions (Weiner, 1986, p. 71). McAuley et al. (1992) breaks the Control dimension out into two factors: External and Personal.

As an example, missing an exam because one was in an accident would generally be seen as unstable, external, and uncontrollable; therefore, few would probably penalize this unfortunate individual. A less-extreme, more subjective case might be missing the exam due to a religious holiday. This is stable, as it

was known and happens regularly; it is external, yet the person ultimately decides whether to attend; and it is uncontrollable, as it happens regardless of the person's involvement. An instructor may or may not accept this reason as an excuse for missing an exam, and there are certainly other factors to consider in this example. It is included to highlight the complexity of and interplay between the attributional dimensions.

When considering more “fuzzy” cases, attributions can vary widely, bringing with them a host of self-judgments and expectations for future performance. If a student attributes poor performance on a test to an inherent lack of ability in that area, it is likely that the student will not expect to be successful on future tests, because ability is seen (by this student at least) as stable and uncontrollable, and therefore difficult or impossible to improve. However, if the poor performance is attributed to a lack of effort, the student may believe that he/she has the potential to succeed, and therefore make a more concerted effort on future tests (Weiner, 1986; Dweck, 2000; Stipek, 2002). At the same time, if the lack of effort is itself attributed to a perceived *inherent* deficiency, such as procrastination or laziness, the student may not only fail to make the additional effort in the future, they may also feel guilt (“I could have tried harder”) or shame (“I'm lazy”). In this case, the situational attribution, though promising for future success, is overridden by the more general, personality-based attribution. Similar issues arise with “test anxiety,” or even just considering oneself to be “a bad test-taker,” which may be seen differently by different students—some may see it as part of their character and therefore relatively

permanent, while others may see it as a psychological obstacle which can be overcome through changes in attitudes, beliefs, and strategies.

Thomas and Mathieu (1994) conducted a study investigating the interplay between attributions, goal processes, self-regulation, and satisfaction. The study gathered student perceptions through scales measuring these factors as well as perceived locus of control, stability, and self-efficacy. If a student's locus was internal, high goal achievement created high satisfaction; however, if their locus was external, high goal achievement raised satisfaction only barely. Likewise, if a student's stability was high, high goal achievement led to a strong rise in self-efficacy; however, if stability was low, high goal achievement led to no rise in self-efficacy. These findings make a strong case for investigating student attributions, because what may appear to be similar performances between students (demonstrated by grades) can in fact be significantly misleading—students with external loci or low stability may view the same performance entirely differently than other students, which can have dramatic ramifications for future persistence and enjoyment.

In general, the more control one perceives over a situation, the more motivation one has to work towards success. Control, in this sense, is *perceived academic control,* and “refers to students' beliefs about whether they possess certain attributes, such as intellectual ability, physical stamina, effort expenditure, task strategies, social skills, and educational experience, and whether such attributes make a difference to their scholastic performance” (Perry et al., 2005, p. 365). Perceived academic control has been shown to have significant

implications for engagement, persistence, enjoyment, and performance (Perry et al., 2005; Haynes et al., 2009). So, even though a student may actually have enough control (ability, strategies, effort, etc.) to succeed on a future test, they still may not *believe* in their ability to succeed, as their perception of their level of control may be inaccurate. In this case, they may not make much effort, and may seek to rationalize their lack of effort to external forces, however unrelated they may be to the actual forces at work. Alternatively, they may adopt an attitude of "not caring" about the task or subject, therefore attributing their lack of effort to their low level of interest, even though this may not be true. Familiar sayings in this vein include "math and science are for dorks" or "school is boring and lame" (Dweck, 2000). Fear of failure and low belief in ability leads to a purported lack of interest, that lack of interest leads to low effort, and that low effort is the cause of poor performance, rather than a lack of ability or intelligence. This new "norm" of low achievement can be fostered by groups of peers to the extent that those who work hard and get good grades become social outcasts. This can have a powerful impact upon not only the hard workers (by dragging them down) but also the low-achievers (by making the low status quo the "in" thing to do) (Dweck, 2000).

Attributional Retraining (AR) refers to interventions designed to make students aware of and change their attributions about event outcomes (Haynes et al., 2009). In the context of academics, AR interventions focus upon various outcomes students regularly face, such as their performance on exams, papers, presentations, or courses in general. Outcomes can be positive or negative,

though in many cases, negative outcomes (and the subsequent potentially negative attributions students hold) are the focus of the retraining. Students are given strategies to take greater responsibility for their performance, such as changing attributions for negative performance from “external and uncontrollable” to “internal and controllable”. In so doing, a student changes their perception of their ability to make positive changes for the next academic event, now believing that the success or failure of an event result from strategy and effort rather than ability or luck.

Based largely upon the work of Weiner’s (1974, 1986) attribution theory of motivation, AR has been shown in a number of studies to have positive impacts upon various cognitive factors held by students, including motivation, mastery orientation, perceived academic control, and adaptive attribution usage; many of these students increased their future test scores, GPAs, and/or were less likely to drop out (Perry et al., 2005; Haynes et al., 2009). The effect sizes of AR treatment in the studies surveyed in the meta-analysis by Haynes et al. (2009) ranged from r=.14 to .42. This means that r-squared (the percentage of variance that can be attributed to the treatment) has been as high as .17 or 17%.

What is remarkable about these treatments is their simplicity, low cost, and minimal amount of time required to administer, given the potential improvements students can experience. The treatment format described by Haynes et al. (2009), designed based on results from a number of earlier studies, includes five phases. In phase one, the “Pre-AR Diagnostic Assessment,” a self-report questionnaire is administered about one month into the semester, near the time

students receive feedback on their first large exam. This questionnaire measures a number of cognitive variables such as perceived control, optimism, and attributional style, and is intended to identify students that are good candidates for AR—those who show signs of academic vulnerability or possess maladaptive attributions. In phase two, “Student Causal Search,” students rate their perceived success by reflecting on their performance on the first test, and are asked to report their attributions about it. Particular attention should be paid to attributions about low performances, as these events typically prompt the most causal search from students, and can reveal maladaptive thoughts more readily than writing about a success event (Stupinsky, Stewart, Daniels, & Perry, 2011). In phase three, “AR Induction,” students watch a videotape of two students talking about their first-year university experiences; their conversation emphasizes how they were able to overcome poor initial academic performance by changing their attributions. A psychology professor concludes the video by summarizing and emphasizing the importance of holding adaptive attributions. (As an alternative to the video, students receive an “AR Handout,” which lists maladaptive and adaptive attributions; students are asked to carefully read and relate the information to their own academic experiences, and group discussion is encouraged.) In phase four, “AR Consolidation,” any of three procedures can be used: group discussion about attributions; an aptitude test designed to cause a failure experience, thereby setting the stage for creating adaptive attributions; or a writing assignment which is intended to promote deeper understanding of the AR content through reflection and elaboration. Finally, in phase five, a post-

assessment is given several months after the main intervention. These results are compared with the pre-assessment, and are combined with test scores, course grades, overall GPA, and course retention data in order to flesh out the performance profiles of students in the study.

While AR treatments have shown considerable success for a number of students, their effects are not consistent among students with different levels of perceived academic control. Specifically, AR tends to help students with low levels of perceived control, while having little to no effect upon students with high levels. While this may be expected, as AR is intended to increase perceptions of control, one nuance was that more effective teaching (defined operationally in experiments as a more enthusiastic delivery of the same content) increased performance in students with high levels of perceived control, while having no effect upon students with low levels (Haynes et al., 2009). Without perceived control as a grouping variable, the overall average improvement could have been interpreted as demonstrating that more enthusiastic teaching promoted higher performance in all students; likewise, AR may have been interpreted similarly. In another study, Stupinsky, Renaud, Perry, Ruthig, Haynes, & Clifton (2007) found that perceived control was a significant predictor of GPA, while perceived self-esteem was not. These differences indicate the importance of understanding the subtleties in student profiles, as changes to instructional methods and interventions may not have the expected effect on different groups within the population, regardless of what their overall averages may suggest.

The relevance of AR treatments to this study should be clear: AR can improve many of the cognitive factors under investigation and has been shown to improve student performance and enjoyment. However, a detailed profile of students is important to understand what kinds of interventions should be targeted to specific groups of students. If additional correlations are discovered between attributions and the other factors in question, interventions can be refined even further (drawing upon best practices for interventions which address other factors) to increase their effectiveness for targeted students, while identifying which students likely would not benefit substantially from participation.

Summary of Literature Review

Investigations into these cognitive elements of academic success has revealed complex, fascinating, and demonstrably important interrelationships and ramifications. Further investigations are important to improve student success, especially given that interventions (such as Attributional Retraining or reading authoritative articles on mindsets) can be achieved with relatively little time, effort, and cost; if profiles of students include more factors, and their interrelatedness is better understood, interventions can be further refined for greater effectiveness. Although some of the studies cited used hypothetical scenarios with little risk, thus bringing generalizability or real-world application into question, the underlying patterns of behavior and belief indicate that further investigations into real-world scenarios would likely prove fruitful. While this study did not use interventions, it is hoped that the data collected from the survey

instrument will provide valuable information for future researchers, institutions, or instructors who do.

CHAPTER III

METHODOLOGY

This study aimed to add to the understanding of how the cognitive and behavioral factors under consideration relate to one another. Given the literature demonstrating the importance of these factors for student success, the problems facing students and institutions regarding retention rates and time to graduation, and the potential for academic improvement through relatively simple interventions, it was hoped that this increased understanding will help researchers and institutions refine future interventions to increase student success.

A quantitative survey of freshman and sophomore college students was conducted to gather information about motivation, self-efficacy, mindsets, attributions, and learning strategies, as described in Chapter 2 and operationalized through the survey instrument described below.

Research Questions

RQ1. Are there significant correlations between motivation, self-efficacy, mindsets, attributions, and learning strategies?

RQ2. How do the various student demographic variables and groups correlate with the factors?

RQ3. How do the mindset and attribution categories relate to the other factors?

These questions were addressed by using the three existing instruments detailed below. All show adequate reliability and construct validity.

Survey Measures

There exist three quantitative survey instruments from which questions were drawn: the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich et al., 1991), the Implicit Theories of Intelligence Scale (Dweck et al., 1995), and the Revised Causal Dimension Scale (CDSII) (McAuley et al., 1992). The original MSLQ has 81 items and was modified for brevity and intent as described below. The Implicit Theories of Intelligence Scale and the Revised Causal Dimension Scale were included in their entirety.

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, parent education levels, family income levels, study hours per week, and work hours per week.

Motivated Strategies for Learning Questionnaire

The MSLQ was designed to “assess college students' motivational orientations and their use of different learning strategies for a college course” (Pintrich et al., 1991, p. 3). It was developed by a research team from the National Center for Research to Improve Postsecondary Teaching and Learning (NCRIPTAL) and from the School of Education at the University of Michigan.

Early versions of the instrument were used to evaluate the effectiveness of the *Learning to Learn* course at the University of Michigan. Over several years of administering the instruments, they “were subjected to the usual statistical and psychometric analyses, including internal reliability coefficient computation, factor analyses, and correlations with academic performance and aptitude measures” (Pintrich et al., 1991, pp. 3-4). The formal development of the MSLQ (drawing upon results from earlier versions) began in 1986; after three years of collecting additional data across three institutions and making corrections based on analyses, the instrument attained its final form.

Pintrich et al. (1991) administered the MSLQ again to determine reliability and validity measures. Confirmatory factor analyses indicate “reasonable factor validity” (p. 4). Cronbach's alphas for most of the 15 subscales were robust, ranging from .52 to .93. Finally, scale correlations with the final grade in the course were “significant, albeit moderate, demonstrating predictive validity” (p. 4). Some correlations of notable strength include Intrinsic Goal Orientation (.25); Self-Efficacy (.41); Metacognitive Self-Regulation (.30) and Effort Regulation (.32). These and four other scales were included in the survey instrument used in this study.

Eight factors of interest on the MSLQ out of the original 15 were chosen for this study: intrinsic goal orientation, extrinsic goal orientation, task value, control beliefs about learning, self-efficacy of learning and performance, metacognitive self-regulation, effort regulation, and help seeking. The others were not chosen for several reasons: first, to keep the survey to a manageable

length; second, some factors overlapped with these (peer learning with help seeking, for example); and third, some factors did not fall within the thrust of the study (test anxiety, time and study environment). Because the original questionnaire asked about a specific course, and this study focused upon college in general, wordings were changed, typically “this course/class” to “my courses.” To this author's knowledge, the MSLQ has not been modified in this way previously, and in fact, the survey creators state that it was developed specifically to address student cognitive factors at the course level rather than the college level (Pintrich, 2004). Although changing the wording and intent in this way puts validity and reliability into question, this study intended to explore whether such a change can produce reliable and useful information regarding college student perceptions in general. By comparison, the mindsets scale addressed general cognitive perceptions rather than course-specific ones; similarly, the attributions scale asked participants to consider an academic performance event which could have occurred in any course. Therefore, it seemed appropriate to make the comparisons similar when searching for correlations between the three instruments.

The original factors in the MSLQ had a varied number of items, from four to twelve; out of the eight chosen factors, those with more than four items were reduced so that each factor contained only four items. Items were removed based on two criteria: first, finding low goodness-of-fit values as reported by the survey's creators (Pintrich et al., 1991); second, some items did not translate well from a course-level question to a college-level question, for example: “I think I will

be able to use what I leans in this course in other courses". Each item was scored on a Likert scale from one to seven, where one equals "Disagree" and seven equals "Agree." The original instrument used the scale labels "not at all true of me" and "very true of me." Because the Mindset questions were to be incorporated within the MSLQ questions, and these questions use "Disagree" to "Agree," it was decided to change the labeling so that the instrument is consistent. Questions from each factor were included on the questionnaire in turn so that questions about the same factor are non-consecutive, in the same manner as the original instrument was presented.

It was hypothesized that patterns of responses on the MSLQ would discovered among various groups of students. Specifically, higher-achieving students would probably indicate higher scores on many elements of the MSLQ, and lower-achieving students would probably indicate somewhat lower scores. However, even if this was so, which specific elements these were, how these elements intercorrelate, and how student demographics affected the results remained to be seen. If one wants to do an intervention to help students succeed, one should know which cognitive areas are strong and which are weak, so the intervention can address the appropriate areas. Additionally, the results may show that it is possible to predict strengths and weaknesses based upon demographics. If this is so, it would allow effective targeting of student populations without even needing to administer the survey. (While using the survey would likely provide more definitive answers than prediction, factors such as time or cost could prohibit its use.)

Implicit Theories of Intelligence Scale

The Implicit Theories of Intelligence Scale (Dweck et al., 1995) was designed to measure one's perception of how much, if at all, intelligence can be changed. The three items were scored on a six-point scale from "strongly agree" to "strongly disagree," where strong agreement indicates the perception that intelligence is fixed. Participants who rated intelligence as fixed (average scores of 3.0 or less) were classified as *entity theorists*, while those who rated intelligence as malleable (average scores of 4.0 or more) were classified as *incremental theorists*. Typically, 15% of participants fell between the classifications, thereby holding no strong preference; the remaining 85% were more or less evenly distributed between the two theories. Six validation studies were performed upon the scale by Dweck et al. (1995). The scale revealed high internal reliability (alphas ranging from 0.94-0.98) and high 2-week test-retest consistency (r=0.80).

The Implicit Theories of Intelligence Scale had three items. Originally, these were scored on a six-point scale; for this study, the scale was modified to a seven-point scale to match the MSLQ items (a seven-point Disagree-Agree scale). The Disagree-Agree positions were reversed from the original, also to match the MSLQ items. These items were distributed among the MSLQ items and were not consecutive. Averages were computed for the three items for use in the factor correlation analysis as well as the ANOVAs of factors vs. demographics.

Because these items were scored on a bipolar spectrum, where one end is not “higher” than the other (as is the case with the MSLQ items), they could also be grouped into five categories based on the average of the three items: strongly incremental (1.0-2.249), incremental (2.25-3.49), neutral (3.5-4.49), incremental (4.5-5.749), and strongly entity (5.75-7.0). Once converted in this fashion, these categorical values were used in additional ANOVAs comparing averages of the other factors to these groups, e.g., “How do people who hold a strong incremental belief in intelligence tend to rate their effort regulation?”

Revised Causal Dimension Scale

The Revised Causal Dimension Scale (CDSII) (McAuley et al., 1992) drew upon the original Causal Dimension Scale (CDS) by Russel (1982), which in turn was based largely upon Weiner's (1974) ideas about attributions. The scale was developed as a way to measure how individuals perceive causes, particularly after an important event. While the CDS showed reasonable reliability and validity in a number of studies, a number of researchers have “raised serious concerns regarding the structure of the scale, particularly the controllability dimension” (McAuley et al., 1992, p. 567). To attempt to address these concerns, the revised scale was developed, which broke out control into two dimensions: personal and external. This change added three items to the original nine-item scale.

The authors performed four studies, each in a different performance setting, to determine the scale's reliability and construct validity (McAuley, E., & Duncan, T., 1989; McAuley, E., & Tammen, V., 1989; McAuley, E., & Duncan, T.,

1990b). Reliability measures (Cronbach alphas) ranged from .60 to .92; average internal consistencies ranged from .67 to .82. Confirmatory factor analysis showed excellent goodness-of-fit of the four factors (GFI = .958, $p < .001$); the factors accounted between 31% and 67% of the response variation. Correlations between factors were all significant and in the hypothesized direction except one, Stability and Locus of Causality (McAuley et al., 1992).

The original CDSII asked about an important academic assignment or test where the performance level was negative, then had items scored on a nine-point scale indicating the position between ends of the spectrum for the item (example: manageable by you-------not manageable by you). The scale was modified to a seven-point scale to match the other two scales used in this study. Averages were computed for the three items for use in the factor correlation analysis as well as the ANOVAs of factors vs. demographics.

Similarly to the mindset items, these items were scored on a bipolar spectrum, where one end was not “higher” than the other. Therefore, they could also be grouped into five categories based on the average of the three items in each factor. As an example, the stability dimension’s categories would be labeled thus: strongly unstable (1.0-2.249), unstable (2.25-3.49), neutral (3.5-4.49), stable (4.5-5.749), and strongly stable (5.75-7.0). Once converted in this fashion, these categorical values were used in additional ANOVAs comparing averages of the other factors to these groups, e.g., “How do people who hold a strong stable belief in attributions tend to rate their help seeking?”

Dependent Variables

There were 13 dependent variables: eight from the MSLQ, one from the Implicit Theories of Intelligence Scale, and four from the CSDII. Items were scored on a seven-point Likert scale and within-factor items were averaged. Averaging allows more precise comparisons because average values can fall between the integer scale numbers reported for each item. Though the scales are technically ordinal-level, their averages are treated as interval-level for the purpose of analysis because an equal difference is assumed between each point on the scale; of course, this assumption should be made with caution, as not all participants may interpret the scales similarly. Pintrich (1991) used factor averages in the study's analyses (which included a correlation matrix and confirmatory factor analyses), thereby treating the values as interval-level.

Data Analysis

Survey data included items for the eight MSLQ factors, the mindset factor, and the four attribution factors. Demographic data included nominal (gender, ethnicity) and ordinal (age, year, mother's education level, father's education level, high school GPA, college GPA, family income, study hours per week, and work hours per week. Four main analyses were run on the collected data, with the analysis types as per Tuckman (1999):

1. Internal consistency of the survey instruments was computed using Cronbach's alpha. Internal consistency means that items relating to a common factor should score similarly for each case (Tuckman, 1999). In other words, a given participant should score all intrinsic goal orientation items similarly, and

should score all extrinsic goal orientation items similarly, though the separate factors could have different averages. Another participant may score these factors differently overall, but should score the items within each factor similarly. If this is not true, the internal consistency of the instrument is called into question—perhaps the items are worded poorly, or perhaps the items do not accurately address the underlying factor.

Cronbach's alpha is the most common test of internal consistency for scale items (Garson, 2002) and was used for each of the 13 factors in this study. A value from 0.0 (completely inconsistent) to 1.0 (completely consistent) was determined. A typical cutoff for consistency in the social sciences is 0.7; however, some researchers use 0.75 or 0.8 (Garson, 2002). In contrast, Tuckman (1999) makes the argument that preference or perception items (such as the ones in this study) should have an alpha of at least 0.5. This study used 0.7 as its criterion for internal consistency and reliability.

Reliability of an instrument is defined in a number of ways, including test-retest, split-half, and interrater (Tuckman, 1999). For this study, split-half was the appropriate test because of how the survey was administered—there was no retest and there were no raters. The split-half method measures the likelihood that equal halves of the instrument (divided through the factor items) will be scored similarly. Because the Mind and Attribution factors have three items each and therefore cannot be split evenly, the split-half analysis was run three times in order to check the possible combinations: 1) using the first and second items of the Mind and Attribution factors; 2) using the first and third items; and 3) using

the second and third items. These results were then averaged to obtain the final value.

2. A correlation matrix (Pearson's r) between the eight interval-level MSLQ, the one Mindset, and the four Attribution factors was computed. Pearson's r determines the amount of correlation between pairs of interval-level factors, returning values in a range between -1.0 (perfect negative correlation) and 1.0 (perfect positive correlation); a value of 0.0 indicates no correlation between the variables (Salkind, 2005). The procedure also returns significance levels for each correlation, which depends on the strength of the correlation and the number of samples.

Additional correlation matrices were created using populations filtered to remove groups with low numbers of cases, such as doctoral students or Asian/Pacific Islanders. While data from these smaller groups can be important and illuminating, it is important to examine how the overall data set changes when their data is removed, which reduces their potentially disproportionate bias. Knowing the correlations for each population set can be important for assessing generalizability to similar populations which have clear-cut majority and minority groups.

3. Comparisons of group means were computed between the 13 interval-level (dependent) factors and categorical demographic (independent) variables. With two groups in the independent variable, such as gender in this study, a t-test is used; with three or more groups in the independent variable, an analysis of variance (ANOVA) is used. ANOVAs and t-tests both analyze the variance

observed in dependent variable values across dichotomous groups within the independent variable, such as 18, 19, 20, etc. within age. The significance of the difference in variance depends on the number of cases, the variance within each group, and the variance between groups: the further the group means are from each other and the more tightly clustered they are around the group mean, the more significant the difference—that is, the less likely such a sample would have occurred by chance. (Salkind, 2005).

Some demographic groups had few or no cases. Running *post hoc* analyses with ANOVAs (to determine between-group differences) requires each included group to have at least two cases, according to SPSS software version 22. If any groups in a variable had less than two cases, the ANOVA was re-run excluding those groups in order to determine the post hoc differences. The revised F value and significance levels were reported as well.

4. ANOVAs were computed between the eight interval-level MSLQ factors and the re-coded mind and attribution factors. This allowed further exploration of groups of respondents within the mind and attribution factor categories, potentially revealing relationships which can remain hidden when considering only the average of the overall factor. Because both the mind and attribution factors were coded as interval as well as categorical variables, each factor served as the grouping variable in its own ANOVA vs. all 12 other interval factors.

Study Sample

The study sample was comprised of freshman and sophomore students. The rationale for this focus was twofold. First, students at an average institution

are most likely to withdraw during or after their freshman or sophomore years, with approximate rates of 25% and 12% respectively, while 8% of juniors and 4% of seniors withdraw (Answers.com article: College Student Retention). Second, the nationwide average six-year graduation rate is 55.5% (NCHEMS graduation rates, 2014), a rate which clearly leaves much to be desired and likely reflects high rates of withdrawal by freshmen and sophomores. Therefore, determining the cognitive factors of freshman and sophomore students may help clarify some of the reasons they withdraw or are otherwise unsuccessful in college.

Second, it was hypothesized that freshmen and sophomores hold different cognitive perceptions during these years as compared to their junior and senior years. If this difference exists, it could be attributed to a number of causes: being more comfortable and familiar with the academic demands of college; being enrolled in generally smaller classes with more individual attention; being enrolled in more courses within their major, which probably are more interesting and relevant to them; being several years older; having lived off-campus; and so on. Therefore, it seemed appropriate to target only freshman and sophomore students so that the sample is more internally consistent.

Focusing recruitment efforts in general education courses seemed to be the best option for reaching as many of these students as possible. It was hoped that 300 or more students would complete the survey. The intent of securing a large sample was to allow strong statistical analyses to be run on a number of demographic variables and combinations. Although the sample targeted specific age groups, it was also a convenience sample. However, a variety of student

demographics should be represented through the sample administration methods. It was not anticipated that any students would need to be excluded from the study; however, such a situation may arise. Representativeness was determined after all data was collected and the percentages of students in various demographics were compared with corresponding overall percentages at the university.

Data Collection Protocols

Administration.

Data collection was accomplished by contacting instructors of general education courses and 1) obtaining permission to come to their class, explaining the study, and having the professor provide the link to the students; and/or 2) having instructors announce the study themselves and put a link to the survey on the course website (or email the link to the class if the professor does not use a website). To track the number of interested students, student enrollment numbers for all classes with access to the link were totaled. The number of completed surveys was divided by the overall total of students provided access to the survey to determine the final participation rate. (Because all responses are anonymous, it was not possible to determine participation rates for the different methods of contact.)

When granted access to a class, the researcher introduced himself, explained the study, and confirmed that the link was made available to the class. The verbal explanation of the study was the script found in Appendix C.

Instructors were asked not to provide any incentives such as extra credit to the class for participation, as this could introduce bias between these courses and courses in which no incentives are offered.

A list of all general education courses offered for fall 2013 at Illinois State University was obtained from the Registrar's office. This indicates a total of 765 courses/lab sections and a total of 23,363 enrolled students as of late June, 2013. Note that these numbers are highly inflated: the number of courses is far less than 765 due to the numerous lab section listings, and the number of students includes those enrolled in both a course and its lab section, as well as students enrolled in multiple general education courses. The instrument indicated that if a student had already completed the survey (from participation via another course) they should not complete it again. Additionally, students were instructed on the survey not to participate if they are under 18 years of age, to conform to IRB protocol. The survey took approximately 10-15 minutes to complete.

Timeline.

The online survey was made available for four weeks, with a reminder email sent out to professors after two weeks. This reminder email served two purposes: 1) it ensured that participating professors had in fact made the survey link available to their students; and 2) it re-invited professors who did not participate upon receiving the first email.

CHAPTER IV

RESULTS

The three research questions guiding this study attempted to determine how cognitive elements contribute to student perceptions. Profiles built from measurements of these elements could then be used to inform and refine student interventions, increasing their chances for academic success.

RQ1. Are there significant correlations between motivation, self-efficacy, mindsets, attributions, and learning strategies?

RQ2. How do the various student demographic variables and groups correlate with the factors?

RQ3. How do the mindset and attribution categories relate to the other factors?

Participants

From the master list of general education courses, a comprehensive list of 286 unique professors was created. These professors were emailed a welcome letter which explained the study and asked for permission to come to their class(es) to invite students to participate. A second email was sent to all professors after two weeks. A total of 34 (11.9%) responded between the two emails sent. Eighteen allowed the researcher to come to their class or classes and posted/emailed the survey link, reaching 1,724 students; 16 announced the

survey themselves and posted/emailed the survey link, reaching 1,543 students, for a maximum possible total of 3,267 students contacted. (As indicated previously, some of these students may have been enrolled in multiple courses, which received access to the survey, thereby lowering the total number of possible participants.)

The total number of surveys collected was 153, with four missing all of the Attributions questions (which were on the final page of the online survey), and 33 missing one or more other questions, for a total of 116 fully-completed surveys (75.8% of collected). Assuming all students were unique, this represents a participation rate of 4.7% (collected surveys) and 3.5% (fully-completed surveys). Missing items are excluded pairwise in the analysis, so that calculations not using the missing item could still be used.

Regarding representativeness of the sample to Illinois State University as a whole, there were only two demographics in the sample which were appropriate to compare (or could be compared at all): gender and ethnicity. Gender frequencies in the sample were heavily biased: 67.3% female vs. 32.7% male, while gender frequencies at the university overall were 55.6% female vs. 44.4% male at the time of the study (Illinois State University, n.d., Quick Facts website). Ethnicity in the sample was heavily biased towards whites (80.4%), with African-Americans and Hispanics comprising relatively low numbers (9.2% and 7.8% respectively), and with all other ethnicities comprising extremely low numbers (2.6% total). All ethnicity categories were relatively similar to overall ethnicity frequencies at the university except the percentage of African-

Americans, which was somewhat lower (6.4%) (Peterson College Search website). Other demographics were either not targeted equally (age and year) or their numbers could not be obtained for the university as a whole due to privacy regulations (family income, parental education level, GPA, etc.).

Frequencies

Most demographic variables had one or several groups with low numbers of cases, such as age 40+, less than 2.0 GPA, or family income higher than $200,000. As described in the section of ANOVAs for demographics vs. factors, most variables were analyzed twice: once with all groups, then once without the low-case group(s), in order to determine the effect of these group(s) upon the overall significance. Frequencies of the 11 demographic variables are shown in the following tables.

Table 1

Gender Frequencies

Gender	Frequency	Percent
Female	103	67.3
Male	50	32.7
Total	153	100.0

Table 2

Ethnicity Frequencies

Ethnicity	Frequency	Percent
White	123	80.4
Black	14	9.2
Hispanic	12	7.8
Asian/Pacific Islander	2	1.3
Native American	0	0.0
Other	2	1.3
Total	153	100.0

Table 3

Age Frequencies

Age	Frequency	Percent
18	59	38.6
19	39	25.5
20	23	15.0
21	18	11.8
22-24	8	5.2
25-29	4	2.6
30-39	1	.7
40+	1	.7
Total	153	100.0

Table 4

Year Frequencies

Year	Frequency	Percent
Freshman	62	40.5
Sophomore	44	28.8
Junior	28	18.3
Senior	18	11.8
Masters	0	0.0
Doctoral	1	.7
Total	153	100.0

Table 5

High School GPA Frequencies

HS GPA	Frequency	Percent
Missing	2	1.3
Less than 2.0	1	.7
2.0-2.49	1	.7
2.5-2.99	25	16.3
3.0-3.33	37	24.2
3.34-3.66	38	24.8
3.67-4.0	49	32.0
Total	153	100.0

Table 6

College GPA Frequencies

College GPA	Frequency	Percent
Missing	6	3.9
Less than 2.0	5	3.3
2.0-2.49	7	4.6
2.5-2.99	31	20.3
3.0-3.33	34	22.2
3.34-3.66	30	19.6
3.67-4.0	40	26.1
Total	153	100.0

Table 7

Mother's Education Level Frequencies

Mother's education level	Frequency	Percent
Less than high school	5	3.3
High school	23	15.0
Some college	31	20.3
Associate's degree	26	17.0
Bachelor's degree	40	26.1
Some graduate school	3	2.0
Master's degree	25	16.3
Doctoral degree	0	0.0
Total	153	100.0

Table 8

Father's Education Level Frequencies

Father's education level	Frequency	Percent
Missing	2	1.3
Less than high school	5	3.3
High school	32	20.9
Some college	27	17.6
Associate's degree	11	7.2
Bachelor's degree	42	27.5
Some graduate school	4	2.6
Master's degree	27	17.6
Doctoral degree	3	2.0
Total	153	100.0

Table 9

Family Income Frequencies

Family income	Frequency	Percent
Missing	1	.7
Less than $30,000	10	6.5
$30,000-$50,000	29	19.0
$50,000-$80,000	31	20.3
$80,000-$120,000	42	27.5
$120,000-$200,000	31	20.3
More than $200,000	9	5.9
Total	153	100.0

Table 10

Study Hours per Week Frequencies

Study Hours per week	Frequency	Percent
Missing	1	.7
0-5	27	17.6
6-10	64	41.8
11-15	35	22.9
16-20	21	13.7
21-30	5	3.3
31+	0	0.0
Total	153	100.0

Table 11

Work Hours per Week Frequencies

Work hours per week	Frequency	Percent
0-5	97	63.4
6-10	14	9.2
11-15	18	11.8
16-20	9	5.9
21-30	12	7.8
31+	3	2.0
Total	153	100.0

Descriptive Statistics

Descriptive statistics for MLSQ items and factors are shown in Table 12; descriptive statistics for mind and attribution items and factors are shown in Table 13. Given that each item and factor average is on a seven-point scale, there was not a high variation among factors: most of the MSLQ items and factors averaged around 5 (grand mean=5.08, average standard deviation of factors=0.64), while most of the mind and attribution items and factors averaged around 3.5 (grand mean=3.54, average standard deviation of factors=0.81). Note that the standard deviations of the mind and attribution items tended to be larger than the MSLQ items, indicating a wider dispersion of perceptions on these factors.

Table 12

Descriptive Statistics for MSLQ Items

Item	N	Mean	Std. Dev.
INT_1	153	4.76	1.36
INT_2	153	5.28	1.33
INT_3	149	5.23	1.30
INT_4	152	3.94	1.42
INT_AVG	153	4.79	.97
EXT_1	153	6.01	1.25
EXT_2	153	5.82	1.38
EXT_3	151	6.05	1.12
EXT_4	152	5.89	1.39
EXT_AVG	153	5.94	.98
TSK_1	153	5.14	1.29
TSK_2	152	5.34	1.34
TSK_3	152	5.19	1.30
TSK_4	151	5.90	1.04
TSK_AVG	153	5.39	1.01
CBL_1	151	5.92	1.15
CBL_2	153	5.13	1.46
CBL_3	151	5.85	1.09
CBL_4	153	4.40	1.59
CBL_AVG	153	5.32	.94
SLP_1	153	5.55	1.12
SLP_2	152	4.59	1.46
SLP_3	151	5.43	1.18
SLP_4	151	5.25	1.17
SLP_AVG	153	5.21	1.02
MSR_1	153	4.83	1.45
MSR_2	151	4.60	1.42
MSR_3	153	5.37	1.11
MSR_4	152	4.85	1.43
MSR_AVG	153	4.90	.99
EFR_1	153	4.27	1.60

EFR_2	152	5.43	1.33
EFR_3	153	5.05	1.39
EFR_4	152	4.74	1.50
EFR_AVG	153	4.87	1.07
HSK_1	153	3.31	1.43
HSK_2	151	4.56	1.53
HSK_3	152	4.45	1.56
HSK_4	153	4.54	1.54
HSK_AVG	153	4.21	1.01

Note. Valid N (listwise) = 137.

INT = intrinsic goal orientation; EXT = extrinsic goal orientation; TSK = task value; CBL = control beliefs about learning; SLP = self-efficacy for learning and performance; MSR = metacognitive self-regulation; EFR = effort regulation; HSK = help seeking. AVG indicates the average of the four items in the factor.

Table 13

Descriptive Statistics for Mind and Attribution Items

Items	N	Mean	Std. Dev.
MIND_1	153	2.72	1.56
MIND_2	152	2.93	1.62
MIND_3	153	3.33	1.69
MIND_AVG	153	2.99	1.47
ATT_LOC_1	149	3.32	1.54
ATT_LOC_2	146	2.92	1.31
ATT_LOC_3	148	2.84	1.29
ATT_LOC_AVG	149	3.03	1.11
ATT_EXC_1	148	3.99	1.48
ATT_EXC_2	149	4.41	1.50
ATT_EXC_3	148	4.07	1.47
ATT_EXC_AVG	149	4.15	1.10
ATT_STA_1	147	5.12	1.47
ATT_STA_2	149	3.95	1.53
ATT_STA_3	148	5.10	1.60
ATT_STA_AVG	149	4.72	1.07
ATT_PCL_1	149	2.74	1.41
ATT_PCL_2	147	2.88	1.39
ATT_PCL_3	149	2.85	1.43
ATT_PCL_AVG	149	2.82	1.15

Note. Valid N (listwise) = 138.

MIND = mind factor; ATT_LOC = attribution locus of causality; ATT_EXC = attribution external control; ATT_STA = attribution stability; ATT_PCL = attribution personal control. AVG indicates the average of the three items in the factor.

Internal Consistency and Reliability

Internal consistency results for each factor are shown in Table 14. While seven factors out of thirteen met the criterion of 0.7, several of the other factors were relatively low in comparison (Attribution Stability = 0.470, Attribution External Control = 0.572, Help Seeking = 0.590). For exploration into these values, additional analyses were run for each factor using only Year 1 and Year 2 (Freshmen and Sophomores) to examine the consistency of that population's responses, as these make up the majority of the cases and are the target population of the study. However, the difference in results was marginal in magnitude and varied in direction.

For each factor, the "Cronbach's alpha if item deleted" values were examined to see if there were item(s) which would raise the internal consistency of the factor by their removal. Out of the thirteen factors, four had items which would raise the alpha if deleted, two of which were below the cutoff of 0.7. Of particular note was the large change in the alpha of Attribution Stability when deleting Attribution Stability item 2: "Is the cause (of the recent poor academic performance) stable over time-------variable over time?" The large increase in alpha for this item may indicate that various participants understood the item quite differently, and because of this, a revision of the wording could prove beneficial.

Table 14

Internal Consistency Values for All Factors

Factor	Alpha	Item to delete	Revised alpha
INT	0.653	n/a	
EXT	0.748*	EXT_3	0.762
TSK	0.822*	TSK_4	0.864
CBL	0.647	n/a	
SLP	0.838*	n/a	
MSR	0.671	n/a	
EFR	0.722*	n/a	
HSK	0.590	HSK_1	0.620
MIND	0.891*	n/a	
ATT_LOC	0.721*	n/a	
ATT_EXC	0.572	n/a	
ATT_STA	0.470	ATT_STA_2	0.606
ATT_PCL	0.744*	n/a	

Note. * > 0.7.

Cronbach's alpha for the survey as a whole was 0.804, which is moderately consistent assuming a cutoff of 0.7. For exploration, additional internal consistency analyses were run for the overall survey using a number of restricted groups, with the hypothesis that more homogenous groups would score items more consistently. Restricted groups included Years 1-2, Years 3-4, Whites, Non-whites, Females, and Males. The magnitude of change from the overall consistency value of 0.804 was small to moderate (0.011 to 0.075), but some values increased while some decreased, which both supported and refuted the hypothesis. Results for these additional analyses are included in Table 15.

Table 15

Alpha Differences Using Selected Groups

Group	Result	Difference from 0.804
Years 1 and 2	0.824	+0.020
Years 3 and 4	0.729	-0.075
Whites	0.815	+0.011
Non-whites	0.759	-0.045
Females	0.772	-0.084
Males	0.854	+0.050

Reliability analyses were also run on each instrument by itself: MSLQ (eight factors at four items each = 32 items); mindset (one factor, three items); and attribution (four factors at three items each = 12 items). Results are as follows:

The MSLQ alpha was .877, which is relatively robust. Four items would increase the alpha if deleted: extrinsic goal orientation #4, control beliefs about

learning #2, help seeking #1, and help seeking #2; however, the increases were very slight, so rewording or removing items is probably not appropriate.

The mind alpha was .891, which is relatively robust. No items would increase the alpha if deleted.

The attribution alpha was .578, which is considerably lower than the study's cutoff of 0.7. Four items would raise the alpha if deleted: external control #2, external control #3, stability #1, and stability #3; however, the increases were very slight. Further analyses were performed on each factor separately to determine if certain ones were considerably different than each other; indeed, this was the case. Locus of causality alpha was .721; external control was .572; stability was .470; and personal control was .744. Within stability, removing item 2 would raise the alpha considerably (to .606), so it may be necessary to remove or reword that particular item. Overall, the attribution items and factors showed much lower reliability than the MSLQ and mind factors, which should be taken into account in future studies.

One additional consistency analysis involves determining the change in the survey's overall Cronbach's alpha if a given item is deleted. Running this analysis showed that thirteen out of 47 items would increase the overall Alpha if they were deleted. The largest increase was 0.009, from 0.804 to 0.813. Running the analysis again with these thirteen items removed increased the overall alpha to 0.888. Of note, eleven out of these thirteen items were found in the Mind and Attribution sections, which is very high compared to the number of items found in the MSLQ section. This may indicate that these questions did not have the same

level of clarity as the MSLQ questions or that students had a wider range of interpretations of the question items. Additionally, having three items in each factor instead of four may produce less consistent results generally, as a given deviation from the mean has a stronger effect on the factor's overall alpha.

Split-half reliability analysis was run three times: 1) using the first and second items of the Mind and Attribution factors; 2) using the first and third items; and 3) using the second and third items. The resulting split-half reliabilities (Spearman-Brown coefficients) were 0.874 for analysis 1, 0.876 for analysis 2, and 0.860 for analysis 3, giving an average of 0.870. These are moderately robust reliabilities assuming a cutoff of 0.7, and are consistent with each other, indicating that the mind and attribution items were scored relatively consistently.

Correlations

Are there significant correlations between motivation, self-efficacy, mindsets, attributions, and learning strategies?

To answer Research Question 1, a correlation matrix (Pearson's r) was calculated between each of the thirteen factors: eight MSLQ factors, one Mindset factor, and four Attributions factors (Table 16). Each of the MSLQ factors was determined by averaging the results from the four items in that factor; the Mindset factor represents the average of the three Mindset items; and the Attributions factors each represent the average of the three items in each of the four Attributions dimensions. The total number of correlations was 78, of which 45 (57.7%) were significant ($p < 0.05$) or highly significant ($p < 0.01$).

Additional correlation matrices were created by removing groups in ethnicity, age, and year which had low numbers of cases in them, as explained in Chapter III. Removing the age groups in particular showed marked changes (defined here as *p*-values 4 or more times smaller and ending below 0.1, or a change in correlation direction with both *p*-values below 0.1) in the following correlations: intrinsic goal orientation/extrinsic goal orientation; intrinsic goal orientation/help seeking; intrinsic goal orientation/attribution external control; extrinsic goal orientation/task value; extrinsic goal orientation/control beliefs about learning; extrinsic goal orientation/effort regulation; extrinsic goal orientation/help seeking; and help seeking/attribution locus of control.

Table 16

Correlations between All Factors

Table X

Correlations between MSLQ, Mindset, and Attribution factors

		INT_AVG	EXT_AVG	TSK_AVG	CBL_AVG	SLP_AVG	MSR_AVG	EFR_AVG	HSK_AVG	MIND_AVG	ATT_LOC_AVG	ATT_EXC_AVG	ATT_STA_AVG	ATT_PCL_AVG
INT_AVG	Pearson Correlation	1	.046	.494**	.385**	.541**	.547**	.293**	.197*	-.050	-.079	.162*	.365**	-.057
	Sig. (2-tailed)		.570	.000	.000	.000	.000	.000	.015	.540	.338	.049	.000	.492
EXT_AVG	Pearson Correlation	.046	1	.213**	.171*	.259**	.378**	.223**	.145	-.058	-.033	-.001	.029	-.112
	Sig. (2-tailed)	.570		.008	.034	.001	.000	.006	.074	.477	.694	.987	.726	.175
TSK_AVG	Pearson Correlation	.494**	.213**	1	.441**	.413**	.442**	.440**	.074	-.375**	-.258**	.081	.222**	-.310**
	Sig. (2-tailed)	.000	.008		.000	.000	.000	.000	.362	.000	.002	.324	.007	.000
CBL_AVG	Pearson Correlation	.385**	.171*	.441**	1	.421**	.430**	.330**	-.055	-.127	-.345**	.192*	.272**	-.328**
	Sig. (2-tailed)	.000	.034	.000		.000	.000	.000	.496	.119	.000	.019	.001	.000
SLP_AVG	Pearson Correlation	.541**	.259**	.413**	.421**	1	.534**	.317**	.104	-.202*	-.138	.154	.311**	-.195*
	Sig. (2-tailed)	.000	.001	.000	.000		.000	.000	.202	.012	.093	.061	.000	.017
MSR_AVG	Pearson Correlation	.547**	.378**	.442**	.430**	.534**	1	.422**	.267**	-.030	-.004	.184*	.380**	-.091
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000	.001	.716	.957	.025	.000	.268
EFR_AVG	Pearson Correlation	.293**	.223**	.440**	.330**	.317**	.422**	1	.201*	-.332**	-.020	.094	.219**	-.215**
	Sig. (2-tailed)	.000	.006	.000	.000	.000	.000		.013	.000	.808	.252	.007	.009
HSK_AVG	Pearson Correlation	.197*	.145	.074	-.055	.104	.267**	.201*	1	.016	.119	.018	.049	.041
	Sig. (2-tailed)	.015	.074	.362	.496	.202	.001	.013		.848	.149	.831	.555	.621
MIND_AVG	Pearson Correlation	-.050	-.058	-.375**	-.127	-.202*	-.030	-.332**	.016	1	.177*	-.100	-.014	.345**
	Sig. (2-tailed)	.540	.477	.000	.119	.012	.716	.000	.848		.031	.227	.864	.000
ATT_LOC_AVG	Pearson Correlation	-.079	-.033	-.258**	-.345**	-.138	-.004	-.020	.119	.177*	1	-.137	-.091	.683**
	Sig. (2-tailed)	.338	.694	.002	.000	.093	.957	.808	.149	.031		.096	.268	.000
ATT_EXC_AVG	Pearson Correlation	.162*	-.001	.081	.192*	.154	.184*	.094	.018	-.100	-.137	1	.292**	-.143
	Sig. (2-tailed)	.049	.987	.324	.019	.061	.025	.252	.831	.227	.096		.000	.081
ATT_STA_AVG	Pearson Correlation	.365**	.029	.222**	.272**	.311**	.380**	.219**	.049	-.014	-.091	.292**	1	-.160
	Sig. (2-tailed)	.000	.726	.007	.001	.000	.000	.007	.555	.864	.268	.000		.051
ATT_PCL_AVG	Pearson Correlation	-.057	-.112	-.310**	-.328**	-.195*	-.091	-.215**	.041	.345**	.683**	-.143	-.160	1
	Sig. (2-tailed)	.492	.175	.000	.000	.017	.268	.009	.621	.000	.000	.081	.051	

Note. N = 153 for MSLQ factors and Mindset factor; N = 149 for Attribution factors. Missing cases excluded pairwise.

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

ANOVAs on Demographics vs. Factors

How do the various student demographic variables and groups correlate with the factors?

To answer Research Question 2, a series of Analyses of Variances (ANOVAs) were used; because gender is a dichotomous variable (only containing two groups), a t-test was used. (Note: when “groups” are indicated, these refer to the groups within demographic variables, such as “male” and “female” in the Gender demographic variable.)

A number of demographic variables had groups with few or no cases in them, such as age, year, and ethnicity. Therefore, additional ANOVAs were run using only the other groups, in order to examine the effect on the overall significance as well as (in some instances) to be able to run post hoc analyses. Excluding groups often had a considerable effect upon the significance of the analysis, illuminating relationships which were otherwise hidden. ANOVA results tables include both sets of F and sig. values as well as significant post hoc group comparisons.

For gender (Table 17), the only factor with a significant difference was extrinsic goal orientation, with females (M=6.12, SD=0.80) rating higher than males (M=5.58, SD=1.21), $t(151)=-3.289$, $p<.001$ (two-tailed), $d=.539$.

Table 17

T-test for Gender vs. All Factors

	Gender	N	Mean	Std. Dev.	t	Sig. (2-tailed)
Intrinsic goal orientation	1	50	4.97	1.01	1.517	.131
	2	103	4.71	0.95	1.487	.140
Extrinsic goal orientation	1	50	5.58	1.21	-3.289	.001**
	2	103	6.12	0.80	-2.868	.005**
Task value	1	50	5.28	1.02	-.937	.350
	2	103	5.45	1.01	-.935	.352
Control beliefs about learning	1	50	5.27	1.00	-.475	.635
	2	103	5.34	0.92	-.461	.646
Self-efficacy for learning and performance	1	50	5.38	1.14	1.411	.160
	2	103	5.13	0.96	1.331	.187
Metacognitive self-regulation	1	50	4.80	1.11	-.891	.374
	2	103	4.95	0.92	-.834	.406
Effort regulation	1	50	4.76	1.17	-.896	.372
	2	103	4.92	1.02	-.856	.394
Help seeking	1	50	4.17	0.98	-.391	.697
	2	103	4.23	1.02	-.396	.693
Mindset	1	50	3.08	1.54	.495	.621
	2	103	2.95	1.44	.485	.629
Attribution locus of causality	1	49	3.08	1.13	.423	.673
	2	100	3.00	1.10	.418	.677
Attribution external control	1	49	3.97	1.13	-1.387	.168
	2	100	4.24	1.07	-1.362	.176
Attribution stability	1	49	4.71	1.14	-.076	.940
	2	100	4.73	1.03	-.073	.942
Attribution personal control	1	49	2.90	1.17	.647	.519
	2	100	2.77	1.14	.640	.524

For ethnicity (Table 18), no significant differences were found between groups, although control beliefs for learning approached significance (p=.091). When run without Asian/Pacific Islanders (n=2), Native Americans (n=0), or Other (n=2), 10 out of 13 factors increased in significance; control beliefs for learning reached significance, while the mind factor and the attribution stability factor approached it. Post hoc analyses showed significant differences in control beliefs for learning (Whites and Hispanics rated higher than Blacks); the mind factor (Blacks rated lower than Hispanics); and attribution stability (Whites and Hispanics rated lower than Blacks).

Table 18

ANOVA for Ethnicity vs. All Factors

Factor	F	Sig.	F[a]	Sig.[a]	Post hoc
Intrinsic goal orientation	.241	.915	.297	.743	none
Extrinsic goal orientation	.362	.835	.220	.803	none
Task value	.927	.450	.152	.859	none
Control beliefs about learning	2.042	.091	3.887	.023*	1>2**, 2<3*
Self-efficacy for learning and perf.	1.171	.326	.152	.859	1>4*, 2>4*
Metacognitive self-regulation	.142	.966	.249	.780	none
Effort regulation	1.167	.328	2.131	.122	none
Help seeking	1.129	.345	1.847	.161	none
Mindset	1.398	.237	2.575	.080	2<3*
Attribution locus of causality	1.035	.391	1.489	.229	none
Attribution external control	.614	.653	.286	.751	none
Attribution stability	1.881	.117	2.719	.069	1<3*, 2<3*
Attribution personal control	.587	.673	.827	.439	none

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

[a] Revised F and Sig values for post hoc analysis. Analysis was run excluding group 4 (n=2) and group 6 (n=2). Group 5 had no cases.

Ethnicity groups: 1=White, n=123, 80.4%; 2=Black, n=14, 9.2%; 3=Hispanic, n=12, 7.8%; 4=Asian/Pacific Islander, n=2, 1.3%; 5=Native American, n=0, 0%; 6=Other, n=2, 1.3%.

For age (Table 19), only one factor (task value) showed significant differences. When ages 30-39 and 40+ were removed (n=1 for each), three factors achieved significance: task value, self-efficacy for learning and performance, and help seeking. When ages 22-24, 25-29, 30-39, and 40+ were removed (total percent of cases=9.2%), most significances dropped somewhat. When only ages 18 and 19 were analyzed, no factors reached significance, though help seeking approached it. This indicates a considerable influence by higher-age groups upon the target groups of 18- and 19-year-olds, and that both 18- and 19-year-olds rated most factors similarly. Post hoc analyses revealed a number of significant differences between the lower and higher groups, most notably ages 21, 22-24, and 25-29: for six of the eight MSLQ factors, these ages rated higher than ages 18 and 19. Additionally, age 25-29 showed lower ratings on attribution locus of causality and higher ratings on attribution stability.

Table 19

ANOVA for Age vs. All Factors

Factor	F	Sig.	F[a]	Sig.[a]	Post hoc
Intrinsic goal orientation	1.789	.094	2.036	.077	1<6*; 2<6*; 3<6*; 5<6**
Extrinsic goal orientation	1.559	.152	1.060	.385	none
Task value	2.289	.031*	2.661	.025*	1<4**; 1<6*; 2<4**; 3<4*
Control beliefs about learning	1.630	.131	2.056	.074	1<4*; 3<4*; 3<6*
Self-efficacy for learning and perf.	1.964	.064	2.707	.023*	1<4*; 1<6**; 2<4*; 2<6**; 3<6*
Metacognitive self-regulation	1.469	.183	1.882	.101	2<4*; 4>5*
Effort regulation	.979	.449	1.120	.352	none
Help seeking	1.856	.081	2.368	.042*	1>4*; 2<5*; 4<5*
Mindset	1.093	.371	.992	.425	none
Attribution locus of causality	1.133	.346	1.391	.231	1>6*; 2>6*; 3>6*; 4>6*
Attribution external control	1.015	.424	1.027	.404	1<4*
Attribution stability	1.556	.153	2.111	.067	1<3*; 3<4*; 3<6*
Attribution personal control	.918	.495	1.080	.374	none

Note. * p < .05. ** p < .01.

[a] Revised F and Sig values for post hoc analysis. Analysis was run excluding groups 7 and 8, which had less than 2 cases in each.

Age groups: 1=18, n=59, 38.6%; 2=19, n=39, 25.5%; 3=20, n=23, 15.0%; 4=21, n=18, 11.8%; 5=22-24, n=8, 5.2%; 6=25-29, n=4, 2.6%; 7=30-39, n=1, 0.7%; 8=40+, n=1, 0.7%.

For year (Table 20), five factors were significant: task value, control beliefs about learning, self-efficacy for learning and performance, attribution external control, and attribution stability. When masters (n=0) and doctoral (n=1) were removed, the same five factors were significant, with two considerably more significant. Post hoc analyses revealed a number of significant between-group differences, where freshmen and sophomores typically showed lower ratings than juniors and seniors on the above-mentioned factors.

Table 20

ANOVA for Year vs. All Factors

Factor	F	Sig.	F[a]	Sig[a]	Post hoc
Intrinsic goal orientation	1.617	.173	1.392	.248	none
Extrinsic goal orientation	1.158	.332	.221	.881	none
Task value	4.432	.002**	4.984	.003**	1<3**; 1<4*; 2<3**; 2<4*
Control beliefs about learning	2.979	.021*	3.625	.015*	1<4*; 2<3*; 2<4*
Self-efficacy for learning and perf.	3.120	.017*	4.089	.008**	1<3**; 1<4*; 2<3*; 2<4*
Metacognitive self-regulation	1.424	.229	1.895	.133	2<3*
Effort regulation	1.500	.205	1.622	.187	2<3*
Help seeking	1.153	.334	1.330	.267	none
Mindset	.398	.810	.264	.851	none
Attribution locus of causality	.597	.665	.762	.517	none
Attribution external control	3.039	.019*	3.371	.020*	1<4**; 2<4*; 3<4*
Attribution stability	3.137	.017*	4.067	.008**	1>3*; 2<4**; 3<4**
Attribution personal control	.793	.531	.888	.449	none

Note. * p < .05. ** p < .01.

[a] Revised F and Sig values for post hoc analysis. Analysis was run excluding groups 5 and 6, which had less than 2 cases in each.

Year groups: 1=Freshman, n=62, 40.5%; 2=Sophomore, n=44, 28.8%; 3=Junior, n=28, 18.3%; 4=Senior, n=18, 11.8%; 5=Masters, n=0, 0%; 6=Doctoral, n=1, 0.7%.

For high school GPA (Table 21), four factors were significant: extrinsic goal orientation, self-efficacy for learning and performance, metacognitive self-regulation, and effort regulation. Three factors approached significance: help seeking (p=.053), attribution external control (p=.060), and attribution stability (p=.066). When re-analyzed without group 1 (<2.0, n=1) and group 2 (2.0-2.49, n=1), no factors were significant, and the same three approached significance. This indicates a strong effect of the two lowest GPA groups. Post hoc analyses revealed several significant between-group differences in the factors mentioned above, in which group 3 (2.5-2.99) rated lower than group 6 (3.67-4.0). Additionally, group 4 (3.0-3.33) and group 5 (3.34-3.66) rated higher than group 6 in attribution external control; the same groups rated lower than group 6 in attribution stability.

Table 21

ANOVA for High School GPA vs. All Factors

Factor	F	Sig.	F[a]	Sig.[a]	Post hoc
Intrinsic goal orientation	.899	.483	.262	.853	none
Extrinsic goal orientation	4.685	.001**	1.321	.270	none
Task value	.632	.676	.173	.915	none
Control beliefs about learning	2.123	.066	1.147	.332	none
Self-efficacy for learning and perf.	3.187	.009**	.786	.504	none
Metacognitive self-regulation	3.383	.006**	1.479	.223	3<6*
Effort regulation	2.878	.017*	1.687	.172	3<6*
Help seeking	1.935	.092	2.615	.053	3<6**
Mindset	1.438	.214	.222	.881	none
Attribution locus of causality	1.423	.219	1.248	.295	none
Attribution external control	1.984	.085	2.524	.060	4>6*, 5>6*
Attribution stability	2.085	.071	2.454	.066	4<6*, 5<6*
Attribution personal control	.955	.448	1.414	.241	none

Note. * p < .05. ** p < .01.

[a] Revised F and Sig values for post hoc analysis. Analysis was run excluding groups 1 and 2, which had less than 2 cases in each.

High school GPA groups: 1=Less than 2.0, n=1, 0.7%; 2=2.0-2.49, n=1, 0.7%; 3=2.5-2.99, n=25, 16.3%; 4=3.0-3.33, n=37, 24.2%; 5=3.34-3.66, n=38, 24.8%; 6=3.67-4.0, n=49, 32.0%.

For college GPA (Table 22), two factors were significant: self-efficacy for learning and performance and effort regulation; attribution stability was highly significant. Two factors approached significance: intrinsic goal orientation (p=.053) and the mind factor (p=.080). When re-analyzed without group 1 (<2.0, n=5) and group 2 (2.0-2.49, n=7), attribution stability was significant and intrinsic goal orientation approached significance (p=.057). This indicates a moderate effect of the lowest GPA groups. Post hoc analyses revealed a number of significant between-group differences, where low-numbered groups typically rated lower than high-numbered groups on MSLQ items, except that group 2 rated higher than group 4 (3.0-3.33) and group 5 (3.34-3.66) on self-efficacy for learning and performance. Group 1 rated higher than all other groups on the mind factor, while groups 3 and 4 rated lower than group 6 (3.67-4.0) on attribution stability.

Table 22

ANOVA for College GPA vs. All Factors

Factor	F	Sig.	F[a]	Sig.[a]	Post hoc
Intrinsic goal orientation	2.246	.053	2.572	.057	2<6*, 4<6**
Extrinsic goal orientation	.954	.449	.308	.819	1<3*
Task value	.542	.744	.469	.704	none
Control beliefs about learning	.902	.482	1.026	.383	none
Self-efficacy for learning and perf.	3.062	.012*	1.841	.143	1<2**, 1<3*, 1<6**, 2>4*, 2>5*, 4<6*
Metacognitive self-regulation	1.221	.302	1.634	.185	3<6*
Effort regulation	3.018	.013*	1.543	.206	1<3*, 1<4**, 1<5**, 1<6**, 3<6*
Help seeking	1.098	.364	1.067	.366	none
Mindset	2.013	.080	.901	.442	1>2*, 1>3**, 1>4*, 1>5*, 1>6**
Attribution locus of causality	1.355	.245	2.010	.116	3<6*
Attribution external control	.410	.841	.502	.681	none
Attribution stability	3.289	.008**	5.211	.002**	3<5*, 3<6**, 4<6**
Attribution personal control	.236	.946	.120	.948	none

Note. * p < .05. ** p < .01.

[a] Revised F and Sig values for secondary analysis, excluding group 1 (n=5) and group 2 (n=7). College GPA groups: 1=Less than 2.0, n=5, 3.9%; 2=2.0-2.49, n=7, 4.6%; 3=2.5-2.99, n=31, 20.3%; 4=3.0-3.33, n=34, 22.2%; 5=3.34-3.66, n=30, 19.6%; 6=3.67-4.0, n=40, 26.1%.

For Mother's Education Level (Table 23), three factors were significant: intrinsic goal orientation, task value, and self-efficacy for learning and performance. Extrinsic goal orientation approached significance (p=.072). When re-analyzed without group 1 (less than high school, n=5) or group 6 (some graduate school, n=3), the same three groups were significant, while extrinsic goal orientation no longer approached significance. When re-analyzed without group 5 (bachelor's degree) and group 6, which each showed large changes in means for most factors, only self-efficacy for learning and performance approached significance. Group 5 showed relatively low means for most of the MSLQ factors, while group 6 showed relatively high means, as compared to all other groups. These differences had a moderate effect upon overall levels of significance, and were unexpected, given the proximity of the groups within the demographic. Post hoc analyses revealed a number of significant between-group differences, where group 5 rated lower than most other groups on intrinsic goal orientation, task value, and self-efficacy for learning and performance. Additionally, group 1 rated lower than most of the higher groups on extrinsic goal orientation.

Table 23

ANOVA for Mother's Education Level vs. All Factors

Factor	F	Sig.	F[a]	Sig.[a]	Post hoc
Intrinsic goal orientation	2.249	.042*	2.699	.033*	2>5*, 3>5**, 4>5*, 5<6*, 5<7*
Extrinsic goal orientation	1.979	.072	1.430	.227	1<2*, 1<3*, 1<4**, 1<7*, 4>5*
Task value	2.292	.038*	3.172	.016*	2>5**, 3>5**, 4>5*
Control beliefs about learning	.708	.644	.720	.580	none
Self-efficacy for learning/perf.	2.745	.015*	3.475	.010*	2<3*, 3>5**, 3>7*, 4>5*, 5<6*
Metacognitive self-regulation	.786	.582	.744	.564	none
Effort regulation	.451	.844	.582	.677	none
Help seeking	1.486	.187	1.750	.142	2>7*
Mindset	.927	.478	.673	.612	none
Attribution locus of causality	1.131	.347	.689	.601	1<6*
Attribution external control	.398	.879	.412	.799	none
Attribution stability	.705	.646	.427	.789	none
Attribution personal control	1.368	.231	1.773	.138	2<3*, 2<5*

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

[a] Revised F and Sig values for secondary analysis, excluding group 1 (n=5) and group 6 (n=3). Mother's education level groups: 1=Less than high school, n=5, 3.3%; 2=High school, n=23, 15.0%; 3=Some college, n=31, 20.3%; 4=Associates degree, n=26, 17.0%; 5=Bachelors degree, n=40, 26.1%; 6=Some graduate school, n=3, 2.0%; 7=Masters degree, n=25, 16.3%; 8=Doctoral degree, n=0, 0.0%.

For Father's Education Level (Table 24), self-efficacy for learning and performance was significant, while task value and attribution personal control approached significance (p=.080 and p=.098, respectively). When re-analyzed without the extreme groups, group 1 (less than high school, n=5) and group 8 (doctoral degree, n=3), self-efficacy for learning and performance was more significant, while intrinsic goal orientation, effort regulation, and attribution personal control approached significance (p=.058, p=.071, and p=.052, respectively). Post hoc analyses revealed numerous differences in task value (group 1 was generally less than higher groups); self-efficacy for learning and performance (high school and some college were greater than associate's degree, while associate's degree was less than some graduate school and beyond); the mind factor (group 1 was generally greater than higher groups); and attribution stability (high school and some college were greater than associate's degree, while associate's degree was less than higher groups). Associate's degree was therefore unexpectedly low given the relatively high values of its neighbors.

Table 24

ANOVA for Father's Education Level vs. All Factors

Factor	F	Sig.	F[a]	Sig.[a]	Post hoc
Intrinsic goal orientation	1.692	.115	2.201	.058	2>5*, 5<6*,
Extrinsic goal orientation	1.030	.413	1.236	.296	none
Task value	1.860	.080	1.713	.136	1<3*, 1<6*, 1<8*, 3>7*, 6>7*
Control beliefs about learning	.817	.574	.595	.703	none
Self-efficacy for learning and perf.	2.241	.034*	2.997	.013*	2>4*, 3>4**, 3>5*, 4<6*, 4<7*, 4<8*
Metacognitive self-regulation	1.425	.199	1.837	.110	2>4*
Effort regulation	1.631	.131	2.084	.071	3>7**
Help seeking	.396	.904	.515	.765	none
Mindset	1.727	.107	1.191	.317	1>2*, 1>3**, 1>5*, 1>8*, 3<4*
Attribution locus of causality	1.276	.267	1.191	.317	3<7*, 3<8*
Attribution external control	.350	.929	.333	.892	none
Attribution stability	1.323	.244	1.702	.138	2>4*, 3>4*, 4<6*, 4<7*
Attribution personal control	1.768	.098	2.264	.052	1>3*, 3<4*, 3<7**

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

[a] Revised F and Sig values for secondary analysis, excluding group 1 (n=5) and group 8 (n=3). Father's education level groups: 1=Less than high school, n=5, 3.3%; 2=High school, n=32, 20.9%; 3=Some college, n=27, 17.6%; 4=Associates degree, n=11, 7.2%; 5=Bachelors degree, n=42, 27.5%; 6=Some graduate school, n=4, 2.6%; 7=Masters degree, n=27, 17.6%; 8=Doctoral degree, n=3, 2.0%.

For Family Income (Table 25), no significant differences were found. When re-analyzed without the extremes, group 1 (less than $30,000, n=10) and group 6 (more than $200,000, n=9), one factor (help seeking) approached significance. Post hoc analyses revealed several significant differences in effort regulation (lower groups were less than group 6); help seeking (group 2 or $30,000-$50,000 was less than group 3 or $50,000-$80,000, while group 3 or $50,000-$80,000 was greater than group 4 or $80,000-$120,000); and attribution personal control (the two bottom groups were less than group 6). Overall, this variable showed fewer and less significant between-group differences than the other variables, though there were relatively consistent trends in effort regulation (lower groups rated above higher groups), and attribution personal control (lower groups rated below higher groups). As was the case with many of the demographic variables in the study, the extreme groups often rated moderately differently than their neighbors or the overall mean.

Table 25

ANOVA for Family Income vs. All Factors

Factor	F	Sig.	F[a]	Sig.[a]	Post hoc
Intrinsic goal orientation	.557	.733	.766	.515	none
Extrinsic goal orientation	1.140	.342	.627	.599	1<4*
Task value	.954	.448	.928	.429	none
Control beliefs about learning	1.239	.294	1.121	.343	1<4*
Self-efficacy for learning and perf.	.892	.488	.876	.455	none
Metacognitive self-regulation	.416	.837	.614	.607	none
Effort regulation	1.529	.184	.528	.664	2>6*, 3>6*, 4>6*
Help seeking	1.623	.157	2.428	.068	2<3*, 3>4*
Mindset	.899	.483	1.105	.350	none
Attribution locus of causality	1.130	.347	.884	.451	2<6*
Attribution external control	.064	.997	.047	.986	none
Attribution stability	.376	.865	.615	.606	none
Attribution personal control	1.318	.260	.536	.659	1<6*, 2<6*

Note. * p < .05. ** p < .01.

[a] Revised F and Sig values for secondary analysis, excluding group 1 (n=10) and group 6 (n=9). Family income groups: 1=Less than $30,000, n=10, 6.5%; 2=$30,000-$50,000, n=29, 19.0%; 3=$50,000-$80,000, n=31, 20.3%; 4=$80,000-$120,000, n=42, 27.5%; 5=$120,000-$200,000, n=31, 20.3%; 6=More than $200,000, n=9, 5.9%.

For Study Hours (Table 26), six factors were significant: intrinsic goal orientation, control beliefs about learning, metacognitive self-regulation, effort regulation, the mind factor, and attribution stability. Two factors approached significance: task value (p=.054) and attribution locus of causality (p=.066). When re-analyzed without group 5 (21-20 hours per week, n=5), which had a number of markedly different ratings than the other groups, five factors were significant (all the same except metacognitive self-regulation), while task value approached significance (p=.055). This shows a slight effect of group 5. Post hoc analyses revealed several significant group differences in task value, control beliefs about learning, metacognitive self-regulation, effort regulation, and attribution locus of causality, in which lower groups generally rated lower than higher groups; in the mind factor, lower groups rated higher than higher groups.

Table 26

ANOVA for Study Hours per Week vs. All Factors

Factor	F	Sig.	F[a]	Sig.[a]	Post hoc
Intrinsic goal orientation	2.712	.032*	2.680	.049*	2<3**, 2<5*
Extrinsic goal orientation	1.694	.154	1.459	.228	1<5*
Task value	2.381	.054	2.600	.055	1<3*, 1<4*, 1<5*
Control beliefs about learning	3.236	.014*	3.315	.022*	1<3*, 1<4*, 1<5*, 2<3*, 2<4*, 2<5*
Self-efficacy for learning and perf.	1.558	.188	.892	.447	1<5*
Metacognitive self-regulation	2.501	.045*	2.027	.113	1<4*, 1<5*, 2<5*
Effort regulation	4.470	.002**	5.557	.001**	1<2*, 1<3*, 1<4**, 1<5*, 2<4**
Help seeking	.473	.755	.580	.629	none
Mindset	2.881	.025*	3.025	.032*	1>2*, 1>3**, 1>5*
Attribution locus of causality	2.254	.066	.827	.481	1>5*, 2>5*, 3>5*, 4>5**
Attribution external control	1.251	.292	.311	.818	2<5*
Attribution stability	2.797	.028*	3.475	.018*	2<3*, 2<4*
Attribution personal control	1.155	.334	.661	.578	none

Note. * p < .05. ** p < .01.

[a] Revised F and Sig values for secondary analysis, excluding group 5 (n=5). Group 6 had no cases.

Study hours per week groups: 1=0-5 hours, n=27, 17.6%; 2=6-10 hours, n=64, 41.8%; 3=11-15 hours, n=35, 22.9%; 4=16-20 hours, n=21, 13.7%; 5=21-30 hours, n=5, 3.3%; 6=31+ hours, n=0, 0.0%.

For Work Hours (Table 27), effort regulation was significant. When re-analyzed without group 6 (31+ hours per week, n=5), effort regulation was significant, while intrinsic goal orientation and help seeking approached significance (p=.072 and p=.097, respectively). Post hoc analyses revealed several significant group differences in metacognitive self-regulation (0-5 hours was less than 6-10 hours, and 6-10 and 11-15 hours were greater than 31+ hours) and effort regulation (0-5, 6-10, and 11-15 hours were less than 21-30 hours, while 21-30 hours was greater than 31+ hours). In a number of factors, 31+ hours was markedly different than 21-30 hours; less often was 0-5 hours markedly different than 6-10 hours. Therefore, the effect of extreme groups was more pronounced at the higher end.

Table 27

ANOVA for Work Hours per Week vs. All Factors

Factor	F	Sig.	F[a]	Sig.[a]	Post hoc
Intrinsic goal orientation	1.782	.120	2.196	.072	1<5*
Extrinsic goal orientation	.222	.953	.266	.900	none
Task value	1.412	.223	1.473	.213	1<5*
Control beliefs about learning	1.530	.184	1.554	.190	1<4*, 4>6*
Self-efficacy for learning and perf.	1.527	.185	1.875	.118	1<5*
Metacognitive self-regulation	1.700	.138	1.196	.315	1<2*, 2>6*, 3>6*
Effort regulation	2.691	.023*	2.607	.038*	1<5**, 2<5*, 3<5*, 5>6**
Help seeking	1.642	.152	2.007	.097	4<5*
Mindset	.414	.838	.524	.719	none
Attribution locus of causality	1.233	.297	1.532	.196	1<2*, 2>4*
Attribution external control	.612	.691	.463	.763	none
Attribution stability	.645	.666	.456	.768	none
Attribution personal control	1.473	.202	1.831	.126	1<3*, 3>4*

Note. * p < .05. ** p < .01.

[a] Revised F and Sig values for secondary analysis, excluding group 6 (n=3).

Work hours per week groups: 1=0-5 hours, n=97, 63.4%; 2=6-10 hours, n=14, 9.2%; 3=11-15 hours, n=18, 11.8%; 4=16-20 hours, n=9, 5.9%; 5=21-30 hours, n=12, 7.8%; 6=31+ hours, n=3, 2.0%.

ANOVAs on Mind/Attribution Categories vs. Other Factors

How do the mindset and attribution categories relate to the other factors?

A series of ANOVAs were run comparing categories of mindsets and attributions with the MSLQ factors. Numerous significant results were revealed, as described below. Recall the meanings of the groups/categories within these variables:

Mind: group 1=strongly incremental; 2=incremental; 3=neutral; 4=entity; 5=strongly entity.

Attribution Locus of Causality: 1=strongly internal, 2=internal, 3=neutral, 4=external, 5=strongly external.

Attribution External Control: 1=strongly externally controllable, 2=externally controllable, 3=neutral, 4=not externally controllable, 5=strongly not externally controllable.

Attribution Stability: 1=strongly stable, 2=stable, 3=neutral, 4=unstable, 5=strongly unstable.

Attribution Personal Control: 1=strongly personally controllable, 2= personally controllable, 3=neutral, 4=not personally controllable, 5=strongly not personally controllable.

Note: in the results tables, “n/a” indicates the category being compared with itself, giving nonsensical results. These were kept in the table for consistent visual identification of row content.

For the Mind categorical variable (Table 28), four factors were significant: task value, effort regulation, attribution external control, and attribution personal control. Three factors approached significance: intrinsic goal orientation (p=.097), self-efficacy for learning and performance (p=.054), and attribution locus of causality (p=.070). Post hoc analyses revealed numerous significant group differences within task value (groups 1-3 were greater than groups 4-5), effort regulation (groups 1-2 were greater than groups 4-5), and attribution personal control (groups 1-3 were less than groups 4-5).

Table 28

ANOVA for Mind vs. All Factors

Factor	F	Sig.	Post hoc
Intrinsic goal orientation	2.002	.097	1>2*, 1>3*
Extrinsic goal orientation	.805	.524	none
Task value	5.601	.000**	1>3*, 1>4**, 1>5*, 2>4*, 3>4*
Control beliefs about learning	1.744	.143	1>2*
Self-efficacy for learning and perf.	2.378	.054	1>2*, 1>5*
Metacognitive self-regulation	.753	.558	none
Effort regulation	4.808	.001**	1>3*, 1>4**, 1>5**, 2>4**, 2>5*
Help seeking	1.222	.304	3<5*
Mindset	n/a	n/a	n/a
Attribution locus of causality	2.219	.070	1<2*, 1<5*
Attribution external control	2.847	.026*	1>2**
Attribution stability	.749	.561	none
Attribution personal control	5.181	.001**	1<3*, 1<4**, 1<5**, 2<4*, 2<5**, 3<5*

Note. * p < .05. ** p < .01.

Mind factor groups: 1=strongly incremental, n=48, 31.4%; 2=incremental, n=55, 35.9%; 3=neutral, n=26, 17.0%; 4=entity, n=17, 11.1%; 5=strongly entity, n=7, 4.6%.

For the Attribution Locus of Causality categorical variable (Table 29), three factors were significant: task value, control beliefs about learning, and attribution personal control. Two factors approached significance: self-efficacy for learning and performance (p=.095) and effort regulation (p=.091). Post hoc analyses revealed significant group differences within attribution personal control (groups 1-2 were less than groups 3-4), task value (group 1 was greater than groups 2-4) and control beliefs about learning (group 1 was greater than groups 3-4, and group 2 was greater than group 3).

Table 29

ANOVA for Attribution Locus of Causality vs. All Factors

Factor	F	Sig.	Post hoc
Intrinsic goal orientation	1.090	.356	none
Extrinsic goal orientation	.153	.927	none
Task value	3.511	.017*	1>2*, 1>3**, 1>4*
Control beliefs about learning	8.182	.000**	1>3**, 1>4*, 2>3**
Self-efficacy for learning and perf.	2.162	.095	1>3*
Metacognitive self-regulation	.446	.720	none
Effort regulation	2.193	.091	2<4*, 3<4*
Help seeking	1.060	.368	none
Mindset	2.087	.105	1<4*, 2<4*
Attribution locus of causality	n/a	n/a	n/a
Attribution external control	2.112	.101	1>2*
Attribution stability	.688	.561	none
Attribution personal control	34.331	.000**	1<2**, 1<3**, 1<4**, 2<3**, 2<4**, 3<4**

Note. * p < .05. ** p < .01.

Attribution locus of causality groups: 1=strongly internal, n=37, 24.2%; 2=internal, n=55, 35.9%; 3=neutral, n=43, 28.1%; 4=external, n=14, 9.2%; 5=strongly external, n=0, 0.0%.

For the Attribution External Control categorical variable (Table 30), four factors were highly significant: self-efficacy for learning and performance, attribution locus of causality, attribution stability, and attribution personal control. No factors approached significance ($p<.10$). Post hoc analyses revealed numerous significant group differences within self-efficacy for learning and performance (group 1 was greater than groups 2-3, while group 2 was less than groups 4-5), attribution locus of causality (groups 1-2 were less than group 3, and group 3 was greater than groups 4-5), attribution stability (low-numbered groups tended to be less than high-numbered groups), and attribution personal control (low-numbered groups tended to be less than high-numbered groups, with the exception of group 2, which was higher than group 5).

Table 30

ANOVA for Attribution External Control vs. All Factors

Factor	F	Sig.	Post hoc
Intrinsic goal orientation	1.257	.290	none
Extrinsic goal orientation	.220	.927	none
Task value	1.830	.126	1>3*
Control beliefs about learning	1.834	.125	3<4*
Self-efficacy for learning and perf.	3.525	.009**	1>2**, 1>3*, 2<4*, 2<5*
Metacognitive self-regulation	1.310	.269	none
Effort regulation	.577	.680	none
Help seeking	.592	.669	none
Mindset	.778	.541	none
Attribution locus of causality	6.310	.000**	1<3**, 2<3*, 3>4*, 3>5**, 4>5**
Attribution external control	n/a	n/a	n/a
Attribution stability	4.657	.001**	1<5**, 2<5**, 3<4*, 3<5**, 4<5*
Attribution personal control	9.454	.000**	1<2*, 1<3**, 1<4**, 2>5**, 3>5**, 4>5**

Note. * p < .05. ** p < .01.

Attribution external control groups: 1=strongly externally controllable, n=5, 3.3%; 2=externally controllable, n=30, 19.6%; 3=neutral, n=65, 42.5%; 4=not externally controllable, n=39, 25.5%; 5=strongly not externally controllable, n=10, 6.5%.

For the Attribution Stability categorical variable (Table 31), seven factors were significant: intrinsic goal orientation, task value, control beliefs about learning, self-efficacy for learning and performance, metacognitive self-regulation, effort regulation, and attribution external control. Attribution locus of causality approached significance (p=.083). When re-analyzed without group 1 (n=1), all results remained at prior significance levels except control beliefs about learning, which became highly significant. Post hoc analyses revealed significant group differences (typically, groups 2-3 were less than groups 4-5) within intrinsic goal orientation, task value, control beliefs about learning, self-efficacy for learning and performance, metacognitive self-regulation, effort regulation, and attribution external control. Most of these differences were highly significant (p<.01).

Table 31

ANOVA for Attribution Stability vs. All Factors

Factor	F	Sig.	F[a]	Sig.[a]	Post hoc
Intrinsic goal orientation	9.623	.000**	12.171	.000**	2<3*, 2<4**, 2<5**, 3<4*, 3<5**, 4<5**
Extrinsic goal orientation	1.088	.365	1.441	.233	2<3*
Task value	3.172	.016*	3.795	.012*	2<4*, 2<5**, 3<5*
Control beliefs about learning	3.412	.011*	4.537	.005**	2<4*, 2<5**, 3<5**
Self-efficacy for learning and perf.	4.728	.001**	6.292	.000**	2<5**, 3<4*, 3<5**, 4<5*
Metacognitive self-regulation	8.921	.000**	11.378	.000**	2<3**, 2<4**, 2<5**, 3<5**, 4<5**
Effort regulation	4.639	.002**	5.425	.001**	2<5**, 3<5**, 4<5**
Help seeking	.875	.481	.785	.504	none
Mindset	.266	.900	.210	.890	none
Attribution locus of causality	2.104	.083	2.510	.061	3>4*, 3>5*
Attribution external control	3.874	.005**	4.469	.005**	2<5**, 3<5**, 4<5**
Attribution stability	n/a	n/a	n/a	n/a	n/a
Attribution personal control	1.584	.182	2.103	.102	3>5*

Note. * p < .05. ** p < .01.

[a] Revised F and Sig values for post hoc analysis. Analysis was run excluding group 1 (n=1). Attribution stability groups: 1=strongly stable, n=1, 0.7%; 2=stable, n=14, 9.2%; 3=neutral, n=51, 33.3%; 4=unstable, n=57, 37.3%; 5=strongly unstable, n=26, 17.0%.

For the Attribution Personal Control categorical variable (Table 32), eight factors were significant: task value, control beliefs about learning, self-efficacy for learning and performance, effort regulation, the mind factor, attribution locus of causality, attribution external control, and attribution stability. Two factors approached significance: metacognitive self-regulation (p=.055) and effort regulation (p=.067). Post hoc analyses revealed significant group differences within task value (group 1 was less than groups 2-4), self-efficacy for learning and performance (group 1 was greater than groups 2-3), metacognitive self-regulation (group 1 was greater than group 3, while groups 2-3 were less than group 5), the mind factor (groups 1-3 were less than groups 4-5), and attribution locus of causality (group 1 was less than groups 2-5, group 2 was less than groups 3-4, and group 3 was less than group 4). These results largely follow the expected pattern: high levels of personal control correlate with high levels of self-efficacy, academic self-regulation skills, and an incremental mindset.

Table 32

ANOVA for Attribution Personal Control vs. All Factors

Factor	F	Sig.	Post hoc
Intrinsic goal orientation	.831	.508	none
Extrinsic goal orientation	1.956	.104	2>3*
Task value	4.385	.002**	1>2**, 1>3**, 1>4**, 2>4*
Control beliefs about learning	4.570	.002**	1>2**, 1>3**
Self-efficacy for learning/perf.	3.399	.011*	1>2**, 1>3**, 3<5*
Metacognitive self-regulation	2.375	.055	1>3*, 2<5*, 3<5*
Effort regulation	2.249	.067	1>2*, 1<3**
Help seeking	.259	.904	none
Mindset	6.407	.000**	1<4**, 1<5*, 2<4**, 2<5*, 3<4**, 3<5*
Attribution locus of causality	31.491	.000**	1<2**, 1<3**, 1<4**, 1<5**, 2<3**, 2<4**, 3<4*
Attribution external control	3.512	.009**	1>2**
Attribution stability	3.409	.011*	1>2**, 1>3*
Attribution personal control	n/a	n/a	n/a

Note. * p < .05. ** p < .01.

Attribution personal control groups: 1=strongly personally controllable, n=50, 32.7%; 2=personally controllable, n=59, 38.6%; 3=neutral, n=31, 20.3%; 4=not personally controllable, n=7, 4.6%; 5=strongly not personally controllable, n=2, 1.3%.

CHAPTER V

DISCUSSION

This study's main goal was to see what relationships exist between the cognitive factors of interest and between these factors and participant demographics. By taking a large sample of students from a variety of demographics, profiles of students could be constructed, giving insights into the variety of cognitive perceptions that exist. These insights could then be used to increase student achievement through changes in instruction and advising, as well as changes in student perceptions through self-reflection or appropriate interventions. Numerous prior studies have been done using the instruments utilized in this study, but to the researcher's knowledge, no study has been done which uses all three instruments together. Finding strong relationships could point toward possibilities for future research and practice.

Each research question is addressed individually by bringing in prior research, relating that research to current results, and discussing possible implications—in particular, what kinds of interventions would be most effective for various student groups. Of course, any student would likely benefit from the skills and information presented in any of these interventions; however, the idea of the study is to try and determine which groups of students would especially benefit from particular kinds of interventions. Additionally, students with strengths in

certain areas can and should be “tapped” during such interventions to provide their insights for other students, if they are willing to do so. This is especially important because those individuals providing the interventions (instructors, advisors, administrators, etc.) will likely not be in the same situation academically as the students; therefore, they may not be able to address many of the *specific* elements students must tackle in order to succeed, whereas student peers might.

Factor Correlations

Correlations between MSLQ factors are discussed here; the mind and attribution correlations are discussed in the section on ANOVAs of mind/attribution factors vs. other factors, as there would be redundancy otherwise.

A high number of significant correlations (45 out of 78, or 57.7%) were found between the thirteen factors; 36 were positive, nine were negative. These correlations largely parallel those found by Pintrich et al. (1991), though with some exceptions, including the following: extrinsic goal orientation correlated significantly with self-efficacy for learning and performance, task value, metacognitive self-regulation, and effort regulation in this study, but not in the Pintrich study; and effort regulation correlated significantly with control beliefs about learning in this study, but not in the Pintrich study. Possible reasons for the discrepancies include the different number of items used in each factor, rewording of items to indicate “college in general” rather than a specific course, and student demographics. Correlations in a study by Sorić & Palekčić (2009) showed similarities with some combinations (such as metacognitive strategies

with effort regulation or internal locus with controllability) but not with others (such as stability with controllability or stability with effort regulation). “Interest” was a key factor in the study and correlated strongly with most learning strategies, indicating that high interest and heavy use of learning strategies (particularly “deeper” ones such as forming relations and critical thinking) go hand in hand; rote learning, considered a “surface” learning strategy, correlated negatively with interest. This parallels findings by Stes, De Maeyer, Gijbels & Petegem (2012) who found strong correlations between positive perceptions of the teaching/learning environment and deep learning strategies. However, each of these studies addressed a number of different factors besides the ones in common with the current study, and the factors in common had slightly modified wording, so comparisons should be drawn with caution.

Note that strong *positive* correlations indicate that high ratings on one variable will tend to accompany high ratings on the other variable, and low ratings with low ratings; on the other hand, strong *negative* correlations imply that high ratings on one variable tend to accompany low ratings on the other, and vice versa. In this study, all significant negative correlations had at least one of the mind or attribution factors as one of the variables; due to the way these variables were scored, their negative correlations with MSLQ factors were expected. For example, participants rating the mind variable low (indicating an incremental mindset) tended to rate MSLQ factors such as effort regulation and self-efficacy for learning and performance high. Similarly, those rating attribution personal control low (indicating a perception of *high* levels of personal control) tended to

rate those same MSLQ factors high. (The possibly unintuitive rating scales for the attribution items were used for consistency with the original instrument.)

Of the top 5 most statistically significant correlations, three involved intrinsic goal orientation, meaning one possesses a “learning for learning’s sake” mentality. These strong positive correlations were between intrinsic goal orientation and task value, self-efficacy for learning and performance, and metacognitive self-regulation. While common sense indicates that intrinsic goal orientation would correlate with the perceived value of a task, it is perhaps not as straightforward to connect it with self-efficacy for learning and performance or metacognitive self-regulation. In other words, one may have a desire to learn for the sake of learning, but this would not necessarily imply that one has the belief that one has the ability or possesses the skills necessary to do it. That said, many of these relationships can feed back upon each other: as one gains confidence and skills, one may feel they have more latitude to “learn for the sake of learning”, which expends effort and time (Schweinle & Helming, 2011), rather than just for the sake of fulfilling a requirement or performing at a certain level (which may be all that a student can give to an assignment or course, given other constraints) (Dasinger, 2013; Sorić & Palekčić, 2009). Intrinsic goal orientation also correlated strongly ($p<.01$) with control beliefs about learning and effort regulation; again, these correlations could be explained as having bidirectional or reciprocal relationships (Bandura, 1997).

Although extrinsic goal orientation sounds like the opposite of intrinsic goal orientation, which would imply opposite correlations between these and the other

factors, the data show that this is not the case. While all positive correlations for extrinsic goal orientation were weaker than those for intrinsic, both goal orientations shared significant correlations for task value, control beliefs for learning, self-efficacy for learning and performance, metacognitive self-regulation, and effort regulation. Intrinsic and extrinsic goal orientations themselves did not significantly correlate with each other (r=.046, p=.570).

The most straightforward explanation for these findings is that these are not mutually exclusive cognitive perceptions—that is, one can believe that learning for learning's sake and performance in one's courses (and possibly also demonstrating that proficiency to others) are both important (Bembenutty, 2012; Ryan & Deci, 2001). As discussed in the Theoretical Framework section, SDT posits a spectrum of extrinsic motivation, ranging from externally controlled to internalized, based upon the perceived locus of control and the valuation of the activity (Deci & Ryan, 1985). Therefore, many actions can have not only elements of both intrinsic and extrinsic motivation, but also different levels of extrinsic motivation. For example, a student may study particularly hard for a test not only out of fear of failure and subsequent reprisal by the instructor or parents (externally-controlled, negative avoidance), but also because he/she wants to get a good grade to be admitted into a desired major (externally-demanded, internally-desired, though the substance of the test may not be related to the desired outcome); additionally, there may be elements on the exam in which that student is intrinsically interested. These and many other reasons exist for a given action to fall in numerous places on the extrinsic motivation spectrum, and having

both can be beneficial for performance: “The promotion of balanced goal orientations needs to be orchestrated with promoting a high level of self-efficacy, intrinsic motivation, outcome expectancy, and self-regulation” (Bembenutty, 2012, p. 105). Therefore, it is ill-advised to assume that motivations fall only into intrinsic and extrinsic categories, as the range of extrinsic motivations—and the behavior ramifications that result—is quite extensive (Ryan & Deci, 2001; Seo, 2013).

The generality of the questions may have confounded the correlation of intrinsic and extrinsic goal orientation as well: a student may lean one way in one course and lean the opposite way in another, and when asked about college courses in general, their answers may have tended to cancel each other out. Even in a single course, there may be assignments which a given student feels more comfortable and confident about than others, therefore feeling that they have more latitude to approach them with an intrinsic goal orientation (for example, being able to “dig deeper” into the assignment for the purpose of additional learning, even if it was not required for the grade). On the other hand, other assignments may cause that same student to feel anxious about their ability to succeed, thereby prompting a more extrinsic goal orientation: “do what is needed to adequately perform, nothing more”. Additional variables in the interplay between intrinsic and extrinsic goal orientations could include the kind of assessment used (objective versus subjective), the perception of how fairly the instructor grades assignments, overall interest in the material, or perception of the learning environment (Bembenutty, 2012; Ning & Downing, 2012; Stes et al.,

2012). A more detailed breakdown of courses and assignment types—and student perceptions about these specifics—could prove illuminating in further understanding the interplay of these two orientations.

Given the importance of the different kinds of motivation in SDT, what are some methods available for those in the educational process to encourage beneficial motivation while discouraging harmful motivation? SDT posits that the three most important cognitive factors for enhancing intrinsic and/or integrated extrinsic motivation are autonomy, competence, and purpose or relatedness (Deci & Ryan, 1985; Pink, 2009). Working from this hypothesis, there are a number of things an instructor can do to promote these factors in their courses. Note that the more instructors *themselves* possess these factors, the more they typically model them to students (Bembenutty, 2012; Deci, Kasser, & Ryan, 1997; Kohn, 2011; Stes et al., 2012).

Autonomy: Provide students with real choices about their work, such as selecting what they will read, the kinds of assignments they will do, even what they will be tested on (Kohn, 2011). Given that there may be departmental pressure on an instructor to cover certain topics, it may not be possible to give complete latitude for students. However, even within a relatively dictated curriculum, there are many ways to encourage student autonomy; this is largely dependent on the will and creativity of the instructor. Of course, difficulties may arise with assessment—if different students are assessed differently, students could perceive that their workload is “unfair” in comparison to their classmates; additionally, the extra time needed to accommodate different student work may

not be realistic for the instructor to take on. That said, one simple way to alleviate many of these issues is to remove the grading portion from the student-choice elements, keeping the grades only in the “traditional” assessments of the course such as exams. This kind of compromise can help promote integrated motivation and autonomy (Ryan & Deci, 2000) while acknowledging that parts of the course curriculum may be specified by the department or other external controlling force, or that the course needs to use specified instruction and assessment methods. Such an acknowledgement can and should be communicated clearly to students, because this is where many of the rules and regulations of the course (dealing with the majority, if not all, of the graded assessment) might come from. “To fully internalize a regulation, and thus to become autonomous with respect to it, people must inwardly grasp its meaning and worth” (Ryan & Deci, 2000, p. 64). Instructors therefore should strive to make this meaning and worth understood by their students.

Competence: Ensure that students have, or perceive they have, the skills and resources necessary to succeed in a given task. “Students will more likely adopt and internalize a goal if they understand it and have the relevant skills to succeed at it” (Ryan & Deci, 2000, p. 64). This includes providing skills and resources not only before the task, but during and after it, particularly with regards to feedback. As discussed previously, certain kinds of feedback can produce much greater engagement and persistence than others; specifically, task-based feedback is preferable to ability-based feedback (Dweck, 2000), and student-determined feedback—where students say what kinds of feedback would

be most beneficial to them—is preferable to instructor-determined feedback (Kohn, 2011), at least within appropriate limits. Such feedback not only shows students where they succeeded and where they need improvement on the task (which might be considered a “base” level of feedback), it also can raise student perceptions of self-efficacy and competence, if delivered effectively (which could be considered a “higher” level of feedback, and one which is perhaps not commonly considered as part of the purpose of “feedback”). Such raised perceptions can have important positive consequences for future learning, as discussed previously. Additionally, student attributions regarding their task and learning outcomes should be monitored closely, with the goal of ameliorating negative ones such as believing that uncontrollable or external causes are the reasons for outcomes (Dasinger, 2013; Mkumbo & Amani, 2012; Sorić & Palekčić, 2009). Note that even if these outcomes are positive, external and uncontrollable attributions for them can impact persistence and self-efficacy negatively; it is essential that students take ownership of their effort and learning strategies and realize that they have high levels of control over most academic tasks. Finally, structuring tasks as small, readily-attainable steps can help students gain perceptions of competence, thereby potentially raising motivation; such steps are particularly effective for students with low levels of perceived competence or self-efficacy (Schweinle & Helming, 2011; Dasinger, 2013). Of course, these small steps need to be balanced with providing challenges that stimulate deeper engagement while not overwhelming students; striking this

balance can be one of the most challenging, yet rewarding elements of teaching, and can require considerable investment.

Purpose and relatedness: These overlapping constructs are also an essential part of increasing intrinsic and integrated extrinsic motivation. SDT states that people have higher levels of positive motivations when they feel they have a higher purpose and therefore are part of “something larger than themselves”, which can be a group, a cause, an idea, etc. Relatedness is a key component of many forms of purpose, as being part of a group working toward common goals can be highly motivating; however, it is of course possible to have purpose and to work alone towards it.

How can classrooms engender these perceptions? Students need to understand not only the “big picture” of what the course is about, they also need to understand how the smaller pieces—especially the potentially dull or repetitive ones—fit into the overall picture (Pink, 2009). Even the most creative and thoughtful instructors may not succeed at making *everything* in a course highly engaging, and thankfully, this is not necessary to still have a highly successful course. However, without clear reasons for why the dull or repetitive tasks are important, student engagement can suffer and carry over into other, more naturally engaging areas, which will sap overall enthusiasm. Zero-stakes competitions and small rewards can be beneficial to make such tasks more palatable, but they must be administered carefully and restricted to *only* those tasks which are deemed “highly uninteresting”; challenging and creative tasks have engagement as their built-in reward, and adding external rewards can

undermine that engagement (Deci & Flaste, 1995; Pink, 2009; Kohn, 1993, 2011). Additional methods to promote purpose and relatedness include having students think through how the material in the course interests them in other areas, whether intrinsic (such as a long-time hobby) or extrinsic (something that might help them get a good job). While this instructional advice has been given for years and may border on being cliché, there are some very effective ways of getting students to brainstorm deeply about it (Bain, 2004; Kohn, 2011). Finally, carefully-planned and well-executed group work can foster both relatedness and autonomy—in this case, a kind of "group autonomy" of the students. While there are many potential pitfalls with group work, some can be lessened or avoided by keeping the assessment portion minimal for the group as a whole, so that the overachiever doesn't feel taken advantage of and the underachiever doesn't get a free ride. Instead, have individual students in the group be responsible for clearly-identified elements; they become experts in these areas and share that knowledge with the other members (and with the overall class eventually), yet there are ample opportunities to collaborate as a group on a larger project which includes the various areas. Done well, such tasks can promote all elements of SDT: autonomy, competence, purpose, and relatedness; and as we have seen, promoting these elements tends to promote self-efficacy, self-regulated learning, and motivation as well. Indeed, "…the richest experiences in our lives…[are when we're] doing something that matters, doing it well, and doing it in the service of a cause larger than ourselves" (Pink, 2009, p. 145).

Help seeking was an unusual factor compared to the other factors, with significant positive correlations only to intrinsic goal orientation ($p<.05$), metacognitive self-regulation ($p<.01$), and effort regulation ($p<.05$). This may be explained by the nature of the factor itself: the willingness to seek help when academically challenged. It seems appropriate that individuals high in intrinsic goal orientation would tend to seek help when needed, as this can help their "learning for learning's sake" by utilizing other, more knowledgeable persons as resources. On the other hand, individuals high in extrinsic goal orientation might regard help seeking in several ways: some may seek help to bolster their performance, while others may specifically *not* seek help, for fear of others seeing their performance as weak or of showing a poor level of competitiveness. That said, there certainly could be other factors in play, such as one's levels of self-efficacy and the various cognitive regulation skills. If one rates high in these areas, they may be perfectly comfortable working out difficult material and assignments on their own, regardless of how they view help seeking; if one rates low (and also rates low on both goal orientations), they may be so unmotivated to succeed that seeking help seems futile. For comparison, in Pintrich et al. (1991), help seeking did not correlate with any of these three factors.

Clearly, there are many moderating factors at work concerning help seeking behaviors, some of which will be discussed when considering the results from the ANOVAs vs. demographics. One of these moderating factors could be the specific academic task for which a student asks for help. A study by Bailey (n.d.) investigated help-seeking behaviors of college students during the course

of a research project, tracking the perceived amount of help needed, who was asked to give help, and what part of the process the help was sought for. Overwhelmingly, students asked for help “finding relevant information”, though some students also sought assistance with “focusing on a specific subject” and “evaluating information found”; they typically sought help from the instructor, a peer, or a library staff member. Interestingly, when asked why one did *not* ask for help from various sources, substantially more students answered “felt I should have known how to do it myself” when talking about their instructor versus a library staff member. This indicates that even though the instructor may have made clear that seeking help from him/her would not reflect poorly on the instructor’s judgment of the student, a significant number of students may have believed it would—and subsequently refrained from asking for help. Additional findings included no significant difference in help-seeking by gender or by past experience writing research papers; however, there was a marginally significant ($p=0.49$) difference between freshmen and seniors, whereby freshmen were more likely to ask peers for help. Such results indicate the need for better understanding of student help-seeking behaviors by instructors, as there are a number of factors which come into play regarding how often, for what purpose, and from whom students ask for help. A better understanding could help instructors ensure that the process is as non-threatening and beneficial as possible for students.

As mentioned in Chapter IV, when correlation matrices were created with limited groups, in some cases there were marked differences, defined as p-

values 4 or more times smaller and ending below 0.1, or a change in correlation direction with both p-values below 0.1. The Age groups 1-4 correlation matrix showed eight such differences, while the Year groups 1-4 showed two and the Ethnicity groups 1-3 showed none. The Age matrix changes were all in the MSLQ factors except two: intrinsic goal orientation with attribution external control, and help seeking with attribution locus of causality. Additionally, six of the changes involved the goal orientation factors.

The rise in correlation strength indicates that the smaller set of cases answered the items in each factor more consistently. This is likely to be because groups 5-8 were students above the typical undergraduate age, ranging from 22 to 40+: age 22-24, n=8; age 25-29, n=4; age 30-39, n=1; age 40+, n=1; total n=14; % groups 5-8 of total = 14/153 = 9.2%. While there were not many cases in these groups compared to the total, the substantial differences between their age demographic and the typical undergraduate age demographic could account for the different manner in which they answered the survey items, therefore accounting for the increases in correlation strength. As will be evident when discussing the ANOVAs for demographics, older students often rated factors on the survey very differently than younger students, presumably stemming from increased experience in college academics (self-regulation skills factors) and from being enrolled in courses in their chosen major (task value, intrinsic goal orientation). Therefore, they may not interpret the relationships between factors in the same manner.

Frequencies of factor averages indicated that distributions were spread throughout the range of values for most factors, and generally clustered near their mean as in a standard distribution, though with some exceptions (skewness magnitude greater than 0.5 in extrinsic goal orientation and mind factors; kurtosis magnitude greater than 0.5 in extrinsic goal orientation, task value, help seeking, and attribution locus of causality). In other words, while there was moderate deviation from a standard distribution in several factors, correlations held strongly for a large number of factor combinations. This indicates that not only did some individuals score these factors consistently high, other individuals scored them consistently low, which shows that for the most part, the questions were consistently interpreted relative to one another.

ANOVAs on Demographics vs. Factors

ANOVAs run on factors vs. demographics showed a variety of significant results. These analyses were run to determine how each demographic variable and its groups rated the various factors, whether groups rated them differently, and in particular, which groups rated the various factors significantly higher or lower than others. From these results, student profiles based upon demographics began to emerge. Following is a discussion of some of the highlights from the findings.

Within gender, the only factor with a significant difference was extrinsic goal orientation, with females (M = 6.12, SD = 1.21) rating higher than males (M = 5.58, SD = 0.80). However, within the factor, the two items with the most significant difference between genders involved getting better grades and raising

GPA; less significantly different was “demonstrating their ability to others”, and “doing better than their classmates” was not significantly different. This clarifies the respondents’ position somewhat, making it more of a personal-gain motivation rather than a demonstration of proficiency or competitiveness. Note that both males and females rated extrinsic goal orientation well above the middle value of 4, while at the same time, each rated intrinsic goal orientation somewhat lower and close to one another (male M = 4.97, SD = 1.01; female M = 4.71, SD = 0.95). This cautions one from reading too much into the significant difference found in the extrinsic goal orientation factor, as a wider spread of intrinsic goal orientation and other related MSLQ factors would be expected given the spread within the extrinsic motivation ratings.

Prior research gives differing results regarding the interplay between goal orientations and gender. A study by Mirabela-Constanta & Maria-Madela (2011) investigated third-year university students, categorizing by goal orientation (intrinsic, extrinsic, both intrinsic and extrinsic, and unmotivated), and examining academic performance of the groups. They found that female students had better performance, while a higher percentage of male students were intrinsically motivated. In her study of motivation orientations and their effect upon adjustment, well-being, stress, and performance, Baker (2004) found that women had higher extrinsic motivation self-report ratings and higher academic performance scores than men. Mägi, Adov, Täht, & Must (2013) found differences between genders in a study investigating the likelihood that students would be willing to take a low-stakes test (a shortened version of the scholastic

aptitude test with no direct benefit or consequence to them). Females were more likely to participate, those with higher levels of motivation had lower results, and prior performance did not predict whether they would be willing to take the test; on the other hand, prior performance did predict whether males would be willing to take the test, with higher-performing males more willing to participate. Deci, Cascio, & Krusell (1973) found that positive verbal feedback during a puzzle-playing experiment led to increased intrinsic motivation (defined as longer free-play with the puzzle after the experiment was supposedly completed) in males but decreased it in females; the hypothesis is that males viewed the feedback as informational and therefore competence-supporting, while females viewed the feedback as controlling and therefore autonomy-decreasing. Importantly, however, if females were given feedback in written form and not verbally from the experimenter, there was no decrease in intrinsic motivation. Mkumbo & Amani (2012) found that females attributed their performance (whether high or low) more to internal factors than males, though performance was not different between genders. Dasinger (2013) found a similar result with low-graded, nontraditional females compared to low-graded, nontraditional males, where "nontraditional" indicates one or more demographics not found in typical college students: higher age, having children, entering college after time off, working full-time, etc.

Given the findings from prior research as well as this study regarding differences in gender, what are some implications for students, instructors, and advisors? If females tend to have higher extrinsic motivation, higher performance

and persistence, and higher internal attributions, while males have somewhat the opposite, perhaps there are ways to reach an appropriate “middle ground” and address the strengths and weaknesses of each gender.

Females might benefit from interventions to increase their intrinsic motivation by boosting their autonomy and competence perceptions, which could be accomplished through a number of techniques: making connections between coursework and already-established interests; giving individualized feedback on performance which is not relative to other students, and therefore viewed as non-competitive; giving written feedback rather than verbal; and allowing greater choice in assignments and assessment techniques, thereby giving room for perceptions of autonomy to rise. Additionally, high levels of internal attributions for performance should be monitored, because while “taking ownership” of one’s performance typically has positive benefits, too much of this perception could be inaccurate. This could have the effect of masking very real external factors which need to be taken into account when considering performance; it could also mean one is overstating one’s contribution to the performance, whether positive or negative, which could cloud judgment in either direction.

Males could benefit from interventions to increase persistence and extrinsic motivation, both of which tend to increase performance (especially if the extrinsic motivation is nearer the internal side of the spectrum); such interventions could include study skills which boost persistence through an understanding of effort regulation, and developing appropriate extrinsic goal orientations through thoughtful questioning about academic priorities.

Additionally, the balance of internal and external attributions for performance should be examined, and if low levels of internal attributions exist, these should be addressed. If the tendency is to attribute performance to external factors more than internal ones, males may have an inaccurate perception of where the causes for performance truly come from, thereby dismissing internal, controllable elements such as low effort and erroneously replacing them with external elements such as bad luck or teacher bias. With such a misperception, males may not be motivated to make appropriate changes in study habits to ensure future success.

The age variable was biased towards younger students (age 18, n=59, 38.6%; age 19, n=39, 25.5%; age 20, n=23, 16.3%; age 21, n=18, 11.8%, age 22 and above, n=14, 9.1%), which was expected given the targeting of first- and second-year classes. Task value showed significant differences, with older students rating higher than younger ones. This indicates that older students held a general belief that their courses were valuable, interesting, or enjoyable, or that understanding the subject matter was important to them. The main difference was evident between students who were 21 years old and younger students, and this difference was evident in the first three task value questions: “I am very interested in the content area of my courses”, “I think the material in my courses is useful for me to learn”, and “I like the subject matter of my courses”. However, task value question 4, “Understanding the subject matter of my courses is very important to me”, did not show a significant difference between 21-year-olds and younger students. This clarifies the overall factor somewhat, as the questions

refer to somewhat different perceptions: questions 1-3 relate to interest and value in the subject without regard to one's ability level, while question 4 refers to valuing the ability to actually understand the subject, presumably at the level needed for success in the course. Therefore, one could imagine a student rating the two groups of questions in a number of combinations: they appreciate the material but don't care or need to engage deeply with it, for whatever reason; they don't appreciate the material but do take time to understand it, in order to perform well in the course; they rate both groups low; or they rate both groups high. Clearly, additional information can be drawn from the various ways this factor can be rated, which indicates that more analysis may be needed than just the factor average.

Other factors of interest included self-efficacy for learning and performance and help seeking, both of which were significant when ages 30-39 (n=1) and age 40+ (n=1) were removed. For self-efficacy, 18- and 19-year-olds rated lower than 21-year olds and students ages 25-29, indicating less general academic confidence by younger students, presumably due to less experience and/or to being enrolled in more General Education courses, most of which are outside one's major. 18-year-olds were also more willing to seek help than 21-year-olds. However, 19-year-olds and 21-year-olds were less willing to seek help than students aged 22-24. Perhaps students in the 22-24 age group, being still enrolled past the standard four years, are more willing to seek assistance to complete their program; conversely, perhaps 19- and 21-year-olds are more confident in their abilities and do not see as much need to seek assistance. That

said, students aged 22-24 comprised a considerably smaller group (n=8) than any of the younger groups, so any extremes in one or two student ratings would have a greater effect on the overall average of the group. Notably, students aged 22-24 also often “bucked the trend” of the means of their neighbors, whether the trend was rising or falling. While this may be a statistical anomaly due to the low number of students in the group, it may reveal specifics about students aged 22-24 which bear closer inspection, especially when considering help seeking, which group 5 rated significantly higher than its neighbor groups.

Overall, older students rated six out of the eight MSLQ factors higher than younger students, though not all these differences were significant. This gives a general indication that older students have more confidence in their abilities and interest in their courses, which seems logical given their greater experience and/or being enrolled in a higher proportion of major courses. Gupta, Harris, Carrier, & Caron (2006) found a similar result with adult learners entering college, determining that they have an eagerness and readiness to learn that is higher than many traditional students; perhaps this is due to greater “world experience” or they have more at stake for successful completion, such as advancement in their career. However, attrition rates are higher for older students (Completecollege.org), though the reasons for attrition may be different than those of younger students.

To address age-related perceptions more closely in future studies or interventions, one might include additional questions which try to clarify the reasons for high ratings in the various academic factors—are they due to greater

experience, higher motivation, higher interest in the material, or other factors? Within “experience”, does this refer to better study habits, understanding particular instructors’ methods of assessment, time management, or other variables? Within “motivation”, what kinds of motivation are in play, and what are the ramifications? As seen previously, different kinds of motivation can have very different behavioral outcomes, and it is not always a simple matter to narrow down which kinds of motivation exist in a given student or situation. Ideally, the information gathered from such clarifications would be made available for other students, instructors, and advisors; the same procedure could be used for questions specific to other demographics as well. Including students from various ages in interventions could make such interventions more effective through peer learning; hopefully, older students would be able to assist younger ones due to their increased experience, and students of similar ages could collaborate in finding solutions to age-specific challenges.

The High school GPA variable showed a very strong effect of groups 1 (n=1) and 2 (n=1), the lowest-GPA groups. These participants showed a marked difference from each other in most of their ratings, which was unexpected due to their proximity in the variable. In particular, the participant in group 2 (HS_GPA=2.0 to 2.49) rated most of the MSLQ factors extremely low, indicating a very low belief in their academic potential, while the participant in group 1 rated most of these factors higher, relatively similarly to groups 3 through 6. The participant in group 2 also rated the mind factor quite high (indicating a strong entity theory belief), yet strong personal-control ratings on the attribution factors.

This was also an unexpected result given the correlations between the mind and attribution locus of causality and personal control—typically, one holding a strong entity theory will perceive less ability to control future outcomes, as their belief is that intelligence is more or less fixed. In this case, this participant appears to have an unusual combination of beliefs, rating their abilities very low but their personal responsibility to try and achieve their potential considerably higher. If these ratings do reflect actual perceptions, these two individual cases could provide a wealth of information about their particular profiles through additional study. While it would be impractical in this study to examine each such case with this level of detail due to the number of demographic and factor combinations, this particular comparison warranted additional scrutiny. For consideration of the possible effects other demographics might have had for these two cases, the participants had the following profiles:

Group 1 (HS_GPA less than 2.0): 20-year-old Black male, sophomore, college GPA of 2.5-2.99, mother=bachelor's degree, father=bachelor's degree, family income $80,000-$120,000, study hours 11-15, work hours 0-5.

Group 2 (HS_GPA 2.0-2.49): 19-year-old Hispanic male, sophomore, college GPA less than 2.0, mother=less than high school, father=less than high school, family income less than $30,000, study hours 0-5, work hours 0-5.

Once these two groups were removed from the analysis due to the low number of cases, all previously-significant differences disappeared, though the same three factors still approached significance. This shows a very strong effect of groups 1 and 2, which as noted previously have a number of unexpected

ratings. To better understand how high school GPA affects ratings it would be necessary to have more cases to analyze—this could show whether such differences truly are inherent in the demographic, how other demographics affect the ratings, and so on. However, students with high school GPA's below 2.5 have a much lower chance of being admitted to the university at all. Therefore, expanding the study to students at open-enrollment institutions would help to gather more data on the low high school GPA demographic.

Post hoc analyses (run on groups 3-6 only) showed group 3 rated significantly lower than group 6 on metacognitive self-regulation, effort regulation, and help seeking; groups 4 and 5 were typically between the two outer groups on these factors, though not always in a line. The differences between groups 3 and 6 were expected, as students with higher ratings in these areas tend to achieve higher grades. However, two caveats should be mentioned: first, this is considering high school GPA, which has already been earned, and may be from a much less-challenging institution than the university; and second, the differences, though statistically significant, were relatively slight in comparison to the extreme differences observed within groups 1 and 2.

College GPA showed somewhat similar results to high school GPA, whereby lower-GPA groups generally rated lower on most MSLQ factors and higher on the mind factor, but with some notable differences. Groups 1 (less than 2.0) and 2 (2.0-2.49) had more cases than high school GPA (n=5 and n=7, respectively), which allowed post hoc analyses without removing them, and also meant less effect of one or two outliers on the overall group mean. Group 1 rated

self-efficacy for learning and performance and effort regulation lower than the other groups, sometimes significantly; they also rated control beliefs for learning and metacognitive self-regulation lower than other groups, which was expected from students achieving low GPAs. However, as with many relationships in this study, one must keep in mind: do low GPAs cause students to rate these factors low, or do low factor ratings cause low GPAs, presumably due to lowered confidence and effort? It is quite possible that both directions are in effect, given the ways these feedback loops can occur (Bandura, 1997; Sorić & Palekčić, 2009). Therefore, it is important to ask clarifying questions to try and get at the specifics (what are the most troublesome areas, why are they occurring, etc.), which could offer possible remedies to such “downward spirals”.

Interestingly, the less-than-2.0 group rated intrinsic goal orientation nearly the same as all students above 2.5, and rated extrinsic goal orientation lower than all other groups. Based on the low values for the other factors, one might predict low values on intrinsic goal orientation (learning for learning’s sake is not valued highly because one has low beliefs of learning ability), and high values on extrinsic goal orientation (getting a good grade is most important because one’s GPA is low); however, the reverse of each of these predictions was evident for the group. Additionally, students in the 2.0-2.49 range rated intrinsic goal orientation lower than all other groups, yet rated extrinsic goal orientation similarly to groups 3 through 6; the other MSLQ factors either followed a trend line across groups, or were rated similarly to groups 3 through 6 (except help seeking, in which group 2 rated lowest). These differences between the two

lowest-GPA groups are curious, given their proximity in the demographic, and possibly point to a larger gap in perceptions than is captured by the categories (GPA less than 2.0, which could mean as low as 0.0, versus GPA between 2.0 and 2.49). Had actual, exact GPAs been available, more precise comparisons could be made using scatterplots of individual case GPAs versus each factor; from these plots, trend lines or curves could be determined, clarifying how the cases fell within these categories.

The lowest-GPA group rated the mind factor significantly higher than all other groups, indicating a strong entity belief about intelligence. When combined with beliefs in low ability, this rating was troubling—not only do these students have low opinions of their academic potential, they also believe that intelligence is more fixed than malleable, thereby diminishing hope for improvement (Dweck, 2000). The underlying question, again, is: Do these beliefs tend to lead to low achievement, or does low achievement tend to lead to these beliefs? Theories used in this study's conceptual framework say that both are true—there is a feedback cycle in which beliefs are shaped by events and performance, yet those beliefs can also be changed internally, thereby changing one's effort in future learning events (Bandura, 1997; Perry, 2005; Sorić & Palekčić, 2009). However, without an understanding of the possibility of changing one's beliefs in this way, students may remain in a negative cycle of belief and performance, not able to "see a way out". Such students could benefit from interventions designed to increase their understanding of the malleability of intelligence (Dweck, 2000) and

to recognize and alter negative attributions of their academic performance (Perry, 2005).

Study hours per week revealed a wealth of significant mean differences and between-group differences. These ratings painted a worrisome picture about students in group 1 (0-5 study hours per week) in comparison to other groups—not only do they study a low amount, they also have low confidence in their academic abilities, don't persist through difficult material, don't believe the material is of high value, and have a more fixed view about intelligence. As discussed before, one wonders what the cognitive dynamics are in this situation: does low confidence lead to low study time? While this may seem evident in one respect, one could also argue that students with low confidence might be driven to study more to make up for this. However, this would imply that these students recognized their low confidence, understood the possible ramifications of it, and have the motivation to make up for it, none of which are givens. Does low task value lead to less study time? This is more clear-cut in one sense, in that lower valuation of something leads to less time spent, assuming there is latitude in the amount of time which can be allotted. However, there may be another effect happening in the opposite direction: less study time may lead to less task value, because one has less familiarity with the material and may not see how it could be relevant or interesting. (A similar argument could be made for confidence, as experience tends to engender it.) Finally, does a more fixed view of intelligence lead to less study time? Again, this seems fairly clear-cut, though there are many moderating factors at work—perhaps the intrinsic enjoyment of a subject leads

one to pursue it further, or the pressure of getting high grades in order to succeed in a major or to demonstrate proficiency to family drives one to spend more time on the material, regardless of an entity belief.

Six of the eight MSLQ factors showed clear trends from group 1 (0-5 study hours per week) through group 5 (21-30 hours per week), in the hypothesized direction: students with lower study hours rated their confidence, effort, and task value lower than students with higher study hours. While these results were expected, as discussed above, they do not address certain potential outliers: students who study very little because they are highly confident in their abilities (knowing they can succeed with little effort) and students who study a lot because they have low confidence (believing they have to overcompensate). Additional survey items could prove useful to determine whether students fall into these categories, and if so, their profiles could be helpful in understanding the overall demographic and to target interventions appropriately. Scatterplots of study hours vs. control beliefs about learning, effort regulation, and task value were created to see if such outliers existed; there were several in each of groups 1 and 2 (6-10 study hours per week) which rated unusually high, and two in group 5 which rated unusually low. This demonstrates a need to further understand why these students hold considerably different views on these factors than their group peers. Additionally, to see if GPA had a combination effect, exploratory analyses were run with control beliefs about learning, effort regulation, and task value each vs. (study hours x High School GPA x College

GPA). While these combinations showed no significant effects, it is possible that some students misreported their GPAs, which would bias the results.

The following are brief discussions of the remaining demographic factors.

The ethnicity variable was heavily biased towards Whites (n=123, 80.4%), with Black (n=14, 9.2%) and Hispanic (n=12, 7.8%) groups having the second and third most participants. Although the variable showed no significant differences between groups as-is, and showed limited significant differences after removing the low-numbered groups 4, 5, and 6, post hoc analyses showed that Black respondents rated several categories (control beliefs for learning, the mind factor, and attribution stability) lower than their White or Hispanic counterparts. Control beliefs for learning correlated strongly with attribution stability, but not with the mind factor, so that combination was somewhat unexpected. Considering the content of the two factors, one would actually expect there to be a positive correlation: a strong belief that intelligence can be changed should infer a high level of control beliefs for learning, which was measured by questions such as “If I study in appropriate ways, then I will be able to learn the material in my courses”. However, Black respondent ratings went against this relationship, indicating a stronger belief that intelligence can be changed, while also indicating a low level of control beliefs for learning. This may be a case of understanding and believing the underlying “potential” for one’s capability to increase one’s intelligence, while feeling less confident about actually putting this into practice in coursework; this clarification could be helpful to ensure that interventions are targeting the appropriate cognitive factors. Overall, however, Black responses in

other highly correlated factors (self-efficacy for learning and performance, metacognitive self-regulation, and effort regulation) were not statistically different than responses from their White or Hispanic counterparts, so inferring a large portion of one's cognitive profile from the significance of one factor is questionable in this instance.

The year variable, though generally paralleling age, showed additional significant MSLQ factors beyond task value: control beliefs about learning and self-efficacy for learning and performance, whereby freshmen and sophomores typically showed lower ratings than juniors and seniors across a number of MSLQ factors. More detailed profiling through additional questions in these factors could provide insight into the specifics of the ratings: for example, do juniors and seniors rate self-efficacy for learning and performance higher because of general academic experience, experience in their major's subject matter, being more interested in their courses, understanding how professors approach grading, being more comfortable in the college setting, or for other reasons? Among freshmen and sophomores—whose averages on these factors were largely similar—are there specific groups which rate these factors differently? If so, which factors, and why?

Mother's education level showed some rather uneven results due to group 6 (n=3 for MSLQ and mind factors, n=2 if attribution factors are included). This group rated eight of the 13 factors considerably higher than its neighbor groups. While most of these factors correlate (and therefore consistent results are to be expected), the mind factor does not, which was unexpected. Group 5,

“Bachelor’s degree” (n=40), was also somewhat unusual, in that it rated intrinsic goal orientation, task value, and self-efficacy for learning and performance significantly lower than many of the other groups. If there were correlations between the demographic and the factor, one would expect to see clear trends across groups, which only occurs in a few factors; group 5, more often than not, goes against the trend. When considering the factor without groups 1 and 6 (n=5 and n=3, respectively), clearer trends are seen and some of the significant differences are diminished; therefore, these small groups have a moderate effect upon the overall results. When group 5 is removed (based upon its tendency to rate considerably differently than its neighbors), the trends are even more evident, and significant differences between groups all but disappear. This indicates a strong influence group 5 upon the overall results. Because group 5 has a large number of cases, it is unlikely that a few outliers would have much effect on the mean. Why this group would rate so many factors so much lower than its neighbor groups warrants further investigation, possibly through demographic combinations.

Father’s education level revealed a significant effect in self-efficacy for learning and performance, and marginally significant effects in task value and attribution personal control. Groups 1 and 8 had the lowest number of cases (n=5 and n=3, respectively), and when re-analyzed without these groups, significance levels rose and three other factors (intrinsic goal orientation, effort regulation, and attribution personal control) approached significance. Group 6, “Some graduate school” (n=4), had some of the more extreme differences from its neighbors in

five of the MSLQ factors, which indicates a possible trend. However, the differences may also be due to the low number of cases. The mind factor showed a large difference between the extreme groups, while the middle groups were largely similar. This distribution could indicate a trend of beliefs about intelligence correlating with father's education level—if family emphasis upon education is lower, children may be led to believe that intelligence is more fixed, or vice versa. However, the education level of the mother was relatively flat across groups (except "some graduate school", which was unusually high in a number of factors, but only had three cases). This goes against the hypothesis that family education levels have a correlation effect upon intelligence beliefs. Note, too, that in some cases, one or both of a student's parents may not have lived with the student prior to college, which likely would reduce or eliminate the effect of their education levels upon the student.

Family income revealed very little in the way of significant differences, both in the overall means and the post hoc analyses between groups. Within help seeking, group 3 rated higher than groups 2 and 4; group 6 scored lower than groups 2 through 4 on effort regulation as well, though the overall factor was not significant. Groups 1 and 6, the extremes of the variable, had relatively few cases (n=10 and n=9, respectively); when analyzed without these groups, help seeking approached significance. The relatively low levels of differences within this variable may indicate that if family income does in fact have an effect on the ratings of these factors, other variables simply overshadow it. Further analysis of

the help seeking factor vs. family income and family education levels revealed no significant interactions.

Work hours per week showed significant differences in effort regulation, with groups 1 (0-5 work hours per week) through 3 (11-15 hours per week) rating less than group 5 (21-30 hours per week), which in turn rated higher than group 6 (31+ hours per week). Group 1 (n=97, the majority of cases) also rated lower than group 5 on several other MSLQ factors. Group 6 (n=3) reported a number of markedly different ratings than its neighbor, group 5. While this may indicate some statistical anomalies due to the low number of cases, it also may indicate a true difference in participants who work 31 or more hours. For exploration, additional demographics of these individuals were examined. In this case, two were seniors aged 22-24, while one was a freshman, aged 18; the low ratings came chiefly from one of the seniors, while the other two rated higher and similarly to each other. All three individuals reported family incomes of at least $80,000, with one over $200,000. Without additional inquiry, it is difficult to identify why their ratings on these factors would be appreciably lower than others.

Only a few factors within the work hours per week demographic showed either a clear trend across groups or a relatively level series of ratings, as there were a number of instances with group ratings (usually groups 5 or 6) going against the trend. Again, this may be due to the low number of cases in these groups (n=11 and n=3, respectively), but it also could indicate a true difference in individuals who work long hours while enrolled. By the same token, group 1 often

rated significantly lower than its neighbor, and given the high number of cases, probably does not reflect a statistical anomaly. Additional questions about student management of work hours while in school and how work experience informs one's academic experience could shed light on the varied perceptions of these students. All this said, however, the overall differences in each factor were small to moderate, so conclusions based on this variable should be drawn with caution.

ANOVAs on Mind/Attribution Categories vs. Other Factors

ANOVAs run on the categorical mind/attribution factors vs. other factors revealed a number of significant interactions. These interactions, by their nature, will parallel the factor correlations described earlier, so highly-correlated factors will tend to show similar interactions here. However, this analysis allows differences between groups within the factors to be examined rather than using only the overall average.

The mind factor correlated significantly with task value ($r = -.375$, $p < .01$); self-efficacy for learning and performance ($r = -.202$, $p < .05$); effort regulation ($r = -.332$, $p < .01$); attribution locus of causality ($r = .177$, $p < .05$); and attribution personal control ($r = .345$, $p < .01$). Recall that low ratings correspond to incremental mindsets, while high ratings correspond to entity mindsets; an example item was "You have a certain amount of intelligence, and you can't really do much to change it". An incremental mindset holds a belief that one's intelligence can substantially change; therefore, the negative correlations with the MSLQ items (due to the numbering system) are expected based upon prior research (Dweck, 2000). However, no significant correlations were found

between the Mind factor and the other similar MSLQ items (control beliefs about learning and metacognitive self-regulation), which was not expected.

Effort regulation was rated higher by mindset groups 1 and 2 than groups 4 and 5, which was expected: an incremental mindset about intelligence tends to lead to higher effort and persistence with difficult tasks, because one believes gains are more readily possible, while entity mindsets can lead to low persistence and learned helplessness (Dweck, 2000; Snyder, Barger, Wormington, Schwartz-Bloom, & Linnenbrink-Garcia, 2013).

Attribution personal control was also rated higher by mindset groups 1 and 2 than groups 4 and 5, indicating that an incremental mindset correlates with a belief of "ownership" of one's performance (in this case, of an important *negative* academic performance). While this may make intuitive sense, one could also imagine individuals who hold strong incremental mindsets, yet tend to place attributions for negative performance outside themselves, while placing attributions for positive performance within themselves (Dasinger, 2013; Mkumbo & Amani, 2012). On the other hand, some individuals may hold strong entity beliefs and high personal control perceptions, yet attribute negative performance to themselves, perhaps believing that "this is the best I can do, because I'm simply not that smart"; conversely, the same individuals may attribute success to external, uncontrollable factors, believing "it was easy" or "I got lucky". These nuances could be explored through further analysis of the relevant MSLQ factors addressing ability and efficacy beliefs.

These attribution combinations can have dramatic effects upon one's persistence, mainly negative, so it is important to understand the nuances of a particular student's attributions (such as how they attribute important positive versus negative events) when planning interventions. For example, a study skills workshop may not be effective on a student with a strong entity mindset, as that student may not believe there is much chance for improvement; at the same time, attributional retraining may not be effective on a student with poor learning strategies, because they may already believe in their ability to improve, but simply need concrete skill-building. Indeed, attributional retraining in general will be most effective if there are specific negative attributions held by students, particularly low controllability, as this appears to have the most potential for negative effects on engagement and persistence (Haynes et al., 2009; Mkumbo & Amani, 2012; Sorić & Palekčić, 2009). Although any student would likely take something away from either of these programs, more in-depth exploration of each factor could allow interventions to better target students with specific needs, which would hopefully encourage students to continue attending such programs and to promote them to their peers.

Task value was another factor showing highly significant interactions with the mind factor, with incremental-mindset groups rating higher than entity-mindset groups. Unlike effort regulation, however, there is not as clear of an expected interaction between the mind factor and task value, as one could imagine persons of either mindset rating task value in a number of ways. Perhaps learning tasks appear to have more value when one believes that one's

intelligence can grow, thereby enabling them to perform better at the task; perhaps those who believe their intelligence is more fixed simply do not value mental pursuits as highly. While this second hypothesis may seem intuitive, as it reflects a belief in limited intelligence growth potential, it does not take into account the range of perceived intelligence among entity-mindset students. That is, while one would expect that entity-mindset students with low perceived intelligence would not value mental pursuits very highly, those with high perceived intelligence may value them quite highly indeed (regardless of a low perception of growth potential) because they believe they already *are* highly proficient. Additional factor interactions (intrinsic goal orientation and self-efficacy for learning and performance) shed a bit more light on this question, as the incremental-mindset groups rated these factors higher than entity-mindset groups. Taken together, this supports the hypothesis that entity-mindset individuals not only value academic tasks less, they also perceive their academic abilities lower than their incremental-mindset counterparts. Further exploration via actual performance indicators such as course grades could be beneficial when considering interventions, as students' perceptions of their abilities may under- or over-estimate their actual ones—and both inaccuracies can lead to a number of negative outcomes. Additionally, a given student may rate various kinds of assignments (such as papers versus tests) quite differently, indicating differences in their perceived value and the student's perceived ability to succeed when doing them.

The attribution factors intercorrelated significantly in two of the six combinations. The first was locus of causality with personal control (r=.683, p<.01, the strongest correlation in the entire matrix). This correlation was also the strongest in Sorić & Palekčić (2009), though that study used “controllability” as a single factor rather than breaking it down into internal and external. Locus of causality and personal control measure somewhat similar constructs; therefore, a strong correlation is reasonable to expect. The second significant correlation was stability with external control (r=.292, p<.01); this correlation was not significant in the Sorić & Palekčić study. The stability factor rates the cause of an event on a spectrum from stable to unstable, while the external control factor rates the cause on a spectrum from externally controlled to not externally controlled. If one believes that events are controlled by other people, it may lead one to ascribe them as stable because they feel they have no control over them; at the same time, events controlled by other people could seem even *less* stable due to the lack of control. However, the data indicate that the first explanation is more likely, at least when considering this specific correlation.

The attribution locus of causality factor showed two highly significant interactions (control beliefs about learning and attribution personal control) and one significant interaction (task value). Each of these factors showed several significant between-groups interactions as well, some of which were highly significant. Recall that low ratings on this factor indicate an internal locus of causality, while high ratings indicate an external locus; an example item (asking

to attribute the cause of a significant negative academic event) was “something about you-------something about others”.

Task value showed group 1 rating higher than groups 2 through 4, indicating that students who place the cause of their hypothetical negative performance more onto themselves rather than outside themselves hold the value of their coursework in higher esteem. Perhaps the idea of “ownership” of one’s academic performance correlates with the belief in the value of the work. This was seen to a degree with the mind factor interactions, except in that case, the measurement was of the level one believes one’s intelligence can be changed, which could be seen as a kind of “ownership” as well.

As is the case with many of these interactions, there is the possibility of reciprocity—if one believes the work has value, one will take more ownership of performance levels, while if one believes the work has low value, one will take less ownership (Sorić & Palekčić, 2009). Similar patterns were found for intrinsic motivation, which were expected. Notably, however, group 4 also rated intrinsic motivation highly—approximately the same level as group 1—though as mentioned, their task value was the lowest of the four groups. In fact, this “U-shaped” means plot, in which groups 1 and 4 rated high and groups 2 and 3 rated low, was also evident in intrinsic goal orientation, extrinsic goal orientation, self-efficacy for learning and performance, and effort regulation. There are several possible explanations for these unusual ratings: one, holding a more external attribution for performance can also lead to high ratings on these factors, though perhaps for a different reason (“it’s necessary to work harder because

performance is more external, and therefore less controllable"); two, that the group holds other, moderating perceptions which bring about these high ratings; and three, that outliers in the low number of cases in the group (n=14, 9.4% of the total) had a disproportionate effect. Additionally, while the overall U-shape was evident in these four factors, the differences were only significant in self-efficacy for learning and performance and effort regulation.

The other highly significant interaction was with attribution personal control. As mentioned in the discussion on correlations, these factors were the most strongly correlated of all factors in the study, as they measure similar constructs. Therefore, the strong interactions found here—which showed a clear trend line from low to high across groups—were expected. In fact, such strong correlations indicate that these factors may be *so* highly related as to not be useful in separating out different constructs (or at least their wording has that effect upon participants). An example spectrum from attribution locus of causality is "something about you-------something about others", while an example spectrum from attribution personal control is "manageable by you-------not manageable by you". In other words, the locus factor is intended to measure "where" one believes something happens, while the personal control factor is intended to measure how much one believes one can do about it, which on their face appear relatively different. In fact, the highest correlation was expected to be between personal control and external control, and the direction to be negative; results indeed showed a negative direction, but the level was not significant in the overall matrix. (There was a highly significant interaction between the two

factors when run as an ANOVA, however.) More analysis through clarifying questions could help determine how much the locus and personal control factors overlap in the underlying construct they are attempting to measure, as well as determine why the external and personal control factors show a non-significant correlation in the overall matrix. Alternatively, one could utilize a modified attributions scale in which "control" is a single dimension, thereby avoiding potential misunderstandings (Sorić & Palekčić, 2009).

The attribution external control factor showed four highly significant interactions: self-efficacy for learning and performance, attribution locus of causality, attribution stability, and attribution personal control. Each of these factors showed several significant between-groups interactions as well, the majority of which were highly significant. Recall that low ratings on this factor indicate a high level of external control, while high ratings indicate a low level of external control; an example item (asking to attribute the cause of a significant negative academic event) was "under the power of other people-------not under the power of other people".

Group 1 rated self-efficacy for learning and performance much higher than the other groups, particularly group 2. This drop does not follow the pattern of the other groups for this factor, which rise steadily. Group 1 also rated intrinsic goal orientation and task value considerably (though not significantly) higher than group 2. This "spike" of group 1 (as compared to group 2) on these factors was unexpected and is difficult to explain based solely upon attribution external

control. Note that group 1 only had five cases (3.3%), so these ratings may indicate that there are outliers among these individuals.

The only factor showing a clear trend across groups was metacognitive self-regulation, in which the means generally rose from groups 1 to 5. In other words, individuals perceiving causes to be less controllable by others perceive these self-regulation abilities higher. Control beliefs about learning and self-efficacy for learning and performance nearly followed this trend, as would be expected given the correlations between these similar factors; however, group 1 was anomalous for self-efficacy and group 3 was anomalous for control beliefs. It could be argued that holding a high perception of one's learning abilities could in turn lower one's perception of events being under control by others, because it is believed that one's ability largely determines the outcome of academic pursuits; indeed, Ning & Downing (2012) found that performance of students with higher levels of self-regulation were not nearly as affected by the learning experience and environment, two factors clearly external to the student. However, if an individual consistently performs poorly even with a high ability belief, the perception of events and outcomes being under control by others (such as instructors) may rise.

When considering those with low ability beliefs, one could imagine either external control belief to exist: poor performance is largely due to external forces, or it is largely due to internal lack of ability. While both outlooks are cause for concern, the first one is potentially worse, because both parts of the attribution are working against success—not only are one's abilities believed to be low,

causes for poor performance are believed to be more external and therefore less controllable (Haynes et al., 2009; Mkumbo & Amani, 2012; Weiner, 1986). Students holding this combination have a high potential for disengagement or helplessness, which could lead to withdrawal. Therefore, it is essential to understand the nuances of student perceptions in these areas, because a student who believes they can't achieve because of low ability is a considerably different case (and needs a different intervention) than a student who believes they have the ability to succeed, but outside factors prevent it. Additionally, knowing which *specific* outside factors a student believes are causing the negative impact on their success—time constraints, family or relationship issues, instructor bias, and so on—could help make the intervention even more targeted.

Additional highly significant interactions were revealed between attribution external control and attribution locus of causality, stability, and personal control. The means plot line of stability showed a clear linear trend (rising from group 1 to group 5), indicating that individuals perceiving high levels of external control also perceive high levels of stability, and vice versa. If one considers external control as a stabilizing factor for events, this trend makes sense; however, one could also imagine the opposite being true, in that others having control means *less* stability because others can determine the outcome more than the individual can. Additional questions about stability, such as "Do you believe instructors grade consistently?" or "Do you believe you can be successful academically even when expectations change dramatically?" could help determine whether these

perceptions originate from within or outside the individual, and could help clarify the specific relationship between external control and stability held by students.

Unlike the linear trend found with attribution stability, the plot lines of locus of causality and personal control showed a clear inverted “U” shape, with group 3 rating the highest, and groups on either side falling away rapidly. (The mind factor plot showed a similar shape, but the differences were not significant.) Both results were unexpected, particularly the personal control means, which were hypothesized to correlate negatively and linearly. Locus of causality also was hypothesized to correlate negatively, though perhaps not as strongly, as the questions address somewhat different perceptions. The results are puzzling and indicate that other factors (such as the various MSLQ items) may be in play which moderate the correlations. Additionally, groups 1 and 5 each had relatively few cases (n=5, 3.3%; n=10, 6.7%, respectively), creating a higher potential for outlier ratings to disproportionately bias the overall mean of the groups. Scatterplots were created to check for outliers visually, but no clear evidence was found. The conclusion is that group 1 simply rated several factors significantly differently than was expected given the underlying correlations, which biased the results for both factors. Demographics of the five cases in group 1 showed nothing unusual except age and year (with a higher percentage of older and upper-class students than overall frequencies) and work hours per week (there was a wide range of work-hour categories represented, unlike overall frequencies which were heavily biased towards low work hours). Perhaps these elements

were part of the moderating influence on the ratings for this factor, but if so, it remains to be seen why this might be.

The attribution stability factor revealed a large number of significant interactions. Intrinsic goal orientation, control beliefs about learning, self-efficacy for learning and performance, metacognitive self-regulation, and attribution external control all were highly significant; in addition, task value was significant. Group differences showed clear patterns of ratings, the majority of which were highly significant. Recall that low ratings on this factor indicate a high level of stability, while high ratings indicate a low level of stability; an example item (asking to attribute the cause of a significant negative academic event) was "stable over time-------variable over time". This indicates that a perception of *instability* in academic achievement (higher scores on the measure) is correlated with high scores on the six MSLQ factors. This supports prior research indicating that a perception that achievement levels can readily change is associated with persistence, self-efficacy, and regulation of effort towards a goal, while the reverse (believing that achievement, especially poor achievement, is stable) can have negative consequences upon these same factors, leading to disengagement, low confidence, and placing blame or credit for achievements outside oneself (Dweck, 2000; Perry, 2005; Haynes et al, 2009). That said, the hypothetical important event asked about was negative, so using a positive event could alter the ratings—especially as some students perceive success to be due to ability, which is more or less stable, and failure due to circumstance, which is unstable (Mkumbo & Amani, 2012).

Group 1 had only one case and was removed from the overall analysis to perform post hoc comparisons. This removal tended to increase significance levels of the interactions. Means plots revealed a clear deviation of group 1 from the largely positive linear relationships across groups 2 through 5, whereby ratings of group 1 tended to be similar to those of group 5, yet quite different than groups 2 through 4, yielding a skewed “V” shape. Further investigation of the single case in group 1 revealed four somewhat unusual demographics: age 21, junior, $120,000-$200,000 family income, and 21-30 work hours per week. Perhaps something about the combination of these demographics moderated the ratings for this factor, but without further information, this is difficult to determine.

The six MSLQ factors which showed significance revealed that groups tended to rate stability in an ascending linear trend across groups from stable to unstable. That is, believing that the cause of one’s poor academic performance on an event is “stable over time”, “permanent”, and “unchangeable” correlates with rating most cognitive academic ability levels low; in contrast, those who see the event as being unstable rate their ability levels significantly higher. This was largely expected based upon prior research (Dweck, 2000; Perry, 2005; Weiner, 1986), which has made clear the positive effects of perceptions of instability. While one can imagine a scenario in which the opposite is true (perhaps that a belief in stability provides a kind of “comfort zone” and alleviates anxiety, or that one’s belief that high ability remains stable and thereby allows achievement even after some setbacks), the data and prior research do not support this. It is possible that the wording of the attribution prompt has an impact, as it posits a

significant *negative* academic performance event, then asks about one's attributions for the cause of the event. If the event in question was positive (by administering two versions of the survey), ratings might show different interactions, thereby revealing nuances in attributions for different outcomes. For example, some students may take credit for achievements while placing blame for failures outside oneself (Mkumbo & Amani, 2012), while others—especially ones with low efficacy and ability beliefs—may attribute success to outside forces such as luck or lenient grading while attributing failure to internal factors (Dasinger, 2013). Both kinds of students could benefit from an exploration of their negative and/or inaccurate attributions, as these have the potential to diminish chances for future success (Perry, 2005; Schunk & Zimmerman, 1994; Sorić & Palekčić, 2009).

The attribution personal control factor, like the other three attribution factors, also showed a number of significant interactions. Task value, control beliefs about learning, the mind factor, attribution locus of causality, and attribution external control were all highly significant; self-efficacy for learning and performance and attribution stability were significant; and metacognitive self-regulation and effort regulation approached significance. Between-group interactions largely showed common trends, though with some exceptions, particularly with groups 4 and 5. Recall that low ratings on this factor indicate high levels of personal control, while high ratings indicate low levels; an example item (asking to attribute the cause of a significant negative academic event) was "over which you have power-------over which you have no power".

Group 5 only had two cases and rated six out of eight of the MSLQ factors much higher than group 4, breaking the overall trends apparent in the means. ANOVAs were re-analyzed without group 5, which changed significance levels slightly and in different directions across factors, with no clear trend. Similarly to outlier groups for other factors, it is unclear why these cases would rate these factors so differently than those in adjacent groups. Demographics of case 1 showed the following unusual categories: father's education level was less than high school and family income was $30,000-$50,000; case 2 showed no unusual categories. Group 4 (n=7) also broke a number of trends in ratings when compared to groups 1-3, though not as dramatically as group 5.

Clear trends were evident in most of the MSLQ factors, in which higher levels of personal control correlated with higher ratings on ability and efficacy factors. These correlations were expected based on prior research (Perry, 2005). While the correlation makes intuitive sense in one regard—the more control one feels over academic outcomes, the higher one's efficacy for performance—what is not as clear is the correlation between personal control and ability ratings. In fact, some students may be conflating the two: higher levels of perceived control may result in higher ability ratings regardless of whether those ability ratings are accurate. Additionally, one can easily imagine this effect occurring in the opposite direction—that is, higher ability and efficacy ratings result in higher ratings of personal control, because one believes that through ability one can take higher levels of control over academic performance outcomes (Haynes et al., 2009).

Given these results for attribution correlations, with each other and with essential study strategy and cognitive factors, what are some ways instructors can put this information to use? Attribution theory posits that an essential element of any learning process occurs immediately *after* the learning event, whereby students do a "causal search" to explain the outcome; this search is particularly strong for results that are unexpected, important, and/or negative (Weiner, 1986). Knowing this, and understanding the different ways in which feedback can be given and how it may be interpreted (or misinterpreted), instructors are advised to be particularly mindful of what they do during this crucial time period. If they provide evidence-supported, informational, and timely feedback about the student's performance, this combination is the most likely to keep student engagement high; deviations from these elements can be problematic for the numerous reasons discussed earlier (Dweck, 2000; Kohn, 2011). Additionally, instructors can address negative affective reactions of students, such as maladaptive attributions for low performance; typically, this is achieved through some form of attributional retraining which focuses outcomes upon the student-controllable domains of effort and study strategies (Haynes et al., 2009; Perry, 2005; Sorić & Palekčić, 2009).

Student perceptions towards the teaching and learning environment itself can have significant effects upon their studying behavior and vice versa, where positive perceptions led to deep studying and mastery orientations, while negative ones led to surface strategies and performance-based orientations (Bembenutty, 2012; Ning & Downing, 2012; Stes et al., 2012). Given this,

instructors could benefit from knowing how students perceive the learning environment, as there may be modifications to the instruction and course design which can increase study depth and subsequent engagement. Indeed, utilizing a student-centered approach in the classroom, “which emphasizes the involvement of the student in terms of negotiating the setting of workload and assessment tasks, is also likely to exert a positive influence on students’ affective and cognitive domains, in addition to their perceptions of the learning environment” (Ning & Downing, 2012, p. 232). This parallels the strategies outlined in the SDT discussion under Factor Correlations, whereby students given an environment which encourages autonomy and competence tend to have higher engagement, persistence, mastery orientations, and subsequent performance. In this context, however, alterations to the environment are also intended to minimize potentially-negative attributions to event outcomes; with greater student involvement and ownership, negative attributions such as uncontrollability are less likely (Mkumbo & Amani, 2012).

CHAPTER VI

CONCLUSIONS

Investigations into cognitive elements of academic success has revealed complex, fascinating, and demonstrably significant interrelationships. Further investigations are important to improve student success, especially given that interventions—such as Attributional Retraining or reading authoritative articles on mindsets—can be achieved with relatively little time, effort, and cost; if profiles of students include more factors, and the interrelatedness of these factors is better understood, interventions can be further refined for greater effectiveness.

This study extends prior research in several ways, most notably the specific combination of factors investigated. Relationships between the numerous factors and demographics largely reinforced prior research and echoed common sense, while in a certain few cases, results did the opposite. Certain demographic groups rated some variables significantly differently than other groups, which indicates the importance of closer examination of the possible causes for these ratings. Additionally, many variables appear to moderate the effects of others, revealing a complex picture of student cognitive perceptions which merits further investigation.

Further research into these cognitive factors could include more specific question items. This could help differentiate between potentially confounded

results, such as the “usefulness” versus “enjoyment” elements of task value, or the “performance” versus “competition” elements of extrinsic goal orientation. Clarification of the specific reasons students hold a particular perception could shed light on what kinds of perceptual modifications might be beneficial. For example, high ratings of attribution external control could indicate a perception that academic outcomes are more or less at the mercy of instructors, that levels of personal control and efficacy are too low to achieve the goal, a combination of both, or other factors; clearly, different modifications would be appropriate for students holding these varying beliefs. As mentioned, it could prove illuminating to administer an alternate form of the survey which asks about attributions stemming from an important *positive* academic event rather than a negative one, to see if and how the interactions between factors change.

In numerous instances in the study, determining whether there was reciprocity between factors (and if there was, to what degree) was difficult given the limited scope of questions. Understanding this relationship is important, especially given the substantial research which suggests that many of these combinations do in fact have reciprocal relationships (Bandura, 1997; Sorić & Palekčić, 2009; Stes et al., 2012). Further clarification through additional questioning—including qualitative elements such as open-ended items, interviews, and focus groups—could help unpack the nuances of these relationships and thereby refine what approaches should be taken during interventions, as it may be more effective to improve one factor indirectly by way of addressing another. Additional questions might include such rating items as

“The less capable I feel with the subject matter, the less I tend to study”, which sets self-efficacy as an independent variable and effort regulation as a dependent one; this may provide more information than the reverse, “The less I study a given subject, the less capable I feel with it”, which most students would probably agree with. Another example question might be “The more I delve into a given subject, the more useful it seems”, setting effort regulation as an independent variable and task value (and one form of extrinsic motivation) as dependent ones. A third example question might be “I work harder in courses where assessment is objective (using such assessments as multiple-choice exams or clearly-defined rubrics) rather than subjective”, comparing effort regulation and one form of extrinsic motivation with external control. The results from these and other additional questions (including ones which address directionality) could help refine understandings not only of individual student perceptions, but also how the factors themselves intercorrelate; if there are clear trends of reciprocity and directionality which go against general understanding, modifications to intervention design may be appropriate.

There are a number of ways advisors, instructors, and students can put this survey to use. Considering advisors first, assuming students are willing to have their ratings known to their advisor, appropriate discussions could follow a student completing the survey. These discussions would center on strengths and areas of improvement for the student, exploring how they interrelate and where potential problems might arise.

For example, a particular student may report high levels of academic self-efficacy, effort regulation, and control beliefs about learning, thereby indicating a high probability of academic success and persistence, at least given that part of the profile. However, if the student indicates low levels of intrinsic goal orientation and task value, issues may arise in the long term with burnout due to feeling that one is “just going through the motions” and that the overall goal may not be “worth it” due to a lack of underlying interest in and valuation of the subject. In this case, specific discussion about the student’s strengths and areas for improvement could help ensure success in both the short-term (by harnessing academic abilities that are already present) and the long-term (by helping the student see the “big picture” and find inherent value in the subject). As another example, a different student might report high levels of attribution external control and perceive the locus of causality for academic events as more outside than inside. Further exploration of why these perceptions are held might include such questions as: Who do you perceive to be in control of your academic outcomes besides yourself? What can you do to regain control (from professors, parents, friends, etc.)? Do you feel differently if you have successes versus failures, and if so, how might these feelings hamper your chances of future success (“it’s out of my control, so why bother” versus “when it’s up to me, I always fail”)? With a greater understanding of how these factors interrelate and how warning signs manifest themselves, advisors could play a greater academic support role through candid discussion and referrals for specific kinds of assistance.

For instructors to make use of this survey and study, one must consider the issue of anonymity for students, both to the instructor and to the student's peers. Students may not want their profiles known, which is understandable given the potential bias by instructors: "this student claims they don't study very much, so I'll be on the lookout for shoddy work", etc. Students also may not want their profiles known to their peers, which could be an issue if the instructor wants to provide specific groups of students in the class alternative assignments, delivery methods, assessment rubrics, and so on. Given this, instructors would generally need to find anonymous ways to put the survey to use in the classroom.

One straightforward way for an instructor to utilize the survey anonymously is to have students complete the survey in one class session, then discuss the overall idea so that students understand the purpose. The instructor would aggregate the results and present them to the class in the next session, pointing out patterns of strength and weakness in the profiles, being careful not to indicate potentially-recognizable demographics. The study by Pintrich et al. (1991) provided feedback to each participating student, which included information and tips about each factor measured; that study also used an anonymous indexing system so that students could compare their results to the averages in the course, and therefore see their relative areas of strength or weakness. Regardless of whether an instructor utilized the survey in this manner, feedback about the factors—in general as well as specific to the course—could be given to all participating students.

For example, low effort regulation might indicate students who are likely to give up when assignments or material becomes difficult; the instructor can let students know which areas of the course are more demanding, and in what way (test performance, essay writing, presentations, etc.), so that students can get a head start or plan to seek assistance if they foresee problems completing the work. High ratings on external control might prompt the instructor to reiterate precisely what the students have control over and what is up to the instructor: objectively- versus subjectively-graded assignments, how to interpret grading rubrics, opportunities for make-up work or extra credit, etc. Low help-seeking ratings might prompt an instructor to encourage study groups, including opportunities for group work in class; requiring a visit during office hours to touch base with each student and address any issues; promoting campus tutoring services; and so on.

Many such potentially-beneficial modifications to a course are available to any instructor; it simply takes some effort, creativity, and an understanding of some of the effective ways of implementing them. Regarding learning outcomes, instructors can go beyond what may be considered the “norm” or adequate learning outcomes. Pintrich (2003) posited four important areas of learning outcomes: the direction of behavior (choice of one activity over another); the intensity of behavior (level of activity or cognitive involvement in activity); persistence (time spent with activity, especially through challenging parts); and achievement outcomes (how one did at the activity). Many instructors and courses take little to no notice of some of these elements: for example, no

choices are offered, intensity and persistence are entirely up to the student, and so on; only the achievement outcomes matter. While it may be difficult or impossible for an instructor to monitor and support all of these areas, particularly in large classes and/or ones with a relatively set curriculum, there certainly are some things instructors can do (as discussed previously) which will increase them, thereby providing a better learning experience for students. Ideally, a culture of such practices will develop not only within departments, but also across campuses through faculty support centers and programs, providing instructors with professional development opportunities to learn about best practices and to share their experiences with colleagues. If students recognize and respect the extra effort instructors are putting in to promote student success, instructor evaluations may rise as a result—a true "win-win" for all involved. Indeed, this was precisely what Stes et al. (2012) found in their study of teachers who followed an instructional development program which encouraged including some of these modifications as well as receiving detailed student feedback.

Finally, for the students themselves, this survey and study can provide ample fuel for reflection. Even without completing the survey, students can gain an understanding of how the various factors interrelate and where potential trouble might arise simply by reading about the results of prior survey administrations and about the underlying concepts addressed. If they do complete the survey, comparing trends across demographics with their own demographics could reveal areas of particularly different ratings than the norm, which might give pause for introspection. If their institution utilizes the survey,

students can seek advice from the centers, advisors, and/or instructors who participate, thereby giving them more ways to interpret their results and thoughts about them. If nothing else, the survey can act as an early-warning system for students, alerting them to areas of potential problems. By taking an honest, thoughtful look at the results, and being willing to address areas of weakness, students of all kinds stand to benefit from participation.

As with virtually all survey research, replicating the study with different populations would provide additional information for exploration of the patterns and correlations between the factors and student demographics. For example, students at private or community colleges could show significantly different profiles, and if so, the possible reasons why this is would need to be explored. Additionally, obtaining a larger sample size would allow more statistical power in the various analyses performed, particularly with subgroups of each demographic. A higher response rate might be obtained by administering the survey manually, though this is far more cumbersome and prone to error unless participants are able to complete it electronically. Incentives for completing the survey could also boost participation, though of course this could introduce bias. Finally, it is this researcher's belief that visiting the classrooms in person boosted participation due perhaps to the "personal touch" and a respect by students for the effort taken by a fellow student to complete their project. However, due to the anonymous nature of the study, rates of response categories could not be tallied for comparison.

While no single survey can ever hope to capture all important facets of a student's profile, results from this brief, easily-administered instrument can illuminate some of these elements in a straightforward manner; hopefully, the discussions which follow promote a deeper understanding of their importance and interrelatedness. These insights could then be used to increase student achievement through changes in instruction, advising, and academic success programs, as well as changes in student perceptions through self-reflection or by participating in appropriate interventions. In this way, more accurate insights into student cognitive perceptions can be gained—aiding future researchers, instructors, administrators, and students themselves—in their endeavors to advance academic success.

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APPENDIX A

SURVEY INSTRUMENT

Gender:	Male	Female

Ethnicity:	White	Black	Hispanic	Asian/Pacific Islander	Native American	Other

Age:	18	19	20	21	22-24	25-29	30-39	40+

Year:	Freshman	Sophomore	Junior	Senior	Masters	Doctoral

High school GPA:	Less than 2.0	2.0-2.49	2.5-2.99	3.0-3.33	3.34-3.66	3.67-4.0
College GPA:	Less than 2.0	2.0-2.49	2.5-2.99	3.0-3.33	3.34-3.66	3.67-4.0

Mother's highest education level:	Less than high school	High school	Some college	Associates degree	Bachelors degree	Some graduate school	Masters degree	Doctoral degree
Father's highest education level:	Less than high school	High school	Some college	Associates degree	Bachelors degree	Some graduate school	Masters degree	Doctoral degree

Yearly family income:	Less than $30,000	$30,000-$50,000	$50,000-$80,000	$80,000-$120,000	$120,000-$200,000	More than $200,000

Study hours per week:	0-5	6-10	11-15	16-20	21-30	31+
Work hours per week:	0-5	6-10	11-15	16-20	21-30	31+

	Item	Disagree ---------- Agree						
1	I prefer course material that really challenges me so I can learn new things.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2	Getting a good grade in my courses is the most satisfying thing for me right now.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3	I am very interested in the content area of my courses.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4	If I study in appropriate ways, then I will be able to learn the material in my courses.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5	I believe I will receive excellent grades in my courses.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
6	I ask myself questions to make sure I understand the material I have been studying in my courses.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
7	I often feel so lazy or bored when I study for my courses that I quit before I finish what I planned to do.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
8	Even if I have trouble learning the material in my courses, I try to do the work on my own, without help from anyone.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
9	You have a certain amount of intelligence, and you can't really do much to change it.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
10	I prefer course material that arouses my curiosity, even if it is difficult to learn.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
11	The most important thing for me right now is improving my overall grade point average, so my main concern in my courses is getting good grades.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
12	I think the material in my courses is useful for me to learn.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
13	It is my own fault if I don't learn the material in my courses.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
14	I'm confident I can understand the most complex material presented by the instructor in my courses.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
15	I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying for my courses.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
16	I work hard to do well in my courses even if I don't like what we are doing.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
17	I ask the instructor to clarify concepts I don't understand well.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
18	Your intelligence is something about you that you can’t change very much.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
19	The most satisfying thing for me in my courses is trying to	**1**	**2**	**3**	**4**	**5**	**6**	**7**

understand the content as thoroughly as possible.

20	If I can, I want to get better grades in my courses than most of the other students.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
21	I like the subject matter of my courses.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
22	If I try hard enough, then I will understand the material in my courses.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
23	I'm confident I can do an excellent job on the assignments and tests in my courses.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
24	When studying for my courses I try to determine which concepts I don't understand well.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
25	When course work is difficult, I either give up or only study the easy parts.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
26	When I can't understand the material in my courses, I ask another student in the class for help.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
27	You can learn new things, but you can't really change your basic intelligence.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
28	When I have the opportunity, I choose course assignments that I can learn from even if they don't guarantee a good grade.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
29	I want to do well in my courses because it is important to show my ability to my family, friends, employer, or others.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
30	Understanding the subject matter of my courses is very important to me.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
31	If I don't understand the material in my courses, it is because I didn't try hard enough.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
32	I'm certain I can master the skills being taught in my courses.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
33	When I study for my courses, I set goals for myself in order to direct my activities in each study period.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
34	Even when course materials are dull and uninteresting, I manage to keep working until I finish.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
35	I try to identify students in my classes whom I can ask for help if necessary.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Think about the last time you performed poorly on an important assignment or exam. The items below concern your impressions or opinions of this cause or causes of your performance. Choose one number for each of the following questions.

Is the cause(s) something:

36	That reflects an aspect of yourself	**1 2 3 4 5 6 7**	reflects an aspect of the situation
37	Manageable by you	**1 2 3 4 5 6 7**	not manageable by you
38	Permanent	**1 2 3 4 5 6 7**	temporary
39	You can regulate	**1 2 3 4 5 6 7**	you cannot regulate
40	Over which others have control	**1 2 3 4 5 6 7**	over which others have no control
41	Inside of you	**1 2 3 4 5 6 7**	outside of you
42	Stable over time	**1 2 3 4 5 6 7**	variable over time
43	Under the power of other people	**1 2 3 4 5 6 7**	not under the power of other people
44	Something about you	**1 2 3 4 5 6 7**	something about others
45	Over which you have power	**1 2 3 4 5 6 7**	over which you have no power
46	Unchangeable	**1 2 3 4 5 6 7**	changeable
47	Other people can regulate	**1 2 3 4 5 6 7**	other people cannot regulate

APPENDIX B

INFORMED CONSENT

My name is Christopher Lackey and I am a doctoral student in the School of Teaching and Learning at Illinois State University. I am conducting research for my dissertation which investigates a number of cognitive factors of college students. The purpose of the research is to see if there are correlations between the factors; if correlations are found, this could be beneficial to future students, because programs for student success could use this information to be more effective.

Participation in this study involves completing a short survey which includes demographic information and a list of questions rated on a numerical scale. The survey should take between 10 and 15 minutes to complete.

Participation is voluntary. Refusing to participate involves no penalty or loss of benefits. You may discontinue participation at any time without penalty or loss of benefits.

All responses are anonymous. All results will be reported in aggregate form and will not be identifiable. Computer IP addresses, which could potentially be used to identify participants, will be kept strictly confidential.

When filling out this survey, you may come across a question or answer choice that you find objectionable—for instance, a few of the questions may cause you to think about negative emotional states. Aside from this there are no foreseeable risks or discomforts from participation beyond the everyday.

Possible benefits from participation include an assessment of one's profile of the cognitive factors being measured and an understanding of the importance of the factors.

If you have questions about the research, contact the Principal Investigator, Dr. Linda Haling, at (309) 438-8863 or llhalin@ilstu.edu. For questions about research participants' rights and/or a research related injury or adverse effects, contact the Research Ethics & Compliance Office at (309) 438-2529 or rec@ilstu.edu.

By clicking the box below, you acknowledge that you have read and understand the Informed Consent section. 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.

☐

Thank you for your participation!

Christopher Lackey

APPENDIX C

IN-CLASS PRESENTATION SCRIPT

Hello everyone,

My name is Christopher Lackey and I'm a doctoral student in the School of Teaching and Learning here at Illinois State. For my dissertation I'm researching a number of cognitive factors of college students, such as motivation, self-efficacy, beliefs about intelligence, and attributions about academic performance. My hope is that through a better understanding of these factors, retention programs, academic advising, and classroom instruction can be made more effective for students.

Data will be collected through an online survey which takes about 10 to 15 minutes to complete. The survey contains several demographic questions, then has a series of questions on a numerical rating scale. All responses are completely anonymous; participation is voluntary and you can opt out at any time. The first page of the survey has more information about the project and the Informed Consent for participation.

The survey link will be posted on ReggieNet [the course management system for Illinois State University] or emailed to you.

The more responses I collect, the richer the data will be and the more I can draw from it. I encourage you to help this research project through your participation. Thank you!