

DISSERTATION

MASTERY MOTIVATION: MOVING TOWARDS A BETTER UNDERSTANDING OF
COLLEGE STUDENT SUCCESS

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ABSTRACT

MASTERY MOTIVATION: MOVING TOWARDS A BETTER UNDERSTANDING OF COLLEGE STUDENT SUCCESS

This comparative and associational quantitative study applied a pragmatic theoretical perspective to the exploration of college student dispositions. First, the study evaluated the Dimensions of Adult Mastery Motivation Questionnaire College (DAMMQ-C) as a measure of mastery motivation in U.S. college students. Secondly, the study explored the relationship between mastery motivation, high school grade point average (HSGPA), ACT composite score, and college academic performance. Finally, the study examined differences in mastery motivation across various student characteristics, including developmental education status.

Participants at a four year regional comprehensive, $n = 288$, and a two-year community college, $n = 37$, completed a 35-item adapted version of the Dimensions of Adult Mastery Motivation Questionnaire (DAMMQ) that included three college specific social persistence scales to better align the instrument with the broader student success literature. Principal axis exploratory factor analysis with a varimax rotation was conducted to evaluate the underlying structure of the 35 items. Multiple iterations of hierarchical multiple regression were conducted with the aggregate sample and disaggregated groups based on development education status to explore the ability of dispositional and cognitive factors. to explain variance in college GPA. Logistic regression analysis was conducted to explore the ability of dispositional and cognitive factors to correctly classify participants that did or did not pass all attempted hours. Finally, t-tests and one-way ANOVA were conducted to examine potential difference in DAMMQ-C scale scores by student characteristics.

Following exploratory factor analysis, 27 items were retained within seven factor structure: (a) preference for challenge, (b) task persistence, (c) task pleasure, (d) task absorption, (e) social persistence with peers, (f) social persistence with faculty, and (g) academic relationship with faculty. The factors displayed adequate to good internal consistency.

Regression analysis results indicated that the DAMMQ-C dispositional scales provided increased explanation of variance in college GPA over and above traditional cognitive factors for the aggregate, developmental, and non-developmental education groups. However, the amount of variance explained varied by group. For the aggregate and non-developmental education groups the DAMMQ-C scales contributed an additional 5% and 2%, respectively. Within the developmental education group, the model failed to significantly explain variance in college GPA until the DAMMQ-C scales were added in the final block. The model then explained 15% of the variance in college GPA.

A few statistically significant differences were found based on student characteristics. Developmental education students reported statistically significantly lower scores in academic relationship with faculty, task-related pleasure, and total mastery motivation. Black students reported statistically significantly lower scores in social persistence with peers, social persistence with faculty, academic relationship with faculty, and total mastery motivation.

The results supported continued use of dispositional factors in understanding and supporting student success, in faculty and staff training, admission practices, and identifying and developing student success interventions, especially for developmental education students. Finally, the study carried implications for future research through the initial validation of a multi-faceted dispositional instrument that was concise and practical for use in longitudinal studies needed to (in)validate more comprehensive models of college student success.

ACKNOWLEDGEMENTS

When reflecting on this project, there are many to thank and other acknowledgements warranted. In clearing the space, I must first briefly acknowledge some unfortunate pain associated with this project. Once bound and on my shelf, this project will be one I look at with a sense of accomplishment. However, it will likely also serve as a physical reminder of my parents, Larry and Lori Bruick, who were tragically lost in the middle of this project. Moving through that reminder of pain and grief, then will come a memory of their legacy.

To my mother, Lori Bruick, I have become increasingly aware of how you influenced me in so many positive ways. My wife and I found out we were pregnant with our first child the week after my first trip to Fort Collins for the first course in the program. I wasn't sure if I could handle a growing family and the program. However, as I progressed, I was able to make the difficult and needed decisions in order to invest in both family and school. Looking back, I realized that I was able to make that transition in part because I had seen it before, when you went back to school. I watched your diligence to your studies while still being a constant presence in our lives. I can picture your warm smile when I think about sharing the news that the project is complete.

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moments we had before. Your legacy and lives are ever present with me and therefore in this project as well.

This project would not have been possible without the impact of God the Father on my life through His son, Jesus. The love of God changed the heart of a selfish and angry nineteen-year-old many years ago. Without that encounter, I would not have responded to a calling to work in higher education, and definitely would not be engaging in a project of this nature. Your love was not a one-time encounter, however, but an on-going identity. You gave me strength in every moment, especially those moments where the next step forward seemed irrational or impossible. Your Word was a light onto me in many ways including Philippians 1:6, “Being confident of this, that He who started a good work in you will carry it through to completion.” Though my attitude towards this at times shifted to “you started this” and now you have to finish it, the still small voice of comfort never departed. May all glory and honor, therefore, be to the Father.

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DEDICATION

This project is dedicated to the loving memory of Larry and Lori Bruick. You taught me life's most valuable lesson in the unconditional love you both displayed towards me. This lesson prepared my soul for the unconditional love of our heavenly Father. For that, and many other things, I am forever grateful.

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CHAPTER 1: INTRODUCTION

With the wealth distribution gap in America at the highest levels since the Great Depression, concerns on the health of the middle class and economic mobility are prevalent (Middle Class Task Force, 2010). In response, many policy makers and citizens are looking to higher education to revitalize the middle class in America (Middle Class Task Force, 2010). Earning a college degree has delivered increased economic mobility, regardless of socioeconomic background. Haskins, Holzer, and Lerman (2009) found that for individuals with parents in the lowest income quintile, only 16% remained in the lowest income quintile as adults when the individual earned a college degree compared to 45% for those without a college degree. The National Center of Education Statistics (NCES; 2017a) also found that individuals with a bachelor's degree earned 64% more than those with a high school diploma. Additionally, the benefits of higher education extended far beyond individual economic perks as increased education has been linked to higher levels of volunteerism, appreciation of diverse populations, lower anxiety, higher overall health, and a lower crime rate (Murray, 2009). Finally, Murray (2009) found that time in education was related to "reduced willingness to blindly accept authority and less political cynicism" (p. 236). Therefore, higher education has significant implications for both a democratic society as a whole and an individual's economic mobility, which led to a societal focus on access to and success within higher education (Tinto, 2012).

From the outside looking in, it would appear that higher education had responded to this societal need by opening their doors. Overall enrollment in postsecondary education had increased drastically since 1980, and institutions were serving a much more diverse student body (Haskins et al., 2009; Tinto, 2012). Unfortunately, for many students the opportunity stopped at access alone as only 59% of students at 4-year institutions attained a bachelor's degree within 6

years (NCES, 2017b). Additionally, 6-year graduation rates dropped consistently based on institution selectivity. Four-year institutions that accepted less than 25% of applicants had an 88% 6-year graduation rate compared to a 70% graduation rate for institutions that accepted 25 to 49.9% of applicants. Six-year graduation rates plummeted at open admission 4-year institutions where only 32% graduated within 6 years (NCES, 2017b). These data suggested the recent increase in access had not been accompanied by success.

Success rates also varied across a multitude of characteristics including race, socioeconomic status (SES), first-generation status, and institutional type. Specifically, Black students and Hispanic students graduated at a 21 percent and 12 percent lower rate than their White peers, respectively (Shapiro et al., 2017). Students from low and middle SES backgrounds attained bachelor's degrees at less than half the rate of their high SES background peers (NCES, 2015; Kim, 2015; Stephan, Davis, Linsay, & Miller, 2015). First-generation students whose parents did not attend college graduated at a 14 percent lower rate compared to their peers whose parents attended college (DeAngelo, Franke, Hurtado, Pryor, & Tran, 2011). Finally, students who attended two-year institutions persisted at much lower rates than their peers at four-year institutions (NCES, 2017a). Early college years seemed especially critical as half of those who did not graduate, did not persist beyond their first academic year (NCES, 2017b).

Developmental education provides an additional example of increased access without increased success. Developmental education are courses offered at two and four-year institutions “that are designed to prepare students for college-level instruction” when a student is entering academically underprepared (Hicks, 2017, p. 7). Chen and Simone (2016) found that 68% of students at public 2-year institutions and 40% at public 4-year institutions took at least one

developmental education course. Students who have taken developmental education graduated at alarmingly low rates, with 51% at 2-year institutions and 40% at 4-year institutions failing to even complete their developmental requirements, let alone college-level courses (Adelman, 2004; Attewell, Lavin, Domina, & Levey, 2006; Chen & Simone, 2016). Additionally, several demographic groups identified earlier as having lower graduation rates were overrepresented within developmental education including: African American and Latino/a students, students from low SES backgrounds, and first-generation students (Chen & Simone, 2016). If higher education seeks to improve overall student success rates, developmental education offers a rich area for potential growth, especially for underrepresented populations (Attewell et al., 2006; Chen & Simone, 2016).

Tinto (2012) summarized the landscape of college success well when he stated that “although access to higher education has increased, greater equality in the attainment of four-year college degrees has not followed suit” (p. 118). The lag in student success in general and the large gaps in success for many underrepresented populations was only compounded by the fact that more students, including those that drop out, were borrowing to fund their education (Nguyen, 2012). Trends of increased borrowing and lagging student success only served to perpetuate a growing disparity in wealth distribution and social capital (Hicks, 2017; NCES, 2017a; Museus, 2014). Higher education is expected to move beyond simply opening their doors as calls for shared responsibility for student success grow louder (Tinto, 2012). Thus, increased access alone is not increased opportunity, and a higher education system that cannot support a diverse student body fails to play the valuable role in society to which it aspires (Engstrom & Tinto, 2008; Museus, 2014; Tinto, 2012).

Problem Statement

Despite a significant body of research around the topic of college student success in the United States, success rates remained unacceptably low (NCES, 2017b). Additionally, the gaps in success rates between underrepresented student populations and majority students persisted, with some studies finding the gap was only growing wider (DeAngelo et al., 2011; Shapiro et al., 2017; Stephan et al., 2015). Traditional theories of college student success face significant limitations as they often failed to examine the role of the institutional environment on psychological aspects and ultimately student success (Museus, 2014). Though a growing body of qualitative literature examines the role of institutional environments, there is limited convergence with quantitative scholarship, which was reflected in the limitations of various theoretical models (Museus, 2014).

Museus (2014) presented the Culturally Engaging Campus Environments (CECE) model in an effort to provide a more comprehensive theoretical model that reflects both the qualitative and quantitative research on student success and addresses many of the limitations of prior theoretical models. Models of this nature are especially important for work with specific populations such as developmental education students (Hicks, 2017; Kim, 2015). One barrier to validating the CECE model is limitations in student dispositional instrumentation due to the prevalence of single construct instruments and lengthy multivariate instruments with limitations of reliability and time frame (Ben Nun, 2008; Le, Casillas, Robbins & Langley, 2005; Noel-Levitz, 2011; Pintrich, Smith, Garcia, and McKeachie, 1991; Richardson, Abraham, & Bond, 2012; Thomas, Kuncel, & Credé, 2007; Tracey & Sedlacek, 1984). Therefore, the evaluation of a new dispositional instrument that measures across multiple dispositional domains, is flexible concerning time frame of administration, and addresses issues of respondent fatigue is a critical

first step in validating the CECE model and ultimately increasing our understandings of college student success.

Mastery Motivation

A body of literature can become so convoluted that sometimes one must step outside of it to synthesize and simplify. Mastery motivation, a construct first established in working with infants and toddlers that has progressed to school-aged children, presented such an opportunity. Barrett and Morgan (1995) defined mastery motivation as “a multifaceted, intrinsic, psychological force that stimulates an individual to attempt to master a skill or task that is at least somewhat challenging for him or her” (p. 58). Mastery motivation has strong empirical support within the early childhood and school-aged literature and has been found to be predictive of future academic performance over and above cognitive measures such as IQ (Gilmore, Cuskelly, & Purdie, 2003; Huang & Lay, 2011; Józsa & Molnar, 2013; Józsa & Morgan, 2015; Józsa, Wang, Barrett, & Morgan, 2014; Morgan, 1997; Morgan & Bartholomew, 1998; Morgan, Wang, Liao, & Xu, 2013).

Doherty-Bigara and Gilmore (2015) developed an instrument to measure adult mastery motivation, the Dimensions of Adult Mastery Motivation Questionnaire (DAMMQ). The DAMMQ included 5 scales: task persistence, preference for challenge, task-related pleasure, self-efficacy, and task absorption (Doherty-Bigara & Gilmore, 2015). These scales theoretically aligned with three of the five dispositional domains related to college student success as identified by Richardson et al. (2012) including the more powerful predictors within Richardson et al.’s analyses. An adapted version of the DAMMQ, the Dimensions of Adults Mastery Motivation-College (DAMMQ-C), was pilot tested with two additional scales to address social persistence, bringing alignment with a fourth dispositional domain, psychosocial (Richardson et

al, 2012). Therefore, this study sought to evaluate the DAMMQ-C as a simplified multi-domain dispositional instrument that was relevant through multiple time frames and practical for the multiple administration designs needed for use within the CECE model.

Purpose of Study

The purpose of this comparative and associational quantitative study was to evaluate the DAMMQ-C as a measure of mastery motivation in U.S. college students, examine differences in mastery motivation across various characteristics including developmental education status, and explore the relationship between mastery motivation and student academic performance.

Mastery motivation had never been measured with U.S. college students and evaluation of the DAMMQ-C presented many opportunities for validating more comprehensive models of student success, such as the CECE model (Museus, 2014; Richardson et al., 2012). Despite a large body of literature on dispositional factors in student success and a multitude of dispositional instruments, significant limitations remained both in instrumentation and understanding of dispositional factors of student success (Richardson et al., 2012; Thomas et al., 2007, Tinto, 2012). Additionally, scholars have identified limited understanding of the influence of dispositional factors with developmental education students specifically (Kim, 2015; Saxon, Martirosyan, Wentworth, & Boylan, 2015). Therefore, this study sought to contribute to the literature in addressing these limitations.

Research Questions

1. Does the DAMMQ-C accurately measure mastery motivation within colleges students in the United States?

- a. What is the relationship between the task persistence scale of DAMMQ-C and the effort regulation subscale of the Motivated Strategies for Learning Questionnaire (MSLQ)?
2. How well do mastery motivation, HSGPA, and ACT score explain the variance of college GPA?
 - a. Does the predictive ability vary based on developmental education status?
3. How well do mastery motivation, HSGPA, and ACT score explain the variance of percentage of attempted hours passed?
 - a. Does the predictive ability vary based on developmental education status?
4. Is there a statistically significant difference in mastery motivation by gender?
5. Is there a statistically significant difference in mastery motivation by race/ethnicity?
6. Is there a statistically significant difference in mastery motivation by developmental education status?
7. Is there a statistically significant difference in mastery motivation by number of attempted credit hours?

Definition of Key Terms

The following definitions were used throughout this study and were defined for the purpose of this study.

Developmental education. Within this study, developmental education was defined as courses offered at two and four-year institutions “that are designed to prepare students for college-level instruction” (Hicks, 2017, p. 7). Remedial education and transitional education as titles were also used interchangeably within the literature.

Developmental education students. Students required to enroll in at least one developmental education course were identified as developmental education students. Academically unprepared and special or conditionally admitted students were also titles present within the literature. “Developmental education students” was used in all cases within this study except when citing a study that does not specify if special or conditionally admitted students were required to take developmental education courses. In these cases, such as Kim (2015), the language present within the study being discussed was used.

Student success. Within this study, student success was defined as academic performance (college GPA, credit hours earned), persistence, and ultimately, graduation.

Student dispositions. Within this study, student dispositions were defined as a wide range of psychological and psychosocial qualities students “use to access, adapt, and employ intellectual traits” and skills (Driscoll & Wells, 2012, p. 5). These qualities were defined with a variety of other titles within the literature including noncognitive (Sedlacek, 2004), psychological (Bean & Eaton, 2000), and non-intellective (Richardson et al., 2012).

Mastery motivation. Within this study, mastery motivation was defined as “a multifaceted, intrinsic, psychological force that stimulates an individual to attempt to master a skill or task that is at least somewhat challenging for him or her” (Barrett & Morgan, 1995, p. 58).

Delimitations

This study was delimited to the two data collection sites, a community college in a large urban area and a four-year regional comprehensive institution in a suburban city of 65,000. With institutional environment as an aspect of the theoretical framework, the CECE model, including varying institutional environments was needed. Additionally, the researcher sought to include

both a 2 and 4-year institution given the difference in success rates between the institution types. Finally, though the admission standards vary at the two institutions, both admit students required to enroll in developmental education, which served as an independent variable within the study.

The study was also delimited to the DAMMQ-C as a multi-domain dispositional instrument measuring mastery motivation. Theoretical alignment of the DAMMQ-C with the broader dispositional literature will be discussed within chapter three. Additionally, data collection occurred within course meeting time. This approach was selected to support a strong response rate and limit non-response bias. An additional delimitation was data collection occurring during the spring term. Dispositional variables, including mastery motivation, have shown to be malleable and influenced by environments. Data collection in the spring semester included the potential influence of the institutional environment on participant's mastery motivation for any participant who was enrolled prior the spring 2018.

Finally, the study was delimited to the specific dependent variables selected and a pragmatic theoretical perspective. Dependent variables of college GPA and likelihood of passing all attempted hours were selected for this study. College GPA has shown to be an effective predictor of future success including graduation (Hosch, 2008; Museus, 2014). Attempted hours passed represented efficiency in progress towards degree, is a factor in many performance funding models, and has significant financial aid implications (Federal Student Aid, n.d; Umbricht, Fernandez, & Ortagus, 2017;). The study was also delimited to a pragmatic theoretical perspective. Pragmatic ontology is based on both "singular and multiple realities" (Creswell & Plano Clark, 2011, p. 42), which was reflected within methodological choices made. A key aspect of this ontology is research that seeks increased understanding more so than

generalizability across all contexts (Creswell, 2014). The pragmatic theoretical perspective will be discussed in more length within chapter three.

Limitations

Consistent with pragmatist perspective, this study sought to inform real-world practice (Creswell & Plano Clark, 2011). Therefore, readers must be aware of limitations within the study when evaluating how findings can transfer to specific contexts and influence practice. Consistent with the CECE model, institutional environment influence student perceptions (Museus, 2014). Therefore, the study was limited in that environmental aspects of the two data collection sites were not representative of all higher education institutions, even those of similar type. For example, developmental education requirements, testing, and structure vary by institution (Chen & Simone, 2016).

The study was also limited by the use of the DAMMQ-C. The DAMMQ-C was chosen in an effort to consolidate a broad student disposition literature base. However, it is possible that a salient dispositional variable was not represented within the scales of the DAMMQ-C. Data collection within a course meeting also presented potential limitations as aspects of the environment within that specific classroom may have weighed more heavily than institutional aspects as a whole. Therefore, it is critical for readers to remember that mastery motivation, though intrinsic, is not static (Barrett & Morgan, 1995; Józsa & Molnar, 2013).

An additional limitation was only associational relationships were examined between mastery motivation and performance outcomes. Therefore, no conclusions concerning causality could be drawn from these findings. Finally, persistence and graduation were not used as dependent variables, which was a potential limitation. Many student success studies utilize

persistence and graduation as dependent variables and as the ultimate definition of student success (Tinto, 1975, Museus, 2014).

Significance of Study

The current study carries implications for both the student success literature and practice. First, the study could provide an instrument measuring student dispositions that was constructed with item wording that is flexible across time frames, theoretically representative of multiple domains of the literature on student dispositions, and practical in terms of length and required resources. An instrument of this nature could unlock many opportunities for future research and practice. For example, the DAMMQ-C could be utilized within a pre-test post-test design to evaluate change in student dispositions over time. Additionally, this design could be paired with measures of environmental aspects to explore the impact of institutional environments on students' dispositions, which would address a significant void in the current research (Museus, 2014; Tinto, 2006).

Secondly, this study provided continued understanding of the relationship between dispositional variables and academic performance outcomes, which can further inform student success practice. The study specifically explored the role of student dispositions in the outcomes of developmental education students, which supported a more wholistic and needed view of developmental education students' success (Kim, 2015; Saxon et al., 2015). Thirdly, the DAMMQ-C could offer a practical multiple domain instrument for student dispositions that practitioners could utilize to identify students who would benefit from increased institutional support or intervention. Finally, long-term significance could include influencing and informing admissions decision criteria, though this would require the development of a non-self-report tool

similar to the game-like school readiness measure developed by Józsa, Barrett, & Morgan (2016).

Research Perspective

Research is not a soulless endeavor. It is shaped by our experiences, our values, and our view of self and others. Arriving at this specific study was influenced by my family dynamics, student interactions, professional experiences, and ethical philosophy.

One of the earliest influences on my interests was my own experience as a student along with those of my sister. Though both academically successful, my sister was the much more dedicated and diligent student, which led to her graduating 3rd in her class of more than 300. However, I had more higher education opportunity due to one factor, my ACT score. Coming from a lower middle socioeconomic background, her lower test scores hindered access to four-year institutions while mine led to a scholarship, which I almost lost as my poor habits were exposed during my first semester. These lived experiences converged with the data showing the limited predictive ability of standardized tests to spark my interest in dispositional factors. This interest in student dispositions has only been reinforced by my professional experience as a student affairs practitioner and adjunct instructor.

As a student affairs professional, I have always worked at regional public institutions that were less selective, and this work highly influenced my research interests. Specifically, I have worked for several years in the area of student success and have overseen the implementation of a student success and early alert program that leverages dispositional variables. This experience provided direct exposure to the value of understanding student dispositions as well as the challenges with current instrumentation. The program assessed more than twenty factors through a lengthy instrument, which required significant financial and human

resources to secure healthy response rates. Additionally, the program produced large quantities of very rich and very dense data. Leveraging these data in timely and relevant practice was quite challenging in scope and the nature of this endeavor made it practically infeasible to utilize the data in evaluating institutional environments. Student disposition variables provided a valuable and more holistic picture of our students, yet current instrumentation was not nimble enough to operate at the scale and pace needed for relevant practice.

As an adjunct instructor for developmental education, I was warned of “challenging students.” However, I did not encounter challenging students, but I did encounter students with challenges. Challenges that impacted their engagement and performance. Challenges that institutional policy and environment often compounded. I also found that these students often wore their low test scores as a psychological tattoo, filtering experiences through a personal deficit filter. These interactions encouraged me to play a part in altering the student success conversation that moves beyond cognitive attributes to a more holistic view of students and their success.

I could share many other experiences and influences, but will briefly share a story that summarizes much of my passion for this type of inquiry. Many years ago, I had a first-year student ask me to proofread an essay for him. It was one of the weakest essays I had read at the college level with very basic grammatical issues throughout. I provided very clear feedback and recommended extensive time in the writing center on campus. My role at the institution changed, and I did not interact with the student past their first year.

Three years later in a different role, I received an e-mail from the president of a student organization requesting use of a space on campus. The e-mail was very professional and clearly written (a rarity with student e-mails). A smile grew on my face as I got to the signature line to

discover it was the same student that had written one of the weakest papers I had ever proofread only three years prior. Every traditional predictive factor would have classified that individual as one who would not succeed. Not only was he succeeding, but he was thriving as a student leader. The most unfortunate part of this story is that the institution recently increased admission standards, and I am confident this student would no longer be admitted under the new standards.

That is what drives and influences my inquiry. With societal pressure increasing, the trend has been to tighten access and close the doors on many potential students in order to boost performance numbers. Yet I constantly ask, what contributed to his (and others) success when traditional predictors were stacked against them? Was it persistence in the face of challenge and other dispositions represented within the construct of adult mastery motivation? What role did the institution play in this success? A professor once recommended pursuing inquiry on the questions that constantly run in your head and “keep you up at night.” These are those questions for me, and they have been directly influenced by family, values, and interactions with countless students. They also have been motivated by the hope that as we increase our understanding of student success we can not only keep the doors of access from swinging shut but also move towards a higher education environment where all students have increased opportunity to succeed.

CHAPTER 2: LITERATURE REVIEW

A thorough review and critique of the literature is a foundational step in developing a research study that will contribute to the inquiry around a topic (Machi & McEvoy, 2012). In an effort to frame the vast literature on the subject, this literature review will begin with a discussion of various paradigmatic influences on how scholars approach the study of college student success. The literature review will then move to a discussion and evaluation of theories on college student success, including the study's theoretical framework, the Culturally Engaging Campus Environment (CECE) model (Museus, 2014). The review will then discuss the wide array of predictive factors present in the literature including cognitive variables, demographic variables, and dispositional variables. Richardson et al.'s (2012) meta-analysis of dispositional factors associated with college grade point average (GPA) will be discussed extensively as a manner of organizing the broad literature on dispositional factors. Single factor instruments will also be discussed within the section on dispositional factors. This will be followed by a discussion around a specific student population, developmental education students. The review will then revisit instruments measuring student dispositions with a focus on multiple domain instruments. Finally, a review of the history and literature surrounding mastery motivation will be presented. The review will conclude by synthesizing the various topics to identify opportunities for scholarly contributions within the current literature.

Paradigmatic Influences

A robust body of research has focused on the topic of student success in college (Museus, 2014; Richardson et al., 2012; Robbins et al., 2004; Tinto, 2012). To accurately frame the areas of focus within this study, a brief discussion on the student success literature broadly is needed.

As with many topics of inquiry, paradigmatic differences can be found within the student success literature. Paradigmatic separations have led to a large body of research on predictive factors from post-positivists and significant exploration of student experiences and institutional environments by constructivist and critical scholars (Dowd, Sawatzky, & Korn, 2011; Museus, 2014; Richardson et al., 2012; Robbins et al., 2004).

Post-positivist scholars seek to predict and control student success, and a panacea culture is prevalent within this approach with researchers seeking the “one factor” that can predict student success. This culture is reflected in the recent popularity of Angela Duckworth’s (2006) work with the construct of grit. Despite limitations in early studies, many quickly adopted the belief “that, in every field, grit may be as essential as talent to high accomplishment” (Duckworth, Peterson, Matthews, & Kelly, 2007, p. 1100). In response, many made significant shifts in practice to focus on college student grit alone (Credé, Tynan, & Harms, 2016). This single factor approach to inquiry is not reflective of the wholistic student experience. Additionally, the single factor approach has led to a broad and disjointed literature base with a multitude of individual constructs and little understanding of how these constructs interact with one another and the environment around them (Museus, 2014; Richardson et al., 2012).

A significant limitation of the post-positivist approach is that researchers are forced to control for the institutional environment in their search for a generalizable panacea. In response to this limitation, constructivist and critical scholars have explored aspects of the student experience and institutional environment that influence student success, predominantly through qualitative methods (Dowd et al., 2011, Harper & Quayle, 2007; Hurtado, 2005; Museus & Neville, 2012; Rendón & Muñoz, 2011; Tierney, 1992). These studies provide valuable depth on the role of the institutional environment, but are limited to small sample sizes (Museus, 2014).

Given this paradigmatic separation, it should not be surprising that despite a significant amount of research on college student success, our understanding remains limited and success rates have not improved (Museus, 2014; Tinto, 2012). The convergence of these methods for understanding student success broadly, and the influence of institutional environments narrowly, is long overdue.

College Student Success Theories

One of the earliest and most prominent theories concerning college student success is Vincent Tinto's (1975) dropout decision model. The model incorporates various aspects including individual characteristics such as family background and prior experiences as well as goal commitment and instructional commitment. However, "the model argues that it is the individual's integration into the academic and social systems of the college that most directly relates to his [sic] continuance in college" (Tinto, 1975, p. 96). Despite extensive adoption of this theoretical framework in both student success research and practice, many scholars have communicated concerns with Tinto's focus on integration (Museus 2014; Rendón, Jalomo, & Nora, 2000; Tierney, 1992).

Concerning integration, scholars identified specific concern with the expectation that students "physically as well as socially dissociate from the communities of the past" (Tinto, 1993, p. 96). Tierney (1992) argued that this disadvantaged students of color by expecting them to dissociate with their cultural background. Museus (2014) summarized this critique by stating, "Expecting undergraduates of color to sever ties with their cultural heritages places an unfair burden on these students to dissociate from communities of the past that are important in their lives and assimilate into the cultures of predominantly White institutions" (p. 196). An additional critique challenged the viability of integration as aligning with traditional campus

operations only, which presents limitations for commuter campuses and community colleges (Crisp 2010; Museus, 2014). In response to these critiques, scholars began to examine connectedness to campus and sense of belonging as constructs to replace integration (Hurtado & Carter, 1997; Museus, 2014).

Museus (2014) identified two additional critiques of Tinto's departure theory, which will play a significant role in the framing of this study. First, scholars argued that the application of Tinto's work has placed an overwhelming majority of the responsibility solely on the student while failing to examine the role of the institution in fostering student success (Bensimon, 2007; Museus 2014). A second and related critique was the lack of a psychological dimension within Tinto's model. The absence of a psychological dimension failed to acknowledge that students "can experience the same activities within their campus environments, and their involvements in these activities, in very different ways" (Museus, 2014, p. 199).

Psychological Model of College Student Retention

Bean and Eaton's (2000) psychological model of college student retention addressed the absence of a psychological dimension in providing a more comprehensive representation of the complexity of college student success, see Figure 2.1. The model built on previous work by Tinto (1975) and Astin (1970) that incorporated student characteristics and environmental aspects as influencing outcomes. The model also included four psychological constructs: attitude, coping behavior, self-efficacy, and attribution or locus of control. The psychosocial constructs of academic and social integration were also present within the model as intermediate outcomes (Bean & Eaton, 2001).

A distinct strength of the model was the identified role of the institutional environment. Specifically, the feedback loop within the environmental aspect spoke to the influence of early

interactions with the environment on the perception of future interactions (Bean & Eaton, 2001). The detailed role of the institutional environment displayed a shared responsibility for student success opposed to the deficit approach often adopted that focused solely on a student's ability and attributes of integration into a static institutional environment (Harper, 2010; Strange & Banning, 2001; Tinto, 1975). A potential limitation is that the model only addresses six psychological constructs despite the presence of others in the student success literature (Richardson et al., 2012). Additionally, though Bean & Eaton's (2000) model addressed the role of the environment, it did not speak to specific environmental factors that support or hinder success and included the problematic concepts of social and academic integration as intermediate outcomes.

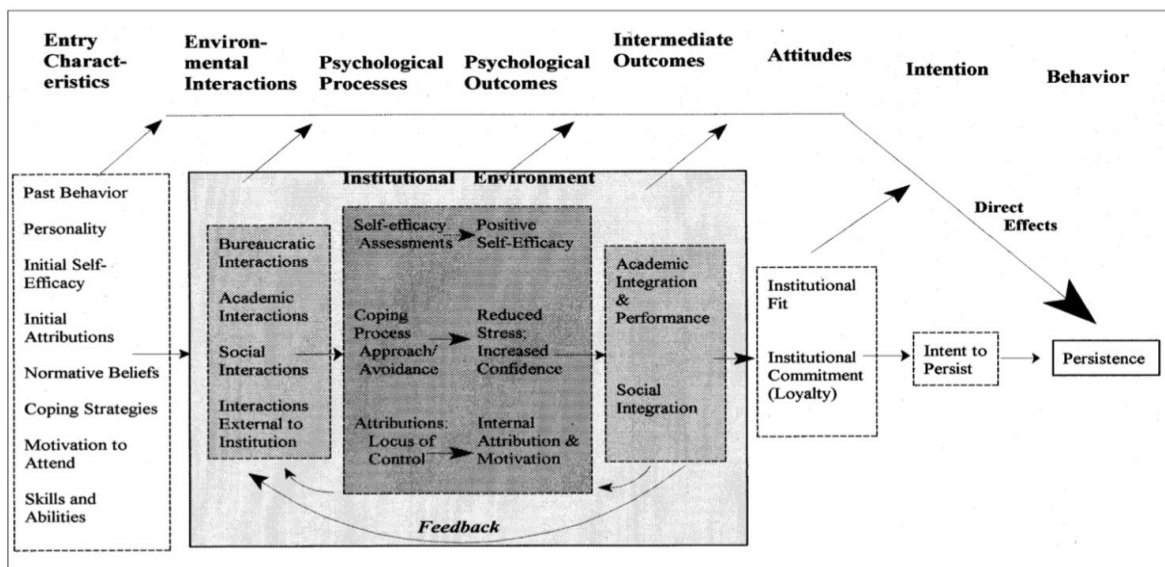


Figure 2.1. A psychological model of college student retention. Retrieved from “The Psychology Underlying Successful Retention Practices” by J. Bean and S. B. Eaton, 2001, *Journal of College Student Retention*, 3(1), 73-89. Copyright 2001 Baywood Publishing Co, Inc.

Culturally Engaging Campus Environment Model

Museus' (2014) CECE model sought to address many limitations in prior student success theory and identified specific environmental aspects that support student success for a diverse student population. One strength of the model is that it was informed by both quantitative and

qualitative literature. For example, the model did not neglect pre-college inputs and external influences such as demographics, academic preparation, family influences, employment, and finances. The model acknowledged the role of these factors while not over emphasizing their influence, see Figure 2.2 (Museus, 2014). Specifically, the CECE model promoted a needed shift in student success theory that integrated the predictive factors found predominantly within prior quantitative work with the institutional environment's impact on these factors. The model highlighted the role of institutional practice and reflected the call for shared responsibility between student and institution (Museus, 2014). Tinto (2006) even spoke to this needed shift by stating "it is one thing to know why students leave; it is another to know what institutions can do to help students stay and succeed" (p. 6). Museus (2014) clearly addressed this need as the CECE "model suggests that the degree to which culturally engaging campus environments exist at a particular postsecondary institution is positively associated with more positive individual factors and ultimately greater college student success" (Museus, 2014, p. 207).

Environmental indicators. Museus (2014) identified nine environmental indicators that support student success. Museus predominantly leveraged qualitative scholarship, which has often been missing from student success theory development, in identifying these environmental indicators. A brief description of the nine environmental indicators is included below. Though these aspects will not be measured within the current study, the discussion is critical to understand the theoretical framework of the study. Understanding these environmental indicators provided clarity on instrumentation needs in order to study how these environmental indicators influence student dispositions.

Cultural familiarity. Museus (2014) discussed cultural familiarity as the opportunity to "physically connect with faculty, staff, and peers with whom they share common backgrounds"

(p. 210). Qualitative inquiry has identified benefits for students of color who connect with same-race agents on campus or different race agents “who have shared and understand their background or individual experiences” (Harper & Quaye, 2007; Museus, 2014, p. 210; Museus and Neville 2012).

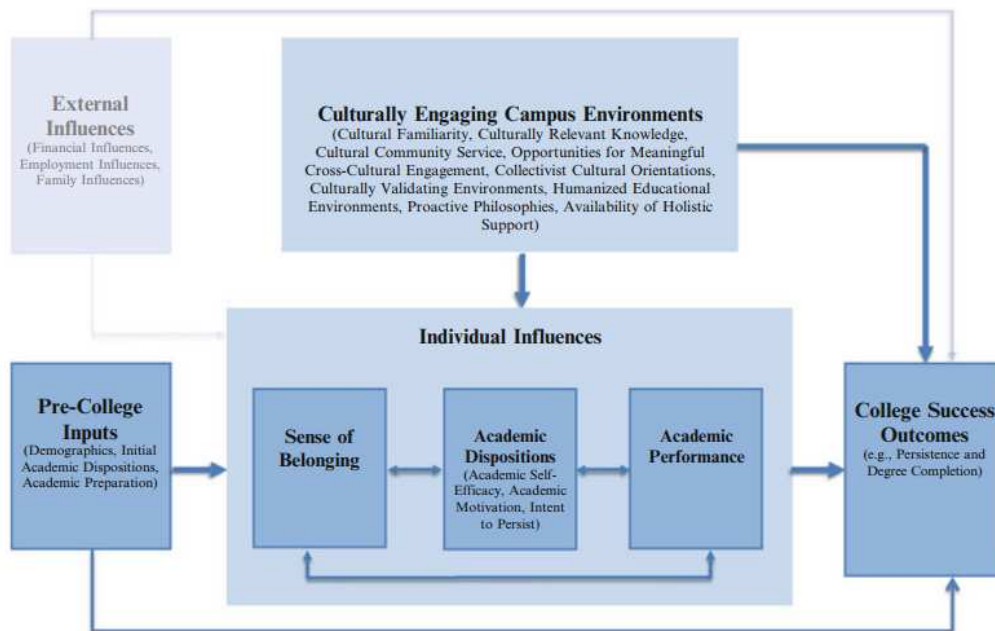


Figure 2.2. Culturally Engaging Campus Environments model of college student success. From “The Culturally Engaging Campus Environments (CECE) Model: A New Theory of Success Among Racially Diverse College Student Populations” by S. D. Museus in M. B. Paulsen (ed.), *Higher Education: Handbook of Theory and Research: Volume 29*, p. 207. Copyright 2014 by Spring Science+Business Media Dordrecht.

Culturally relevant knowledge. Museus (2014) identified the indicator of culturally relevant knowledge as “opportunities for students to cultivate, sustain, and increase knowledge of their cultures and communities of origin” (p. 210). An example of this would be a student from a low SES background learning about class inequalities in a social science course (Museus, 2014). Qualitative research has associated culturally relevant knowledge with increased institutional connection, motivation, and likelihood of success (Museus, 2014; Harper & Quaye, 2007; Kiang, 2009).

Cultural community service. This indicator was concerned with access to opportunities to “give back to and positively transform” their communities through service, problem-based research, activism, and other mechanisms (Museus, 2014, p. 211). This indicator has been linked specifically with increased connection to the institution (Astin & Sax, 1998; Eyler & Giles, 1999; Harper & Quaye, 2007).

Opportunities for meaningful cross-cultural engagement. Museus (2014) identified opportunities to “engage in positive and purposeful interactions with peers from disparate cultural origins” as foundational to this environmental indicator (p. 211). Museus (2014) referenced a significant amount of quantitative research that supports the inclusion of this environmental indicator with such cross-cultural engagement being linked to “learning, development, and cultural awareness” along with increased “self-confidence, satisfaction, and sense of belonging among both White students and students of color” (p. 212; Hurtado, 2005; Locks, Hurtado, Bowman, & Oseguera, 2008; Zuniga, Williams, & Berger., 2005).

Collectivist cultural orientations. Museus (2014) argued that collectivist versus individualistic environments support student success. Specifically, students are supported through challenges and transitions within a collectivist environment. For example, Dennis, Phinney, and Chuateco (2005) examined the role of peer support in college transition and college GPA in their study of 100 ethnic minority first-generation college students. Dennis et al. found lack of peer support had a significant and negative relationship with college adjustment. Lack of peer support was also associated with a lower college GPA (Dennis et al., 2005).

Culturally validating environments. This indicator is concerned with the “extent to which postsecondary institutions and educators convey that they value the cultural backgrounds and identities of their diverse college student populations” (Museus, 2014, p. 212). This

environmental indicator is grounded in work around validation theory (Rendón, 1994; Rendón & Muñoz, 2011). For example, Barnett's (2011) study of 366 community college students found faculty validation was a significant, strong and positive predictor of intent to persist after controlling for various demographic variables.

Humanized educational environments. Humanized educational environments are “characterized by institutional agents who care about, are committed to, and develop meaningful relationships with their students” (Museus, 2014, p. 213). This environmental indicator was informed heavily by Museus's (2011) qualitative study of institutional factors that contribute to racial and ethnic minority student success. Museus specifically examined these factors at three predominantly White institutions where retention and graduation rates of underrepresented racial and ethnic minority students were high and equitable to majority students. Museus (2011) performed sixty-five individual interviews as well as a document analysis from the institutions. Humanized educational experiences emerged as one of four salient elements common across all three institutions.

Proactive philosophies. Environments with proactive philosophies, “go beyond making information and support available to making extra efforts to bring that information and support to students and maximize their likelihood of success” (Museus, 2014, p. 213). Philosophies of this nature are a clear reflection of shared responsibility for student success (Museus, 2014; Tinto, 2012).

Availability of holistic support. Museus (2014) described holistic support as access to at least one faculty or staff member that students are confident will address their areas of need or connect the student directly with the information or support they need. This is contrary to an environment where student must “hunt down the information and support they require on their

own” (Museus, 2014, p. 214). Museus and Nelville (2012) linked environments of this nature with increased likelihood of student success in their qualitative study of 60 Asian American, Black, and Latino undergraduates.

Individual influences. The CECE model situates individual influences as a central focus within the model (Museus, 2014). The CECE model posits that individual influences are positively associated with college student success (persistence and degree completion). Additionally, these individual influences are impacted by external influences, the institutional environment, and each other (Museus, 2014). Museus, identified three individual influences: sense of belonging, academic dispositions, and academic performance.

Sense of belonging. Sense of belonging has been offered as an alternative to the problematic concepts of academic and social integration (Hurtado & Carter, 1997; Museus, 2014). Sense of belonging has been linked to college GPA, intent to persist, persistence, and academic performance (Hausmann, Schofield, & Woods, 2007; Walton & Cohen, 2007). Sense of belonging will be discussed further within the student dispositions section of this literature review.

Academic dispositions. Museus (2014) identified three academic dispositions related to college student success: academic self-efficacy, academic motivation, and intent to persist. Academic dispositions appeared within both the pre-college inputs and individual influences section of the CECE model, which is reflective of the malleability of these constructs (Museus, 2014). Self-efficacy and motivation will be discussed in more detail when addressing other variables within this literature review. Intent to persist has been shown to be a powerful predictor of persistence and graduation (Cabrera, Nora, & Castañeda. 1993; Tinto 2006).

However, intent to persist is often influenced by other factors and situating intent to persist as an intermediate outcome may be best supported by the literature (Bean & Eaton, 1991).

Academic performance. The final individual influence is academic performance, most commonly measured by college GPA (Museus, 2014). College GPA has been identified as one of the strongest predictors of bachelor's degree attainment. Hosch (2008) found that first semester college GPA, specifically, was a significant predictor of both retention and graduation rates.

Other considerations. Museus (2014) clarified a few important features of the CECE model. First, Museus was clear that the "CECE model is hypothesized to explain how environments influence success among racially diverse populations, including both White students and students of color" (p. 216). The incorporation of literature that focuses specifically on students of color throughout the model's creation (in addition to student success literature in general) should not mislead one's interpretation of the CECE model. Instead, this literature was included in an effort to build a robust model that included the voices of both racial minority and majority students (Museus, 2014). Additionally, Museus (2014) stated that the CECE model should be viewed in partnership with existing theoretical models that may focus more heavily on a single factor or aspect of the student experience.

Finally, Museus (2014) clarified that the model is theoretical and needs to be (in)validated with both aggregated student populations and disaggregated samples based on student characteristics and institutional type. Museus argued that a focus of future research should be to test the hypothesized relationships. Specifically, Museus identified the institutional environment's relationship to individual influences (sense of belonging, academic dispositions,

academic performance) and the relationship of individual influences and environmental indicator's separately on college success outcomes (Museus, 2014).

The CECE model theoretically synthesized the complexity of college student success. The model included pre-college inputs and external influences known to influence student success while shifting the focus to the interaction between students and institutional environments. The model is strengthened by its inclusion of both qualitative and quantitative scholarship (Museus, 2014). One limitation of the model is that "academic dispositions" is not inclusive of the breadth of the literature on student dispositions, which will be discussed later in this review (Richardson et al., 2012). Therefore, within this study, academic dispositions will be replaced with adult mastery motivation representing multiple domains of student disposition. In conclusion, the CECE model provided the type of theoretical work that breaks down paradigmatic and methodological walls to provide a more holistic representation of college student success. Researchers must now be open to stretching their own paradigms in (in)validating the model.

CECE Model Applied

Despite being a relatively new model, the CECE has been supported and examined in recent literature as well as the work of the National Institute of Transformation and Equity (NITE). Roksa et al. (2017) analyzed data from 2,540 participants within the Wabash National Study of Liberal Arts Education. Specifically, Roksa et al. explored the influence of positive and negative diversity experiences on both need for cognition and critical thinking skills. The study utilized a longitudinal approach with data collection during the student's first and fourth year of college. Roksa et al. found that negative diversity experiences had a strong negative relationship with both need for cognition and critical thinking. Positive diversity experiences were related to

need for cognition only, as students who reported high levels of positive experiences scored .35 standard deviations higher than their peers with low levels of positive experiences (Roksa et al., 2017). Finally, Roksa et al. found that for students who experienced high levels of positive experiences, the effect of negative experiences on need for cognition were largely neutralized though this pattern did not hold true concerning critical thinking.

Roksa et al.'s (2017) findings supported the CECE model as environmental aspects, specifically the quality of diversity experiences, were related to the student disposition of need for cognition. The longitudinal structure of the study is a strength as it allowed for the exploration of change in need for cognition over time. However, the extended time frame between data collections eliminated the opportunity to explore this relationship with individuals who did not persist to their fourth year, which contributed to a sample that was disproportionately White and female, a reflection of persistence and graduation trends (Roksa et al., 2017). Additionally, the study reflected the single construct nature of much of the student disposition research.

Museus, Yi, and Saelua (2017) examined the relationship between the 9 environmental indicators identified within the CECE model and sense of belonging in a quantitative study with 499 students at a large research university on the east coast and two rural community colleges on the west coast. Museus et al. (2017) utilized a survey instrument developed by Museus, Zhang, and Kim (2015) to measure the nine environmental indicators along with a three-item sense of belonging scale (Bollen & Hoyle, 1990; Hurtado & Carter, 1997) serving as the dependent variable. Hierarchical multiple regression analysis found that a model including demographics, socioeconomic status, and credits earned along with the nine CECE indicators explained 68% of the variance in sense of belonging. (Museus et al., 2017). The CECE indicators were the final

block added within the model and accounted for 56% of the variance in sense of belonging with collectivist cultural orientation ($\beta = .25$) and cultural validation ($\beta = .24$) as the strongest contributors. Additionally, post-hoc analysis found that the relationship between the CECE indicators and sense of belonging did not vary by race (Museus et al., 2017).

Museus et al.'s (2017) findings supported the CECE model as a useful theoretical framework with diverse student populations. Additional studies are needed with varied populations and institutional contexts to further validate the CECE model. A significant limitation to the study was that data were collected at one moment in time only, which did not allow for the control of students' predisposition of belonging. Museus et al. (2017) stated that additional longitudinal studies are needed to further explore the relationship between CECE indicators and change in sense of belonging over time. Finally, as with Roksa et al. (2017), the study is limited in that it only explored a single dispositional construct.

Much of the work with the CECE model is now coordinated by the National Institute for Transformation and Equity (NITE) through Indiana University. Museus and Smith (2016) presented a summary of current and future endeavors for the CECE model in a report published by the National Association of Student Personnel Administrators (NASPA). The report briefly discussed the survey instrument that has been created (Museus et al., 2016) and early findings. Specifically, Museus and Smith (2016) reported positive and significant correlation between many of the nine environmental indicators and sense of belonging, academic self-efficacy, and academic motivation. Museus and Smith also reported the need and future plans for longitudinal studies and studies with larger samples.

Museus and colleagues working with NITE have produced significant and valuable work in shifting the conversation of student success to a shared responsibility between students and

institutions. However, the primary measurement focus has been placed on quantitatively measuring environmental aspects as work of this nature has traditionally utilized qualitative methods (Museus, 2014; Museus & Smith, 2016). One could argue that less focus has been placed on measurement of individual influences (sense of belonging, academic motivation, academic self-efficacy) or within the context of the current study, dispositional variables. Though Museus and Smith (2016) reported correlation between the nine environmental indicators and academic motivation and academic self-efficacy, the report does not speak to how motivation and self-efficacy were measured.

A sample CECE survey obtained via the NITE website, revealed the measurement approach. Participants respond to multiple items on a 5-point Likert scale (much worse to much better) with the prompt, “Compared to when you first entered this institution, how would you describe your...” (NITE, n.d.). Example items within this prompt include: “Motivation to work hard in school,” “Ability to be academically successful,” and “Ability to solve problems.” Though self-report instruments of self-efficacy, motivation, and other dispositional variables are widely used and have been empirically supported, self-reporting perceived change in these variables over time is problematic and calls content validity into question (Fowler, 2009; Gliner, Morgan, & Leech, 2017; Richardson et al., 2012). Additionally, asking students about perceived change at one moment in time carries limitations. Assuming the items are valid, this approach would allow for associational findings at best (Gliner et al., 2017). However, the CECE model presented the relationship between environmental indicators and individual influences (including student dispositions) as causal (Museus, 2014).

In conclusion, the CECE model presented a timely theoretical framework that is supported by recent literature and seeks a critical shift in the student success conversation

(Museus, 2014; Museus et al., 2017; Museus & Smith, 2016; Roksa et al., 2017). However, a need for longitudinal studies persists that will evaluate the hypothesized relationship between environmental indicators and individual influences. While Museus and colleagues have provided valuable work in creating quantitative instruments for measuring the CECE environmental indicators (Museus et al., 2015), less attention has been paid to the measurement of individual influences including student dispositions. Practical instruments that can measure multiple dispositional aspects at various moments in time would be required for longitudinal studies, especially those that seek to (in)validate the hypothesized causal relationship. Finally, the scope of individual influences identified by Museus (2014) does not reflect the broader literature on student dispositions (Richardson et al., 2012). Therefore, the following section will discuss factors associated with student success with a specific focus on dispositional factors and noncognitive instrumentation that may be utilized in future research around the CECE model.

Predictive Factors of College Student Success

Cognitive Factors

Cognitive variables such as high school grade point average (HSGPA) and standardized test scores, most commonly SAT or ACT, are traditionally used as predictive factors of college performance both in research and in college admissions practices (Richardson et al., 2012). Empirical research has found that HSGPA and test score each explain unique variation in college GPA with HSGPA being the strongest predictor (Bridgeman, Pollack, & Burton, 2004; Ramist, Lewis, & Mccamley-Jenkins, 2001). Taken together, these traditional factors account for approximately 25% of the variance in college GPA (Mouw & Khanna, 1993; Richardson et al., 2012; Robbins et al., 2004).

Kim (2015) found mixed results in a study of 7,045 students examining the predictive ability of cognitive and demographic factors. In multiple regression analysis, Kim found that HSGPA and ACT along with gender, ethnicity, and Pell Grant status predicted 23% of the variance in college GPA for regularly admitted students. HSGPA and ACT accounted for 19% of the model with HSGPA being the most useful predictor. However, Kim found that the variables were less predictive for conditional admission students (HSGPA below a 2.5 or ACT composite below a 20). Kim (2015) also examined first year retention utilizing logistic regression. Kim's analysis found that HSGPA was the only statistically significant predictor of retention for regularly admitted students, and no variable was a statistically significant predictor of retention for conditional admission students.

Despite strong empirical support of cognitive variables, especially HSGPA, as predictors of academic performance and to a lesser extent retention, significant limitations and concerns exist. As noted, Kim (2015) found that cognitive factors were less predictive or not predictive at all for conditionally admitted students. Kirby et al. (2007) found similar results, as standardized test scores predicted college success for White students only in their study of 299 students at a small, Midwestern private women's college. Additionally, findings that Hispanic and African American students perform significantly lower on the ACT require consideration (ACT, 2016; ACT, 2012; Hudson, 1989). For example, ACT's (2013) national report on Black or African American students reported that only 5% of Black or African American students were ready for college level coursework in all areas tested (math, English, reading, science). ACT has argued that the test's predictive ability of college success is strong and consistent across race/ethnicity (Radunzel & Noble, 2013). However, these reports typically speak to correctly classifying

success and do not discuss accuracy in identifying students who will not succeed, which becomes quite problematic when only 5% of a specific population are deemed college ready.

Demographic Factors: Sex, Age, Socioeconomic Status, and Race/Ethnicity

Richardson et al. (2012) argued that the changing demographics within higher education warrants the exploration of demographic influences with sex, age, socioeconomic status (SES), and race/ethnicity present in the literature as demographic variables. LaForge and Cantrell's (2003) study of 116 upperclassmen undergraduate students found that female students earned higher college GPAs and earned more total course points than their male peers. Nelson and Leganza (2006) found consistent results concerning performance in mathematics courses in their multi-institutional study, $n = 6,240$, with female students completing the mathematics courses at a higher rate. Concerning age, findings have been mixed. Clifton, Perry, Roberts, & Peter's (2008) study of 854 undergraduate students found that older students adapted better to the university setting and earned higher college GPAs. However, Farsides & Woodfield (2007) did not observe an association between age and GPA.

Concerning socioeconomic status, NCES (2015) reported that only 14% and 29% of students from low and middle SES backgrounds had attained a bachelor's degree within 8 years of high school graduation compared to 60% of students from high SES backgrounds. Additionally, Stephan et al.'s (2015) study of Indiana's 2010 high school graduate cohort, $n = 32,564$, found that students from high SES backgrounds enrolled in fewer remedial courses, completed a higher percentage of attempted hours, and persisted to their second year at a higher rate than their low SES background peers. Finally, success rates varied based on students racial and ethnic background though this variable was not included in Richardson et al.'s (2012) meta-analysis. A 2017 study that examined graduation rates of the fall 2010 national cohort found the

6-year graduation rate of Black students, 45.9 %, and Hispanic students, 55%, to be noticeably lower than their White and Asian peers, 67.2 % and 71.7 %, respectively (Shapiro et al., 2017).

Within Richardson et al.'s (2012) meta-analysis, students from higher socioeconomic backgrounds, older students, and female students all achieved higher college GPA than their peers, though the effect sizes were small. However, the three demographic variables were not significant predictors of college GPA within the regression analyses performed by Richardson et al. (2012). In general, demographic factors have significant but weak relationships with college outcomes and offer little predictive ability over HSGPA (Richardson et al., 2012). Additionally, simply knowing that a certain demographic of students is less likely to succeed does not inform what type of intervention would be appropriate. As Zientek, Ozel, Fong, & Griffin (2013) argued, “we cannot change if a student comes from a low-income family” (p. 991). However, when we move beyond demographic and cognitive variables, a more wholistic view of the student is available as well as opportunities to provide support and intervention.

Student Dispositions

There is considerable variation in the definition and title of student dispositions throughout the literature. However, across this variability, student dispositions are clearly distinguished as factors students “use to access, adapt, and employ intellectual traits” (Driscoll & Wells, 2012, p. 5). Therefore, student dispositions are clearly separated from “knowledge skills, & aptitude” (Driscoll & Wells, 2012, p. 5) and instead “may clarify how individuals are likely to use their intellectual capacities” (Richardson et al., 2012, p. 354). A significant amount of research has examined the predictive ability of a wide range of dispositional factors (Richardson et al., 2012; Robbins et al., 2004). Given the breadth of the literature on student dispositions,

this review will utilize Richardson et al.'s (2012) meta-analysis to organize the presentation and review of literature.

Richardson et al.'s (2012) meta-analysis reviewed 13 years of empirical research on factors related to college GPA with the goal of enhancing models for predicting academic performance. Specifically, Richardson et al. attempted to organize the vast literature on student dispositions (referred to as non-intellective within the meta-analysis). Richardson et al. (2012) conducted a "systematic search" of the literature and identified 7,167 records. Multiple iterations of a three-step identification of relevance process resulted in 400 papers being read. Due to duplicate data and other factors, the final analysis consisted of 217 papers representing 241 unique data sets.

The meta-analyses ultimately identified 50 unique constructs. Traditional cognitive and demographic aspects included HSPGA, SAT score, ACT score, A Level Point (secondary education exit evaluation used outside the United States), sex, age, and SES. Additionally, 42 unique "non-intellective" constructs were identified and grouped into five research domains: personality traits, motivation factors, self-regulatory learning strategies, students' approach to learning, and psychosocial contextual influences, see Table 2.1. The following section will discuss the five domains identified by Richardson et al. (2012) as well as highlight five individual constructs: need for cognition, academic self-efficacy, effort regulation, concentration, and social integration. These constructs represent four of the five domains identified by Richardson et al., with approach to learning being the only domain not represented. Theoretical alignment with the five individual constructs discussed below and the sub-scales of the Dimensions of Adult Mastery Motivation College (DAMMQ-C) will be discussed in a chapter three.

Table 2.1

Non-Intellective Correlates of GPA Grouped by Distinct Research Domains

Personality Traits	Motivation Factors	Self-Regulatory Learning Strategies	Students' Approach to Learning	Psychosocial Contextual Influences
Conscientiousness	Locus of control	Test anxiety	Deep	Social integration
Procrastination	Pessimistic attributional style	Rehearsal	Surface	Academic integration
Openness	Optimism	Organization	Strategic	Institutional integration
Neuroticism	Academic self-efficacy	Elaboration		Goal commitment
Agreeableness	Performance self-efficacy	Critical thinking		Social support
Extraversion	Self-esteem	Metacognition		Stress (in general)
Need for cognition	Academic intrinsic motivation	Effort regulation		Academic stress
Emotional intelligence	Academic extrinsic motivation	Help seeking		Depression
	Learning goal orientation	Peer learning		
	Performance goal orientation	Time/study management		
	Performance avoidance goal orientation	Concentration		
	Grade goal			

Note. Retrieved from “Psychological Correlates of University Students’ Academic Performance: A Systematic Review and Meta-Analysis,” by M. Richardson, C. Abraham, and R. Bond, 2012, *Psychological Bulletin*, 138(2), 353-387. Copyright 2012 American Psychological Association.

Personality Traits

Personality traits included conscientiousness, extraversion, neuroticism, openness, and agreeableness, which Richardson et al. (2012) referred to as the “big five.” All five have been found to predict college GPA, with conscientiousness being the most powerful predictor.

Conscientiousness was defined as students being organized, self-disciplined, and achievement oriented. Additionally, Richardson et al. (2012) included need for cognition and emotional intelligence within the personality traits domain.

Need for cognition. Need for cognition is defined as “an individual’s tendency to engage in and enjoy effortful cognitive endeavors” (Cacioppo, Petty, & Feng Kao, 1984, p. 306). A 34-item (Cacioppo & Petty, 1982) and 18-item (Cacioppo et al., 1984) Need for Cognition Scale (NFCS) have proven to be reliable measures of need for cognition with Cronbach alphas typically above .85 across a multitude of studies and varied populations (Cacioppo, Petty,

Feinstein, & Jarvis, 1996). Participants self-report their level of agreement with statements via a 10-point Likert scale ranging from 0 (very strong disagreement) to 9 (very strong agreement). Example items include: “I would prefer complex to simple problems,” “Thinking is not my idea of fun” (reverse ordered), and “I find satisfaction in deliberating hard and for long hours” (Cacioppo et al., 1984, p. 307).

NFCS scores have been positively associated with various outcomes including college academic achievement as measured by test performance, course grade, and grade point average (Akpur, 2017; Elias & Loomis, 2002; Petty & Jarvis, 1996; Tolentino, Curry, & Leak, 1990). Additionally, significant positive correlations have been found between NFCS scores and both ACT scores and HSGPA (Petty & Jarvis, 1996). Consistent with other dispositional factors, need for cognition has also served as a dependent variable within the literature and environmental factors have been shown to influence need for cognition (Padgett et al., 2010; Roksa et al., 2017).

The single construct nature of many of the studies also limits our understanding of how need for cognition interacts with other variables with the exceptions of Ellias and Loomis (2002) and Akpur (2017). Ellias and Loomis’ study of 138 undergraduate students found that academic self-efficacy beliefs “fully mediated the impact of need for cognition on [college] GPA” (p. 1696). Akpur’s study of 253 university students in Turkey found that need for cognition and metacognition were significantly and positively correlated ($r^2 = .28$), and combined they predicted 58% of the variance in academic achievement. Studies of this nature that explore relationships between need for cognition and other noncognitive factors are valuable contributions to the literature though they are limited in number.

Despite significant empirical research displaying need for cognition's relationship to academic achievement, the methods employed have left critical questions unanswered. For example, Akpur (2017) and Elias & Loomis (2002) did not control for traditional predictors of HSGPA and ACT/SAT score when examining the predictive ability of need for cognition. Additionally, consistent with much of the student dispositions literature, most studies adopt the single construct approach (Richardson et al., 2012).

Motivation Factors

Motivation factors were divided into three groups: attributions, sources of motivation, and goal types (Richardson et al., 2012). Attribution includes items such as locus of control, pessimism, and optimism. Sources of motivation looked at efficacy and self-esteem. Richardson et al. (2012) distinguished self-efficacy into performance self-efficacy and academic self-efficacy. Performance self-efficacy was defined as students drawing on past experiences in similar challenges to formulate expectations. Academic self-efficacy was defined as when the challenge is less familiar, and belief is anticipated "on the basis of more generalized representations of relevant competencies" (p. 359). Finally, goal type compared intrinsic motivation focused on effort and self-improvement versus extrinsic motivation focused on achievement and competition (Richardson et al., 2012).

Self-efficacy. Self-efficacy, "confidence in one's capability for organizing and implementing the cognitive, behavioral, or social skills necessary for successful performance of a task" (Shell & Husman, 2001, p. 482), has been examined within numerous contexts, including college student performance (Bandura & Locke, 2003). Self-efficacy is a domain specific concept with self-efficacy beliefs being specific to certain tasks in a specific context (Bandura 1977, 1986). Therefore, multiple context specific constructs of self-efficacy have emerged

through the literature including performance self-efficacy and academic self-efficacy, which emerged as two of the stronger predictors of college GPA within Richardson et al.'s (2012) meta-analysis. In measuring performance self-efficacy, Shell and Husman (2001) asked "What is the highest GPA that you feel completely certain you can attain?" for both at the time of graduation and in future courses. Academic self-efficacy measures were less direct outcome focused and asked the student's level of agreement with items such as: "I have a great deal of control over my academic performance in my courses" (Richardson et al., 2012).

Additional context specific measures present within college student success literature include: general academic self-efficacy measures such as Academic Self-Confidence subscale of the Student Readiness Inventory (Le et al., 2005) and the College Academic Self-Efficacy Scale (Owen & Froman, 1988), social self-efficacy measures such as the Scale of Perceived Social Self-efficacy (Smith & Betz, 2000), and a measure of self-efficacy for the holistic college experience, the College Self-Efficacy Inventory (Solberg, O'Brien, Villareal, Kennel, & Davis, 1993). These instruments are typically self-report measures with students identifying their level of agreement with statements via a variety of Likert scales. The contextual nature of self-efficacy does present challenges for instrument development and selection.

Self-Regulatory Learning Strategies

Self-regulatory learning strategies concerned how students "regulate their cognitions, emotions, motivation, behavior, and environment" (Richardson et al., 2012, p. 359). This domain addressed volition, which is the translation of motivation into action. The domain included 11 total constructs and spoke extensively about metacognition and effort regulation. Metacognition encompasses a student's ability in planning, self-monitoring, and flexibility.

Effort Regulation. Effort regulation was defined as “persistence and effort when faced with challenging academic situations” (Richardson et al., 2012, p. 357). The two most common measures of effort regulation are subscales of more comprehensive measures, the motivation subscale of Learning and Study Strategies Inventory (LASSI; Weinstein, Palmer, & Schulte, 1987) and the effort regulation subscale of the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich & DeGroot, 1990).

Within both scales, student agreement with statements are collected via Likert scales and sample items included: “When work is difficult, I either give up or study only the easy parts” (Weinstein, Palmer, & Acee, 2016) and “Even when course material is dull or uninteresting, I manage to keep working until I finish” (Pintrich, Smith, Garcia, McKeachie, 1993). Research designs including effort regulation typically include other self-regulatory constructs, and limited research has examined effort regulation as an individual construct or in relation to other dispositional domains (Dill et al., 2014). One exception is Boyraz, Granda, Baker, Tidwell, and Waits’ (2016) study of post-traumatic stress disorder (PTSD) and college persistence where effort regulation was found to be a mediator between PTSD and persistence to the second year of college. Additionally, within Richardson et al.’s (2012) meta-analysis, effort regulation was one of only a handful of medium-sized correlates to GPA. Effort regulation was also a significant predictor within a cross-domain regression model that predicted 28% of the variance in college GPA including an additional 6% of the variance over and above HSGPA and SAT/ACT (Richardson et al., 2012).

Student Approach to Learning

Richardson et al. (2012) discussed deep, surface, and strategic as three approaches students can apply toward learning. Students representing a deep approach are intrinsically

motivated to learn and use critical evaluation and syntheses of information. Within the surface approach, students rely heavily on memorization and rehearsal along with an extrinsic motivation. Finally, students adopting the strategic approach use a combination of deep and surface attitudes based on the perceived importance and context of the task (Richardson et al., 2012).

Psychosocial Contextual Influences

Richardson et al. (2012) identified 8 psychosocial constructs. Tinto's (1975) model of student persistence framed several of the psychosocial constructs including social, academic, and institutional integration.

Social integration. Social integration is a longstanding component of Vincent Tinto's (1975) work concerning student persistence and retention. Tinto (1975) defined social integration as "a person's integration into the social system of the college," and identified connections to peers and faculty members as aspects of the integration process (p. 107).

Multiple approaches to measuring social integration are present in the literature including: Wolniak, Mayhew, & Engberg's (2012) Peer Interactions Scale that examined perceptions of positive interactions with other students, Cabrera, Nora, and Castaneda's (1993) two question scale including example item, "Since coming to this university I have developed close personal relationships with other students" (p. 130), and Pan's (2010) scale exploring characteristics such as campus employment.

Psychosocial influences such as social integration reflect the complexity of student success. Unlike other constructs discussed, social integration is rarely found to be a significantly related to learning outcomes such as college GPA, which is consistent with the findings of Richardson et al. (2012). However, social integration has been found to be a significant

predictor of another valued outcome, student persistence at an institution (Pan, 2010; Wolniak et al., 2012).

Sense of belonging. As discussed earlier, many scholars have taken issue with the implications of integration and have adopted sense of belonging as an alternative (Hurtado & Carter, 1997; Museus, 2014; Tierney, 1992). Sense of belonging has been linked to various student outcomes and has shown to be influenced through intervention (Hausmann et al., 2007; Walton & Cohen, 2007)

Hausmann et al. (2007) conducted a longitudinal study that explored the relationship of sense of belonging with intent to persist as well as the impact of intervention on sense of belonging. Hausmann et al.'s study included 365 students at a large public institution. The participants were randomly assigned one of three groups. An experimental group received small gifts with the university logo (ID holders, decals, etc.) and e-mails from upper level administrators communicating that the participant was valuable to the institutional community (Hausmann et al., 2007). One control group received similar gift items, but the items did not contain the institution's logo. The other control group did not receive gifts. Participants in all three groups completed a survey that included Bollen and Hoyles (1990) three-item sense of belonging scale. The study included three data collection points throughout the participants' first-year at the institution.

Hausmann et al. (2007) found that initial sense of belonging was not related to race, gender, SAT scores, or financial difficulty. In general, students reported a small but statistically significant decline in sense of belonging over the first year, and this decline was not associated with any background characteristics. However, the change in sense of belonging was related to academic integration and parental support. Students with higher levels of academic integration

reported an increase in sense of belonging. However, increased levels of parental support were associated with a faster decline in sense of belonging (Hausmann et al., 2007). Students in the experimental group “experienced a less rapid decline in sense of belonging over time compared to both of the control groups” (p. 824). Finally, sense of belonging was a significant predictor of participants’ intention to persist after controlling for background characteristics (Hausmann et al., 2007).

Won, Wolters, and Mueller (2017) also found sense of belonging to be an important factor within their study of 385 students at a large and diverse university in the southern United States. Won et al. explored the relationship between sense of belonging and self-regulatory behaviors through structural equation modeling. Sense of belonging was found to be a significant predictor of both metacognitive strategies ($\beta = .45$) and time management ($\beta = .42$). These findings complimented a large base of literature on self-regulatory behaviors, which have consistently been linked to academic performance. However, a better understanding of what contributed to students deploying self-regulatory behaviors is needed and this study began to address that gap (Won et al., 2017).

Multiple scales measuring sense of belonging are present within the literature. Bollen and Hoyles’ (1990) presented a three-item sense of belong scale with participants responding to a five-point Likert scale concerning their level of agreement with statements: “I feel a sense of belonging at (institution name),” “I am happy to be at (institution name),” and “I see myself as part of the (institution name) community.” Others have deployed more comprehensive scales seeking to measure various aspects of belonging including distinctions between belonging at the institution and belonging with peers at the institution (Won et al., 2017). These scales also use a

Likert scale asking the participant's level of agreement with statements concerning sense of belonging.

Relationship Across Domains

Richardson et al.'s (2012) meta-analysis provided a significant contribution by organizing the vast literature on college student success, which included significant contributions coming from scholars in the fields of Education and Psychology. Richardson et al. spoke directly to the limited number of multivariate studies, which limited the ability for cross-domain regression analyses. Richardson et al. (2017) concluded that "at present, construction of integrative, cross-domain, theories modeling predictors of GPA lacks empirical foundations" (p. 373). This limitation is represented within the CECE model, which failed to represent several domains of noncognitive factors. Recent scholarship has begun to explore the relationships across domains, yet this work often only includes two or three domains at most (Akpur, 2017; Elias & Loomis, 2002; Pan, 2010; Wolniak et al., 2012; Won et al., 2017).

Grit

An additional construct, grit, though not presented within Richardson et al.'s (2012) meta-analysis warrants some discussion given recent popularity and potential confusion with variables within this study. Grit is defined as "perseverance and passion for long-term goals (Duckworth, Peterson, Matthews, & Kelley, 2007, p. 1087). Grit includes two aspects, perseverance toward a long-term goal even when setbacks are experienced and consistency, which was described as not frequently changing interests, plans, or long-term goals (Credé, Tynan, & Harms, 2016). Grit would best align with the personality trait domain with Richardson et al.'s (2012) organization of student dispositions, and grit is strongly associated with the

personality trait of conscientiousness though Duckworth et al. (2007) argued that it is a distinct construct and specifically that it had more predictive strength than conscientiousness.

Duckworth et al. (2007) summarized five studies in early use of the grit scale.

These studies provided evidence of both construct validity and predictive validity including grit being positively associated with education level in a sample of 1,545 adults (Duckworth et al., 2007). Grit was also found to be predictive of education level over and above the big five personality traits in a sample of 706 adults. Grit predicted college GPA ($r = .25$, $p < .01$) in a sample of 139 undergraduate students at an elite university and the association was stronger ($r = .34$, $p < .001$) when SAT score was held constant (Duckworth et al., 2007).

Duckworth et al. (2007) also found that grit was a better predictor of candidate retention at West Point military academy than the any component of the Whole Candidate Score used for admission, which included SAT score, high school class rank, leadership potential, and physical aptitude exam. Finally, Duckworth et al. (2007) studied the role of grit at the Scripps National Spelling bee and found that grittier participants performed better and spent more time studying on weekends. The grit scale displayed good internal consistency throughout these studies with $\alpha = .79$ to $.85$.

The combination of early positive findings and a market friendly name, propelled grit as the construct of choice for educators at multiple levels, including higher education. The desired panacea or proverbial silver bullet had been discovered. Unfortunately, this included looking over limitations in the foundational grit studies (Credé et al., 2016). For example, admission into West Point is extremely competitive and the retention rate for the small number selected is typically 94-95%. Therefore, the practical relevance of successfully classifying which candidates will be retained is easily overstated (Credé et al., 2016). A similar limitation existed for the

study that identified grit as a predictor of college GPA, as the sample within that study had an average SAT score of 1,415, which represents the top 4% of scores nationally (Duckworth et al., 2007). Additionally, conflicting findings such as Stewart's (2015) dissertation that found no relationship between grit and college GPA, and Washington's (2016) dissertation that found no significant relationship between grit and GPA examining grit GPA for middle school students raised concerns.

Credé et al.'s (2016) meta-analysis of 73 studies that involved grit within higher education raised additional concerns. First, Credé et al. raised concerns of grit as a distinct construct due to consistently high associations with conscientiousness, including many reporting significant Rho values about .95. Credé et al. suggested that grit may be an aspect of conscientiousness. Credé et al. (2016) also expressed concerns with potential misrepresentation of the predictive power, "this confusion may have arisen because the authors of both of the foundational papers appear to confuse odds ratios with probabilities in their discussion of logistic regression results, resulting in incorrect inference about the size of observed effects" (p. 3). Despite concerns and areas with need for continued research, Credé et al. did argue that grit, specifically the perseverance aspect, could provide additional predictive value, especially concerning retention, when used in combination with other dispositional variables. However, Credé et al. expressed significant concerns with the consistency aspect of grit and argued this could contribute to low help-seeking behaviors and poor time management. Credé et al. (2016) recommended removing the consistency aspect from the scale entirely. In summary, there is still much to be explored concerning grit and though it may prove to be a beneficial addition to the literature on student dispositions, it is not the panacea some had imagined (Credé et al., 2016).

Predictive Ability of Dispositional Factors

Richardson et al. (2012) utilized univariate analyses and identified constructs with small, medium, and large correlation to college GPA. Cognitive measures of HSGPA, SAT/ACT, and A level scores produced medium-sized correlations. Academic self-efficacy, grade goal, and effort regulation also showed medium-sized correlations. Finally, performance self-efficacy was the only construct that exhibited a large correlation to GPA and “was the strongest correlate (of 50 measures) followed by HSGPA, ACT, and grade goal” (Richardson et al., 2012, p. 353).

Richardson et al. (2012) also discussed the limited number of studies with a multivariate approach, which limited the ability to perform regression analysis across domains. One such regression analysis found that effort regulation, test anxiety, academic self-efficacy, and grade goal accounted for 20% of the variance in GPA. After controlling for traditional cognitive measures of ACT/SAT and HSPGA, effort regulation, academic self-efficacy, and grade goal explained an additional 6% of the variance in college GPA. Several studies have supported Richardson et al.’s (2012) results by reporting predictive ability of dispositional factors in both college GPA and college persistence for various student populations (Brickman, Alfaro, Weimer, & Watt, 2013; Sedlacek, 2004; Zientek et al., 2013).

Malleability

An important aspect in considering the practical application of predictive variables concerns malleability or the ability to influence the variable through intervention (Zientek et al., 2013). Richardson et al. (2012) noted that more “stable individual characteristics” such as conscientiousness, procrastination, and approach to learning failed to exhibit medium or large correlations to college GPA (p. 372). Conversely, “potentially modifiable cognitions and self-

regulatory competencies” of performance self-efficacy, grade goal, effort regulation, and academic self-efficacy emerged as important constructs in correlation to college GPA (p. 372).

Longitudinal studies have supported the hypothesis that dispositional factors are malleable (Hausmann et al., 2007; Walton & Cohen, 2007; Wernersbach, Crowley, Bates, & Rosenthal, 2014; Zientek et al., 2013). One study compared the change in noncognitive variables between 126 students enrolled in a study skills course and 111 students enrolled in a general education psychology course (Wernersbach et al., 2014). The study skills course traditionally consisted of mostly academically underprepared students based on advising practices. The study utilized the College Self-Efficacy Inventory (CSEI), Motivated Strategies for Learning Questionnaire (MSLQ), and Learning and Study Strategies Inventory (LASSI). Wernersbach et al. (2014) found that the academically underprepared students scored significantly lower on the CSEI during the pre-test, which supported a genuine difference between the groups. The authors did note that placement in the study skills course or being identified as “academically underprepared” could have influenced pre-test self-efficacy.

Utilizing a two-way ANOVA statistical analysis, Wernersbach et al. (2014) found that underprepared students had statistically significant improvement for academic self-efficacy on the CSEI. Additionally, Wernersbach et al. found statistically significant improvement for academically underprepared students for the Self-Efficacy for Learning and Performance and the Control of Learning Beliefs scales within the MSLQ. Students in the general education course did not have any significant improvement within either measure. Concerning the LASSI, underprepared students had significant improvement on all 10 scales while the comparison group only had significant improvement within 7 of the 10 scales. Wernersbach et al.’s (2014) study displayed the malleability of multiple dispositional factors in response to a specific intervention.

Walton and Cohen (2007) found consistent results concerning the malleability of sense of belonging. An important aspect of Walton and Cohen's study was that the sense of belonging of Black students was most impacted by the intervention. In the first experiment, Black students who were led to believe they may have a limited number of friends within the academic environment displayed a decrease of sense of belonging at the institution while White students were not affected (Walton & Cohen, 2007). In the second experiment, students received an intervention that normalized doubts in belonging. Black students who received the intervention maintained their pre-intervention levels of sense of belonging even when faced with adversity compared to black students within the control group who reported a decrease in sense of belonging (Walton & Cohen, 2007). Additionally, Black students who received the intervention had a greater improvement in their college GPA compared to the control group. A significant difference was also reported between the Black students in the treatment group and Black students campus wide concerning college GPA, $t(801) = 2.49, p = .013, d = .72$. There was no difference between White students in the treatment and control groups concerning change in sense of belonging or college GPA (Walton & Cohen, 2007). Walton and Cohen's (2007) work provided a clear example of the malleability of sense of belonging and the translation of improvement in dispositions relating to increased academic performance, which is consistent with the CECE model (Museus, 2014).

Summary of Student Dispositions Section

Existing dispositional literature directly supports the hypothesized relationships within the CECE model as dispositional factors have been shown to be malleable (Hausmann et al., 2007; Walton & Cohen, 2007; Wernersbach et al., 2014; Zientek et al., 2013) and predictive of academic outcomes and persistence towards graduation (Richardson et al., 2012). Additionally,

student dispositions are predictive of college success outcomes over and above traditional cognitive measures of HSGPA and ACT or SAT score (Richardson et al., 2012). One gap in the literature is limited presence of multivariate studies that examined the relationship of dispositional factors with one another and the institutional environment (Richardson et al., 2012; Museus, 2014). Continued exploration and refinement of our understanding of dispositional factors is especially important when considering underrepresented student populations where cognitive factors are less predictive (Kim, 2015; Kirby et al., 2007).

Developmental Education

A growing population of students is entering college underprepared or lacking basic skills required to succeed in college-level coursework. What defines a student as underprepared varies by state and at times by institution, but generally consists of incoming standardized test scores (ACT/SAT), high school GPA, and/or placement test scores taken during college registration (Hughes, Gibbons, & Mynatt, 2013). Institutions conditionally admit these students and require the students to complete developmental education courses to address the preparation gap. Developmental education programs focus on deficiencies in math, writing, and reading, while some programs also include a general student success course (Radford, Pearson, Ho, Chambers, & Ferlazzo, 2012).

Enrollment and Success Rates

Chen and Simone's (2016) descriptive analysis of national data on developmental education through the National Center for Educational Statistics examined course enrollment and completion over a 6-year span for students entering higher education in academic year 2003-2004. Chen and Simone found that 68% of students at public 2-year institutions and 40% of those starting at public 4-year institutions took at least one developmental education course. Of

those at 2-year institutions, about 51% failed to complete all their developmental education courses compared to 40% at 4-year institutions. Additionally, several demographic groups were overrepresented within the developmental education population including African American and Latino/a students, students from low-income backgrounds, first-generation students (at 4-year institutions only), and female students (at 2-year institutions only) (Chen & Simone, 2016).

Concerning degree attainment, Chen and Simone (2016) found that even developmental education students who complete their developmental requirements attained a degree at a 12% lower rate compared to non-developmental education students (55% versus 67%). Students who did not complete their developmental education requirements attained a degree at a much lower rate, 30-33%. These findings are consistent with previous longitudinal studies by Adelman (2004) and Attewell, Lavin, Domina, and Levey (2006). A similar trend is found when examining persistence rates in the state of Arkansas. For the 2014 cohort of first year students at four-year public institutions, 72.2% of non-developmental education students returned in the fall 2015, while only 56.2% of developmental education students returned in fall 2015. (Arkansas Department of Higher Education, 2016).

Developmental Education Literature

Given the disparity in success rates, developmental education students are a population of interest for many researchers. Research in this area is increasingly timely as concerns of the efficacy of developmental education has been called to question (Attewell et al., 2006; Hicks, 2017). In response, several states (Illinois, Montana, Tennessee, and Texas) have removed developmental education from four-year institutions while Ohio passed legislation to pull state subsidies from developmental courses (Chen & Simone, 2016). Policy shifts of this nature directly impact access to certain types of higher education institutions for a sizeable number of

students, which is especially concerning given that underrepresented student populations are overrepresented within developmental education (Attewell et al., 2006; Chen & Simone, 2016)

A significant portion of the developmental education literature focuses on policies, structure, and subject specific pedagogical approaches (Goldwasser, Martin, & Harris, 2017; Hicks, 2017; Ingalls, 2017; Pierce, 2017; Walker, 2017). A significant limitation of these foci is the perceived underlying assumption that developmental education students face cognitive challenges only and this cognitive gap in specific content areas is solely what needs to be addressed to support student success. However, this neglects the role of dispositional factors, which is problematic given Kim's (2015) findings that cognitive factors have limited to no predictive ability in the success of special admission students. Though limited in number, researchers recently began examining the role of dispositional factors specifically for developmental education students.

Zientek et al.'s (2013) study of developmental math students at three community colleges examined the influence of demographic, behavioral, and dispositional factors on course grade. Multiple regression analysis found that 40.7% of the variance in course grade was predicted by the model including 16 demographic, behavioral, and dispositional variables. Specifically, class attendance was the strongest predictor, followed by belief in resource management strategies, beliefs in motivational strategies, repeating a mathematics course, beliefs in self-regulated learning, interpretation of frequency of teacher explaining consequences of incomplete work, and belief in meeting others' expectation (Zeinteak et al., 2013).

Wernersbach et al.'s (2014) study, which was discussed within the malleability section of the literature review, also supported the relevance of student dispositions for developmental education students specifically. Wernersbach et al. found that conditionally admitted students

reported lower academic self-efficacy, motivation, and test strategies while reporting higher levels on the anxiety scale of the LASSI. Though conditional admission or developmental education students may arrive on campus with lower levels of several dispositional aspects, Wernersbach et al. (2014) identified the positive influence of the institutional environment, in this case a specific course, in seeing growth in student dispositions.

Bachman's (2013) qualitative study examining student attitude towards developmental education highlighted unique psychological and dispositional aspects within the experience of developmental education students. Bachman performed semi-structured individual interviews with nine undergraduate students who had completed developmental math. Five of the participants were enrolled at a large public research institution, and four were enrolled at a small liberal arts college. The participants were racially and ethnically diverse with three participants identifying as Latino/a, two identifying as African American, and four identifying as White. Bachman specifically focused on the students' perception of why they needed developmental education, perception of themselves as students, and attitudes and feelings about participating in developmental education.

Bachman (2013) found that many participants in the study associated developmental education with "being dumb" and being an "exception" compared to "normal" students. Bachman also reported negative attitudes and feelings from participants towards developmental education. Four themes emerged as influencers of a positive attitude shift for participants. First, participants shifted requirement for developmental education from perceived personal deficits of being "dumb" to filling gaps that the participants were not taught in high school. Secondly, courses needed to meet the "Goldilocks" standard in terms of rigor where they were not perceived as a waste of time for being too easy but were not equivalent to credit-bearing courses

in difficulty. Third, participant perceptions changed following encounters where they saw “normal” students struggling and benefiting from support. Finally, the theme of “establishing human connections” with instructors emerged as an important aspect of the participant’s experience. Bachman’s (2013) study displayed the unique psychological perceptions impacting developmental education students and supported the CECE model as various environmental aspects positively influenced these perceptions.

Hicks’ (2017) qualitative dissertation also explored the experience of developmental education students. Hicks specifically explored the experience of 15 African American “achievers,” which was defined as “students who passed all developmental education courses” (p. 7). Hicks identified themes of support from family and community agents as well as positive interactions with peer tutors as prevalent in the experience of achievers. Hicks also identified environmental aspects, including “chilly learning environments,” as a salient aspect within the participants’ experiences. Finally, Hicks (2017) identified intrinsic motivation and the influence of other themes on this motivation as critical aspects to the success of developmental education students.

In conclusion, dispositional factors have proven to be relevant predictors of success for developmental education students and environmental interventions have shown to improve dispositions for developmental education students, such as self-efficacy (Wernerbach et al., 2014; Zientek et al., 2013). Additionally, Saxon et al. (2015) and Kim (2015) identified a need for increased understanding of dispositional factors and their impact on developmental education student success. Finally, the qualitative work of Bachman (2013) and Hicks (2017) highlighted the complex psychological and dispositional aspects at play within the experiences of developmental education students. Therefore, this study will examine the mastery motivation of

developmental education students compared to their peers and will contribute to a growing body of literature supporting the holistic understanding of success for developmental education students.

Measuring Student Dispositions

Richardson et al. (2012) discussed the multitude of dispositional constructs present within the literature on college student success, which corresponded with the development of a multitude of measurement instruments for these constructs. The measurement of five individual constructs was highlighted earlier in this review of literature. The following section will discuss the limitations of single construct or single domain instruments followed by a discussion around four instruments developed that measure across multiple dispositional domains, a need identified by Richardson et al. (2012).

Limitations of Individual Construct and Single Domain Methods

Gliner et al. (2017) identified three purposes for research: theory development, practical application, and development of tools or measurement. The individual construct and single domain methods frequently employed within noncognitive research limits the ability to fulfill these three purposes. Numerous theories concerning student success have been developed (Bean & Eaton, 2000, 2001; Museus, 2014; Seidman, 2012; Tinto, 1975). Unfortunately, these theoretical models are limited due to the lack of integration with the entire body of literature on student dispositions. For example, Bean & Eaton's (2000, 2001) psychological model of college student retention, perhaps the most robust theory from a dispositional perspective, fails to incorporate self-regulatory learning strategies.

Limitations exist with practical application from current research methods as well. Among the myriad of single construct instruments, practitioners have the choice of selecting the

construct they deem most relevant or attempting to assess and intervene across multiple constructs using multiple instruments and interventions. The first approach runs the risk of neglecting a variable that is important to a certain student or student population. For example, a practitioner could focus on self-regulated learning strategies that have a strong relationship to academic performance (Richardson et al., 2012), but would be neglecting psychosocial variables that have been found to moderate the relationship between student learning and persistence (Pan, 2010; Wolniak et al., 2012). Wernersbach et al. (2014) utilized the second approach by including three instruments within a single study. This approach can lead to difficulties in interpreting results as the instruments overlap in some areas but not others. Additionally, respondent fatigue for participants becomes a concern with multiple instruments, especially with the need for longitudinal studies with multiple data collections (Ben Nun, 2008; Museus, 2014).

To state that the individual construct and single domain methods are without value would be an error. Student success in college is a complex phenomenon and understanding the individual pieces involved is a pragmatic and required first step. However, researchers must acknowledge that these methods are limited, and though the current literature answers questions around specific constructs' relationship to student success, it fails to answer questions about how multiple constructs interact. As Richardson et al. (2012) discussed, the lack of studies that measure constructs across multiple domains limits the ability to perform multiple domain analyses. Therefore, as the dispositional literature progresses, researchers must examine reliable and valid ways of measuring factors across multiple domains (Richardson et al., 2012, Robbins et al., 2004).

Multiple Domain Instruments

Noncognitive Questionnaire

Tracey and Sedlacek (1984) first published and validated the Noncognitive Questionnaire (NCQ) in a study of 1,975 college students. Tracey and Sedlacek analyzed the predictive validity of the NCQ by race and found that the NCQ scores predicted persistence for Black students and predicted college grades for White and Black students. Multiple variations of the NCQ have been developed, with the most common published by Sedlacek (2004). The NCQ consists of 23 items (18 Likert scale, 2 multiple choice, 3 open-ended) across 8 scales: positive self-concept, realist self-appraisal, successfully handling the system (racism), preference for long-term goals, availability of strong support person, leadership experience, community involvement, and knowledge acquired in the field. Sedlacek (2004) clearly stated that the goal of the NCQ was to address the racial inequality around standardized tests as a major factor in college admission decisions. Sedlacek discussed relevant literature to support the inclusion of the eight scales listed above. However, Sedlacek (2004) did not provide evidence of a systematic review of the literature for identifying the eight scales. Instead, Sedlacek (2004) focused more on the need of noncognitive measurement due to issues related to standardized testing.

Tracey and Sedlacek (1988) performed a confirmatory factor analysis of the NCQ in two samples of black students ($n = 101$ and $n = 97$) and one sample of white students ($n = 202$) and found that the eight-factor structure had adequate fit across the various samples. Sedlacek (2004) referenced several studies to support predictive validity of the NCQ for predicting both GPA and

persistence for various student populations. Finally, Sedlacek (2004) provided case studies of institutions utilizing the NCQ within the admissions process.

Despite individual examples of success, significant concerns persist with the NCQ. Thomas, Kuncel, and Credé (2007) performed a meta-analysis of 42 studies that used the NCQ. Thomas et al. concluded that “the consistently poor performance of the NCQ indicates that the NCQ is not a valid predictor and should not be used to make decisions that affect students’ lives” (p. 652). In supporting this conclusion, Thomas et al. discussed the inconsistent and relatively low predictive validity of the NCQ. Specifically, the meta-analysis found correlations to college GPA of $r = .05$ to $r = .07$. Concerning persistence, self-concept was the most predictive scale with correlation of $r = .14$. Thomas et al. (2007) also referenced concerns with small sample sizes in general within many of the studies cited as support of validity and reliability. Tracey and Sedlacek (1984), which is often cited concerning test-retest reliability, was highlighted as an example with a very small sample size of 18 (Thomas et al., 2007).

Finally, Thomas et al. (2007) identified psychometric concerns including item wording. One example item reads “I am as skilled academically as the average applicant to this school,” which is problematic as an identical response could represent an applicant feeling he or she is more skilled or less skilled than the average applicant. Concerns such as this are likely contributors to the most significant issue concerning the NCQ, reliability of the instrument. Thomas et al. (2007) reported Cronbach alpha scores of .39 to .82 within the meta-analysis with an average of .57. In fact, Tracey and Sedlacek (1988) report alpha scores that fail to meet .60 on multiple scales across 3 samples. For example, for the support for academic plans factor, the first sample of 101 Black students had strong internal consistency, $\alpha = .84$, but the second sample of 97 Black students and third sample of 202 White students had unacceptable internal

consistency, $\alpha = .53$ and $\alpha = .49$. Issues of reliability are also found in Radigan's (1998) dissertation of 464 community college students taking developmental education courses ($\alpha = .11$ to $.45$), and Scarfone's (2013) dissertation of 88 college students with learning disabilities ($\alpha = .08$ to $.48$).

The work of Sedlacek and colleagues in measuring dispositional factors in student success played a vital role in the dispositional agenda as the NCQ was the first attempt at a comprehensive dispositional instrument. Unfortunately, the NCQ carries significant reliability concerns and a tool that is not reliable cannot be valid (Gliner et al., 2017). Therefore, the conclusion presented by Thomas et al. (2007) is reflective of the approach a well-informed scholar-practitioner should take by avoiding use of the NCQ.

Student Readiness Inventory

Le, Casillas, Robbins, & Langley (2005) developed the Student Readiness Inventory (SRI) based on the Robbins et al. (2004) meta-analysis of dispositional factors in student success. The SRI consists of 108 items on 10 scales: academic discipline, academic self-confidence, commitment to college, communication skills, emotional control, general determination, goal striving, social activity, social connection, and study skills. The scales are grouped in four broad areas: motivation, skill, social engagement, and self-regulation (Le et al., 2005). One should note the relative consistency in domains with those identified by Richardson et al. (2012).

In developing the SRI, Le et al. (2005) identified 320 items reflecting the conceptual model based on the Robbins et al. (2004) meta-analysis. The items were split into two groups of 160 and pilot tested with high school seniors to evaluate item clarity, which resulted in 305 items being retained. The 305 items were randomly assigned to five clusters of 61 items each and 10 unique questionnaires were created with each consisting of 3 clusters. The questionnaires were

administered to 2,337 high school students, 2,471 community college students, and 1,648 university students for a total of 6,456 participants, which produced 5,970 useable responses (Le et al, 2005).

Exploratory factor analysis identified 11 factors, and 10 factors were retained as 1 factor was determined to be uninterpretable (Le et al., 2005). Items that loaded at .30 or higher on the principal factor and were .20 or lower on secondary factors were retained, which consisted of 145 items. Confirmatory factor analysis was performed with the remaining 145 items. The model displayed a very good fit and confirmed the factor structures. Le et al. then evaluated items based on the regression weights for the assigned factors, which resulted in 95 items being retained on the 10 factors. Internal consistency of the factors was acceptable to good ($\alpha = .72 - .87$). Intercorrelations were reflective of the conceptual model with higher correlations between factors that are conceptually related, such as social activity and social connection. Correlations between the scales and family income and ethnicity were mostly not statistically significant and those that were statistically significant had very small effect sizes leading the authors to conclude there was no practical significance. Differences based on gender were found but were consistent with findings of previous research (Le et al. 2005). Finally, four scales, commitment to college, social connection, academic discipline, and academic self-confidence, were moderately correlated with HSGPA ($r = .20$ to $.32$). ACT scores were correlated with the academic self-confidence scale ($r = .32$).

Robbins, Allen, Casillas, Peterson, and Le (2006) examined the predictive validity of the SRI on college outcomes of GPA and persistence in a large study of 14,464 students from 48 institutions. The significant sample was attained due to ACT Incorporated's ownership of the SRI, which allowed multiple partner institutions to be recruited. Hierarchical linear models were

performed to allow for institutional characteristics to be used as independent variables in addition to demographic data, traditional cognitive measures, and the SRI results. Hierarchical linear regression models for first semester and first year college GPA were conducted with four blocks of predictors: institution effects, demographics, prior academic achievement (ACT and HSGPA), and SRI scale scores. At four-year institutions, the model accounted for 33.6% of the variance in first-semester GPA and 39% of the variance in first-year GPA. The fourth block, addition of SRI scale scores, increased the predictive ability by 3.5% and 3.4%, respectively. Similar results were found for 2-year institutions with SRI scales explaining an additional 3.3% of the variance in first semester GPA and 2.7% of the variance in first year GPA. Logistic regression results found that commitment to college and academic discipline were statistically significant predictors of first semester and first year retention at both two and four-year institutions with social connections being a statistically significant predictor at four year institutions only. ACT and HSGPA were statistically significant predictors within both models as well. Additionally, Robbins et al.'s (2006) found support for the reliability of the SRI with Cronbach alpha scores for the factors ranging from .80 to .87.

Similar results were found in Komarraju, Ramsey, and Rinella's (2013) study of 540 freshman undergraduate students. Hierarchical multiple regression analysis found that HSGPA, ACT, and the academic discipline scale from the SRI were significant predictors of college GPA. Block one was ACT score which accounted for 13% of the variance in college GPA, and HSGPA predicted an additional 11% of the variance when added. Finally, academic discipline accounted for an additional 2% of the variance over and above ACT and HSGPA. Komarraju et al. (2013) found support of strong internal consistency of the SRI scales with Cronbach alpha ranging from .81 to .87, consistent with Robbins et al. (2006). One critique of Komarraju et al.'s

analysis methods is the order in which predictors were entered into the hierarchical multiple regression (Leech, Barrett, & Morgan, 2015). HSGPA is consistently found to be the strongest cognitive predictor of college GPA, (Richardson et al., 2012) and yet ACT score was entered first. No justification was provided by the authors which is a cause for concern, especially given the business relationship of the SRI to the ACT, though this decision should not have impacted the results concerning the SRI scales entered after both ACT and HSGPA.

The SRI has been shown to be a reliable tool for measuring a broad range of dispositional factors. Reviewing the scales of the SRI, one would find that four of the five domains identified by Richardson et al. (2012) are represented. The quality of the instrument is reflective of the process used in constructing it. The construction of the SRI was grounded in the current literature and a large potential item pool was systematically evaluated (Le et al., 2005). The SRI does present some limitations when one considers the practical application of the instrument. The most significant limitation is the length of the overall inventory. The practical reality of having students complete a 108-item inventory without fatigue is challenging (Ben Nun, 2008). Additionally, though the SRI has been shown to have predictive validity over and above traditional cognitive measures, one must evaluate the power of that predictive ability with the practical implications of utilizing the instrument. Does an increase of 2% to 3.5% in predictive ability justify the resource allocation required to utilize a measure such as the SRI? Perhaps utilizing the tool to evaluate needs of at risk students is a logical use as explored by Allen (2009). The final limitation to consider with the SRI is access due to the financial costs associated with using the instrument.

College Student Inventory

Another tool owned by a private company is the College Student Inventory (CSI) created by Noel-Levitz. The tool comes in three forms with the most recent updated in 2006. The forms vary in number of items (194, 100, 74) and number of scales (18, 16, 13). The CSI is predominately used within a comprehensive student success program that allows students to self-assess and receive feedback. Slanger, Berg, Fisk, and Hanson (2015) performed a longitudinal study with CSI data from 10 cohorts of first-year students from one institution. Slanger et al. found the CSI to be predictive of college GPA, credits earned, and persistence through the sixth semester. However, only descriptive data were reported with comparison based on high or low classification across four stanines: dropout proneness, educational stress, predicted academic difficulty, and receptivity to institutional help. The absence of other independent variables such as HSGPA create concern of overstatement of predictive ability. Additionally, Slanger et al., (2015) provide minimal description of the instruments construction. Finally, the instrument's length creates concerns around respondent fatigue, and the CSI shared the challenge of limited access due to financial costs associated with use (Ben Hun, 2008).

Motivated Strategies for Learning Questionnaire

The final multi-domain noncognitive measurement instrument is the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich, Smith, Garcia, and McKeachie, 1993). The MSLQ is an 81-item 15-scale instrument with two main sections: motivation and learning strategy. The two main sections align with two of the five domains identified by Richardson et al. (2012): motivation and self-regulated learning. Pintrich et al. (1993) found poor to excellent internal consistency for the scales with Cronbach alpha ranging from .52 to .90. Pintrich et al. also found the MSLQ to be predictive of course grade. Additional studies have found predictive validity for course grade and college GPA, though which scale proved predictive has varied

across studies (Bruso & Stefaniak, 2016). The MSLQ has been used extensively and is a flexible tool that allows specific scales to operate independently. However, the MSLQ is limited in its ability to predict student success holistically due to the purpose of the tool. The MSLQ is situated within the context of a specific course and the item language reflects this positioning as they speak to a student's actions in a specific course. Finally, the inclusion of only two of the five domains identified by Richardson et al. (2012) results in an incomplete picture of what may be influencing a student's motivation and self-regulated learning.

Limitations of Existing Multiple Domain Instruments

Practical measurement of dispositional variables across multiple domains is a complex challenge. Four of the more prominent attempts to measure across multiple noncognitive domains were discussed, and a gap remains for a measurement tool that is reliable, valid, and practical. The NCQ (Tracey & Sedlacek, 1984) has significant concerns with reliability of the instrument. Both the SRI (Le et al., 2005) and CSI (Noel-Levitz, 2011), share concerns with length and accessibility. Additionally, though the SRI has proven to be predictive over and above traditional cognitive factors, the predictive increase is minimal, and one must evaluate the practical costs of time and finances in utilizing the tool. Finally, the MSLQ (Pintrich et al. 1993) has been shown to be a reliable and valid instrument. However, the MSLQ measures student behaviors, beliefs, and likelihood of success within the context of a single course instead of student success broadly defined. Additionally, the MSLQ does not address psychosocial variables, which have been found to moderate the relationship between learning outcomes and persistence (Wolniak et al., 2012).

As previously discussed, more comprehensive models of student success, such as the CECE model, have created new needs within the measurement of student dispositions (Musesus,

2014). Richardson et al. (2012) identified the need for instruments that measure across multiple domains opposed to the single construct approach that is prevalent within the literature. Additionally, an instrument must possess flexibility and practicality across time frames as the need for longitudinal studies with data collections at multiple points are needed to explore what influences change in student dispositions (Museus, 2014; Museus et al., 2017). Current dispositional instruments failed to meet these needs. Therefore, the evaluation of a new dispositional instrument that measures across multiple dispositional domains, is flexible concerning time frame of administration, and addresses issues of respondent fatigue is a critical first step in validating the CECE model and ultimately increasing our understandings of college student success.

Mastery Motivation

The historical background of the construct of mastery motivation can be traced back to the theoretical work of White (1959) concerning the motivation of children's behavior. Specifically, White discussed effectance motivation, or a motive to have an affect on one's environment and to be effective in doing so. Yarrow, Rubenstein, and Pederson's (1975) work with the behavior of infants began to solidify concepts from White's theoretical work. A follow up study by Yarrow, Klein, Lomonaco and Morgran (1975) applied empirical research to these theoretical concepts. As the work continued, a structured tasks measurement was developed where infants were presented with specific tasks or problems. The construct became known as mastery motivation, as the researchers were evaluating the infants' persistent efforts to master the tasks. It is important to note that "the scores focused on persistence, the process or motivation to master the task rather than the child's ability to solve it" (Busch-Rossnagel & Morgan, 2013, p. 248).

Multiple definitions of mastery motivation have been proposed over the years. Though having minor variance, the definitions consistently speak to tasks that are challenging to a specific individual, one's desire to master the task without the influence of external motivational factors, and approaching tasks in a focused and persistent manner (Busch-Rossnagel & Morgan, 2013). Within this review, Barrett and Morgan's (1995) definition will be utilized where mastery motivation is "a multifaceted, intrinsic, psychological force that stimulates an individual to attempt to master a skill or task that is at least somewhat challenging for him or her" (p. 58).

Dimensions of Mastery Questionnaire

As the research around mastery motivation expanded beyond toddlers into school-aged children and adolescents, the Dimensions of Mastery Questionnaire (DMQ) was developed. Multiple iterations of the DMQ have been published, with the most recent being the DMQ 18 (Józsa & Morgan, 2015). Morgan's (1997) DMQ 17 was used within multiple studies from 1997 to 2014. The DMQ 17 examined two aspects of mastery motivation, instrumental and expressive, through 45 items and seven scales (Józsa & Morgan, 2015).

The instrumental or persistence aspect of mastery motivation is measured by four scales within the DMQ 17: object-oriented persistence, gross motor persistence, social persistence with adults, and social persistence with children or peers (Józsa & Morgan, 2015). The expressive or affective aspects of mastery motivation are measured by two scales, mastery pleasure and negative reaction to failure. The DMQ 17 also included a final scale that measured a child's general competence, which is not included as part of the mastery motivation measurement (Józsa & Morgan, 2015). Over 15,000 children across 7 countries have been rated with the DMQ 17 with ages ranging from 6 months old to 19 years old. The DMQ 17 includes both a self-report

version for students of appropriate age and an adult report used with parents and teachers (Józsa & Morgan, 2015).

Reliability and validity. Józsa and Morgan (2015) synthesized multiple studies supporting the reliability and validity of the DMQ 17. Evidence of adequate to excellent internal consistency has been found for the scales with both student self-report and adult (parent or teacher) report and these findings have remained true across multiple languages and cultures (Morgan, Wang, Liao, & Xu, 2013; Józsa & Molnar, 2013). Józsa and Molnar (2013) found test-retest reliabilities from .61 to .94 in a study of 98 Hungarian teachers, parents, and students. Józsa and Molnar (2013) also reported moderate correlations of scores between the ratings of two separate teachers for children in grades 4 and 8 though the correlation was lower in grade 10. Additionally, multiple studies have reported long range stability for various age groups, populations, and time frames ranging from 5 months to 4 years (Gilmore & Cuskelly, 2009; Huang & Lay, 2011; Wang, Morgan, & Biringer, 2013).

Evidence of convergence and predictive validity has been found across various ages. Morgan and Bartholomew's (1998) study of 64 elementary aged (7-10 years old) children found that the child's self-rating on the DMQ was significantly related to the child's self-ratings on both Harter's (1981) intrinsic motivation scales and Harter's (1982) preference for challenge scale. Additionally, the DMQ parent rating of 2-year old typically developing girls predicted cognitive, reading, and spelling ability at the age of 8 (Gilmore, Cuskelly, & Purdie, 2003). Józsa and Molnar (2013) found mastery motivation to be a stronger predictor of academic achievement than IQ in a study of 928 Hungarian students in the 3rd and 6th grades. Finally, Józsa, Wang, Barrett, and Morgan (2014) performed a principal axis factor analyses on a combined data set that included 200 American, 1,465 Chinese, and 8,175 Hungarian children 7

to 19 years old. The study found strong factorial evidence of validity as items loaded on the intended factors and no factors had cross loading above .30. These results were consistent across all three countries in the study (Józsa et al., 2014). In conclusion, the DMQ 17 has significant empirical research supporting it to be a reliable and valid instrument.

DMQ 18

Józsa and Morgan (2015) and Morgan et al. (2015) introduced the DMQ 18 in efforts to address a few concerns that persisted from the DMQ 17. Specifically, the reversely coded items were removed after analysis across multiple studies showed that 10-20% of raters appeared to read them inaccurately. Additionally, the negative reaction to failure scale was split into two subscales, frustration/anger and sadness/shame, due to consistently low alpha scores. Finally, a few problematic items were deleted based on confirmatory factor analysis (Józsa & Morgan, 2015; Morgan et al., 2015).

Józsa and Morgan (2015) evaluated the DMQ 18 in a study of 211 preschool children that were rated by teachers. Excellent internal consistency, alpha scores above .9, was found for most scales. Issues remained within the reaction to failure scale, specifically within the sadness/shame subscale with an unacceptable alpha of .54. Interrater reliability was acceptable to good for all scales except for the negative reaction to failure subscales. Finally, a five-factor principal factor analysis with promax rotation displayed excellent fit with all items having their highest loading on the appropriate factor and no items cross-loading above .4 (Józsa & Morgan, 2015).

Mastery Motivation Changes Over Time

Though mastery motivation in infants and toddlers has been found to be fairly stable (Huang & Lay, 2017), mastery motivation in school age children appears to decline over time. A large Hungarian cross-sectional study of 7,410 students examined mastery motivation across

ages 8-16 with collection within the following grades: 2, 4, 6, 8, and 10 (Józsa & Molnar, 2013). The study found that overall mastery motivation declines with age, with these findings being consistent across parent, teacher, and self-report ratings. Józsa and Molnar (2013) speculated that motivation reflected changes in school structure such as a move from primary to secondary school. Though the overall trends were consistent across rating groups, there were some variations in timing and level of decline. Teachers and parents perceived a decline in mastery pleasure (more significant for teachers) though student reports remained flat. Gross motor persistence declined steadily and most severely (Józsa & Molnar, 2013).

Józsa and Morgan's (2014) longitudinal study provided confirmatory results concerning decline in mastery motivation over time. The study included 372 Hungarian students from 25 primary school classes with data collection taking place in the 4th grade (10 years old) and the second data collection taking place in the 8th grade (14 years old). The 25 classes were each located in a different town, but all classes implemented a common curriculum. The study analyzed the nine-item cognitive persistence scale of the DMQ only, $\alpha = .76$ in grade 4 and $\alpha = .79$ in grade 8. The 5-point scale was transformed into a 0-100 percentage point scale with 1 = 0%, 2 = 25%, 3 = 50%, 4 = 75%, and 5 = 100%. The analysis found a 15% percentage point decline in cognitive persistence overall, which was statistically significant with a large effect size, $d = .89$, and supported the findings of the cross-sectional study discussed above (Józsa & Morgan, 2014).

A medium strength correlation ($r = .39, p < .001$) was found between the two data collections, which suggested that the change in cognitive persistence varied by individual student (Józsa & Morgan, 2014). While the majority of students (61%) reported a drop in cognitive persistence, a modest number (33%) reported no change in cognitive persistence and few (6%)

reported an increase in cognitive persistence. The most motivated students in the 4th grade displayed the highest levels of decrease in cognitive persistence. The least motivated students in 4th grade displayed the lowest degree of decrease, but half of these students still reported a decline. Józsa and Morgan (2014) identified that regression to the mean likely plays a role in this decline, however, the fact that almost half of the students with low initial motivation also reported a decline suggested other influences were present as well.

Józsa and Morgan (2014) divided the sample into quartiles based on 4th grade GPA and found significant difference between the groups concerning cognitive persistence both in 4th grade and 8th grade. Students in the lowest GPA quartile reported the lowest cognitive persistence and those in the highest GPA quartile reported the highest cognitive persistence. However, there was no significant differences in the GPA quartile groups in degree of motivation decline; high GPA students reported a similar degree of decline in cognitive persistence compared to their middle and low GPA peers. Therefore, a student's change in cognitive persistence did not depend on their initial academic performance (Józsa & Morgan, 2014).

Józsa and Morgan (2014) explored change in GPA based on change in cognitive persistence across three groups: students who reported a decline, students who reported no change, and students who reported an increase. Consistent with the findings from the GPA quartiles, there was no significant difference between the 3 groups (decline, no change, increase in cognitive persistence) in 4th grade GPA. However, there was a significant difference between the three groups concerning 8th grade GPA. Students who reported a decline in motivation also had a large decline in GPA (4.00 to 3.53, $d = .79$). Students who reported no change in cognitive persistence had a less drastic change in GPA ($d = .26$). Students who reported an increase in

cognitive persistence maintained their academic performance with no significant difference between GPA in grade four and eight. It should be noted, that though this relationship is present, it is unknown if changes in motivation led to changes in GPA or if lower performance led to decreased motivation (Józsa & Morgan, 2014).

Finally, Józsa and Morgan (2014) explored factors that may explain the change in cognitive persistence. Józsa and Morgan found that cognitive persistence was not related to parent's education level and parent's education level did not predict change in motivation. These findings were consistent concerning town size as well with class size showing a minimal relationship to cognitive persistence. However, there was significant variation in change in cognitive persistence based on class groupings. For example, three classes with an initial mean of 73% for cognitive persistence displayed different levels of decrease: 9%, 15%, and 29% (Józsa & Morgan, 2014). Józsa and Morgan stated that "students experience different teaching styles, methods, and classroom climates at different schools" (p. 529). These findings suggested that an educational environment can influence the change in mastery motivation over time (Józsa & Morgan, 2014).

Józsa, Wang, Barrett, and Morgan (2014) also performed a cross-sectional study across American ($n = 200$), Chinese ($n = 1,465$), and Hungarian ($n = 8,175$) cultures. Participant's age ranged from 7 to 19 years old, and participants were grouped into 3 age groups within the American and Chinese sample and 5 age groups within the Hungarian sample. Józsa et al. (2014) found a statistically significant decline in total persistence, cognitive persistence, gross motor persistence, and social persistence with peers across all three countries. The most significant declines appeared to occur between ages 11 to 13 and age 16, which the authors identified as the typical transition period from primary to secondary school (Józsa et al., 2014). These findings

made a valuable contribution to the literature and displayed that the trend of declining mastery motivation was not unique to the previous Hungarian only samples.

Hashmi, Seok, and Halik (2017) performed a randomized experimental study with a pretest and posttest design to evaluate the efficacy of the “I Can” mastery motivation program with 44 preschool children in Malaysia. The experimental group received the 15-week “I Can” program that was built around mastery motivation, while the control group received traditional instruction. Pretest and posttest mastery motivation scores were assessed using the individualized observation method. Specifically, students were scored within an individualized structured play setting with three types of toys (puzzles, shape sorters, cause and effect) with toys representing four levels of difficulty for each type. The experimental group displayed significantly higher task persistence gain scores (posttest minus pretest) on the puzzles, with a larger than typical effect size, $d = 1.05$. This difference in persistence gain was not statistically significant for shape sorters and cause and effect toys, though a medium effect size was observed for shape sorters. Though this study was limited by small sample sizes and explored preschool students only, the findings provided support from an experimental study that educational environments can influence mastery motivation (Hashmi et al., 2017).

Mastery motivation is an empirically supported construct that is distinguished by the focus on an individual’s persistence and desire to master a task rather than one’s ability to complete the task (Busch-Rossnagel & Morgan, 2013). Additionally, multiple versions of the DMQ have proven to be a reliable and valid measurement of the construct, which has allowed for mastery motivation to be studied in populations from infants to secondary school students (Huang & Lay, 2011; Józsa & Morgan, 2015; Wang et al., 2013). Empirical research has also shown that mastery motivation is malleable as it changes over time and can be influenced by

one's environment (Hashmi et al., 2017; Józsa & Morgan, 2014). Given the foundation of the literature, the circumstances were ripe for the exploration of the mastery motivation construct beyond secondary school students.

Adult Mastery Motivation

Doherty-Bigara and Gilmore (2015) developed an instrument to measure adult mastery motivation, the Dimensions of Adult Mastery Motivation Questionnaire (DAMMQ). Doherty-Bigara and Gilmore (2015) found significant differences across gender, age, and educational level within the sample of 628 adults. A linear trend was also identified, with task absorption steadily increasing with age beginning at age 30-39. Even though younger participants had lower task absorption they also reported significantly higher self-efficacy than older participants. Concerning gender, there was a significant difference concerning task-related pleasure, with females having higher task related pleasure. Finally, participants with university degrees reported statistically significantly higher task persistence, preference for challenge, task related pleasure, and self-efficacy than participants with a high school degree though all effect sizes were small (Doherty-Bigara & Gilmore, 2015). The DAMMQ presented promising opportunities to advance the study of mastery motivation beyond secondary school.

The DAMMQ displayed good internal consistency in a recent study with university students across four different countries: Australia, Hungary, Iran, and Bangladesh (Gilmore, Islam, Younesian, Bus, & Józsa, 2017). Adult mastery motivation has never been measured within college students in the United States. A detailed discussion of the creation of the DAMMQ as well as the reliability and validity of the instrument and the instrument's alignment with the higher education dispositional literature will be presented in chapter three.

Intersection and Opportunity in the Literature

The review of literature presented above, displayed the complex nature of college student success. Recent theoretical models, specifically the CECE model, have more comprehensively represented this complexity (Museus, 2014). The CECE model moved beyond the methodological separation of quantitative studies focused on student attributes, including dispositional factors, and qualitative studies focused on student experiences. Converging the quantitative and qualitative literature contributed to a robust model of student success that also created new needs for scholarly (in)validation. Theoretical progression of this nature was needed to better understand student success. This progression was especially important for student populations that are less represented in traditional student success theory (Museus, 2014). Additionally, scholars have identified a specific need to better understand dispositional factors with this student population (Kim, 2015; Saxon et al., 2015).

Current dispositional instrumentation presents a significant barrier to (in)validating the CECE model, especially the hypothesized relationship between institutional environments and student dispositions. Specifically, current dispositional instruments fail to measure across multiple domains or present significant limitations for use within longitudinal studies (Museus et al., 2017; Richardson et al., 2012). Additionally, the limitations of current multiple domain instruments and the propensity to use single construct instruments limits our understanding of how various student dispositions interact with one another (Richardson et al., 2012).

Mastery motivation, as a “a multifaceted, intrinsic, psychological force” (Barrett & Morgan, 1995, p. 58), presents a unique opportunity to address current gaps in the literature on student dispositions. The recent creation of the of the DAMMQ has enabled measurement of

mastery motivation in adults; however, adult mastery motivation has never been measured in U.S. college students (Doherty-Bigara & Gilmore, 2015). Dispositional factors in student success, developmental education, and mastery motivation present three distinct but related bodies of literature that intersect when seeking to increase understanding around student success, especially success for developmental education students. A study targeting this intersection, specifically quantitative instrumentation within this intersection, would contribute valuable understanding of student success beyond cognitive measures and would lay a foundation for future understanding of how various aspects of the educational environment impact dispositional factors and, therefore, support or hinder the success of college students.

CHAPTER 3: METHOD

The purpose of this comparative and associational quantitative study was to evaluate the DAMMQ-C as a measure of mastery motivation in U.S. college students, examine differences in mastery motivation across various characteristics including developmental education status, and explore the relationship between mastery motivation and student academic performance.

Mastery motivation had never been measured with U.S. college students and evaluation of the DAMMQ-C presented many opportunities for validating more comprehensive models of student success, such as the CECE model (Museus, 2014; Richardson et al., 2012). Despite a large body of literature on student dispositions as factors in student success and a multitude of student disposition instruments, significant limitations remained both in instrumentation and understanding of student dispositions as factors of student success (Richardson et al., 2012; Thomas et al., 2007, Tinto, 2012). Additionally, scholars have identified limited understanding of the influence of student dispositions with developmental education students specifically (Kim, 2015; Saxon et al., 2015). Therefore, this study sought to contribute to the literature in addressing these limitations.

Research Questions

1. Does the DAMMQ-C accurately measure mastery motivation within college students in the United States?
 - a. What is the relationship between the task persistence scale of DAMMQ-C and the effort regulation subscale of the Motivated Strategies for Learning Questionnaire (MSLQ)?

2. How well do mastery motivation, HSGPA, and ACT score explain the variance of college GPA?
 - a. Does the predictive ability vary based on developmental education status?
3. How well do mastery motivation, HSGPA, and ACT score explain the variance of percentage of attempted hours passed?
 - a. Does the predictive ability vary based on developmental education status?
4. Is there a statistically significant difference in mastery motivation by gender?
5. Is there a statistically significant difference in mastery motivation by race/ethnicity?
6. Is there a statistically significant difference in mastery motivation by developmental education status?
7. Is there a statistically significant difference in mastery motivation by number of attempted hours?

Research Design

This study was grounded within a pragmatic theoretical perspective and utilized quantitative survey methods. It should be noted that this study did not attempt to identify casual relationships (Gliner et al., 2017). Finally, this study employed a non-experimental design as there was no active independent variable and all comparisons utilized attribute independent variables (Gliner et al., 2017). The rest of this chapter will discuss design details including theoretical perspective, sampling, instrumentation, and analysis.

Theoretical Perspective

When engaging in scholarly work, it is important to situate the work within the theoretical perspective the researcher applied to the work (Creswell, 2014). To that end, my perspective as a pragmatic scholar was a significant aspect of this study and is important context

for readers evaluating the quality and implications of this work. At the core, pragmatists reject the premise of adopting a singular paradigm and method for scholarly work (Creswell, 2014). Instead, pragmatists are focused on research problems and “use all approaches available to understand the problem” (Creswell, 2014, p. 10).

Pragmatic ontology is based on both “singular and multiple realities” (Creswell & Clark, 2011, p. 42). Therefore, though hypotheses are tested, researchers will also seek to provide multiple perspectives concerning the area of inquiry (Creswell & Clark, 2011). Within this study, a pragmatic ontology was reflected in that the sample was disaggregated for specific analyses to examine multiple realities. Therefore, it was not my goal to produce a panacea that was generalizable to all college students and their success within all contexts, which I find to be an unattainable distraction within a scholarly quest to better understand student success. More specifically, I argued that the post positivist desire to predict and control student success can hinder our work to better understand this complex phenomenon as it pushes us to “control” for variables such as institutional environments instead of understanding the potential role of those environments (Museus, 2014). “Pragmatists agree that research always occurs in social, historical, political, and other contexts” (Creswell, 2014, p. 11). Therefore, we cannot chase the ghost of pure prediction that will apply regardless of context. However, this does not imply we must fully abandon predictive statistics that can increase our understanding, when viewed in context.

Concerning methodology, a purely quantitative study was unique as pragmatists often rely on a mixed methods approach (Creswell, 2014; Creswell & Clark, 2011). However, this study focused on potential convergence of quantitative and qualitative methods in examining student success and sought to examine the specific issue of quantitative instrumentation to

support this convergence. Finally, a point concerning pragmatic axiology was needed.

Pragmatism argues that “researchers include both biased and unbiased perspectives” (Creswell & Clark, 2011, p. 43). Therefore, as a pragmatic scholar, I not only acknowledged but embraced that a confluence of my lived experiences, interactions with college students, and the literature influenced the research questions I pursued, the analysis decisions I made, and ultimately the scholarly product produced.

Population and Sampling

Participants for the study were drawn from lower division courses at two institutions: University of Southern State (USS), a four-year regional comprehensive university, and Eastland College (EC), a two-year community college within a larger community college system in a large metropolitan area. Participants from lower division courses were selected because first and second-year students were more likely to be saturated within lower division courses. A significant portion of the student success literature focused on first and second-year students as this was when the majority of attrition occurs (NCES, 2017b). Additionally, early interactions with the institutional environment influence psychological factors such as motivation (Bean & Eaton, 2001; Museus, 2014).

USS is a four-year public regional comprehensive institution located in a suburban city of 65,000 in the Southern region of the United States. USS houses six colleges and enrolled 11,350 students in Fall 2017. Almost 30% of the students were enrolled within the College of Health and Behavioral Sciences with the next largest subpopulation being undeclared students, 18%. The gender breakdown at USS was 58.7% female and 41.3% male. The racial/ethnic breakdown was 66.1% White, 16.3% Black/African American, 5.4% international, 5.3% Hispanic, 3.8% two or more races, 2.1% Asian, and less than 1% American Indian or Alaskan, Native Hawaiian or

Pacific Islander, or unknown. USS's 1-year retention rates have been 72-73% for the fall 2015-2017 first-year cohorts and 6-year graduation rates were 40-45% for the Fall 2006-Fall 2010 cohorts. In recent years, the one-year retention gap between White students and students of color had disappeared. However, it was unknown if this translated to graduation as White students within the Fall 2010 cohort graduated at almost twice the rate of their peers of color, 46.8% and 28.3% respectively. Approximately 25% of incoming students at USS required developmental education courses, and this number was markedly higher for students of color, 42.7%, compared to 16.3% of their White peers. This disparity in development education enrollment was consistent with larger national trends (Chen & Simone, 2016).

Eastland College (EC) is a community college located in a large metropolitan in the Southwest region of the United States. EC reported credit enrollment of 15,105 for Fall 2016, with 72% of students enrolled part-time and 28% enrolled full time. The gender breakdown was 60% female and 40% male. The racial/ethnic breakdown at Eastland College was 46.6% Hispanic, 22.6% White, 21.8% African American, 4.6% Asian and Pacific Islander, and 4.5% American Indian, Alaskan, or other. The average age of students at Eastland College was 24 years old. Only 3% of students graduated within 2 years and only 15% graduated within 4 years. These graduation trends were likely more reflective of the part-time nature of students at EC as 72% of all course grades were a C or better. Course grades were lower for developmental education courses where only 55% achieved a C or better.

Sampling

A non-probability convenience sampling approach was used to identify specific course sections for potential participation at each institution. Specifically, at USS, the sample included course sections from various disciplines including: history, psychology, music, chemistry, and

student transitions. At Eastland College, the sample included sections of developmental education courses on the topic of student success. Though non-probability sampling introduced the limitation of sampling bias, several factors supported this approach (Gliner et al., 2017). The sampling approach supported a stronger response rate by collecting data within specific course sections during class meeting time, which minimized limitations of non-response bias (Fowler, 2009). As Fowler (2009) discussed, nonresponse bias becomes problematic when those not responding are “systematically different from the whole population” concerning content of the instrument (p. 51). It was logical to believe students with lower mastery motivation would be less likely to engage in an e-mailed survey, which would have introduced significant risk of nonresponse bias. Additionally, as Gliner et al. (2017) discussed, a majority of social science and educational research deploys nonprobability sampling, which is “useful in examining relationships between variables or the differences between groups” (p. 143).

The sample size was influenced by course enrollment in the identified courses. The final sample consisted of 288 students from USS and 37 students from EC. The gender composition of the sample was representative of the larger population at the data collection sites.

Developmental education students were overrepresented within the sample. However, given the focus on developmental education students within this study, the overrepresentation was not a cause of concern. A detailed description of the final sample will be presented in Chapter 4.

As displayed in the institutional descriptions, the two sites varied in multiple ways such as part-time or full-time enrollment, racial/ethnic breakdowns, and overall institutional type. One important shared characteristic was the offering of developmental education courses though differences in developmental education did exist. Specifically, Eastland College utilized a two-level developmental education structure whereas USS predominantly used a corequisite model

where students enroll in college-level and developmental education courses simultaneously. The institutions also differed on placement policies. Eastland College used the Texas Success Initiative Assessment (TSIA) for developmental education placement. USS used ACT sub-score for developmental education placement, and students had the option of completing the ACCUPLACER to be placed in college-level courses. Including participants from varying institutional environments strengthened the overall sample.

Instrumentation

Instrument selection is a critical component of methods within a quantitative study (Creswell, 2014). As discussed in the literature review, current instrumentation within student disposition research carried significant limitations (Ben Nun, 2008; Richardson et al., 2012; Thomas et al., 2007). Instruments that measure a single construct or multiple constructs within a single domain (i.e. self-regulatory learning strategies) had limitations for understanding how variables interacted and influenced one another (Richardson et al., 2012). Additionally, the single construct or single domain method limited the ability to perform multi-variate analysis even within a meta-analytic approach (Richardson et al., 2012). As discussed, single construct or single domain methods also had practical limitations as practitioners may neglect to account for a salient factor or must attempt to use multiple disjointed measures simultaneously.

The handful of multiple domain instruments developed were not without reliability or practical concerns. Specifically, Sedlacek's (2004) NCQ had significant reliability concerns (Thomas et al., 2007). The SRI (Le et al., 2005), CSI (Noel-Levitz, 2011) and MSLQ (Pintrich et al., 1993) have been proven to be reliable and valid instruments. However, each has significant practical limitations. The SRI and CSI are quite lengthy and require significant dedication of financial resources and faculty, staff, and student time, which can hinder response rates and

introduces respondent fatigue (Ben Hun, 2008; Fowler, 2009), and the MSLQ is course specific in focus and only addressed two dispositional domains identified by Richardson et al., (2012).

Dimensions of Adult Mastery Motivation Questionnaire

Mastery motivation, as measured by the Dimensions of Mastery Questionnaire (DMQ), has been used extensively with infants to school aged children as discussed within the literature review (Gilmore, Cuskelly, & Purdie, 2003; Huang & Lay, 2011; Józsa & Molnar, 2013; Józsa & Morgan, 2015; Józsa, Wang, Barrett, & Morgan, 2014; Morgan, 1997; Morgan & Bartholomew, 1998; Morgan, Wang, Liao, & Xu, 2013). Doherty-Bigara and Gilmore's (2015) study of 628 adults aged 18 to 90 years old looked to validate a measurement of adult mastery motivation, Dimensions of Adult Mastery Motivation Questionnaire (DAMMQ). Doherty-Bigara and Gilmore identified four components to include in the DAMMQ based on a review of mastery motivation literature: task persistence, preference for challenge, task-related pleasure, and task absorption. Self-efficacy and perceived control were also included as constructs with influence on mastery behaviors. Social persistence scales were not included due to concerns with the variation of social goals across ages (Doherty-Bigara & Gilmore, 2015).

The original version of the DAMMQ included 41 items, with task absorption being the smallest scale (5 items) and task persistence being the largest with 9 items. The DAMMQ also included 8 negatively worded items. Doherty-Bigara and Gilmore (2015) used principal axis factor analysis with oblique rotation (Promax) to evaluate the scales and individual items. In initial analysis, nine factors were identified based on Kaiser's (1960) criterion of eigenvalues of 1 or above. Additionally, all 8 negatively worded items loaded on a factor together. No practical commonality was found among the eight negatively worded items and therefore these items were

removed along with nine additional items that were removed due to low communalities and low correlations with other items (below .32; Doherty-Bigara & Gilmore, 2015).

The 24 remaining items loaded onto 5 factors: task persistence, preference for challenge, task-related pleasure, self-efficacy, and task absorption (Doherty-Bigara & Gilmore, 2015). The task persistence scale loaded on eight items and each of the remaining scales loaded on four items. The Kaiser-Meyer-Olkin value for the 24 items was .93 and multicollinearity was not a problem. The alpha scores ranged from .70 for self-efficacy to .84 for task persistence. Test-retest reliability was good, based on 39 participants completing the DAMMQ 2 to 3 months later, with correlations ranging from .48 for self-efficacy to .71 for preference for challenge. Concurrent validity was supported by adequate correlations to the mastery and work scales of the Work and Family Orientation Questionnaire (WFO) with the mastery factor assessing one's preference for completing challenging tasks and the work factor assessing positive attitudes towards work (Doherty-Bigara & Gilmore, 2015; Helmreich & Spence, 1978).

Gilmore, Islam, Younesian, Bus, and Józsa (2017) evaluated the DAMMQ with 469 university students across four countries: Australia, Hungary, Bangladesh, and Iran. Gilmore et al. found that the Cronbach alpha scores for the total scale and most subscales were acceptable to good. Specifically, the Cronbach alphas were above .7 for the task persistence and preference for challenge scales across all four countries. Additionally, Gilmore et al. performed item analysis for scales with alphas below .6 in certain countries. One item on task absorption proved problematic in Bangladesh alone and the item was ultimately retained. One item was removed from the task pleasure scale as it correlated below .3 with the total mastery motivation score within each group except Australia, and the alphas for all countries increased with the removal of

the item (Gilmore et al., 2017). In early use, the DAMMQ has been found to be a useful measure of mastery motivation in adults across multiple cultures.

Theoretical alignment. Though the DAMMQ was not created with college students as a target population, the factors aligned with multiple student disposition domains represented within the literature, see Table 3.1 (Richardson et al., 2012; Robbins et al., 2004). Specifically, task persistence defined as “sustained effort to gain mastery of a challenging task” (Doherty-Bigara & Gilmore, 2015, p. 143) aligned with effort regulation, a self-regulated learning strategy defined as “persistence and effort when faced with challenging academic situations” (Richardson et al., 2012, p. 357). Task absorption, approaching a challenging task with focus, aligned with the self-regulated learning strategy of concentration, “the capacity to remain attentive and task focused” (Richardson et al., 2012, p. 358). Doherty-Bigara and Gilmore’s (2015) task-related pleasure, “positive emotions displayed while working towards and particularly when achieving mastery,” and preference for challenge, likelihood to “embrace rather than avoid challenge” (p. 143) both aligned with the personality trait of need for cognition (Richardson et al., 2012). Finally, the DAMMQ included a self-efficacy scale, which is one of the most prevalent motivation factors within the higher education literature (Doherty-Bigara & Gilmore, 2015; Richardson et al., 2012). Therefore, the DAMMQ theoretically aligned with three of the five domains identified by Richardson et al. (2012): personality traits, motivation factors, and self-regulatory learning strategies. Additionally, the DAMMQ aligned with two constructs, self-efficacy and effort regulation, that emerged as the strongest correlates to college GPA within Richardson et al.’s (2012) meta-analysis.

College specific adaptation. Doherty-Bigara & Gilmore (2015) did not include social persistence scales due to concerns with incongruence of social goals across various adult age

groups. However, when employed with a specific population, such as college students, relevant social aspects similar to the Dimensions of Mastery Questionnaire (DMQ) with school-aged children (Józsa & Morgan, 2015) could be identified. With the social persistence scales of the DMQ providing guidance, two college specific social persistence scales were developed: social persistence with peers and social persistence with faculty, see Table 3.2.

Table 3.1

Theoretical alignment of Adult Mastery Motivation and Student Disposition Variables

Adult Mastery Motivation Scale	Definition (Doherty-Bigara & Gilmore, 2015)	Higher Education Disposition Variable	Definition (Richardson et al., 2012)	Domain Identified by Richardson et al. (2012)
Task Persistence	Sustained effort to gain mastery of a challenging task.	Effort Regulation	Persistence and effort when faced with challenging academic situations.	Self-Regulated Learning
Task Absorption	Approaching challenging task with focus.	Concentration	Capacity to remain attentive and task focused.	Self-Regulated Learning
Task-Related Pleasure	Positive emotions displayed while working towards and achieving mastery.	Need for Cognition	General tendency to enjoy activities that involve effortful cognition.	Personality Trait
Preference for Challenge	Likelihood to embrace rather than avoid challenge.	Need for Cognition	General tendency to enjoy activities that involve effortful cognition.	Personality Trait
Self-Efficacy	Confidence in one's own ability.	Self-Efficacy	Perceptions of performance capability.	Motivation Factors

The two scales were combined with the original five of the DAMMQ to create an adapted college specific version, Dimensions of Adult Mastery Motivation Questionnaire College (DAMMQ-C). In a pilot study of 27 college students conducted in spring 2017, the social

persistence with peers scale displayed adequate internal consistency, $\alpha = .67$, and the social persistence with faculty scale displayed good internal consistency, $\alpha = .81$. Additionally, participants in the pilot study communicated no issues with item wording. The inclusion of the social persistence scales aligned the DAMMQ-C with four of the five domains identified by Richardson et al. (2012). The DAMMQ-C was a 35-item instrument with a total of seven scales (see Appendix A). All items were 5-point Likert scales where respondents evaluate how typical the statement was of themselves. A “1” represented items that are “not at all typical” and a “5” represented “very typical.” The original scales displayed acceptable to good internal consistency within the pilot as well: preference for challenge, $\alpha = .89$, task persistence, $\alpha = .88$, self-efficacy, $\alpha = .73$, task absorption, $\alpha = .61$, and task related pleasure, $\alpha = .60$.

Table 3.2

Internal Consistency of Social Persistence Scales from Pilot of DAMMQ-C

Social Persistence with Peers ($\alpha = .67$)	α if deleted	Social Persistence with Faculty ($\alpha = .81$)	α if deleted
I try hard to make friends with other students.	.69	I try to figure out my instructor’s expectations.	.84
I try to keep relationships with other students going.	.63	I try hard to understand the academic interests of my instructors.	.76
I try to include myself in what other students are doing.	.59	I try hard to form relationships with my instructors.	.73
I try to keep other students interested in what I am doing.	.65	I try hard to have my instructors understand who I am as person.	.75
I try to understand other students.	.60	I try hard to engage in conversations with my instructors.	.75
I try to engage in conversations with other students.	.60		

Note. n = 27; Cronbach alpha if item removed from scale.

Effort regulation scale of MSLQ

The effort regulation scale of the MSLQ was also administered to participants (see Appendix B). The effort regulation scale is a 4-item scale that examines “students’ ability to control their effort and attention in the face of distractions and uninteresting tasks” (Pintrich, Smith, Garcia, & McKeachie, 1991, p. 27). The MSLQ utilized a seven-point Likert scale where

participants rated themselves from “not at all true of me” to “very true of me” (Pintrich et al., 1991). Within Credé and Phillips’ (2011) meta-analysis of studies utilizing the MSLQ, the effort regulation scale was found to be the strongest correlate to course grade and overall college GPA among all the MSLQ scales. Internal consistency has been supported for the effort regulation scale as Pintrich et al. (1991) reported $\alpha = .69$. The effort regulation scale was used to evaluate convergent validity of the task persistence scale of the DAMMQ-C, which examined one aspect of the theoretical alignment of the DAMMQ-C and student success literature discussed above.

Data Collection Procedures

At each data collection site, students were recruited within the identified course sections and were invited to complete a hard copy of the questionnaire during a class meeting in spring 2018. To minimize the interruption of instruction, the questionnaire was administered at the beginning or end of the class period. At USS, the researcher discussed the informed consent cover letter prior to administration and administered the survey in most of the participating course sections (see Appendix C & D). For course sections the researcher could not be present for at USS and Eastland College, the faculty members in participating sections were provided a script prepared by the researcher that introduced the study and discussed the informed consent cover letter.

During completion of the questionnaire, students provided their university ID number and no other identifier. After completion, the researcher input survey responses including student ID number into a Microsoft Excel spreadsheet. The researcher then assigned each participant a random participant number. Student ID number and the random participant number was then recorded in a separate data file. The researcher sent the data file containing only student ID number and random participant number to the designated university official at each data

collection site. After sending the data file, the researcher deleted student ID from the original data file leaving only random participant number and survey responses. The researcher also deleted the data file containing only student ID and random participant number. Therefore, the researcher no longer possessed any data file containing the identifier of student ID.

The designated official at USS populated the following fields based on student ID number: HSGPA, ACT Composite, developmental education enrollment status, cumulative college GPA, total attempted hours at the institution, total passed hours at the institution, sex/gender, and race/ethnicity. The designated official at EC populated only sex/gender and race/ethnicity. The designated officials then removed the student identifier, student ID number, from the data file and returned the data file to the researcher with no student identifier included. The researcher then combined the institutional data file (stripped of any identifier) and the survey response file based on the random participant number.

The data file was encrypted and stored in a password protected cloud storage. Additionally, the data file was stored within a password protected folder. Copies of the completed questionnaires were stored in a locked file cabinet at the School of Education at Colorado State University where they will remain for three years. Copies of the questionnaires were also stored in a locked file cabinet within the researcher's office at the University of Central Arkansas where they will be stored for a period of three years.

Data Preparation

The data were entered into SPSS. Table 3.3 includes the variable list, level of measurement, and coding. After input, exploratory data analysis was performed to “examine and get to know” the data (Leech, Barrett, & Morgan, 2015, p. 27). Exploratory data analysis

included descriptive statistics, box plots, box plots split by dichotomous variables, and stem-and-leaf plots.

Table 3.3

Variable Definition and Coding

Variable	Level of Measurement & Variable Type	Coding
DAMMQ-C Scale Scores	Scale DV & Attribute IV	0 to 5
Total Mastery Motivation Scale Score	Scale DV & Attribute IV	0 to 5
Effort Regulation Scale Score (MSLQ)	Scale Attribute IV	0 to 7
High School Grade Point Average (HSGPA)	Scale Attribute IV	0 to 4.5
ACT Composite	Scale Attribute IV	0 to 36
Developmental Education Status	Dichotomous Attribute IV	0 = Not enrolled in developmental education 1 = Enrolled in at least 1 developmental course at any time
Cumulative College GPA	Scale DV	0 to 4
Attempted Hours Passed	Dichotomous DV	0 = Did not pass all attempted hours 1 = Passed all attempted hours
Gender/Sex	Dichotomous Attribute IV	0 = Female 1 = Male
Race/Ethnicity	Nominal Attribute IV	0 = White 1 = Black/African American 2 = Hispanic 3 = Other
Institution	Dichotomous Attribute IV	0 = USS 1 = Eastland College
Attempted Hours	Dichotomous Attribute IV	0 = 0 to 16 Hours 1 = 17 to 60 Hours

Exploratory data analysis was a critical first step in preparing the data for inferential statistics as it examined potential problems with the data such as outliers, missing data, errors in coding, and skewed distributions (Leech et al., 2015).

Data Analysis

Multiple inferential statistics were used to analyze the data. Selection of appropriate statistics was based on nature of the research question, distribution of the data, and number and type of variables, see Table 3.4 (Leech et al., 2015; Morgan, Leech, Gloeckner, & Barrett, 2013).

Table 3.4

Analysis Approach

Research Question	Statistic(s) Used
1. Does the DAMMQ-C accurately measure mastery motivation within college students in the United States?	Exploratory Factor Analysis, Cronbach Alpha
1a. What is the relationship between the task persistence scale of DAMMQ-C and the effort regulation subscale of the Motivated Strategies for Learning Questionnaire (MSLQ)?	Pearson Correlation
2 & 2a. How well do mastery motivation, HSGPA, and ACT score explain the variance of college GPA? (Does predictive ability vary based on developmental education status?)	Hierarchical Multiple Regression
3. How well do mastery motivation, HSGPA, and ACT score explain the variance of percentage of attempted hours passed?	Logistic Regression
4. Is there a statistically significant difference in mastery motivation by gender?	T-Test
5. Is there a statistically significant difference in mastery motivation by race/ethnicity?	One-way ANOVA
6. Is there a statistically significant difference in mastery motivation by developmental education status?	T-Test
7. Is there a statistically significant difference in mastery motivation by number of attempted hours?	T-Test

Discussion of Analysis Approach

Exploratory factor analysis (EFA) was conducted to validate the factor structure of all scales within the DAMMQ-C including the two social scales that were developed (question 1). EFA examined how items load into groups or “hang together” meaning participants provided similar responses to the grouped items (Leech et al., 2015). Given that adult mastery motivation had never been measured in U. S. college students and the DAMMQ-C was introducing newly created scales, EFA was appropriate to evaluate the underlying structure of the 35 items. Specifically, principal axis factor analysis with a varimax rotation was conducted. Cronbach alphas for each DAMMQ-C sub scale and the overall DAMMQ-C was also calculated to evaluate internal consistency of the scales (question 1). To evaluate convergent validity, a Pearson correlation statistic was calculated between the task persistence scale of DAMMQ-C and effort regulation subscale of MSLQ (Gliner et al., 2017).

Hierarchical multiple regression was conducted for question two with HSGPA, ACT, and each scale of the DAMMQ-C serving as independent variables and college GPA serving as the dependent variable within question two and percentage of attempted hours passed as the dependent variable within question three. Hierarchical multiple regression “enables the researcher to see if each new group of variables adds anything to the prediction produced by the previous blocks of variables” (Leech et al., 2015, p. 125). HSGPA was entered in the first block as it has been found to carry the most predictive weight (Richardson et al., 2012). ACT composite score was entered in the second block as it is traditionally paired with HSGPA as common cognitive factors (Richardson et al., 2012). The third block consisted of each scale of the DAMMQ-C: task persistence, task absorption, preference for challenge, task-related pleasure, self-efficacy, social persistence with faculty, and social persistence with peers.

DAMMQ-C scale scores were chosen instead of total mastery motivation score from the DAMMQ-C in an effort to identify not only if mastery motivation is predictive over and above cognitive variables, but also which scales of the DAMMQ-C carried predictive value. Total mastery motivation, based on the responses to all DAMMQ-C items, was placed in the third block within additional iterations of the hierarchical regression procedure to evaluate the usefulness of total score and to reduce the number of variables in response to limited sample sizes for some disaggregated populations.

Multiple iterations of the procedures above were conducted with both the aggregate sample and disaggregated groups within the sample, specifically developmental education students and non-developmental education students. Given the overrepresentation of many underrepresented populations within developmental education, and previous findings of differential prediction for special admission students and students of color, it was important to run multiple analyses (Kim, 2015; Kirby et al., 2007). Additionally, scholars have recently argued for the need to run predictive analysis at both the aggregate and with disaggregated populations (Museus, 2014; Museus et al., 2017; Museus & Smith, 2016).

Logistic regression was conducted for question three. The attempted hours passed variable was heavily negatively skewed and was transformed into a dichotomous variable. HSGPA, ACT composite, and the DAMMQ-C scales served as independent variables within the logistic regression analysis.

T-Tests were conducted for questions four, six, and seven. Each question included multiple T-Tests with dependent variables of total mastery motivation score and DAMMQ-C scale scores. Mastery motivation as a multi-faceted construct representing multiple domains of the student disposition literature informed this approach as it allowed for the examination of

difference across each sub scale as well as the overall mastery motivation score. Independent variables were gender for question four, developmental education status for question six, and number of attempted hours for question seven.

Finally, one-way ANOVA was conducted for questions five. Consistent with the approach taken with the T-Tests, multiple analyses were run with total mastery motivation and DAMMQ-C scale scores as the dependent variables. Four-level race/ethnicity (White, Black/African American, Hispanic, and other) served as the independent variable for question five.

CHAPTER 4: RESULTS

The Dimensions of Adult Mastery Motivation Questionnaire – College (DAMMQ-C) was completed by 325 participants across the two data collection sites. Most participants were from University of Southern State (USS), $n = 288$, which represents 88.6% of the total sample. Response rates at Eastland College were lower than anticipated due to two participating course sections being cancelled due to low enrollment numbers. The majority of the sample was female students, $n = 189$, which represented 58.2% of the sample. Gender and race/ethnicity was unknown for three participants due to errors on their reported student ID. White students represented the largest race/ethnicity group at 46.2% of the sample followed by 28.9% Black students, 12% Latino/a, 5.8% Nonresident Alien, 4% two or more races, 1.2% Asian, .6% American Indian/Alaskan Native, and .3% unknown.

Descriptive Analysis

Developmental Education Status.

The distribution between developmental education students and non-developmental education students was nearly evenly split. Developmental education students represented 44% of the sample, $n = 144$. Developmental education status was unknown for one participant. Developmental education students are overrepresented within the sample compared to overall population due to all the participants from EC, $n = 37$, being developmental education students. However, given the focus on developmental education students within the study, the overrepresentation was not a cause for concern. As a whole, the sample was diverse in terms of institutional type, gender, race/ethnicity and developmental education status, which supported an overall evaluation of the DAMMQ-C, see Table 4.1.

Table 4.1

Demographics of Sample

Characteristic	<i>n</i>	%
Institution		
University of Southern State	288	88.6
Eastland College	37	11.4
Gender		
Male	133	41.3
Female	189	58.2
Missing	3	.9
Race/Ethnicity		
White	150	46.2
Black	94	28.9
Latino/a	39	12.0
International	19	5.8
Two or More Races	13	4.0
Asian	4	1.2
American Indian/Alaskan Native	2	0.6
Unknown	1	0.3
Missing	3	0.9
Developmental Education Status		
Developmental Education Student	144	44.3
Non-Developmental Education Student	180	55.4

Demographic Variables by Developmental Education Status.

The gender breakdown within the developmental education and non-developmental education populations was similar, with 61.7%, $n = 111$, of the non-developmental education population being female compared to 54.9%, $n = 58$, of the developmental education participants, see Table 4.2. However, noticeable differences were present concerning race/ethnicity. White students made up 66.7%, $n = 120$, of the non-developmental education group with Black students accounting for 20.0%, $n = 36$, of the population and no other racial/ethnic group accounting for more than 5%. Within the developmental education population, Black students accounted for 40.8%, $n = 58$, of the population, Latino/a students accounted for an additional 22.5%, $n = 32$, and White students accounted for 21.1%, $n = 30$.

This distribution is influenced by EC serving a predominantly Latino/a student population and all participants from EC being developmental education students. However, when looking only at USS participants, Black students made up 48.6%, $n = 52$, of the developmental education population and only 27.1%, $n = 29$, of the developmental education participants were White students, see Table 2. This overrepresentation of students of color is consistent with the national data on developmental education (Chen & Simone, 2016).

Table 4.2

Gender and Race/Ethnicity by Developmental Education Status

Characteristic	Non-Developmental Education		Developmental Education	
	<i>N</i>	%	<i>n</i>	%
Gender				
Male	69	38.3	64	45.1
Female	111	61.7	78	54.9
Race/Ethnicity				
White	120	66.7	30	21.1
Black	36	20.0	58	40.8
Latino/a	7	3.9	32	22.5
Nonresident Alien	4	2.2	15	10.6
Two or More Races	9	5.0	4	2.8
Asian	3	1.7	1	0.7
American Indian/Alaskan Native	1	0.6	1	0.7
Unknown	0	0	1	0.7

Academic Variables

Due to vast differences in pre-enrollment requirements between the two data collection sites and inability to obtain certain records at Eastland College, only participants from University of Southern State were included in the analyses concerning academic outcomes. Therefore, the descriptive information below only pertains to participants from USS.

Attempted hours. Attempted hours included all attempted hours at USS prior to spring 2018. Spring 2018 hours were not included because outcomes for those hours would not be

available within the timeline of the study. As anticipated with data collection in lower division courses, 67%, $n = 191$, of the sample had attempted between 1 and 16 credit hours, which suggested most of the sample were first-year students currently participating in their second semester. Thirteen participants had zero attempted hours, which suggested that Spring 2018 was their first term of enrollment. An additional 23.8%, $n = 68$, had attempted between 17 and 60 hours. Therefore, 95%, $n = 272$, of the overall sample had attempted 60 credit hours or less, which indicated the sample was saturated with students early in their college careers, which is when the majority of attrition occurs (Tinto, 2012).

Table 4.3

Mean, Standard Deviation, and Skewness for Academic Variables

Variable	<i>M</i>	<i>SD</i>	Skewness
High School Grade Point Average	3.46	.50	-.363
ACT Composite	23.76	4.78	.162
Cumulative College GPA	3.07	.722	-.868
% of Attempted Hours Passed	93.75	13.06	-2.966

High school grade point average (HSGPA). HSGPA was reported for 263 participants and ranged from 1.88 to 4.64. Mean HSGPA was 3.46 and the standard deviation was .50, see Table 4.3. HSGPA was approximately normally distributed with a skewness statistic of -.363. Within the sample, 14.4%, $n = 38$, had a HSGPA of 4.0 or higher, 39.2%, $n = 102$, had a HSGPA between 3.5 and 3.99, 26.2%, $n = 70$, had a HSGPA of 3.0 to 3.49, and 20.2%, $n = 53$, had a HSGPA of 2.99 or below.

Developmental education students had a lower mean HSGPA at 3.07 and ranged from 1.88 to 3.91. There were noticeable differences in HSGPA based on developmental education status. For example, 43.4% of developmental education students had a HSGPA below 3.0 compared to only 6.1% of non-developmental education students, and no developmental

education students had above a 4.0 HSGPA compared to 23.2% of non-developmental education students, see Table 4.4.

Table 4.4

Academic Variables by Developmental Education Status

Characteristic	Non-Developmental Education		Developmental Education	
	<i>N</i>	%	<i>n</i>	%
High School Grade Point Average				
4.0 and Above	38	23.2	0	0
3.50 to 3.99	87	53.0	15	15.2
3.00 to 3.49	29	17.7	41	41.4
2.99 and Below	10	6.1	43	43.4
ACT Composite				
19 or Below	4	2.5	52	74.3
20 to 24	62	39.0	17	24.3
25 to 29	58	36.5	1	1.4
30 and Above	35	22.0	0	0
Cumulative College GPA				
3.50 to 4.0	76	43.4	14	14.3
3.00 to 3.49	50	28.6	29	29.6
2.50 to 2.99	26	14.9	26	26.5
2.00 to 2.49	11	6.3	17	17.3
1.99 or Below	12	6.9	12	12.2

ACT composite. ACT composite score was reported for 229 participants and displayed a range of 23 points (12 to 35). Mean ACT composite was 23.76 and the standard deviation was 4.78. ACT composite was approximately normally distributed with a skewness statistic of .162. Within the sample, 24.5%, $n = 56$, had an ACT composite of 19 or below, 34.5% $n = 79$, had a composite score of 20 to 24, 25.8%, $n = 59$, scored 25 to 29, and 15.3%, $n = 35$, had an ACT composite of 30 or higher.

ACT composite scores ranged from 12 to 26 for developmental education students with a mean score of 18.5. In fact, 74.3% of developmental education students had an ACT composite

below a 19, which was expected due to ACT score's role in developmental education placement at USS.

Cumulative college GPA. Consistent with attempted hours, cumulative college GPA represented the GPA of participants prior to the spring 2018 semester as spring 2018 outcomes were outside the timeline of this study. College GPA ranged from 0 to 4.0 with a mean score of 3.07. The standard deviation was .722, and college GPA was approximately normally distributed with a skewness statistic of -.868. College GPA was not available for 15 participants due to 13 participants not enrolling prior to Spring 2018 and an error reporting student ID for 2 participants. Within the sample, 8.8%, $n = 24$, had a college GPA below a 2.0, 10.3%, $n = 28$, had a 2.0 to 2.49, 19.0%, $n = 52$, had a 2.50 to 2.99, 28.9%, $n = 79$, had a 3.00 to 3.49, and 33.0%, $n = 90$, had a college GPA of 3.5 or higher.

Differences between developmental education and non-developmental education students were observed but were less pronounced than other outcomes. Noticeably fewer developmental education students had a college GPA of 3.5 to 4.0, 14.3% of developmental education students compared to 43.4% of non-developmental education students. However, 29.6% of developmental education students had a 3.0 to 3.49 which was similar to 28.6% of non-developmental education students. A larger percentage, 26.5% of developmental education students had between a 2.5 and 2.99 college GPA, compared to 14.9% of non-developmental education students. However, a noticeably larger percentage of developmental education students had a 2.0 to 2.49, 17.3% compared to 6.3% for non-developmental education students, or a 1.99 college GPA or below, 12.2% for developmental education students compared to 6.9% for non-developmental education students, see Table 4.

Percentage of attempted hours passed. Percentage of attempted hours passed for any semesters prior to spring 2018 was reported for 273 participants, which reflected the 13 participants who had not enrolled prior to spring 2018 and 2 participants with ID reporting errors. Percentage of hours passed ranged from 0% to 100% with a mean of 93.75% and standard deviation of 13.05. Percentage of hours passed was heavily negatively skewed with a skewness statistic of -2.966. In fact, 72.2% of the sample had passed all of their attempted hours. Only 5.5% had passed less than 67% of attempted hours, which is the threshold for satisfactory progress for financial aid, and an additional 22.3% had passed between 67.1% and 98.70% of attempted hours.

Developmental education students were drastically more likely to pass less than 67% of attempted hours, 11.2% for developmental education students compared to only 2.3% for non-developmental education students. However, 68.4% of the developmental education student population passed all attempted hours, which presented a less severe gap compared to the rate for non-developmental education students, 74.3%.

Item Level Exploratory Data Analysis

Item level exploratory data analysis was performed prior to exploratory factor analysis (EFA). Descriptive statistics were completed for all Dimensions of Adult Mastery Motivation-College (DAMMQ-C) individual items as well as the Effort Regulation (ER) scale on the Motivated Strategies for Learning Questionnaire (MSLQ). All DAMMQ-C items displayed a range of 1 to 5 on the 5-point Likert scale except for items 7, 8, 25, 27, and 35, which had a range of 2 to 5. Four items were negatively skewed including: item 4 *faculty expectations* (-1.073), item 8 *sense of accomplishment* (-2.596), item 25 *feel proud* (-2.744), and item 34 *excited with progress* (-1.153). Several univariate outliers were also identified within the DAMMQ-C

items. The range for all four items on the ER scale was 1 to 7, and all four items were approximately normally distributed with skewness statistics between -1 and 1.

Data transformation was conducted for the skewed items. Item 4 and item 34 responded to transformation, x^2 , with skewness statistics of -.540 and -.757, respectively. Despite data transformation, x^3 , item 8 and item 25 remained negatively skewed, -.2017 and -2.116. EFA does not “make strong distributional assumptions” and use of the transformed data did not produce significant changes in overall analysis (Leech et al., 2015, p. 68). Therefore, the raw data were retained for EFA calculations, which is consistent with the approach of Doherty-Bigara and Gilmore (2015).

Exploratory Factor Analysis

The 35 items of the DAMMQ-C were subjected to principal axis factoring with orthogonal rotation (Varimax) to explore the underlying structure of the items. Orthogonal rotation was deemed appropriate as it creates factors that are uncorrelated with each other and the relationship between the potential new social persistence scales and previous scales of the DAMMQ was unknown. Additionally, Varimax rotation “can make results easier to interpret and to replicate with future samples” (Leech et al., 2015, p. 71). EFA was conducted requesting extraction of both a six and seven factor structure to explore the possibility of the newly introduced social persistence scales loading as a single factor. An additional EFA was conducted requesting the extraction of eight factors as the hypothesized social persistence with faculty scale loaded on two separate factors and the proposed self-efficacy scale was not observed within the seven-factor structure. However, these findings continued within the eight-factor structure and eigenvalues did not support an eight-factor structure. The seven-factor structure was deemed most appropriate based on the clarity within the loaded factors and eigenvalues above one.

The Kaiser-Meyer-Olkin measure met the desired value of greater than .70 indicating sampling adequacy, KMO = .892 (Leech et al., 2015). Bartlett's test of sphericity was significant, $\chi^2(595) = 4609.52$, $p < .001$, which indicated the correlations between items were high enough for principal axis factoring. The seven factors all displayed eigenvalues of one or above, and the factors accounted for 49.2% of the total variance. However, a determinant value of 1.285E-7 indicated that correlations were too high across multiple items.

A review of the initial factor loadings resulted in the removal of seven items. Item 15, *I can become completely immersed in tasks that are developing my skills*, had its highest loading with the preference for challenge items, .558, while displaying a weaker value, .364, with the expected task absorption items. Within Doherty-Bigara and Gilmore's (2015) study of the DAMMQ factor structure, this item cross loaded on the task absorption scale, .42, and the preference for challenge scale, .32. Given the inconsistencies across the two samples and continued cross loading, the item was removed. Item 3, *I prefer to challenge myself with difficult tasks even if I am unsure I am able to complete them*, displayed a similar issue with its strongest loading, .46, with the preference for challenge items and a weaker loading, .32, with the expected task persistence items. Again, the cross-loading pattern was observed in Doherty-Bigara and Gilmore's study though in the opposite direction, .52 on the task persistence scale and .34 on the preference for challenge scale.

Item 21, *I begin to enjoy difficult tasks as I begin to develop new skills*, did not load with the intended task-related pleasure items and instead loaded with the preference for challenge items, .571. Within Doherty-Bigara and Gilmore's (2015) original study, this item had a relatively low loading on the task-related pleasure factor, .37, and loaded at .33 on the preference for challenge factor. Though the item had a strong loading on the preference for challenge factor

within this study, .571, it was ultimately removed. Unlike the other items within the preference for challenge factor, item 21 is a conditional statement indicating difficult tasks are preferred only when new skills are developed. Additionally, removal of the item had minimal impact on the Cronbach alpha for the resulting preference for challenge factor.

The intended self-efficacy scale items also proved problematic. Within the six-factor analysis, the self-efficacy items all loaded on a factor with the task persistence items. This was thought to be due to the compression from a hypothesized seven factors to six. However, within the seven-factor structure, the four self-efficacy items were split with two items loading with the task persistence items and two items loading with the newly emerging academic relationship with faculty items. This led to the decision to request eight factors. However, the four self-efficacy items returned to loading with the task persistence items within the eight-factor structure. An examination of the correlation matrix confirmed inconsistent relationships among the self-efficacy items, see Table 4.5. Item 5 had low correlation values with both item 27, .162, and item 31, .254. Item 12 also had a low correlation value with item 27, .225. Therefore, the four self-efficacy items were removed from future analysis.

Following the removal of the seven items described above, the determinant still was too close to zero, with a value of 5.05E-6. Item 29, *I try to engage in conversations with other students*, was removed to address multicollinearity. Item 29 was identified due to high correlations with the other items within the social persistence with peers factor including correlation above .6 with two other items. Additionally, a regression analysis conducted with item 29 as the dependent variable and the other items in the social persistence with peers factor as the independent variables accounted for 53% of the variance in item 29. Removal of item 29

increased the determinant value to .0000181, above the recommended value of .00001 (Field, 2013).

Table 4.5

Correlation Matrix Values of Self-Efficacy Items

	Item5 <i>solve problems</i>	Item12 <i>complete difficult tasks</i>	Item27 <i>good at things</i>	Item31 <i>skills and abilities</i>
Item5 <i>solve problems</i>	1			
Item12 <i>complete difficult tasks</i>	.412	1		
Item27 <i>good at things</i>	.162	.225	1	
Item31 <i>skills and abilities</i>	.254	.414	.446	1

For the final EFA, 27 of the original 35 items were subjected to principal axis factoring with orthogonal rotation (Varimax). The Kaiser-Meyer-Olkin measure met the desired value of greater than .70 indicating sampling adequacy, KMO = .878 (Leech et al., 2015). Bartlett’s test of sphericity was significant, $\chi^2(351) = 3383.29$, $p < .001$, which indicated the correlations between items were high enough for principal axis factoring. The seven factors all displayed eigenvalues of one or above, and the factors accounted for 52.19% of the total variance.

The final factor structure included seven factors: (a) preference for challenge, (b) task persistence, (c) task pleasure, (d) task absorption, (e) social persistence with peers, (f) social persistence with faculty, and (g) academic relationship with faculty, see Table 4.6. The structure represented the expected structure except that the self-efficacy items were not included, so there was no self-efficacy factor and the emergence of the academic relationship with faculty factor.

Table 4.6

DAMMQ-C Final Factors, Items, Rotated Factor Loadings, and Factor Reliabilities

Item	Rotated Factor Loadings						
	SPP	TPe	PFC	SPF	TPI	TA	ARF
16. I try to include myself in what other students are doing.	0.76						
22. I try to keep other students interested in what I am doing.	0.7						
11. I try to keep relationships with other students going.	0.7						
2. I try hard to make friends with other students.	0.69						
33. I try to understand other students	0.61						
6. If I am unsuccessful with a difficult task, I know that I can gain the skills needed to try it again.		0.58					
20. I attempt difficult tasks even if I have some uncertainty about whether I will be able to complete them.		0.56					
7. I practice new skills over and over until I am satisfied.		0.55					
30. I persist with a task even if I feel it is difficult.		0.55					
35. I like to build on my existing skills even if it will be difficult for me.		0.48					
1. I work at a new challenge until I feel I can do it well.		0.47					
18. I explore all ways to solve a problem.		0.44					
28. I enjoy being challenged by difficult tasks.		0.39	0.77				
14. I find challenging tasks to be more interesting than easy ones.			0.68				
10. I like a challenge when learning new skills			0.66				
17. I choose to do tasks that I think will be challenging to me.		0.42	0.61				
32. I try hard to engage in conversations with my instructors.	0.35			0.77			
19. I try hard to form relationships with my instructors.	0.32			0.73			
26. I try hard to have my instructors understand who I am as a person.	0.35			0.61			
25. I feel proud of myself when I am successful.					0.77		
8. I feel a sense of achievement when I complete a difficult task.					0.63		
34. I feel excited when I realize I am making progress with a difficult task.					0.45		
23. I often lose track of time when I am working on a challenging task.						0.7	
24. I generally persist with a difficult task for a long time.						0.6	
9. I can become completely absorbed in a challenging task.			0.36			0.52	
4. I try to figure out my instructor's expectations.							0.68
13. I try hard to understand the academic interests of my instructors.							0.54
Eigenvalues	7.42	3.09	1.93	1.42	1.26	1.2	1.01
Cronbach Alpha	0.85	0.8	0.85	0.84	0.63	0.68	0.72

SPP= Social Persistence w/Peers, TPe= Task Persistence, PFC= Preference for Challenge, SPF= Social Persistence w/Faculty, TPI= Task-Related Pleasure, TA= Task Absorption, ARF= Academic Relationship w/Faculty

The academic relationship with faculty factor emerged from items intended for the social persistence with faculty factor. However, the results identified a separation among the purely social and academic aspects of the faculty and student relationship.

The task persistence factor loaded on seven items, the social persistence with peers factor loaded on five items, and the preference for challenge factor loaded on four items. The social persistence with faculty, task pleasure, and task absorption factors loaded on three items each. Finally, the academic relationship with faculty factor loaded on two items. All items had primary loadings above .4. Five items had cross-loadings above .3 across two factors, however, the loading was noticeably lower on one factor. One item had a secondary loading above .4. Again, a clear distinction in the values was observed, and the item was retained on the factor with its strongest loading.

Internal Consistency

Cronbach's alpha was conducted for all factors. The preference for challenge, social persistence with peers, social persistence with faculty, and task persistence factors indicated good internal consistency with alphas at or above .8 (Leech et al., 2015). The academic relationship with faculty factor produced an alpha of .72. Finally, the task-related pleasure and task absorption factors produced alphas of .63 and .68, respectively, which are acceptable though stronger internal consistency would be preferred (Gliner et al, 2017).

Exploratory Data Analysis

Descriptive statistics were computed for all DAMMQ-C scales, see Table 4.7. All scales displayed acceptable skewness statistics of -1 to 1, with the exception of the task related pleasure scale (-1.50), see Table 7. The task related pleasure scale was submitted to data transformation, x^3 , which resulted in a skewness statistics that remained above the preferred range, -1.05.

Though slightly above the preferred range, the x^3 transformation was retained as all variables displayed a small to moderate negative skewness and additional transformation could result in difficulty interpreting results (Tabachnick & Fidell, 2007).

Table 4.7

Mean, Standard Deviation, and Skewness Statistics for DAMMQ-C Scales

Variable	<i>M</i>	<i>SD</i>	Skewness
Task Persistence	3.76	.58	-.20
Preference for Challenge	3.50	.77	-.12
Task Related Pleasure	4.64	.49	-1.50
Task Absorption	3.65	.76	-.24
Social Persistence with Peers	3.14	.79	-.24
Social Persistence with Faculty	3.26	.97	-.27
Academic Relationship with Faculty	4.03	.84	-.86

Convergent Validity

A Pearson Correlation statistic was conducted to evaluate the relationship between the task persistence scale of the DAMMQ-C and the effort regulation scale of the MSLQ. A statistically significant positive correlation was observed between the scales, $r(319) = .39, p < .001$. This represented a medium effect size and supported the theorized relationship between the two scales.

Question 2, Explaining Variance in College GPA

To investigate how well HSGPA, ACT Composite, and DAMMQ-C scales explained the variance in cumulative college GPA, a hierarchical linear regression was computed. HSGPA was entered as block one, ACT composite as block two, and DAMMQ-C scales as block three. Due to limitations in data and difference in pre-college testing, only participants from USS were included in all multiple regression analyses. When HSGPA was entered alone, it significantly explained variance in college GPA, $F(1, 216) = 100.21, p < .001, \text{adjusted } R^2 = .31$, see Table

4.8. Therefore, 31% of the variance in college GPA could be explained by HSGPA. When ACT composite was added to the model, there was no significant improvement in the model, Sig. F change = .11 and R^2 change = .008. Therefore, ACT composite score did not improve the ability to explain variance in college GPA over and above HSGPA, which remained the only significant predictor within the model. When block three, DAMMQ-C scales, was added to the model, they significantly improved the explained variance, R^2 change = .04, $F(7, 208) = 2.10$, Sig. F change = .047. HSGPA and academic relationship with faculty were the only significant predictors in the model with HSGPA being the strong predictor, $\beta = .45$. Task related pleasure was approaching significance at $p = .071$. The overall model significantly explained 34% of the variance in college GPA, $F(9, 208) = 13.53$, $p < .001$, adjusted $R^2 = .34$. Adding the DAMMQ-C scales to the model explained an additional 3% of the variance in college GPA over and above HSGPA and ACT Composite.

However, results from the correlation matrix and collinearity statistics suggested a potential issue with multicollinearity. Specifically, multiple pairs of variables correlated at very high levels including HSGPA and ACT Composite, .72, social persistence peer and social persistence faculty, .55, and preference for challenge and task persistence, .61. Task persistence, social persistence with faculty, and social persistence with peers were also all significantly correlated with college GPA though they did not emerge as significant predictors within the model, which also suggested an issue with multicollinearity (Leech et al., 2015).

Therefore, the hierarchical multiple regression was conducted again with the following adjustments. The ACT composite block was removed due to correlation with HSGPA, and ACT composite not adding any predictive value over HSGPA, which is consistent with the literature (Richardson et al., 2012). Block two became the DAMMQ-C scales, but preference for

challenge was not included since task persistence was a significant correlate to college GPA and task persistence was often the more powerful predictor in previous mastery motivation research (Józsa & Molnar, 2013; Józsa & Morgan, 2014). Additionally, the social persistence with peers and social persistence with faculty scales were combined into a general social persistence scale due to their high correlation and conceptual similarity (Leech et al., 2015).

Table 4.8

Hierarchical Multiple Regression Analysis Summary Explaining Variance in College GPA from HSGPA, ACT Composite, and DAMMQ-C Scales (n = 218)

Variable	<i>B</i>	<i>SEB</i>	β	<i>R</i> ²	ΔR^2
Step 1				.31	.31
HSGPA	.81	.08	.56**		
Constant	.25	.29			
Step 2				.32	.01
HSGPA	.68	.12	.47**		
ACT Composite	.019	.01	.13		
Constant	.25	.29			
Step 3				.34	.04
HSGPA	.64	.12	.45**		
ACT Composite	.02	.01	.11		
Preference for Challenge	-.04	.06	-.04		
Task Persistence	.02	.10	.01		
Task Absorption	-.01	.06	-.01		
Task Related Pleasure	.01	.35	-.12		
Social Persistence Peers	-.01	.06	-.01		
Social Persistence Faculty	.02	.05	.03		
Academic Relationship Faculty	.13	.06	.14*		
Constant	-.34	.41			

* $p < .05$, ** $p < .001$

The model including block one of HSGPA and block two of task persistence, task absorption, academic relationship to faculty, task pleasure, combined social persistence significantly explained the variance in college cumulative GPA, $F(6, 212) = 20.17, p < .001$, adjusted $R^2 = .35$, see Table 4.9. Therefore, the second approach to analyses produced a slightly larger increase, R^2 change = .05, while having fewer variables in the model.

Table 4.9

Hierarchical Multiple Regression Analysis Summary Explaining Variance in College GPA from HSGPA and Adjusted DAMMQ-C Scales (n = 219)

Variable	<i>B</i>	<i>SEB</i>	β	R^2	ΔR^2
Step 1				.31	.31
HSGPA	.81	.08	.56**		
Constant	.25	.29			
Step 2				.35	.05
HSGPA	.75	.08	.52**		
Task Persistence	-.01	.08	-.01		
Task Absorption	-.01	.06	-.02		
Task Related Pleasure	.003	.002	.11		
Social Persistence Combined	-.003	.05	-.004		
Academic Relationship Faculty	.14	.05	.16*		
Constant	-.37	.40			

* $p < .05$, ** $p < .001$

Question 2a, Explaining Variance in College GPA by Developmental Education Status

Developmental education participants. Hierarchical multiple regression was conducted to evaluate how well HSGPA, ACT Composite, and the DAMMQ-C scales explained the variance in college cumulative GPA for developmental education students within the study. Block one was HSGPA, block two was ACT Composite, and block three was the DAMMQ-C scales. Both model one and two did not significantly explain variance in college GPA, $p = .80$ and $p = .74$, respectively. However, the full model including all DAMMQ-C scales, HSGPA, and ACT composite did significantly explain variance in college GPA, $F(9, 58) = 2.31$, $p = .03$, adjusted $R^2 = .15$, see Table 4.10. Therefore, though HSGPA individually and HSGPA and ACT composite combined failed to explain variance in college GPA, the addition of the DAMMQ-C scales resulted in a R^2 change of .187 and a model that explained 15% of the variance in college GPA. However, no individual variable emerged as a significant predictor though social persistence with faculty was approaching significance, $p = .06$. One potential limitation within

this analysis was the sample size of 68, which does not provide 10 participants for every predictor variable.

Table 4.10

Hierarchical Multiple Regression Analysis Summary Explaining Variance in College GPA for Developmental Education Students from HSGPA, ACT Composite, and Total Mastery Motivation

Variable	<i>B</i>	<i>SEB</i>	β	R^2	ΔR^2
Step 1				.03	.05
HSGPA	.38	.21	.22		
Constant	1.60	.66			
Step 2				.05	.03
HSGPA	.30	.22	.17		
ACT Composite	.07	.05	.18		
Constant	.47	1.01			
Step 3				.14	.10
HSGPA	.29	.21	.16		
ACT Composite	.07	.05	.17		
Total Mastery Motivation Score	.46	.16	.32*		
Constant	-1.03	1.09			

* $p < .01$

In an effort to address the limitation in sample size, variables that were not significant correlates to college GPA were removed from the model: preference for challenge, task persistence, and task related pleasure. Simultaneous multiple regression was conducted with independent variables of HSGPA, ACT composite, social persistence with peers, social persistence with faculty, task absorption, and academic relationship with faculty. The model significantly explained variance of college GPA for developmental education students, $F(6, 61) = 2.87, p = .016$, adjusted $R^2 = .14$. Within this model, social persistence with faculty was the only statistically significant predictor, $p = .04, \beta = .29$.

A final hierarchical multiple regression was conducted with the developmental education population within the study which included block one as HSGPA, block two of ACT Composite, and block three of total mastery motivation score. As with the prior analysis, models one and

two did not significantly explain variance in college GPA. However, model three had a Sig. F change of .006 and significantly explained variance in college GPA, $F(3, 64) = 4.70, p = .005$, adjusted $R^2 = .14$. Total mastery motivation was the only significant predictor within the model, $p = .006, \beta = .32$.

Non-developmental education participants. Hierarchical multiple regression was conducted to evaluate how well HSGPA, ACT Composite, and the DAMMQ-C scales explained the variance in college cumulative GPA for non-developmental education students within the study. Block one was HSGPA, block two was ACT Composite, and block three was the DAMMQ-C scales. Block one, HSGPA, significantly explained variance in college GPA, $F(1, 148) = 95.07, p < .001$, adjusted $R^2 = .39$, see Table 4.11. Therefore, HSGPA alone explained 39% of the variance in college GPA for non-developmental education participants, which is a larger than typical effect size (Leech et al., 2015). Neither block two or three produced a Sig. F change, .248 and .096, respectively. The addition of ACT composite in block two resulted in a less than 1% increase in explanation of variance. The addition of the DAMMQ-C scales resulted in a small increase, R^2 change = .05 and the total adjusted R^2 increased to .41. HSGPA was the only significant predictor within the overall model, $p < .001$, though academic relationship with faculty was approaching significance at $p = .07$.

Question 3, Explaining Variance in Hours Passed

Due to the significant negative skewness of percentage of hours passed, it was transformed into a dichotomous variable based on if the student passed all attempted hours or did not pass all attempted hours. For the 218 students with data available, 160 passed all attempted hours (73%) and 58 did not pass all attempted hours (27%). Logistic regression was conducted to assess whether HSGPA, ACT Composite, and the DAMMQ-C scales, significantly explained

variance in whether or not a student passed all attempted hours. With all variables considered together, they significantly explained variance in whether or not a student passed all attempted hours, $\chi^2 = 18.08$, $df = 9$, $N = 218$, $p = .03$. The model correctly classified 95.6% of students who passed all attempted hours. However, the model only correctly classified 10.3% of students who did not pass all attempted hours. Table 4.12 presents the odds ratios, which suggested that the odds of passing all attempted hours was increasingly greater as HSGPA increased.

Table 4.11

Hierarchical Multiple Regression Analysis Summary Explaining Variance in College GPA for Non-Developmental Education Students from HSGPA, ACT Composite, and DAMMQ-C Scales

Variable	B	SEB	β	R ²	ΔR^2
Step 1				.39	.39
HSGPA	1.07	.11	.63**		
Constant	-.72	.41			
Step 2				.39	.01
HSGPA	.98	.13	.57**		
ACT Composite	.02	.01	.09		
Constant	-.83	.42			
Step 3				.41	.05
HSGPA	.93	.13	.55**		
ACT Composite	.01	.02	.07		
Preference for Challenge	-.09	.07	-.11		
Task Persistence	.10	.10	.08		
Task Absorption	-.05	.06	-.05		
Task Related Pleasure	.01	.002	.14		
Social Persistence Peers	-.01	.06	-.02		
Social Persistence Faculty	-.06	.06	-.10		
Academic Relationship Faculty	.13	.07	.15*		
Constant	-1.11	.51			

* $p < .1$, ** $p < .001$

Questions 4-7, Difference in Mastery Motivation by Student Characteristic

Gender

Independent sample T-tests were conducted to explore if there was a statistically significant difference between male and female participants on the scales of the DAMMQ-C.

Each scale of the DAMMQ-C was entered as a dependent variable along with total mastery motivation score. The original, non-transformed, values for task related pleasure were used as t-test is robust to skewed dependent variables, especially when the skewness is the same direction for both groups (Morgan, Leech, Gloeckner, & Barrett, 2013). No statistically significant difference was found between males and females on total mastery motivation and five of the DAMMQ-C scales, see Table 4.13. A statistically significant difference was found for task related pleasure, $p < .001$, with females reporting higher task-related pleasure than males. The difference in task related pleasure approached a medium effect size, $d = .43$. Additionally, the difference between males and females on the social persistence with faculty scale was approaching significance, $p = .07$. Females reported higher social persistence with faculty, $M = 3.35$, than males, $M = 3.20$.

Table 4.12

Logistic Regression Explaining Variance in Who Will Pass All Attempted Hours

Variable	<i>B</i>	<i>SE</i>	<i>Odds ratio</i>	<i>p</i>
HSGPA	1.68	.50	5.35	.001
ACT Composite	-.06	.05	.94	.238
Preference for Challenge	.10	.26	1.11	.700
Task Persistence	.03	.40	1.03	.939
Task Absorption	-.23	.24	.80	.346
Task Related Pleasure	.001	.007	1.00	.900
Social Persistence Peers	-.34	.24	.71	.152
Social Persistence Faculty	.05	.21	1.05	.816
Academic Relationship Faculty	.14	.24	1.15	.554
Constant	-2.70	1.47	.07	.066

Race/Ethnicity

A one-way ANOVA statistic was conducted to evaluate if there was a statistically significant difference in DAMMQ-C scales and total mastery motivation score based on four-level race ethnicity: Latino/a, Black, White, and other. A statistically significant difference was

found among the four levels of race/ethnicity on social persistence with peers, $F(3, 312) = 9.52$, $p < .001$, social persistence with faculty, $F(3, 314) = 3.71$, $p = .01$, task absorption, $F(3, 315) = 2.70$, $p = .05$, academic relationship with faculty, $F(3, 316) = 5.51$, $p = .001$, and total mastery motivation, $F(3, 316) = 5.31$, $p = .001$, see Table 4.14. Levene tests were not statistically significant for social persistence with peers, social persistence with faculty, task absorption, and total mastery motivation. However, Levene test was significant for academic relationship with faculty, $p = .002$, which indicated the variances were significantly different for the four race/ethnicity groups (Morgan et al, 2013).

Table 4.13

Comparison of Male and Female Students on DAMMQ-C Scales and Total Mastery Motivation

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Preference for Challenge				.74 ^a	305.5 ^a	.456
Male	132	3.54	.70			
Female	186	3.48	.82			
Task Persistence				.03	316	.975
Male	131	3.76	.53			
Female	187	3.76	.61			
Task Absorption				-.32	319	.751
Male	133	3.64	.77			
Female	188	3.67	.77			
Task Related Pleasure				-3.66 ^a	227.7 ^a	.000
Male	132	4.52	.56			
Female	189	4.73	.41			
Social Persistence with Peers				.17	316	.865
Male	130	3.15	.86			
Female	188	3.13	.92			
Social Persistence with Faculty				-1.81	318	.071
Male	133	3.15	.98			
Female	187	3.35	.96			
Academic Relationship with Faculty				-1.44	320	.150
Male	133	3.95	.87			
Female	189	4.08	.82			
Total Mastery Motivation				-.83	320	.406
Male	133	3.63	.50			
Female	189	3.67	.50			

^aThe *t* and *df* were adjusted because variances were not equal.

Post hoc Tukey tests indicated a statistically significant difference in mean score for social persistence with peers between Black students and each of the other three race/ethnicity groups. Black students had a mean value of 2.74 on the social persistence with peers scale compared to $M = 3.30$ for Latino/a students, $M = 3.31$ for White students, and $M = 3.30$ for

Table 4.14

One-Way Analysis of Variance Summary Table Comparing Race/Ethnicity Groups on DAMMQ-C Scales and Total mastery Motivation

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Preference for Challenge					
Between Groups	3	2.55	.85	1.42	.238
Within Groups	312	187.24	.60		
Total	315	189.80			
Task Persistence					
Between Groups	3	1.72	.57	1.73	.161
Within Groups	312	103.50	.33		
Total	315	105.22			
Task Absorption					
Between Groups	3	4.69	1.56	2.70	.046
Within Groups	315	182.39	.58		
Total	318	187.08			
Task Related Pleasure					
Between Groups	3	.07	.02	1.26	.288
Within Groups	315	5.60	.02		
Total	318	5.66			
Social Persistence with Peers					
Between Groups	3	21.01	7.00	9.52	.000
Within Groups	312	229.62	.74		
Total	315	250.63			
Social Persistence with Faculty					
Between Groups	3	10.28	3.42	3.71	.012
Within Groups	314	289.36	.92		
Total	317	299.61			
Academic Relationship with Faculty					
Between Groups	3	11.24	3.75	5.51	.001
Within Groups	316	215.10	.68		
Total	319	226.30			
Total Mastery Motivation					
Between Groups	3	3.78	1.26	5.31	.001
Within Groups	316	75.06	.24		
Total	319	78.84			

students of other race/ethnicities, see Table 4.15. The mean difference between Black students reflected a medium to large effect size compared to Latino/a, $d = .65$, White, $d = .68$ and other race/ethnicity students, $d = .63$ (Leech et al., 2015).

Table 4.15

Means and Standard Deviations Comparing Four Race/Ethnicity Groups

Race Ethnicity	PFC	TPe	TA	TPI	SPP	SPF	ARF	TMM
White								
<i>n</i>	150	148	149	150	149	150	150	150
<i>M</i>	3.49	3.78	3.66	.11	3.31	3.44	4.21	3.72
<i>SD</i>	.77	.55	.78	.12	.86	.98	.68	.48
Black								
<i>n</i>	93	93	94	94	93	92	94	94
<i>M</i>	3.43	3.66	3.53	.10	2.74	3.02	3.79	3.49
<i>SD</i>	.81	.60	.77	.13	.82	1.00	.95	.48
Latino/a								
<i>n</i>	37	38	39	39	37	39	39	39
<i>M</i>	3.73	3.89	3.94	.12	3.30	3.28	4.05	3.77
<i>SD</i>	.71	.57	.63	.16	.88	.79	.79	.50
Other								
<i>n</i>	36	37	37	36	37	37	37	37
<i>M</i>	3.56	3.81	3.67	.15	3.30	3.17	3.86	3.66
<i>SD</i>	.76	.64	.77	.13	.93	.94	1.02	.55

PFC= Preference for Challenge, TPe= Task Persistence, TA= Task Absorption, TPI= Task-Related Pleasure, SPP= Social Persistence w/Peers, SPF= Social Persistence w/Faculty, ARF= Academic Relationship w/Faculty, TMM= Total Mastery Motivation

Post hoc Tukey tests indicated a statistically significant difference in mean score for social persistence with faculty between Black students, $M = 3.02$, and White students, $M = 3.44$, $p = .006$, which represented a medium effect size, $d = .42$ (Leech et al., 2015). Post hoc Tukey tests indicated a statistically significant difference in mean score for task absorption between Black students, $M = 3.53$, and Latino/a students, $M = 3.94$, $p = .025$, which represented a medium effect size, $d = .58$.

Post hoc Tukey tests indicated a statistically significant difference in mean score for total mastery motivation between Black students, $M = 3.49$, and both Latino/a students, $M = 3.77$, $p =$

.014, and White students, $M = 3.72$, $p = .002$. The mean difference between Black students reflected a medium effective size compared to both Latino/a students, $d = .57$, and White students, $d = .48$ (Leech et al., 2015).

Finally, post hoc Games-Howell tests indicated a statistically significant difference in mean score for academic relationship with faculty between Black students, $M = 3.79$, and White students, $M = 4.21$, $p = .002$, which represented a medium effect size, $d = .51$ (Leech et al., 2015).

Developmental education status.

Independent sample t-tests were conducted to explore if there was a statistically significant difference between developmental education students and non-developmental education students on the scales of the DAMMQ-C and total mastery motivation. No statistically significant difference was found between developmental education students and non-developmental education students on five scales: preference for challenge, social persistence with peers, task persistence, social persistence with faculty, and task absorption.

A statistically significant difference was found for the academic relationship with faculty scale ($p < .001$), task related pleasure scale ($p = .04$), and total mastery motivation ($p = .02$), see Table 4.16. For academic relationship with faculty, non-developmental education students reported a higher mean, $M = 4.20$, than their developmental education peers, $M = 3.84$. The Cohen d value was .41, which was approaching a medium effect size (Morgan et al., 2013). Concerning task related pleasure, non-developmental education students reported a higher mean, $M = 4.70$, than their non-developmental education peers, $M = 4.56$. The Cohen d value was .28, which represented a small effect size (Morgan et al., 2013). Finally, concerning total mastery motivation, non-developmental education students reported a higher mean, $M = 3.71$, compared

to their developmental education peers, $M = 3.58$. The difference in total mastery motivation represented a small effect size, $d = .27$ (Morgan et al., 2013).

Table 4.16

Comparison of Developmental Education and Non-Developmental Education Students on DAMMQ-C Scales and Total Mastery Motivation

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>df</i>	<i>p</i>
Preference for Challenge				1.45	318	.149
Non-Developmental Education	178	3.56	.76			
Developmental Education	142	3.43	.79			
Task Persistence				1.36	318	.174
Non-Developmental Education	177	3.80	.56			
Developmental Education	143	3.71	.60			
Task Absorption				1.60	321	.111
Non-Developmental Education	179	3.72	.74			
Developmental Education	144	3.58	.79			
Task Related Pleasure				2.42 ^a	248.1 ^a	.012
Non-Developmental Education	180	4.70	.41			
Developmental Education	143	4.56	.57			
Social Persistence with Peers				1.30	318	.198
Non-Developmental Education	179	3.20	.90			
Developmental Education	141	3.10	.87			
Social Persistence with Faculty				.75	320	.454
Non-Developmental Education	178	3.30	1.00			
Developmental Education	144	3.22	.93			
Academic Relationship with Faculty				3.71	322	.000
Non-Developmental Education	180	4.20	.81			
Developmental Education	144	3.84	.84			
Total Mastery Motivation				2.31	322	.021
Non-Developmental Education	180	3.71	.48			
Developmental Education	144	3.58	.50			

^aThe *t* and *df* were adjusted because variances were not equal

Attempted Hours

Independent sample T-tests were conducted to explore if there was a statistically significant difference on the scales of the DAMMQ-C based on attempted hours. The comparison groups were participants who had attempted 0 to 16 credit hours and students who

had attempted 17 to 60 credit hours. No statistically significant difference between the two groups was found for any scale of the DAMMQ-C or total mastery motivation.

CHAPTER 5 DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS FOR FUTURE RESEARCH

College student success has been explored ad nauseam, yet student success rates have not improved in the United States, and gaps in success rates between underrepresented student populations and majority students persist and may even be growing larger (DeAngelo et al., 2011; NCES, 2017b; Shapiro et al., 2017). Paradigmatic separations in the research and literature surrounding college student success have created limitations in student success theory. Models such as Museus' (2014) Culturally Engaging Campus Environments (CECE) model break down these paradigmatic barriers in an effort to reflect the robust student success literature. Models of this nature are especially important for student populations that may not be fully reflected in traditional student success theory, such as developmental education students (Hicks, 2017; Kim, 2015).

Unfortunately, barriers exist in validating the CECE model, including limitations in student dispositional instrumentation. Specific limitations include the prevalence of single construct instruments or lengthy multivariate instruments with limitations of reliability and practicality in use (Ben Nun, 2008; Le, Casillas, Robbins & Langley, 2005; Richardson, Abraham, & Bond, 2012; Pintrich, Smith, Garcia, and McKeachie, 1993; Thomas, Kuncel, & Credé, 2007; Tracey & Sedlacek, 1984). Therefore, this study sought to evaluate a new dispositional instrument that measured across multiple dispositional domains, was flexible concerning time frame of administration, and addressed issues of length and respondent fatigue.

Additionally, the study explored the role of dispositional factors in the success of developmental education students compared to their non-developmental education peers.

Developmental education students make up a healthy percentage of overall undergraduate enrollment at both two-year and four-year institutions (Chen & Simone, 2016). Additionally, many demographic groups are overrepresented within developmental education: including Black students, Latino/a students, students from low SES backgrounds, and first-generation students (Chen & Simone, 2016). Traditional cognitive factors, such as HSGPA and standardized test scores, have been found to have limited to no predictive power for developmental education students (Kim, 2015). Additionally, scholars have called for increased research on dispositional factors for developmental education students. (Kim, 2015; Saxon et al., 2015).

This research evaluated the validity and reliability of the Dimensions of Adult Mastery Motivation Questionnaire College (DAMMQ-C), an adapted version of Doherty-Bigara and Gilmore's (2015) Dimensions of Adult Mastery Motivation Questionnaire. Specifically, the DAMMQ-C was theorized to align with four of the five dispositional domains identified within Richardson et al.'s (2012) meta-analysis. The study also examined the ability of cognitive, HSGPA and ACT composite, and dispositional factors in explaining variance in cumulative college GPA and likelihood of passing all attempted hours. As informed and encouraged by prior research, analyses concerning explanation of variance were conducted with both the aggregate sample and disaggregated groups based on developmental education status (Kim, 2015; Meseus, 2014; Museus et al., 2017). Finally, the study explored differences in dispositional factors across multiple student characteristics including gender, race/ethnicity, developmental education status, and number of attempted hours.

Discussion of Findings

Descriptive Comparisons by Developmental Education Status

Several trends emerged when comparing descriptive statistics for developmental education students compared to their non-developmental education peers. Black students were drastically overrepresented within the developmental education population, and female students were moderately overrepresented, which is consistent with Chen & Simone's (2016) national study. Developmental education students also had a lower cumulative college GPA and were less likely to pass all attempted hours. These findings are consistent with other research on developmental education students that has found lower completion rates, longer time to degree, and lower academic performance in general (Adelman, 2004; Attewell et al., 2006; Chen & Simone, 2016). These findings reaffirmed the importance of increased understanding in student success for developmental education students.

Explaining Variance in College GPA

College GPA is an outcome of value given its predictive relationship to future academic success and other tangible aspects such as remaining in good standing with the institution (Hosch, 2008). One must first recognize that the present study was not longitudinal; thus, analyses were not predictive across time, as the DAMMQ-C was not completed before the students earned their respective GPAs (Gliner et al., 2017). However, as an initial study, the ability of DAMMQ-C scales to explain variance in college GPA over and above traditional cognitive measures undoubtedly spoke to the validity and usefulness of the instrument. The relationship to college GPA over and above cognitive factors painted a clearer picture of the complete student experience and factors contributing to student success.

High school grade point average (HSGPA). Consistent with much of the literature, HSGPA explained the largest portion of variance in cumulative college GPA within this study and there was a large effect size for the relation between HSGPA and college GPA in the aggregate sample (see also Bridgeman et al., 2004; Kim, 2015; Ramist et al., 2001; Richardson et al., 2012). In fact, HSGPA accounted for a larger portion of the variance in college GPA in this study compared to other studies, which suggested variability in the predictive power for HSGPA in various context (Richardson et al., 2012; Robbins et al., 2004). Some variability in the relationship of HSGPA and college GPA was not surprising considering that HSGPA has a level of subjectivity and context driven features such as “difference in course content and grading criteria” (Richardson et al., 2012, p. 354). Additionally, though commonly classified as a “cognitive” measure, HSGPA may be indirectly measuring both cognitive competence and various student dispositions. For example, aspects of a student’s task persistence, motivation, interactions with instructor, and various other aspects observed by a teacher are likely to be at least partially represented in the subjectivity of an assigned grade (Reuschel, 2009). Though there is some murkiness in what HSPGA is a measure of, this could contribute to its predictive ability. However, this murkiness creates a significant limitation for intervention development as there is limited clarity on what a lower HSGPA represents and therefore limited clarity on areas of focus for intervention.

Developmental education is a textbook example of this limitation. Designed as a comprehensive intervention for what was believed to be a purely cognitive need, traditional developmental education has largely failed to produce student success. Therefore, though HSGPA does have merit within admission and placement policies, higher education

professionals must expand their scope of consideration when developing strategies and interventions for supporting admitted students.

ACT composite. Motivated by previous literature that consistently found HSGPA to explain a larger portion of college GPA (Bridgeman et al., 2004; Kim, 2015; Richardson et al., 2012) and the problematic differences on the ACT based on race/ethnicity and socioeconomic status (ACT, 2016; Hudson, 1989; Kirby et al., 2007), this study separated HSGPA and ACT composite within regression analyses. This approach allowed for ACT composite to be evaluated individually and was contrary to much of the previous literature that joined HSGPA and ACT as cognitive measures (Kim 2015; Richardson et al., 2012; Robbins et al., 2004). Within this study, ACT composite failed to contribute an increased explanation of variance in college GPA over and above HSGPA for both the aggregate population and developmental education population. This is contrary to other studies including Kim (2015) that also looked specifically at ACT composite score. Though ACT composite was a significant predictor of college GPA for both regular and conditionally admitted students in Kim's (2015) study, the effect size was small and HSGPA was clearly the more valuable predictor for regularly admitted students. Therefore, the usefulness and role of standardized test scores in general and ACT composite specifically may be examined more closely.

Part of this examination must address the disconcerting trend in the literature of grouping HSGPA and test scores as cognitive measures within regression analyses (Kim, 2015; Richardson et al., 2012; Robbins et al., 2004). Though these cognitive blocks were often significant and medium to large predictors, HSGPA consistently carried most or all of the predictive ability. However, the take away was often that cognitive predictors are "collectively accounting for approximately 25% of the variance [in college GPA]" (Richardson et al., 2012, p.

354). This approach consistently overstated the usefulness of standardized test scores. Radunzel and Noble (2013) found merit in the use of standardized test sub-scores for subject specific course placement (Radunzel & Noble, 2013). However, the use of composite scores in admission and placement policies is not supported by a large portion of the literature (ACT, 2013; Hudson, 1989; Kim, 2015; Kirby et al., 2007; Richardson et al., 2012) nor the findings of this study. Additionally, these policies can create access barrier for many students, especially underrepresented student populations.

Dispositional factors. In this study, the dispositional scales of the DAMMQ-C provided significant increase in the explained variance of college GPA over and above HSGPA and ACT composite for both the aggregate population and developmental education population. These findings were consistent with numerous other studies where dispositional factors have provided significant explanation of variance in college GPA over and above cognitive variables (Brickman et al., 2013; Richardson et al., 2012; Zientek et al., 2013). The amount of additional explained variance for the aggregate population was consistent with Robbins et al.'s (2006) findings from another multivariate instrument, the Student Readiness Inventory (SRI). Of note, the 27-item DAMMQ-C was a fourth of the length of the 108-item SRI.

The clear role of dispositional factors in explaining variance in a relevant college outcome was important for many reasons. First, dispositional factors, including mastery motivation, have been found to be malleable (Hashmi et al., 2017; Hausmann et al., 2007; Józsa & Morgan, 2014; Walton & Cohen, 2007; Wernersbach et al., 2014; Zientek et al., 2013). Therefore, interventions can be developed to support improvement for student dispositions whereas this would be less plausible when considering only static demographic characteristics or cognitive factors. For example, professionals have developed intervention programs for many

“at-risk” demographic groups such as first-generation students. However, as Zientek et al. (2013) argued, no intervention will change a demographic characteristic like first-generation status. Additionally, imbedded within programs of this nature is an assumption that first-generation students (or any other demographic group) all share the same needs and experiences. This assumption failed to consider the multiple dimensions of an individual student’s identity (Jones & Abes, 2013). Additionally, these multiple dimensions of identity are social constructed and interact with both the environment and other identity dimensions (Jones & Abes, 2013).

An additional distinction is needed in that dispositional interventions are not skill development interventions such as note-taking, time management, or reading comprehension strategies. Student dispositions speak to qualities students “use to access, adapt, and employ intellectual traits” and skills (Driscoll & Wells, 2012, p. 5). The findings of this study concerning the role of student dispositions, therefore, stretched many of the dichotomous assumptions that exist concerning students as prepared/unprepared, skilled/unskilled, or even intellectually capable or not. One must ask if the students assumed to be unskilled or not “college material” simply need improved dispositions to “access, adapt, and employ their intellectual traits” and skills (Driscoll & Wells, 2012, p. 5)? Therefore, higher education professionals must combine support for student dispositions and skill development to truly support comprehensive student success.

Academic relationship to faculty. HSGPA and academic relationship with faculty were the two significant predictors within the final aggregate population model, with HSGPA explaining the largest portion of variance. Academic relationship with faculty as the second significant factor is consistent with other literature that examines student-faculty interaction (Kim & Sax, 2017). Specifically, Kim & Sax (2009) examined the role of interactions such as

participating in research and interacting with a faculty member in class, which would reflect the academic aspect of the student-faculty relationship. Kim & Sax found that research related interactions and course related interactions were both significant and positive correlates with college GPA.

Academic relationship with faculty being found as a significant factor in this study also aligned with the Culturally Engaging Campus Environments (CECE) model's basic principal of environmental aspects being related to student performance (Museus, 2014). However, the concept of academic relationships with faculty was not well represented within the specific environmental indicators identified in the CECE model. Perhaps the environmental indicator that most closely aligned with academic relationship with faculty was culturally relevant knowledge. Culturally relevant knowledge was identified as opportunities to increase knowledge of "cultures and communities of origin" and was predominantly concerned with course content (Musues, 2014, p. 210). Though items of course content likely contribute or inhibit academic aspects of the student-faculty relationship, academic related interactions as explored by Kim & Sax (2009) better aligned with the findings of this study. Therefore, though the CECE model was grounded in a significant review of the literature (Museus, 2014), the findings of this study revealed a potential limitation in that the nine environmental indicators of the CECE model may not comprehensively represent environmental components. As discussed by Strange and Banning (2001), campuses are complex ecological systems consisting of inhabitants, social settings and functions, and physical features, which would be difficult to represent in only nine components.

Explaining Variance in College GPA by Developmental Education Status

Ability to explain variance in cumulative college GPA varied greatly when the sample was disaggregated by developmental education status. The results of this study were consistent with Kim's (2015) study where cognitive variables were better predictors for fully admitted students than for special admission students. However, HSGPA was a weaker but statistically significant predictor of college GPA for special admission students in Kim's study, which is contradictory to the findings of this study where HSGPA failed to significantly explain variance in college GPA for developmental education students. Despite the differences in findings concerning HSGPA, findings from this study along with Kim's (2015) findings displayed a clear difference in the role of cognitive variables based on admission or developmental education status. These findings reinforced the need to move beyond cognitive measures in understanding student success, especially for developmental education students.

Additionally, accurate placement concerning developmental education is critical. Placement in courses that do not challenge students has been found to negatively impact student attitude, and placement in developmental education has been found to bring on additional costs and time to degree for students (Bachman, 2013; Chen & Simone, 2016). A one size fits all evaluation of college readiness that is predominantly reliant on cognitive factors simply does not work for a significant population of students. Therefore, the results of this study came alongside existing literature in supporting the need for multiple measures when evaluating college readiness and placement (Cullinan et al., 2018; Qin, 2017).

Dispositional factors and developmental education. The findings of this study also highlighted the efficacy of dispositional factors in understanding student success for developmental education students specifically. The findings were consistent with a small body of

literature exploring dispositional factors with developmental education students specifically including Zeintek et al. (2013) who found that dispositional factors explained 40.7% of variance in student's grades in developmental math courses. Though there is healthy amount of literature examining the role of dispositional factors at the aggregate, there has been limited exploration of the role of dispositional factors with developmental education students. Developmental education is an area ripe for improvement within higher education, and this study makes a valuable contribution to the literature by connecting dispositional factors with college GPA for developmental education students. As discussed earlier, pre-college cognitive measures leave a significant void in understanding student performance in college, especially for developmental education students. This study's contribution to a growing literature on the role of dispositional factors made a valuable contribution to begin addressing that void.

Social persistence with faculty. The emergence of social persistence with faculty as a significant predictor in the developmental education models was consistent with Bachman's (2013) qualitative study of attitude changes in developmental education students. Within Bachman's study, "establishing human connections" with instructors emerged as a critical aspect to the experience of developmental education students. Noteworthy was social persistence with faculty emerged only within the developmental education population, which suggested these social or humanistic aspects of the relationship are especially important for developmental education students. Therefore, the findings of this study suggested that different aspects of the student-faculty relationship may play a more significant role in the student experience for specific groups of students.

Schlossberg's (1989) theory on student transitions and the concepts of marginality and mattering could assist in explaining the salience of social aspects of the student-faculty

relationship for developmental education students. Schlossberg discussed that students in transition often felt marginal or “out of place” and had a need for mattering. Mattering included students perceiving that others depend on them, are interested in them, and are concerned with their fate (Schlossberg, 1989). Considering the developmental education student experience, one could argue an increased level of marginality exists. Students are welcomed with an admission letter stating they have been brought into the institution’s community, but this inclusion has “conditions” (Stewart & Heaney, 2013). Students do not receive college credit for their developmental coursework in addition to many aspects of policy and physical environments unique to individual institutions that can push developmental education to the margins. Not surprisingly, developmental education students have associated their status with being “dumb” and that they are an “exception” to the “normal” student (Bachman, 2013). Given this psychological backdrop, it is logical that developmental education students would desire increased aspects of mattering, such as social aspects of the student-faculty relationship.

Interaction between marginality and the importance of varying aspects of the student-faculty relationship is present in other areas of the literature as well. Kim and Sax (2009) found course-related interactions, more academic interaction in nature, were predictive of college GPA for all race/ethnicity groups except African Americans. Additionally, concerning race/ethnicity, Lundberg and Schreiner (2004) found that the quality of the student-faculty relationship was a stronger predictor of learning for students of color compared to their White peers. The quality of the student-faculty relationship within their study was more aligned with social aspects such as approachability and encouragement (Lundberg & Schreiner, 2004). This is consistent with the findings of the current study where academic aspects are significant for the majority, but social aspects emerged as critical for student populations on the margins such as students of color or

developmental education students. Therefore, this study contributed to the literature supporting the theoretical concepts of marginality and mattering, which were also present in the CECE model (Museus, 2014; Schlossberg, 1989).

Total mastery motivation. Total mastery motivation was the only significant factor for developmental education students in the final model that also included HSGPA and ACT composite. Though this is the first study with U.S. college students, the findings were consistent with Gilmore et al.'s (2003) study of 2-year old typically developing girls and Józsa and Molnar's (2013) study with school age children where mastery motivation was a significant predictor of future academic performance. Additionally, Gilmore et al. (2017) previously evaluated the original DAMMQ with university students in Australia, Hungary, Bangladesh, and Iran. This study built on recent mastery motivation literature by introducing a new population, U.S. college students, and adapting the DAMMQ to the university context. Additionally, this study made a valuable contribution in exploring the relationship between adult mastery motivation and academic performance in college. The specific finding of total mastery motivation as a significant factor in explaining variance in college GPA identified the value of utilizing the holistic construct of mastery motivation when considering the role of student dispositions in college student success. Finally, the findings of this study suggested that mastery motivation was especially relevant for developmental education students, which was quite valuable given the limited power of traditional cognitive factors for developmental education students within this study.

Explaining Attempted Hours Passed

Results of the logistic regression analysis explaining the variance in likelihood to pass all attempted hours continued to show the value of HSGPA as it was the only statistically significant

variable. One should also note that though the model was very successful in classifying students who would pass all attempted hours, the model performed poorly in classifying students who did not pass all attempted hours. Therefore, the results of this study highlighted the importance of exploring multiple outcome variables in seeking a better understanding of student success. As Credé et al. (2016) warned, logistic regression findings can be easily misinterpreted “resulting in incorrect inference about the size of observed effects” (p. 3). If attempted hours passed had served as the only dependent variable within this study, the practical relevance of the findings would be difficult to interpret given the poor ability to correctly classify students who did not pass all attempted hours. However, taken comprehensively with other findings, these findings served as additional support of the relevance for HSGPA in explaining college academic performance.

Differences in Dispositions by Student Characteristics

Females reported higher task related pleasure and the difference represented a medium effect size. These findings are consistent with Doherty-Bigara and Gilmores (2015), however, the difference was not found by Gilmore et al. (2017). Females also reported higher social persistence with faculty and the result was approaching statistical significance. This was consistent with Kim and Sax’s (2009) findings that females students were more likely to interact with faculty one-on-one and were more satisfied with these interactions than their male peers.

Race/ethnicity. This study found that Black students reported lower mean scores on all three social persistence scales compared to their peers: (a) social persistence with peers, (b) social persistence with faculty, and (c) academic relationship with faculty. Though this study was somewhat unique in that it examined dispositional persistence in social and academic relationships instead of the quality of those relationships, existing literature concerning the racial

climate on many campuses could inform this study's findings. Specifically, George Mwangi, Thelamour, Ezeofor, and Carpenter's (2018) qualitative study focused on campus racial climate and spoke to the troubling climate experienced by Black students. Specifically, Black students were increasingly aware of stereotypes and microaggressions from peers such as peers "being on edge" around Black students and "their [Black students'] race being associated with fear" (George Mwangi et al., 2018, p. 462). Participants in Solorzano, Ceja, and Yosso's (2000) qualitative study identified how peer interactions contributed to a feeling of isolation. Specifically, multiple participants reported incidents of peers not wanting Black students within study groups and group projects. For some, the incident was covert as peers quickly formed other groups that did not include Black students, while one Black female student was directly told from a peer "Well, I don't want to work with you because you're Black" (Solorzano et al., 2000, p. 67). Undoubtedly, problematic campus racial climates could inform the finding of low social persistence with peers by Black students within this study.

Student-faculty relationship. Concerning the scales related to faculty, Black students reported lower means compared to White students. These findings were consistent with Lundberg and Schreiner (2004) and Kim and Sax (2009) who found that though Black students interacted with faculty more frequently than their White peers, Black students were less satisfied with their relationships with faculty. Similar to interactions with peers, qualitative studies (George Mwangi et al., 2018; Solorzano et al., 2000) have revealed troubling interactions with faculty including assumptions of cheating after strong performance, feeling "invisible" in the classroom, microaggressions, tokenization, and inequitable treatment. Participants in George Mwangi et al.'s (2018) study also identified lack of acknowledgement or insensitive comments

concerning societal racial issues and a lack of representation on the faculty as experiences straining the student-faculty relationship for Black students.

Other dispositional factors. Finally, Black students reported lower task absorption than Latino/a students and lower total mastery motivation compared to both Latino/a and White students. Though these specific scales had not previously been used with US college students, Farruggia et al. (2018) also found difference in dispositional factors by race. Consistent with findings in this study, Farruggia et al. (2018) found that white students reported higher dispositional aspects, in this case self-efficacy, than Black students. However, Farrugia et al. did not find a difference between Latino/a students and Black students unlike the results of this study. In interpreting these results, one must remember that dispositional factors are malleable, and a multitude of factors could be influencing this difference. It is worth noting that data collection for this study took place at a predominantly White four-year institution and Latino/a serving community college. Therefore, many of the environmental aspects identified by Museus (2014) could be influencing these dispositional factors. The findings of this study continue to reveal the need for (in)validation of the CECE model as we seek to better understand environmental influences on student dispositions.

Differences by developmental education status. Concerning developmental education status, developmental education students reported significantly lower academic relationship with faculty, task-related pleasure, and total mastery motivation. These findings are consistent with Wernersbach et al.'s (2014) findings that conditionally admitted students reported lower dispositional aspects compared to fully admitted peers. However, Wernersbach et al. did not explore a potential difference in faculty relationship, and currently no literature has been identified that explored the student-faculty relationship based on developmental education status.

Therefore, this study added to the limited literature comparing dispositional factors by developmental education status. Exploration of this nature was needed to move towards a better understanding of developmental education students' needs. Additionally, it is possible that the overrepresentation of Black students within developmental education influenced the lower academic relationship with faculty finding in this study (Chen & Simone, 2016; Kim & Pax 2009; Lundbeg & Schreiner, 2004).

Change in mastery motivation over time. Finally, mastery motivation and other dispositional factors have been found to decrease over time in general in the absence of intervention (Józsa & Molnar, 2013; Józsa & Morgan, 2014; Wernersbach et al., 2014). Within this study, students who had attempted more hours did not differ from those who had taken less hours concerning the DAMMQ-C scales. However, given that data collection only took place at one moment in time, individual differences in disposition could not be accounted for within this study. Additionally, the saturation of students with less than 60 attempted hours could explain the lack of difference between the groups.

Evaluating the DAMMQ-C

Following the final exploratory factor analysis, 27 of the original 35 items were retained and loaded onto seven factors: (a) preference for challenge, (b) task persistence, (c) task pleasure, (d) task absorption, (e) social persistence with peers, (f) social persistence with faculty, and (g) academic relationship with faculty. Three items were removed due to cross loading or loading on an unexpected factor. All three items had similar yet less severe cross loading concerns within Doherty-Bigara and Gilmore's (2015) original validation study. Surprisingly, the intended self-efficacy items did not load on a cohesive factor despite requesting both a six-

factor and seven-factor structure, and analysis confirmed low correlations among the self-efficacy items.

Warning signs of the potential issue with self-efficacy items were present in Doherty-Bigara & Gilmore's (2015) study, as the self-efficacy factor displayed acceptable but lower than preferred internal consistency, and item loading values were smaller than many loading values on other factors. Despite issues with the self-efficacy scale, results of this study support existing literature on mastery motivation as a multifaceted psychological construct (Barrett & Morgan, 1995). Additionally, mastery motivation research has only recently expanded beyond infants and children (Doherty-Bigara & Gilmore, 2015; Gilmore et al., 2017), and the current study makes a valuable contribution to the literature by exploring adult mastery motivation with a previously unstudied population, U. S. college students. The results of this study were consistent with prior research with school-aged children where mastery motivation explained variance in academic outcomes over and above traditional cognitive measures (Józsa & Molnar, 2013; Józsa & Morgan, 2014). The results of this study also supported the flexibility of the mastery motivation through the development of a context specific measurement adaptation similar to the work of Józsa (2014) with language learning mastery motivation scales.

Value of multifaceted construct. Though the college student success literature is inundated with a variety of psychological constructs, mastery motivation's multifaceted nature offers unique opportunities. As Richardson et al. (2012) discussed, a significant gap in the student success literature is the lack of studies measuring across multiple dispositional domains. A validated measure of adult mastery motivation would make a significant contribution in addressing this gap, and the current study provided initial validation of such an instrument, the DAMMQ-C. One opportunity in exploring multifaceted constructs of this nature was it allowed

for expansion in our understanding of college student success beyond traditional cognitive factors.

An over emphasis on cognitive measures such as standardized tests and high school grade-point average (HSGPA) prevails in higher education practice and policy. Though cognitive measures have been found to have predictive power of college student success (Bridgeman et al., 2004; Ramist et al., 2001; Richardson et al., 2012), their perceived measurement of static cognitive ability contributes to a problematic deficit mindset culture that labels large portions of students as “at-risk” (Harper, 2010). Specifically, these cognitive measures are void of contextual understanding of what may or may not be influencing a student’s performance. Therefore, one should not be surprised that higher education has been unsuccessful in improving the success of these “at-risk” students given the limited ability to inform intentional practice and develop interventions.

This limitation of cognitive factors has led to the exploration of other variables, including dispositional factors such as self-efficacy, sense of belonging, and conscientiousness, which are malleable and allow higher education professionals to develop interventions to support students (Richardson et al., 2012). The current study makes a significant contribution to the dispositional literature through the initial validation of a multifaceted dispositional measure that is more representative of the student experience. In doing so, this study condensed a broad and disjointed literature base populated with a multitude of related yet individual constructs. A multifaceted approach to exploring the student experience and ultimately supporting student success allows for increased understanding and contextual flexibility, which is vital to supporting diverse populations of students attending a variety of higher education institutions (Museus, 2014).

A single factor or domain will always limit professionals and scholars in understanding complex students interacting with complex environments. Therefore, though this study is not exhaustive of all components of the student experience, it makes a valuable contribution to the student success literature by introducing mastery motivation as a new multifaceted construct that can allow for exploration of how dispositional domains interact with one another, how these domains interact with the environment, and no longer forces professionals and scholars to select a single domain or extremely long multi-domain measures.

Measuring across multiple dispositional domains. A key component of this study was evaluating the DAMMQ-C as a multi-domain dispositional instrument. The task persistence scale was significantly and positively correlated with the effort regulation scale of the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich & DeGroot, 1990), with a medium effect size. This supported the construct (convergent) validity of this DAMMQ-C scale, as the effort regulation scale, like the task persistence scale, was identified within the self-regulatory learning strategy domain (Richardson, et al., 2012). Effort regulation was also one of only a handful of medium-sized correlates to college GPA within Richardson et al.'s study. A goal of this study was to measure multiple, useful parts of the CECE in a reliable, valid, and efficient way. The DAMMQ-C was found to be a more efficient measure at 27 items compared to other multiple domain measures such as the College Student Inventory with 74+ items and the Student Readiness Inventory at 95 items. Moving forward, a key piece in validating the DAMMQ-C as a multiple domain measure will be displaying its alignment with the existing literature rather than its uniqueness from existing constructs.

Self-efficacy. Unfortunately, results did not support the factorial validity of the self-efficacy scale of the current DAMMQ-C. Therefore, the current DAMMQ-C aligned with three

of the identified domains instead of the originally hypothesized four. The self-efficacy scale not loading was especially unfortunate as self-efficacy was the strongest correlate to college GPA within Richardson et al.'s (2012) meta-analysis. Self-efficacy has been measured within various contexts within the higher education literature including performance self-efficacy (Shell & Husman, 2001), academic self-efficacy (Le et al., 2005), social self-efficacy (Smith & Betz, 2000), and college self-efficacy (Solberg et al., 1993). Moving forward, this extensive literature could inform the inclusion of self-efficacy items within the DAMMQ-C, which would allow for continued alignment with the larger dispositional literature.

Psychosocial factors. One domain identified by Richardson et al. (2012) was psychosocial factors, which have a well-documented influence on student success (Hausmann et al., 2007; Pan, 2010; Tinto, 1975; Walton & Cohen, 2007; Wolniak et al., 2012; Won et al., 2017). Likewise, social persistence with both adults and peers has served as a vital factor within mastery motivation research in general (Józsa & Morgan, 2015). However, Doherty-Bigara and Gilmore (2015) did not include social persistence scales in their adult measure of mastery motivation due to significant variation in social context across the adult lifespan. Current student success literature views psychosocial factors through concepts such as academic and social integration (Tinto, 1975), belongingness (Walton & Cohen, 2007; Won et al., 2017), and support (Richardson et al., 2012).

The psychosocial scales within this study took a unique approach in looking at a student's persistence in developing relevant social relationships, which is consistent with mastery motivation research "focused on persistence, the process or motivation to master the task rather than ability" (Busch-Rossnagel & Morgan, 2013, p. 248). This approach shifted the focus to student dispositions and contributed a new lens for examining critical psychosocial aspects of the

student experience. For example, current concepts of integration and belongingness do not account for an individual student's disposition or desire to persist in efforts to belong. Within this new lens, higher education professionals should consider the role of an attitude of shared responsibility reflective of an ethic of care (Keeling, 2014). Therefore, faculty and staff must ask, regardless of ability to develop relationships, what environmental aspects could influence a student's desire, or lack thereof, to persist in efforts to develop relationships? The newly created social persistence scales in this study allows for the exploration of this and other valuable questions.

Social persistence with faculty. The social persistence with peers scale in this study performed very well and displayed good internal consistency. Unexpectedly, two separate factors loaded on the newly created social persistence with faculty items within this study. Based on exploratory factor analysis, a clear separation between the social and academic aspects of the student-faculty relationship was observed. Therefore, these findings identified that students may view the student-faculty relationship as multifaceted. Though the social and academic aspects of the student-faculty relationship are related, they are also independent of each other. Therefore, it is possible for an academic relationship to exist in the absence of a social relationship and vice versa.

A multifaceted relationship between students and faculty was consistent with the findings of Barnett (2011). Specifically, Barnett sought to validate a quantitative measure for the concept of "validation" as presented by Rendón (1994). Focusing specifically on faculty validation, a four-factor structure was identified that included: (a) students feeling known and valued, (b) caring instruction, (c) appreciation for diversity, and (d) mentoring (Barnett, 2011). Though Barnett's study focused on student perceptions towards the actions of faculty, and the current

study focused on student dispositions toward the faculty relationship, both supported the conclusion that the student-faculty relationship is complex and multifaceted. This multifaceted relationship runs contrary to the view of faculty members as holders of knowledge who share this wisdom with promising young pupils typically through an impersonal and purely academic relationship. Remnants of this view endure within the academy and create tension with modern day students who can access immense amounts of information from the phones they carry and who desire a genuine and multifaceted student-faculty relationship (Barnett, 2011; Bequist & Pawlak, 2008).

Overall Discussion

A trend was observed across the study concerning the student-faculty relationship. First, this study suggested that this is a multifaceted relationship as a student's persistence to socially connect with faculty was unique to the student's persistence in the academic aspect of the relationship. Interestingly, the two scales concerning faculty and student relationship were also the most frequent to emerge as individual significant predictors within the various regression models and were also areas where differences across student characteristics emerged. Though this did not directly validate Museus's (2015) CECE model, it did provide support to the main focus of the model, environmental aspects influencing student dispositions. People, in this case faculty, appear to heavily impact the nature of a campus or classroom environment (George Mwagi et al., 2018; Solorzano et al., 2000). The findings of this study suggested that aspects of the student-faculty relationship are not only important for explaining variance in college GPA, especially for developmental education students, but are also an area where student dispositions seem to be more varied.

Implications for Practice

The study also revealed significant implications for practice, especially for professionals working with Black students and developmental education students. This study supported prior research that identified both the importance (Trolan, Jach, Hanson, & Pascarella, 2016) and variation in the student-faculty relationship (Kim & Sax 2009; 2017). The findings in conjunction with existing literature expose a glaring need for continued faculty training concerning interactions with students, both social and academic in nature. This training could include aspects concerning diversity and inclusion for students of color, especially concerning Black students. This study is one more piece of research shining light on the troubling details of the student-faculty relationship for Black students in higher education. For higher education to play the role it desires in society, it simply cannot allow this trend to continue unaddressed.

The study also found that the student-faculty relationship was important for developmental education students. Specifically, a student's social persistence with faculty was the strongest factor in the model explaining variance in college GPA. Additionally, developmental education students reported lower academic relationship with faculty compared to their non-developmental education peers. These findings identified the complexity and importance of the student-faculty relationship for developmental education students. Additionally, this study highlighted the critical role of dispositional factors in student success for developmental education students.

Therefore, increased training for faculty and staff working with developmental education students is merited. These trainings should not only highlight the importance of dispositional aspects in general, but also highlight social and academic aspects of the student-faculty relationship. Too often, the research and therefore the practice in developmental education has

focused on the perceived cognitive deficit of developmental education students. This perceived cognitive deficit produced an over emphasis on exploring and training on specific pedagogical approaches and trying to “fix” the puzzle of cognitive “limitations.” The results of this study, however, identified the need for expanding the foci of faculty and staff training and development. This is not to suggest pedagogy is irrelevant. However, pedagogical strategies will consistently fall short if the faculty and staff fails to understand and intentionally approach the dispositional soul of the students in the classroom.

Some may argue that faculty and staff are not responsible for the dispositions of students. Are these students not adults who must take responsibility for themselves? This question seems to consistently arise in discussions of student success and is a problematic aspect of a large portion of the student success theory (Museus, 2014). First, this sentiment ignores the fact that environments matter, and every individual within an environment contributes to the environment (Pope & LePeau, 2011; Strange & Banning, 2001). Secondly, adopting an ethic of care demands shared responsibility for student success and therefore, student disposition. Keeling’s (2014) discussion of ethic of care within higher education included “attention to students as whole people, a shared responsibility for learning, and responsiveness to student’s well-being” as key aspects (p. 141). Additionally, the ethic of care philosophy required acknowledgement that some students encounter constraints to their success such as inadequate academic preparation, social skills, social capital, and limited belief in their capacity to succeed, (Manning, Kinzie, & Schuh, 2014) and these constraints may be “individual and personal or systematic and structural” (Keeling, 2014, p. 145). Contrary to the deficit mindset found on many campuses where constraints are associated with deficits within the student’s abilities (Harper, 2010), institutions or professionals with an ethic of care “emphasize that colleges and

universities have a moral and educational obligation to provide the academic, personal, and social support students need to succeed” (Keeling, 2014, p. 135). Therefore, professionals might focus on increased intentionality and incorporation of dispositional aspects in both the education and support of developmental education students.

Beyond expanded training, increased intentionality and support could also include use of the DAMMQ-C to identify students who would benefit from additional support or intervention. The benefit of the DAMMQ-C measuring multiple domains of dispositional aspects could be leveraged within a support program of this nature. Interventions could be strategically crafted to meet the unique needs of individual students and continual assessment of the success of interventions is also needed. Examples of interventions could include discussing individual self-assessment with peer success coaches trained with appropriate helping and strategy building skills or even incorporation of interventions through reflective assignments within college transition courses. Regardless of the form of intervention, higher education professionals might ensure the intervention incorporates the student as an active participant contrary to a prevailing thought process of students lacking the agency to develop and participate in developing strategies for their own success.

Higher education professionals might also consider implications for both admissions and developmental education placement. The role of standardized tests within the admissions and placement process might be critically examined as these scores often serve as barriers to access and/or contribute to additional cost and time to degree. However, this study along with a multitude of others exposed the limited relationship between standardized tests and college outcomes, especially for specific student populations and when other cognitive and dispositional factors are included (Bridgeman et al., 2004; Kim, 2015; Kirby et al., 2007; Richardson et al.,

2012). Consideration for dispositional measures within the admission and placement process could be warranted for higher education professionals seeking to more accurately identify institutional fit and appropriate placement. However, non-self-report measures of student dispositions, similar to the work of Józsa, Barrett, & Morgan (2016) with school aged children, would be required for such a consideration to move forward.

Finally, the study supported a continued focus on developmental education. Many underrepresented student populations are overly saturated within developmental education (Chen & Simone, 2016). Additionally, on many campuses, developmental education is a separate and unique environment within the larger campus environment. If higher education professionals are interested in improving student success, developmental education could be a fruitful area of focus, especially concerning increased success for students from underrepresented populations.

Implications for Scholarship and Recommendations for Future Research

The study's findings provided initial support for the DAMMQ-C as a valid and reliable instrument measuring multiple dispositional aspects. Given the item wording and brevity of the DAMMQ-C, the instrument could play a valuable role in exploring the malleability of dispositional factors within pre-test post-test designs that explore change in student dispositions over time. The DAMMQ-C could also serve well within more complex longitudinal designs that measure various aspects of the student experience or campus environment in an effort to identify what influences the change in dispositional factors. Specifically, validation of the DAMMQ-C unlocked increased opportunity to address a significant gap in the student success literature.

Museus (2014) discussed this gap:

“...quantitative research that tests the impact of these types of environments and approaches to delivering education programs and services on success among larger

populations would help fill an important persisting void in the scholarship on success among diverse student populations in college” (p. 197)

A specific example would be a study that paired the DAMMQ-C with measures of environmental aspects as identified within the CECE model to (in)validate the CECE model (Museus, 2014). As discussed in chapter two, Museus et al. (2015) have developed measures for the environmental aspects, yet the current instrumentation for student dispositions utilized within studies seeking to validate the CECE model raised significant concerns and limitations.

Scholars can utilize the DAMMQ-C as a multi-domain measure to address the limitation of studies that only explore a single construct or domain (Richardson et al., 2012). Student success is complex. The literature around dispositional factors is robust yet disjointed. With contributions from scholars in both education and psychology, a plethora of individual constructs have been identified as relevant factors for consideration (Richardson et al., 2012). However, single construct designs do not represent the complexity of the wholistic student. Scholars must explore multiple domains of dispositional factors, how these factors interact with each other, and how they interact with the environment around them. Continued validation and refinement of the DAMMQ-C provides an opportunity to engage in this type of scholarship, and ultimately could support moving towards a better understanding of student success.

Unexpectedly, the findings in this study revealed the complex and valuable role of the student-faculty relationship, especially for developmental education students. Future research should continue to explore the role this relationship plays in student success and the influence of student-faculty interactions on student dispositions towards seeking out and maintaining both a social and academic relationship with faculty. Specifically, longitudinal quantitative studies that explore change in dispositions towards faculty over time, as measured by the DAMMQ-C scales,

and evaluate the quality of faculty interactions with the student-professor interaction scale (Cokley et al., 2004) or Barnett's (2011) faculty validation scale, would prove valuable in increasing understanding around the student-faculty relationship. The student-faculty relationship is also ripe for qualitative studies exploring both students' and faculty members' lived experiences and meaning making concerning the student-faculty relationship.

The findings also support a focus on the student-faculty relationship with Black students. Though this study did not explore the quality of the student-faculty relationship, it is plausible that negative interactions or unsatisfying interactions with faculty could result in Black students having less persistence in their relationship with faculty. Future research could utilize both quantitative and qualitative methods in exploring this potential relationship.

All studies carry limitations, and the limitations of this study also present opportunity for future research. First, this study is limited to the sample obtained at the two data collection sites. Future research should continue to evaluate the DAMMQ-C with diverse samples from various institutional types and geographic locations. Additionally, this study was the first time adult mastery motivation was measured with college students in the United States. Therefore, future research should continue to evaluate the DAMMQ-C. Continued evaluation should include test-retest reliability, continued evaluation of internal consistency of scales, continued evaluation of item loading, predictive validity, and testing for convergent validity with the scales of the DAMMQ-C and existing measures within multiple dispositional domains as identified by Richardson et al. (2012).

The study's implications are also limited to the primary purpose of evaluating the DAMMQ-C as a multiple domain measure of student dispositions for U.S. college students. Specifically, the DAMMQ-C was utilized in an effort to evaluate an instrument that could

consolidate the broad literature on student dispositions. Consolidation of this nature carries limitations in that aspects of salient constructs may be neglected. Additionally, the failure of a self-efficacy scale to load on the anticipated items limited this study to alignment with only three dispositional domains versus the theorized alignment with four domains as identified by Richardson et al. (2012). Therefore, future research should explore new items for inclusion in the DAMMQ-C to measure self-efficacy.

Another limitation of this study was that analyses focused on associational relationships, and therefore, no conclusions concerning causality can be taken from the findings. Future research should explore predictive validity of adult mastery motivation through analyses that utilizes outcome variables that occur after participants complete the DAMMQ-C. Additionally, future research should explore this predictive ability across a range of relevant outcomes including semester to semester persistence, semester and cumulative GPA, graduation, and student behaviors such as academic and social engagement measures.

Adoption of the Culturally Engaging Campus Environments (CECE) model as the theoretical framework for this study also influences opportunities for future research. Specifically, the DAMMQ-C was evaluated in an effort to address a significant limitation in dispositional measurement that limited the ability to (in)validate more comprehensive models of student success, such as the CECE model. Therefore, future research should include longitudinal designs that include measures of the student experience and campus environment to explore the influence of experiences and environment on student dispositions, and ultimately student success. Though Museus (2014) identified the specific void of quantitative research of this nature, mixed methods studies would also be needed to explore the potential emergence of other environmental factors influencing student dispositions.

Future research should also continue exploring the role of dispositional factors in student success with both aggregated and disaggregated populations. A specific sub-population of interest is developmental education students. Developmental education students represent a significant portion of students in higher education, especially students from underrepresented backgrounds, and developmental education students succeed and graduate at alarmingly low levels. Future research should not only continue to explore the role dispositional factors in developmental education student success, but also should also evaluate the efficacy of various forms of intervention around dispositional factors for both developmental and non-developmental education students.

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APPENDICES

Appendix A

Dimensions of Adult Mastery Motivation Questionnaire- College (DAMMQC)

For the questions below, please circle the number that best indicates **how typical** each statement is of you. Think of a rating of 3 as being average for a college student. There are no right or wrong answers, just circle the answer that best describes you. Please answer all questions even if you are not sure. Circle only one number for each question.

Student ID Number: _____

	NOT AT ALL TYPICAL	2	3	4	VERY TYPICAL
1. I work at a new challenge until I feel I can do it well.	1	2	3	4	5
2. I try hard to make friends with other students.	1	2	3	4	5
3. I prefer to challenge myself with difficult tasks even if I am unsure that I will be able to complete them.	1	2	3	4	5
4. I try to figure out my instructor's expectations.	1	2	3	4	5
5. I solve problems quickly	1	2	3	4	5
6. If I am unsuccessful with a difficult task, I know that I can gain the skills needed to try it again.	1	2	3	4	5
7. I practice new skills over and over until I am satisfied.	1	2	3	4	5
8. I feel a sense of achievement when I complete a difficult task.	1	2	3	4	5
9. I can become completely absorbed in a challenging task.	1	2	3	4	5
10. I like a challenge when learning new skills.	1	2	3	4	5
11. I try to keep relationships with other students going.	1	2	3	4	5
12. I usually <u>am able to</u> complete tasks even if they are difficult.	1	2	3	4	5
13. I try hard to understand the academic interests of my instructors.	1	2	3	4	5
14. I find challenging tasks to be more interesting than easy ones.	1	2	3	4	5
15. I can become completely immersed in tasks that are developing my skills.	1	2	3	4	5
16. I try to include myself in what other students are doing.	1	2	3	4	5
17. I choose to do tasks that I think will be challenging to me.	1	2	3	4	5

18. I explore all ways to solve a problem.	1	2	3	4	5
19. I try hard to form relationships with my instructors.	1	2	3	4	5
20. I attempt difficult tasks even if I have some uncertainty about whether I will be able to complete them.	1	2	3	4	5
21. I begin to enjoy difficult tasks as I begin to develop new skills.	1	2	3	4	5
22. I try to keep other students interested in what I am doing.	1	2	3	4	5
23. I often lose track of time when I am working on a challenging task.	1	2	3	4	5
24. I generally persist with a difficult task for a long time.	1	2	3	4	5
25. I feel proud of myself when I am successful.	1	2	3	4	5
26. I try hard to have my instructors understand who I am as a person.	1	2	3	4	5
27. I am good at the things I do.	1	2	3	4	5
28. I enjoy being challenged by difficult tasks.	1	2	3	4	5
29. I try to engage in conversations with other students.	1	2	3	4	5
30. I persist with a task even if I feel it is difficult.	1	2	3	4	5
31. I believe I have the skills and abilities to complete challenges that I am faced with.	1	2	3	4	5
32. I try hard to engage in conversations with my instructors.	1	2	3	4	5
33. I try to understand other students.	1	2	3	4	5
34. I feel excited when I realize I am making progress with a difficult task.	1	2	3	4	5
35. I like to build on my existing skills even if it will be difficult for me.	1	2	3	4	5



Appendix C

USS Cover Letter

**University of Southern State
Informed Consent Cover Letter**

Mastery Motivation: Moving Toward a Better Understanding of College Student Success

You are being asked to participate in a research study. Before you give your consent to volunteer, it is important that you read the following information to be sure you understand what you will be asked to do.

Dear Participant,

My name is Thomas Bruick, and I am a researcher from Colorado State University in the School of Education. We are conducting a research study on the role of motivation within the college experience. The Principal Investigator is Dr. Linda Kuk, School of Education and the Co-Principal Investigator is Thomas Bruick, School of Education. The research study is serving as Mr. Bruick's dissertation project within the Higher Education Leadership Ph.D. program.

If you volunteer to participate in this study, you will be asked to complete a survey about your motivation. Participation will take approximately 5 to 10 minutes. Your participation in this research study is voluntary and you must be at least 18 years old to participate. You may refuse to participate or stop participation at anytime without penalty. To stop simply stop answering questions on the survey.

During the survey, you will be asked to provide your student ID number. Your survey will also be randomly assigned a participant number by the researcher. Your student ID number will be used by a university official to match your participant number to institutional information including academic records and demographic information. The university official will delete your student ID number before returning the data file to the researcher. The researcher will match your survey responses to institutional records based on your random participant number. Therefore, your institutional records will never be identifiable to the researcher. Completion of the survey will serve as consent to match your survey responses with institutional records.

The data file will be encrypted and stored in password protected cloud storage. Survey responses will be stored in a locked file cabinet in Mr. Bruick's office at the University of Central Arkansas for a period of three years. When we report and share the data with others, we will combine the data from all participants. There are no foreseeable risks or direct benefits to you, but we hope to gain more knowledge on the role of motivation in the college student experience.

If you have any questions about the research, please contact Thomas Bruick at thomas.bruick@colostate.edu or Dr. Linda Kuk at linda.kuk@colostate.edu. This research project has been reviewed and approved by the Institutional Review Board for the Protection of Human Subjects at both the University of Southern State and Colorado State University. If you have any questions about your rights as a volunteer in this research, contact the CSU IRB

at: RICRO_IRB@mail.colostate.edu; 970-491-1553.

I have read the information provided above. I understand that by returning a completed survey, I am agreeing to participate in this research study.

KEEP THIS INFORMED CONSENT COVER LETTER FOR YOUR RECORDS.

Sincerely,

Dr. Lina Kuk
Associate Professor

Thomas Bruick
Doctoral Candidate

Appendix D

Eastland College Cover Letter

Date

Dear Participant,

My name is Thomas Bruick, and I am a researcher from Colorado State University in the School of Education. We are conducting a research study on college student motivation. The title of our project is *Mastery Motivation: Moving Toward a Better Understanding of College Student Success*. The Principal Investigator is Dr. Linda Kuk, School of Education and the Co-Principal Investigator is Thomas Bruick, School of Education.

We would like you to complete a survey about your motivation. Participation will take approximately 5 to 10 minutes. Your participation in this research is voluntary, and you must be at least 18 years old to participate. If you decide to participate in the study, you may withdraw your consent and stop participation at any time without penalty.

During the survey, you will be asked to provide your student ID number. Your survey will also be randomly assigned a participant number by the researcher. Your student ID number will be used by a university official for the purpose of matching your participant number to institutional information including academic records and demographic information. The university official will delete your student ID number before returning the data file to the researcher. The researcher will match your survey responses to institutional records based on your random participant number. Therefore, your institutional records will never be identifiable to the researcher. Completion of the survey will serve as consent to match your survey responses with institutional records.

The data file will be encrypted and stored in password protected cloud storage. When we report and share the data with others, we will combine the data from all participants. There are no known risks or direct benefits to you, but we hope to gain more knowledge on the role of motivation in the college student experience.

If you have any questions about the research, please contact Thomas Bruick at thomas.bruick@colostate.edu or Dr. Linda Kuk at linda.kuk@colostate.edu. If you have any questions about your rights as a volunteer in this research, contact the CSU IRB at: RICRO_IRB@mail.colostate.edu; 970-491-1553.

Sincerely,

Dr. Linda Kuk
Associate Professor

Thomas Bruick
Doctoral Candidate