CONTRIBUTIONS OF ACADEMIC CONTINGENT SELF-WORTH AND MATH

SELF-EFFICACY TO SELF-HANDICAPPING AND MATH TEST PERFORMANCE

A Dissertation Presented to the

Faculty of the College of Education

University of Houston

In Partial Fulfillment of the

Requirements for the Degree

Doctor of Philosophy

by

Brittany J. Thorne

December 2014

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An Abstract

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Abstract

Persons' performance-contingent appraisals of their self-worth and their task-specific abilities may interrelate to have invasive consequences that are far reaching, including less time persisting in the face of failure, task disengagement, lower achievement, defensive self-enhancement, and the erosion of interest and motivation. The present study investigated the individual and interactive contributions of academic contingent self-worth (CSW) and math self-efficacy beliefs (MSE) to self-handicapping behaviors and math test performance within a college student sample. Participants completed measures of the above self-related appraisals prior to their exposure to three practice math exam problems that were scored. They were then offered the option of (a) either receiving additional practice test problems before taking a graded and timed, 8-item math exam, or (b) proceeding directly to math exam without additional practice. Prior to choosing, they were informed that students who completed additional practice problems typically improved their actual math test performance. The analysis evaluated the contributions of ACSW and MSE scores on two outcomes, graded math exam performance and self-handicapping (refusing additional practice questions before taking the exam). It was hypothesized that academic contingent self-worth would interact with math self-efficacy to predict math exam performance and choice of whether to self-handicap. Results of the regression analyses indicated (a) that, controlling for students'

gender and practice test performance, ACSW and MSE scores each significantly and

positively predicted math exam scores, but their interaction did not significantly enhance

math test performance, and (b) that neither ACSW nor MSE scores predicted self-

handicapping behavior.

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Chapter I

Introduction

Academic motivation, choice, and behavior are closely related to career success, optimism, and satisfaction (Lent, Brown, & Hackett, 2000). Therefore, persistence in academics and perceptions that one is efficacious in these endeavors are important to students, especially because of their influence on future career outcomes. Researching constructs integral to academic motivation and persistence is vital for enhancing our knowledge of ways to improve well-being well into adulthood. Unique relationships have emerged from these studies and have advanced thought on additional connections that should be assessed in future research as related to career and academic success.

This study will describe and advance literature relevant to two components of the self-system, contingent self-worth and self-efficacy, and how they may relate to performance and motivation in the face of academic obstacles. Rusk and Rothbaum (2010) theorized that it is best to examine the outcomes of the broad self-esteem construct through its more specific correlates. They proposed that examining the motivation for behaviors, as well as one's beliefs about their behavioral capabilities, would prove to be a more accurate and descriptive predictor of career and academic outcomes than each of these constructs alone. Though these authors reviewed evidence to support their hypothesis, until very recently, the interaction of motivation behaviors and capability beliefs has not been tested. The present investigation will contribute to this line of inquiry by testing the possible interaction of one's motivation to enhance or protect their academic self-worth and their task-specific performance beliefs to their preparations to take (and their actual performance on) a difficult math exam. The sections that follow

will provide a summary of literature relevant to the proposed study. First, a summary of key findings on the broad concept of global self-esteem will be presented. This will be followed by a review of studies pertaining to contingent self-worth, a narrower self-esteem construct that more accurately predicts behavioral motivation, persistence, and academic outcomes. Next, self-efficacy, or beliefs about one's task-specific performance capabilities, and its relationship to important academic outcomes including achievement, persistence, and confidence will be discussed. Self-efficacy as it relates to self-worth will be presented, as this combination could be a unique construct in academic motivation. Following this, an integrative model of these constructs and their hypothesized connections will be advanced, which will highlight important gaps in our understanding of these concepts as they are related to academic motivation, performance, and persistence.

Chapter II

Literature Review

Contemporary Perspectives on Self-Esteem

Recent studies have shown that self-esteem is a complex construct. Until recently, self-esteem had mainly been considered a unitary or global construct; however, contemporary research has shown that self-esteem appears to be subject to variability and instability (Kernis, 2003). This recent research was prompted by findings that the objective benefits of high self-esteem are limited. While persons with high self-esteem are more likely to have positive feelings about themselves, they are no more likely to achieve academically, show leadership, or have good job performance, nor are those with low self-esteem any more likely to smoke, be violent, or under-achieve professionally (Baumeister, Campbell, Krueger, & Vohs, 2003). It appears, rather, that while global self-esteem tends to be a stable, trait-like feature of one's self-concept, it is the pursuit of state self-esteem that influences motivation and behavior. Individuals are more motivated to pursue increases, and avoid drops, in state-self-esteem over and above trait level global self-esteem. It is one's susceptibility to these fluctuations that determines self-esteem stability and is a powerful predictor of motivation and beliefs about what one has to attain worth and value. Self-esteem stability refers to changes in day-to-day self-worth (Kernis, Paradise, Whitaker, Wheatman, & Goldman, 2000). The fluctuations in self-appraisals of worth are context-based (Kernis, 2003) and are dependent on events in important domains, areas upon which self-worth is contingent (Crocker, Karpinski, Quinn & Chase, 2003). Thus, even individuals with high levels of self-esteem have self-worth that is fragile to threat.

Kernis (2003) distinguished between high fragile self-esteem and "optimal self-esteem" (p. 13). Relative to their peers with high yet fragile self-esteem, persons with optimal self-esteem experience feelings of self-worth that are less variable and more stable because they do not interpret feedback from external sources as central to their self-concepts. In other words, while they might experience sadness or disappointment when they fail at a certain task, they are able to self-soothe and to regulate their self-esteem so that this feedback does not affect their felt sense of worth. For example, individuals with optimal self-esteem will be more likely to maintain a mastery-oriented motivation for learning, and will interpret failure feedback as helpful to their future success rather than a statement about their personal capabilities. Intuitively, we might expect all individuals with high self-esteem to receive negative performance feedback in this way, graciously and without a great deal of defensiveness. However, research suggests individuals with unstable high self-esteem are more likely to interpret events as self-esteem relevant and define external events in terms of their own self-worth. They have difficulty self-soothing and thus, walk around with a "defend the fort mentality" anticipating threats to self-esteem and engaging in self-deception and criticism of out-groups in order to help maintain their worth (Kernis, 2003). These are not adaptive strategies, as individuals with high unstable self-esteem tend to be more defensive, prone to anger, experience greater levels of stress, and engage in more self-enhancement at the expense of achievement, than do their counterparts with comparably high yet more stable self-esteem levels (Molden & Dweck, 2000).

People with low self-esteem similarly tend to interpret external events as central to their self-worth. Kernis (2003) argued that low self-esteem individuals also lack

stability and internal consistency because they experience pockets of favorable self-judgments concurrent with low confidence in abilities. Persons with low self-esteem have more neutral self-concepts and possess a lack of self-clarity in regard to their perceived worth. Consequently, their perceived worth and self-esteem are highly variable and fluctuate according to feedback they receive from external sources. These individuals will engage in extra effort to defend against negative feedback to protect self-worth, rather than expend effort to improve their performance. They are less likely to interpret negative feedback as helpful, and have less ability to regulate fluctuations in self-esteem. As described below, studies have shown that these efforts are likely to occur if they perceive that a performance-related failure is particularly indicative of self-worth.

Contingencies of Self-Worth

Crocker, Luhtanen, Cooper, and Bouvrette (2003) theorized that self-esteem is anchored in specific individual domains identified as Contingencies of Self Worth (CSWs). Examining the different domains of CSW and the overall concept of self-esteem, provides implications for better predicting motivation, affect, and feelings of worth. Self-esteem stability is also dependent on successes and failures in areas meaningful to the individual (Crocker, Sommers, & Luhtanen, 2002). When assessing self-esteem instability, Crocker and colleagues (2002) found that self-esteem was lower on the days individuals received a threat (negative feedback) to their self-worth. However, this change in self-esteem was moderated by a measure of specific areas of contingent self-worth. In other words, individual self-esteem changed more dramatically when negative feedback was related to performance in an important or contingent domain, as opposed to a non-contingent domain.

Crocker et al. (2002) proposed that college students selectively anchor their worth in one or more of seven separate domains (appearance, approval from others, competition, family love and support, God's love, virtue, academic competence) labeled Contingencies of Self-Worth (CSW). For some people, self–esteem may depend on being attractive to others or beating others in competition. For others, self-esteem may depend on feeling that they are a good person or that God loves them. These individuals' self-esteem is thus contingent on these specific and important domains. Self-esteem will rise and fall as a result of victories or failures in contingent domains of self-worth (Crocker et al., 2002).

Changes in one's self-esteem are likely to be associated with fluctuating affects (Brockner, 1984, Pelham & Swanson, 1989, as cited in Crocker et al., 2002). Positive feelings will result from successes whereas negative feelings arise from losses. A person's affect is expected to fluctuate when goals in contingent areas are not met, relative to those areas wherein self-worth is not contingent. The seven domains hypothesized by Crocker et al. (2003) have important characteristics and differentiations. Those whose self-worth is contingent upon approval from generalized others believe others' views of the self are an important basis of self-esteem (Leary & Baumeister, 2000). An important distinction in this domain is that these individuals base their worth on how they *believe* others see them, not as they are actually seen (Crocker et al., 2003). For some, self-esteem is based less on how competent one is, and more about being superior relative to others (competition). Men, in particular, have a tendency to anchor their self-esteem in the competition domain (Crocker et al., 2003).

Individuals can base their self-esteem on perceived capability in certain areas, such as academics (Crocker et al., 2003). For these individuals, evaluations by teachers, such as grades, will cause greater fluctuations in self-esteem among people whose self-worth is contingent upon competence in academics. Crocker and colleagues (2003) had students who were applying to graduate school complete pre- and post-measures of depression, complete the CSW scale, and record the daily news of either acceptance or rejection notification from schools for two months. Students' self-esteem rose on days they received acceptances and fell on days they received rejections. This effect was moderated, however, by academic CSW scores. These findings demonstrated that persons whose self-worth was based on academic competence experienced higher or lower self-esteem related to the days they had acceptances or rejections, respectively. Those with lower academic contingent self-worth did not demonstrate the same variability in their self-esteem level when experiencing acceptances or rejections. No other contingency moderated these effects. This study provided evidence that self-esteem will more dramatically increase or decrease in response to success or failure feedback in self-esteem contingent areas. Furthermore, students whose self-worth was not contingently based evidenced less affect-related instability relative to their peers with contingent self-worth. In fact, only instability of self-esteem predicted depressive symptoms at the end of the study. Receiving variable feedback, both acceptances and rejections, caused instability only among those students with academically contingent self-worth.

Succeeding or failing can have immense importance for one's self-worth. The implications of performance outcomes in a domain of contingent self-worth are likely to be far reaching and generalized to an individual's overall perceived worth (Wolfe &

Crocker, 2003). For persons with contingent self-worth, a success means more than simply achieving a goal; it also means that one is a worthwhile and good person. Consequently, good feelings or positive affect about oneself will follow. By contrast, the experience of failure in a contingent domain of self-worth is likely to heighten the risk of negative affect. This experience does not just mean one did not achieve a specific goal; it means that one is a bad or unworthy person. In other words, for an individual whose self-esteem is contingent on academic competence, achieving an A grade will not only satisfy a goal, but it will also mean they are a worthy person. A person's perception of their self-worth has important implications for their motivation, academic performance, and achievement.

Persons' ability to regulate their self-esteem will be dependent upon their specific CSWs interacting with relevant events that prompt particular coping responses. The attempt to regulate self-esteem influences one's motivation and behavior. Research has shown that individuals will act in ways to boost their self-esteem and to avoid areas where they will experience a blow to their feelings of worth (Carver & Scheier, 1998; Heine, Lehman, Markus, & Kitiyama, 1999, as cited in Wolfe and Crocker, 2003). Seeking higher self-esteem can be a powerful motivator. Crocker et al. (2003) found that areas of contingency predicted how college students spent their time. Women whose self-esteem was contingent on their physical attractiveness (i.e., they scored highly on the appearance CSW subscale) were more likely to join a sorority and spend more time and energy on personal grooming. God's love CSW predicted the amount of time spent in church (Crocker & Wolfe, 2001). Though academically contingent students reported spending more time studying than non-contingent students, they did not earn higher

grades or report greater achievement (Crocker & Wolfe, 2001). This discrepancy was theorized to be a result of additional time spent self-enhancing instead of being motivated to devote all of one's time to learning and improving on a task. This model had yet to be tested however, and examining task persistence and self-handicapping would provide valuable information for extending this model.

A factor analysis of CSW data suggested that these seven CSW subscales could be classified into either internally or externally contingent domains of self-worth (Crocker et al., 2003). Later, additional analyses completed by Sargent, Crocker, and Luhtanen (2006) further supported this 2-factor model. Internally contingent domains (God's love, virtue) are based on internally mediating appraisals of worth. Externally contingent domains (appearance, approval from others, competition, academic competence, family support) are based more on the opinions of others or external sources. CSWs differ based on how easy it is to gain satisfaction in that area. More externally contingent areas have less stable levels of self-esteem and result in a lower typical self-worth level (Crocker et al., 2003). In contrast, those that are internally contingent are more easily and more readily satisfied, because gaining approval or praise does not depend on others providing it. Relative to their peers with high levels of contingent self-worth, their capacity to engage in adaptive self-soothing is better developed and a more accessible internal coping process.

Perceptions of self-worth based on internally contingent domains have been shown to be more beneficial to psychological well-being, whereas the endorsement of externally contingent self-worth poses greater risks to psychological well-being (Wolfe & Crocker, 2003). Individuals are more likely to function better when their self-esteem is

based on core abstract unique features of the self, or experienced with less variability (Pyszczynski, Greenberg, & Goldenberg, 2003). Kernis (2003) argued that optimal self-esteem does not require validation from others nor is it based on specific performance outcomes. From this perspective, persons with internally contingent self-worth are assumed to possess more positive and stable levels of self-esteem whereas those with externally contingent self-worth would experience lower and less stable self-esteem.

In the externally contingent domains, significant differences in successes and failures will make self-esteem unstable and therefore increase their risk for depression (Crocker & Wolfe, 2001; Sargent, et al., 2006). In fact, a recent study of undergraduate women demonstrated that external CSWs and self-esteem instability made unique contributions to depression over a 3-month period (Lopez, Thorne, Schoenecker, Siffert, Chaliman, & Castleberry, 2014). Basing one's self-worth in internally contingent areas appears to provide a buffer against anxiety and concurrent low self-esteem (Pyszczynski, et al., 2003). More externally contingent domains are negatively related to adjustment (Crocker et al., 2003). These domains are also related to neuroticism, lower self-esteem, and heightened anxiety; thus, a person's typical and/or stable self-esteem level, will largely depend on the particular contingencies a person holds and their ability to gain successes in that area.

Those who hold academic contingencies of self-worth report higher rates of depression than others and appear to be more hyper-vigilant to protection from failure. Being contingent in this area was shown to increase anxiety and to adversely affect motivation (Crocker & Park, 2004). Expending effort to protect oneself from failure can effectively sabotage achievement because students are less persistent and disengage from

tasks in an effort to create excuses or to self-handicap. A recent study gave students the choice of listening to "distracting" or "enhancing" music while completing either a difficult or an easy academic task. For students low on academic contingency, there was no difference in music selection regardless of anticipated task difficulty (Niiya, Brook, & Crocker, 2010). However, students who were highly contingent on academic competence chose to listen to the most distracting music when they anticipated a difficult academic task, and chose the most enhancing music when they anticipated an easy task. Research suggests that self-handicapping is most likely to occur when individuals are uncertain that they will succeed on a task and when they believe their competence is being evaluated. For example, Lawrence and Crocker (2009) found no differences in task performance for students with varying levels of academic contingency when students were primed with a learning goal (i.e., were told that only their learning strategies, and not their ability, would be evaluated). However, when students in a different condition were primed with a performance-goal by being told they were being evaluated for their strengths and weaknesses and general academic competence, the more academically contingent these students were, the worse they performed on the task.

Self-handicapping behaviors are defined as those behaviors that provide plausible excuses for failure that do not implicate ability, thereby protecting self-esteem but also decreasing the probability of success (Rhodewalt & Tragakis, 2002). For example, procrastination, reduced effort, practice, and persistence, and creating distraction, like listening to music while studying, could all provide compelling arguments for why performance suffered without undermining the perception of one's actual abilities. Even after failure occurs, those who engage in these behaviors can continue feeling competent

and efficacious. In the present study, participants' decision not to engage in additional practice items prior to taking an evaluated math test will be used as an index of self-handicapping.

Academically contingent students choose settings and opportunities where successes in their domains will be verified and appreciated by others and avoid areas which could provide feedback of failure. If failure is anticipated, these individuals will disengage their self-worth from important tasks (Wolfe & Crocker, 2003). Thus, when anticipating negative performance feedback, they are more likely to employ self-handicapping behaviors or to attribute reasons for failure to external properties, thereby protecting their self-worth. This could result in limiting learning opportunities or goals because of a desire to avoid failure in important domains. There is suggestive evidence that, whereas individuals might engage in self-handicapping behaviors that avoid immediate failure, these behaviors can be detrimental to well-being (Sherman, Nelson, & Steele, 2000). Individuals who commit to choices to protect self-esteem, and thus pursue performance enhancing goals rather than risking failure, will be limiting their opportunities to grow and learn. Conversely, those who maintain more internally CSWs tend to exhibit more adaptive academic behaviors and report less of a tendency to self-handicap (Niiya, Brook, & Crocker, 2010). These individuals will be more likely to attribute negative feedback to lack of practice or study skills as opposed to ability, and exhibit more mastery-oriented responses including increased effort on an academic task. This model implies that one's self-efficacy, or beliefs about their performance capabilities, determines their persistence on tasks, however self-efficacy's relationship to self-handicapping and persistence has yet to be tested. It is shown that anticipation of

failure can affect self-esteem and mood, but no study has empirically tested the relationship between failure feedback and confidence or self-efficacy. This concept could prove to be an important predictor of academic persistence and affect regulation.

Beliefs about the stability of self-worth do appear to be affected by their particular contingent domain. Crocker and Park (2004) found support for this hypothesis. Participants in their study read a vignette that could have been interpreted as relevant to either a school competency contingency or to an approval contingency. Participants' reactions to the vignette were uniquely predicted by their corresponding contingent self-worth (academic competency or other's approval). Moreover, this study's findings suggested that an individual's contingency of self-worth can affect how they interpret and attach meaning to various events. These contingencies act as a lens through which self-relevant information is assigned and processed.

Self-Efficacy

The consequences of contingent self-worth and its influence on motivation are far reaching. Therefore it is important to understand more clearly how and why we base our self-esteem in the areas we do, as well as consequences of these appraisals on task performance, motivation, and persistence. Although the relationship of CSWs to self-esteem has been investigated, the relationship of CSWs to one's beliefs about their own capabilities has not (Niiya et al., 2010). These two facets of the greater self-concept, motivation to self-regulate and self-efficacy (or one's performance-related confidence), appear to operate simultaneously but little is known about how they interact. Though the relationship of motivation and self-appraisals has been theorized to be the most predictive of achievement-related outcomes, this relationship has yet to be tested (Rusk &

Rothbaum, 2010). In addition, while the pursuit of self-enhancement, which is deemed to underlie the presence of contingent self-worth, has been associated with unstable self-esteem and related outcomes, a relationship with self-efficacy has only been implied. Further studies could provide valuable data regarding the prediction and maintenance of unstable self-esteem, achievement, persistence, performance enhancing, and self-handicapping. This study addresses this important gap in the literature. Understanding the outcomes that determine motivation and performance is critical to understanding academic success itself.

Self-efficacy, as originally theorized by Bandura (1977), is the subjective appraisal of one's domain-specific performance capabilities, a perception that organizes, assesses, and executes action, and thus promotes task persistence and future performance outcomes. Self-efficacy is the judgment or beliefs persons make about their ability to complete specific actions and to attain specific results. As such, it is a social-cognitive and self-referential judgment that is constructed from person and environmental factors (Bandura, 1993). One's perceived self-efficacy is constructed of self-appraisals of developmental, environmental, and biological factors, which are integrated into an evaluation of ability to complete an action in a specific domain. Self-efficacy beliefs are thus subjective appraisals of one's abilities to successfully execute particular tasks.

These task specific appraisals are based on personal factors including performance history (previous successes and failures), vicarious assessments (perceptions of other's ability to complete an action, modeling), persuasion (feedback from others, "you can do it"), and biological factors (muscle strength, heart rate, breathing). Determining one's self-efficacy is a dynamic process that is constantly assimilating or

rejecting new information related to one's perceived ability (Bandura, 1993). After completing a particular action, self-efficacy could change according to one's perception of their performance, outcome, task difficulty, amount of effort extended, perceived relatedness to the vicarious model, and/or perceived credibility of the persuasive source. Perception, or social-cognitions of events, will define current efficacy perceptions as well as future ability to reach similar outcomes in similar tasks (Bandura, 1986). These appraisals of future abilities will predict particular behaviors and motivation (Lent, Brown, & Hackett, 1994).

When persons report high self-efficacy, they are more likely to be motivated to complete a particular action (Bandura, 1986). Self-efficacy is also said to predict interest. Individuals enjoy feeling efficacious, gain pleasure from succeeding, and therefore will develop interest in and seek out areas where they perceive they will achieve success. This sequence of events continues in a cyclical fashion. Experiencing efficaciousness in a particular domain promotes interest in that domain and strengthens further motivation to complete actions, which promotes additional practice, and therefore opportunities for success. Experiences of success enhance positive feelings, and are predictive of increases in self-efficacy and continued task-related interest (Lent et al., 1994). This model appears to identify the same motivation cycle that CSW theory postulates. Individuals are motivated to seek successes and consequent positive feelings in important specific domains. Additionally, according to Social Cognitive Career Theory (SCCT; Lent et al., 1994), individuals will disengage from performance tasks in domains wherein they feel less efficacious and will instead pursue performances in areas of greater perceived competence. Though this theory describes a similar process of motivation as that of

CSW, SCCT and CSW beliefs had yet to be investigated in relationship to each other. This is a valuable direction for inquiry especially in light of recent findings that self-esteem stability varies according to investment in specific domains, and self-efficacy is also a domain-specific self-appraisal. Does this self-system construct also experience instability?

Self-efficacy has been shown to play a very influential role in career-related behaviors and psychological consequences. Persons with high self-efficacy are more likely to show persistence with challenging problems, have higher motivation, expend more effort, and show higher levels of cognitive processing abilities than those with low self-efficacy (Seifert, 2004). These individuals will evidence higher task engagement, more task enjoyment, and a stronger mastery-oriented learning strategy (Bandura, 1993). Those with this learning orientation are described as perceiving academic tasks as opportunities to learn and grow rather than simply a means to an end wherein high grades are necessary to prove one's abilities to others. Therefore, one could reason that individuals with high self-efficacy will be less likely to pursue self-worth enhancement above the pursuit of opportunities to learn. It appears these individuals would be less likely to be externally contingent, self-handicap in pursuit of opportunities to improve, and would persist longer on tasks. Prior research appears to support this model, as those with high self-efficacy experienced less ego-oriented attributions and were less likely to generalize feedback as descriptive of their self-concept as those with low self-efficacy (Bandura, 1986). Examining the relationship of contingent self-worth and self-efficacy beliefs in tandem could enhance the prediction of academic failure and disengagement outcomes.

The most efficient predictor of self-efficacy beliefs and related behaviors is one's own perception of prior performance accomplishments (Bandura, 1986). Bandura's Social Cognitive theory postulates that individuals are motivated to pursue activities consistent with their self-efficacy beliefs thus further reinforcing interest in a particular domain, and that they will disengage from areas where they do not feel efficacious. Therefore when persons experience failure, or even the perceived threat of failure, these experiences will prompt a re-evaluation of their personal and environmental characteristics, thus re-establishing their level of self-efficacy. This process will determine a particular course of action, such as choosing a task or college major one perceives as being easier or where one's skills and abilities are perceived as being more effective (Lent et al., 2002).

Current career theories incorporate Bandura's theory of self-efficacy (Bandura, 1977, 1986) into their models and are utilized to predict career related choice and behaviors. SCCT cites Bandura's concept of self-efficacy as the most predictive aspect of future career choices. SCCT also identifies the expectation of a particular outcome as a contributing factor to motivation (Lent et al., 1994). Outcome expectations refer to the evaluation of the expected outcome after successfully completing a particular action. This is said to be motivating if it provides a desired physical (monetary), social (other's approval), or self-evaluating (self-satisfaction) reward (Bandura, 1986). It will discourage action if the perception of the outcome has negative implications for one's self-esteem or the desired reward (Lent et al., 2002). Self-evaluation or gaining self-satisfaction is theorized to be the most influential motivator on behavior. Studies have consistently found that if completing a particular action is expected to bring a positive outcome, and

therefore a positive self-evaluation, individuals will more likely persist in that action:

however, when attempting a challenging and difficult task, individuals will be more

likely to disengage from the task in order to preserve an existing positive self-evaluation

(Bandura, 1993; Lent et al., 2006). This pursuit of self-enhancement and the protection of

self-worth, as noted in SCCT literature, appear to be very similar to motivation as it is

described in the CSW literature. Both theories describe that the desire to protect and

promote self-worth directs motivation and academic outcomes, including choice and

persistence behaviors. However, only one of these models, SCCT, explicitly states that

one's perception of their abilities and beliefs about their capability to achieve success in

the future will affect these outcomes. Even though this model states this direct

relationship, self-efficacy has not been examined for instability, like that in self-esteem.

SCCT-guided studies have found that self-efficacy is the best predictor of future

academic outcomes, even over and above actual ability. However, this relationship

appears to be vulnerable when stress occurs especially in areas where the outcome is

important, or the risk associated with failure is great (Dunning, Heath, & Suls, 2004). In

fact, when these circumstances occur, individuals typically have, at best, only a modest

level of insight into their level of skill and character. In academia, self-assessments of

performance and intelligence only slightly correlate. Individual's perception of their own

intelligence tends to correlate only weakly ($r = .20$) with their performance on

intelligence assessments (Hansford & Hattie, 1982; Paunonen & Hong, 2010). This also

has important implications for real world performance. Students' ratings of their

academic skill during their first year of college only moderately correlated ($r = .35$) with

their instructors' evaluations (Dunning et al., 2004). This can be an especially sobering

fact when you consider that surgical residents' opinions of their surgical skills failed to correlate with their performance on standardized board exams.

Vulnerability in self-efficacy appraisals is supported by evidence of individuals' selectively processing important information regarding their future capabilities (Dunning et al., 2004). If their self-concepts cannot withstand objective scrutiny, individuals will be more likely to ignore important discrepant information which could furnish them a more accurate appraisal of their abilities. Such information-processing biases undermine the ability to make an accurate prediction of future performance, and occur most often when a situation is connected to an emotionally-provoking component (Paunonen & Hong, 2010). When asked before each test during a college semester about their impending performance, those students who provided more accurate predictions of their performance as the semester progressed did perform better, while poorly performing students remained dramatically over-confident, despite the feedback of failure from previous exams (Hacker, Bal, Horgan & Rakow, 2000). This can be an especially risky cycle for the latter group of students because their peers who have a better understanding of their own weaknesses are more willing to admit problems with comprehension, employ better study skills, ask for more guidance, and perform better on exams (Thiede, 1999). Individuals also may choose to remember information that matches their views of themselves and ignore information that does not. Those who were higher in self-enhancement were more likely to underperform or earn lower scores on an academic test (Paunonen & Hong, 2010), suggesting that these individuals may overcompensate psychologically for their performance-related inadequacies. Kruger and Dunning (1999) found that the more likely one is to overestimate their general level of intelligence, the

lower their actual ability. There is also evidence that self-efficacy appraisals appear vulnerable to maladaptive strategies intended to defend and enhance the total self-concept. Both self-efficacy and self-worth are subject to instability in important areas, however it is unknown how these two systems work together to promote learning motivation by predicting self-handicapping tendencies, time spent persisting on a task, and task performance.

Studies relating self-efficacy to higher achievement have shown differential outcomes and therefore should be investigated further. Robins and Pals (2002) showed that self-efficacy accounted for much of the variability in writing and verbal achievement of middle school students, and Schunk (1994) found that higher self-efficacy is positively related to higher global performance. Elsewhere, other studies have found that, because of its subjective nature, self-efficacy is only moderately correlated with objective abilities, and that high self-efficacy can actually lead to an over-prediction or over-confidence of abilities, which can adversely affect achievement outcomes (Eccles & Wigfield, 2002). These discrepancies are confusing, especially when one considers the model self-efficacy theory promotes: that is, that individuals will consistently re-evaluate their capabilities in the face of performance challenges and adjust their self-beliefs and efforts accordingly. It is a wonder that individuals would have low or inaccurate self-efficacy at all. According to this theory, once persons perceive the threat of failure they would reassign their efforts elsewhere in order to achieve more desired outcomes and a better prediction. This apparently is not occurring in certain situations, and these inconsistencies could be explained by other important self-perceptions occurring that obstruct accurate performance-related appraisals.

Self-Esteem and Self-Efficacy

These inconsistencies in the extant literature support continued inquiries into the nature and relationship of self-efficacy vulnerability. The social-cognitive model provides evidence of an interaction between the perception of abilities and the protection and enhancement of self-worth. This interaction has not been tested according to specific domains and therefore should be evaluated, as self-efficacy is a domain-specific measure and we now have access to a valid domain-specific measure of self-worth. The conjoint analysis of self-efficacy and contingent self-worth perceptions could provide an explanation for the persistence of low self-efficacy, as well as a better understanding of the conditions where in self-efficacy under-predicts task-related performance. Should it exist, this interaction could have important real-world implications. For instance, imagine the student who enrolls in an engineering major only to experience challenging courses and lower grades than expected. If this student were academically contingent he or she might choose to protect his or her self-worth and not persist in the desired direction of becoming an engineer. Instead, this individual might choose another major or continue to persist in engineering while being distracted with thoughts and feelings associated with low self-esteem and low self-efficacy, thus placing him or her at continuing risk for lower grades and achievement (Molden & Dweck, 2000).

An additional discrepancy of important consideration refers to the stability of self-efficacy across time. Bandura (1986) argued that self-efficacy is a stable belief that will persist and not be affected by threats of failure because it is not ego-involved, and will therefore be reliable in predicting achievement in a particular domain. This assumption was not supported in a study of the predictive ability of self-efficacy on achievement

across time through differing stages of life (Hong, Chiu, & Dweck, 1999). In that study, self-efficacy was an accurate predictor across the eighth grade year for middle school students, but in these students' transition to high school, self-efficacy lost its predictive power. Encountering more difficult academic-related tasks in high school was related to self-efficacy vulnerability. These investigators theorized that because self-efficacy is a meta-cognitive self-appraisal it did not as accurately predict the change in achievement as an objective cognitive appraisal would have (Dweck, 1999). Perhaps other aspects of the self-concept were also operating which influenced self-referent judgments and made self-efficacy perceptions unstable.

Previous research thus underscores the importance of examining other aspects of the greater self-concept in relation to self-efficacy, as a means of gaining a more accurate understanding of academic performance and related outcomes (Bong & Clark, 1999; Pietsch, Walker, & Chapman, 2003; Tafarodi & Swann, 2001). Self-efficacy beliefs represent primarily cognitive appraisals of competence, whereas self-concept perceptions include both cognitive and affective components (Pietsch et al., 2003).

Understanding the covariation of the cognitive and affective domains of self-esteem contributes to our knowledge of motivation and self-esteem regulation in individuals. Do individuals maintain fragile or defensive beliefs about self-competence, like self-efficacy, in an attempt to maintain their contingent self-worth and thereby regulate their self-esteem? After finding the inconsistencies in self-efficacy and broad or global self-esteem literature, several studies have examined these concepts in a narrower, more domain specific means to find the clearest predictor of outcomes. Examinations of the predictive qualities of self-efficacy in *comparison* to the greater self-concept have

been conducted; however, no study has considered the concurrent contributions of contingent self-worth and self-efficacy to performance-related predictions. While domain specific and narrow measures of self-esteem have proven to have the most predictive utility (Bandura, 1993; Crocker & Wolfe, 2001; Osborne & Jones, 2011; Paunonen & Hong, 2010) the interaction of two of these types of assessments may better explain their respective contributions to performance-related outcomes. Together, vulnerabilities in each of these aspects of the greater self-concept could best explain the inconsistent findings in prior studies, as well as clarify how distinct self aspects influence our performance-related actions, choices, and outcomes.

Summary and Research Objectives

In sum, it is evident that self-worth contingencies and self-efficacy each uniquely contribute to academic outcomes including self-handicapping behaviors and task performance. Maintaining specific beliefs about one's capabilities and contingent self-worth may alter the perception of what success and failure mean about a person's worth and abilities. These beliefs clearly can have invasive consequences that are far reaching, including less time persisting in the face of failure, task disengagement, lower achievement, defensive self-enhancement, and the ability to erode interest and future motivation. Though it has been shown that self-efficacy beliefs and contingent self-worth contribute to these consequences, these concepts have never been examined as working together to differentially predict academic outcomes. Do these two concepts interact and relate to vulnerabilities in self-esteem? Could these two forms of self-appraisals interact to incrementally predict self-handicapping motivations and task-performance?

Recent literature has also revealed notable differences between high global self-esteem and optimal self-esteem (Crocker et al., 2003; Kernis, 2003). Optimal self-esteem lacks the variability, vulnerability to threat, and defensiveness that high fragile self-esteem maintains. These differences account for vulnerabilities in self-worth which is exemplified through less optimal outcomes including less efficient effort, use of defensive strategies, higher degrees of procrastination and self-handicapping, and ultimately more negative affect (Crocker & Wolfe, 2001). Because of their unfortunate consequences, these are key distinctions to identify. An additional consequence that has been alluded to, yet never tested, is that of lowered confidence in abilities. It appears that Crocker and colleagues (Crocker et al., 2003; Crocker & Park, 2004; Crocker & Wolfe, 2001; Lawrence & Crocker, 2009) believe these outcomes are at least indirectly produced because of a change in one's confidence in their abilities. These studies found that participants disengaged from tasks when failure was anticipated. It appears these authors assumed that individuals engaged in destructive behaviors when they believed their abilities would not be enough to gain a desired successful outcome. This direct relationship, however, has only been assumed and neither empirically assessed nor determined to be a part of this process. Determining whether self-efficacy has a unique contribution in this model could greatly inform the social cognitive and career literatures. The self-efficacy literature in part answers this by asserting that one's beliefs about their abilities do have important predictive qualities for academic outcomes like self-handicapping and performance; however, it also can be subject to over-inflation and defensiveness.

To my knowledge, no study to date has investigated a possible interaction between academic contingent self-worth and self-efficacy as they relate to self-handicapping and task performance, both important academic outcomes. In fact, a relationship between contingent self-worth and self-efficacy has never been examined, though this relationship has been assumed. The literature suggests that for individuals who are low in academic contingent self-worth the threat of failure, through anticipation of a difficult task, will not have an effect on self-handicapping as measured by number of practice problems requested (Lawrence & Crocker, 2009). However, for those who are highly contingent on academics the threat of a difficult task, as opposed to an easy task, is associated with vulnerabilities in self-efficacy resulting in greater self-handicapping and lowered task-performance. Maintaining this performance-goal, where self-worth needs to be proven or enhanced results in vulnerable self-efficacy and consequently maladaptive academic outcomes.

To better understand the contributions of math self-efficacy and academic contingent self-worth during difficult tasks, an experimental setting was designed to present participants an opportunity to self-handicap, as well as to allow them to demonstrate their ability to perform on a brief evaluated math test. In this experiment, participants were presented with a range of easy to very difficult math items on a pre-test measure. These items were indicative of the type of test items they completed later on in an evaluated math task, and the difficult items were expected to evoke a state of challenge among all participants. Their pre-test math items were scored and used to control for prior math ability. Participants' decisions to accept or reject additional practice opportunities will be recorded as a measure of self-handicapping behavior.

Students then completed as many Graduate Record Exam (GRE) sample items as they could, one at a time, within a 15 minute period. To create a difficult condition wherein there is threat of failure, the selected math problems were taken from the quantitative reasoning section of the GRE and ranged from easy to very difficult, as normed by the Educational Testing Service (2003). Participants' final score on this test was then used as a proxy for academic achievement.

Research Hypotheses

The interactions of the key predictor variables, academic contingencies of self-worth and level of self-efficacy, were examined in relation to the criterion variables, self-handicapping and math test performance, and the following hypotheses are advanced.

I.   Academic contingencies of self-worth will interact with math self-efficacy to predict choice of whether to practice additional items. Participants will request practice problems, and evidence adaptive behaviors, in order of the following:

Ia.   Students who are high in academic contingency and who report high self-efficacy, will request the most practice items before beginning the test. These students will be motivated to self-enhance and will also feel confident in their abilities.

Ib.   Students who are low in academic contingency and who report high self-efficacy, will request the second highest amount of practice items before beginning the test. These students will be confident in their abilities and will be less concerned with threats to performance.

Ic.   Students who are low in academic contingency and who report low self-efficacy, will request the third highest amount of practice items before beginning the test. These students will feel less confident in their abilities, but will not be distracted by concerns of failure.

Id.   Students who are high in academic contingency and who report low self-efficacy, will request the least amount of practice items before beginning the test. These students will have the most vulnerable self-system, where they are less confident in their abilities and are distracted by goals to self-enhance.

II.   Academic contingencies of self-worth will interact with math self-efficacy to predict performance (scores on the math task). Participants' scores on the math task will rank in order of the following:

IIa.   Students who are low in academic contingency and who report high self-efficacy, will achieve the highest score on the math task. These students are confident in their abilities and will be less concerned about the threat of failure.

IIb.   Students who are high in academic contingency and who report high self-efficacy, will achieve the second highest score on the math task. These students will be distracted by the threat of failure from a difficult task, but will feel confident in their abilities.

IIc.   Students who are low in academic contingency and who report low self-efficacy, will achieve the third highest score on the math task.

These students will feel less confident in their abilities, but will not be distracted by concerns of failure.

IId.   Students who are high in academic contingency and who report low self-efficacy, will achieve the lowest score on the math task. These students will have the most vulnerable self-system, where they experience less confident in their abilities and are distracted by goals to self-enhance on this difficult task.

Chapter III

Method

Participants and Procedures

This study assessed 126 undergraduate students recruited from courses in human development and family studies, cultural studies, and education classes at a large public university in the Southwest (Table 1). These students are required to engage in research participation for their classes in the College of Education. They signed up to participate in a "study of factors affecting college student motivation," after this study received approval from the University of Houston's Committee for the Protection of Human Subjects. The data were collected between June and October of 2013.

Participants accessed the study through a link listed on the recruiting website, SONA. After signing up for a specific 30-minute time slot, participants attended a small group session in which they completed informed consent materials. Following this, participants completed all study measures, the experimental portion of this study, and finally the demographic measure on an individual computer in the CITE lab in the College of Education. Instructions for the task explained that participants would be completing a timed and evaluated math test involving eight math problems, in which they would complete as many problems as they could in 14 minutes, and their performance on this task is indicative of their math abilities and measures their strengths and weaknesses. These instructions were designed to prime the goal to perform (Lawrence & Crocker, 2009).

Following the instructions, the computer asked participants to complete the CSW questionnaire and the measure of self-efficacy. Participants were then presented with

instructions on the math task and a description of the scoring method, and then with a set

of three math items on a pre-test measure. Students received one full point for a correct

answer, no points for a blank answer, and a quarter of a point was subtracted for a wrong

answer to account for guessing. This method of scoring is used on similar GRE tests, and

the instructions for the tasks in this study explained the scoring method. After completing

the pre-test math items, which had a four-minute limit, participants were presented with

the option to receive additional problems and practice for four additional minutes, or to

proceed directly to evaluated test. They were informed that in the past students who

elected to practice additional items performed better on the evaluated test. Following the

optional second set of practice items, all students proceeded to the evaluated math task.

Before the evaluated task, students were informed they had 14 minutes to complete the

math problems, and their score would be presented at the end of the task. Following the

completion of this task, students were debriefed and awarded partial course credit

through SONA for their participation.

Measures

  Demographic questionnaire. This brief form solicited participants' self-report of

ethnicity, gender, age, education level, major, number of completed college math courses,

and current GPA.

  Contingencies of self-worth (Crocker, Luhtanen, Bouvrette, & Cooper, 2003).

This measure consists of 35 items to which participants provide ratings of agreement on

scales ranging from 1 (strongly disagree) to 7 (strongly agree). Five items on the

measure load on each of seven domains that represent the seven contingencies of self-

worth. The seven subscales all have high internal consistency (coefficient alphas .82-.97).

This measure also has high test-retest reliability with correlations from .78 to .94 across a four-month interval. Each of the seven subscales on the CSW measure has been found to possess good test-retest reliability and correlate in expected ways with other measures of self-esteem. For the purposes of this study, only the academic contingency subscale was used (Appendix 2). Crocker and colleagues (2003) indicated this was an appropriate interpretation of this subscale. An example item on this subscale is "My self-esteem is influenced by my academic performance."

Math self-efficacy scale (MSE; Spencer, Steele, & Quinn, 1999). This 4-item measure, was used to assess participants' current perceptions of their task-specific math self-efficacy (Appendix 1). This task specific measure, which refers directly to the current task, is a more accurate predictor of task performance than a more general measure or measure assessing college course self-efficacy (Pajares & Miller, 1995). Participants indicated their agreement with items on a four-point scale (1=*Strongly Agree*, 2=*Agree*, 3=*Disagree*, 4=*Strongly Disagree*). These specific items were adapted from the broader General Self-Efficacy Scale created by Schwarzer (1993), which was designed to be tailored to a more subject specific assessments. The items (*I am uncertain I have the mathematical knowledge to do well on this test; I am concerned about whether I have enough mathematical ability to do well on the test; I doubt I have the mathematical ability to do well on the test; I can handle the test*) were shown to load strongly on a single factor when compared to items relating to math self-concept, and a Cronbach's alpha of .88 was reported (Spencer et al., 1999). A separate study (O'Brien & Crandall, 2003) reported correlations in expected directions with scores on a measure of math course self-efficacy (Betz & Hackett, 1983).

Task performance. Participants completed a range of easy to very difficult GRE math items which have been normed on a college student population (Educational Testing Services, 2003). Participants were given 14 minutes to complete 8 math problems, 2 easy, 3 of medium difficulty level, and 3 that were deemed very difficult. Possible scores can range from -8 to 8 full points. Calculator use was not allowed on this task, although participants were provided with paper and pencils to perform necessary calculations.

Analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) software program (IBM, 2012). A correlation matrix was computed to examine zero-order correlations for all predictor and dependent measures (Table 4). Subscale scores from the ACSW scale, measure of Self-Efficacy, and task performance did not have correlations higher than .70 and therefore were not considered to be collinear (George & Mallery, 2003).

Two regression analyses were utilized to examine the ability of academic contingent self-worth (ACSW scores) and Math Self-Efficacy (MSE scores) to predict the criterion measures of task performance scores and requests for additional practice items (self-handicapping). First, a logistic regression analysis was conducted to examine if ACSW and math self-efficacy predicted participants' choice to self-handicap, as indexed by whether or not they elected to work on additional practice problems to potentially improve their actual test performance. Choice to self-handicap was represented by a dichotomous variable (0 = did not ask for practice items, 1 = did ask for practice items). Pre-test item scores were entered into the first block to control for

participants' prior math abilities. ACSW subscale and Self-Efficacy scores were then entered into the second block. Interaction scores were computed multiplying centered ACSW and Self-Efficacy scores, and then entering this cross-product value into the third block. The interaction term tested for moderation, or whether MSE operated differently at different levels of ACSW. This was meant to establish whether, controlling for math ability, this combination of variables best predicts the choice to receive additional practice items. Beta weights in the full model were examined to assess the strength of the predictor variables in regard to choice of practice items.

Next, to determine the contribution of ACSW and MSE scores and their interaction to predict task performance, a hierarchical regression analysis was performed. Similar to the previous model, scores from pre-test items were entered into the first block of the analysis to control for participants' prior math abilities. ACSW and MSE scores were entered into the second block. These predictor scores were then centered, multiplied together to create the interaction variable and included in the second block of the analysis, as well, to test for an interaction effect that might explain more of the variance in task score than ACSW and MSE scores alone. If MSE operated differently at different levels of ACSW, the interaction term would reveal this moderation effect. The beta weights were examined to assess for each predictor's contribution to the criterion variable. If the interaction score had contributed highly, as was expected, the pattern of means on ACSW and MSE scores would then be examined to check whether hypotheses about this interaction were supported.

Finally, in order to meet exploratory aims, a point biserial correlation was calculated to examine the relationship between task score and participants' choice to

receive practice items. This satisfied the question of whether or not extra practice was

positively or negatively related to scores on the task.

Table 1

Summary of Participant Demographic Information

Item	N	%	M	Mode	Min	Max
Gender						
Male	46	36.5				
Female	80	63.5				
Ethnicity						
White	47	37.3				
Hispanic	34	27.0				
Asian	28	22.2				
Black	13	10.3				
Native American	2	1.6				
Pacific Islander	2	1.6				
Age			26.0	21	18	59
Years of College Completed			3.2	3	< 1	6
< 1	4	3.2				
1	8	6.3				
2	27	21.4				
3	37	29.4				
4	29	23.0				
5	15	11.9				
6	6	4.8				
Number of Prior Math Courses			3.1	2	< 1	7
< 1 – 1	20	15.9				
2 – 3	73	57.9				
4 – 5	21	16.7				
6 – 7	12	9.5				
GPA			3.2	3.3	< 2.0	4.0
< 2.0	1	.8				
2.0 – 2.5	16	12.7				
2.5 – 3.0	31	24.6				
3.0 – 3.5	42	33.3				
3.5 – 4.0	37	29.4				

<center>**Chapter IV**</center>

<center>**Results**</center>

Preliminary Analyses

Table 1 presents descriptive statistics related to the demographic information collected. Before examining the primary hypotheses regarding the impact of the interaction of ACSW and MSE on participants' math test score and efforts to self-handicap, characteristics of the study sample, as well as the bivariate relationships associated with the separate predictor and criterion variables were examined. The recruited sample was ethnically diverse (37.3 % White, 27.0% Hispanic, 22.2% Asian, 10.3 % Black, 1.6% Native American, 1.6% Pacific Islander) and the majority of participants identified as female (63.5%). In terms of ethnicity, this sample is very similar to the University of Houston undergraduate population, which is reported as being made up of 12,140 (30.7%) students who identify as White, 10,188 (25.8%) students that identify as Hispanic, 7,655 (19.4%) Asian American students, 4,232 (10.7%) African American students, 62 (.2%) Native American students, and 90 (.2) Pacific Islander students. The male (19,854 students) and female (19,686 students) undergraduate population is almost evenly split, which does differ from this study's sample. The variability in the study sample is likely because the participants were recruited from the College of Education, which is made up of predominantly female students.

Differences in practice accepters and decliners. In regard to the practice items, 53 (42.0%) participants chose to have more practice and received three additional math problems, and 73 (57.9%) participants chose to skip the additional opportunity to practice. Table 2 displays the findings related to accepters and decliners. Forty-five

percent (33 students) of the participants who chose not to practice also rated themselves as having high MSE (MSE scores above 2.5), where as only 19% (10 students) of the participants who chose additional items reported high MSE. 36% (26 students) of practice decliners rated themselves as having low MSE (scores below 2.5) and 19% (14 students) reported moderate MSE (scores of 2.5). The majority of practice accepters rated themselves as having neutral MSE (62%, 33 students) and 19% (10 students) reported low MSE. Additionally, most participants rated themselves as having high academic contingent self-worth and only seven participants reported being lowly contingent, three who chose additional practice and four who did not.

Practice decliners did slightly better on the timed math test scoring on average 1.73 ($SD = 4.01$) as opposed to a 1.45 ($SD = 3.80$) for practice accepters. Those that did not practice also took the exam more quickly, averaging 7 minutes 17.4 seconds ($SD = 3$ minutes 22.8 seconds) to those who did practice, averaging 8 minutes 11.4 seconds ($SD = 3$ minutes 6 seconds). In regard to GPA, the respondents appeared to be fairly evenly split with 26% (14 students) of participants who had additional practice reporting a GPA between 3.5 and 4.0, 34% (18 students) reporting a 3.0 – 3.5, 23% (12 students) at a 2.5 – 3.0, 17% (9 students) a 2.0 – 2.5, and 2% (1 student) under a 2.0. Similarly, practice decliners were made up of 30% (22 students) who reported a GPA of 3.5 – 4.0, 32% (23 students) with a GPA between 3.0 and 3.5, 26% (19 students) in the 2.5 – 3.0 range, and 10% (7 students) between 2.0 and 2.5. Most of the female participants (55%, 44 females) chose not to have additional practice items, as did a majority of the male participants (62%, 29 males). The average age of the participants that declined was 25.2 years ($SD = 5.97$), which was younger than the average age of participants who accepted additional

practice items (*M*=27.2, *SD* = 9.06). Of the practice accepters, 32% were men (17

students) and 68% were females (36 students).

Table 2

Practice Accepter and Decliner Characteristics

	Accepters		Decliners	
Variable	*N*	%	*N*	%
Academic CSW				
High (above 3.50)	50	94.3	69	94.5
Low (below 3.50)	3	5.7	4	5.5
Math Self-Efficacy				
High (above 2.50)	10	18.9	33	45.2
Neutral (2.50)	33	62.3	14	19.2
Low (below 2.50)	10	18.9	26	35.6
Gender				
Female	36	67.9	44	60.3
Male	17	32.1	29	39.7
GPA				
< 2.0	1	1.9	0	0
2.0 – 2.5	9	17.0	7	9.6
2.5 – 3.0	12	22.6	19	26.0
3.0 – 3.5	18	34.0	23	31.5
3.5 – 4.0	14	26.4	22	30.1
	M	*SD*	*M*	*SD*
Exam Score	1.45	3.80	1.73	4.01
Exam Time (seconds)	491.6	186.0	437.1	202.9
Age	27.2	9.06	25.2	5.97

Gender differences in predictor variables. Female and male participants scored similarly to each other on both predictor variables; Table 3 presents these findings. Female participants, on average, rated themselves on the higher end of ACSW reporting an average score of 5.59 out of 7 ($SD = .88$). Similarly, male participants reported an average score of 5.42 ($SD = .84$) on the ACSW measure. Male participants reported feeling efficacious with an average score of 2.45 ($SD = .24$) on the MSE measure, as did female participants with an average score of 2.50 ($SD = .64$). Male participants, on average, finished the exam more quickly than female participants, spending approximately 7 minutes 22.5 seconds ($SD = 3$ minutes, 7 seconds) on the exam versus 7 minutes 49.3 seconds ($SD = 3$ minutes 25 seconds). Approximately 31.3% of female participants (25 students) reported a GPA between 3.5 and 4.0, 32.5% (26 students) reported a GPA between 3.0 and 3.5, 26.3% (21 students) of female participants reported GPAs between 2.5 and 3.0, and 11.3% (9 students) reported a GPA between 2.0 and 2.5. Among male participants, 28.3% (13 students) reported a GPA between 3.5 and 4.0, 34.8% (16 students) reported GPAs between 3.0 and 3.5, 21.7% (10 students) reported between a 2.5 and 3.0, 15.2% (7 students) reported GPAs between 2.0 and 2.5, and 2.2% (1 student) reported a GPA under 2.0. Male participants reported being older, on average, ($M = 28.19$, $SD = 9.76$) than female participants ($M = 24.77$, $SD = 5.43$).

Table 3

Gender Characteristics

Variable	Female		Male	
	M	*SD*	*M*	*SD*
Academic CSW	5.59	.88	5.42	.84
Math Self-Efficacy	2.50	.64	2.45	.24
Exam Score	.70	3.81	3.14	3.44
Exam Time (seconds)	469.3	205.0	442.5	183.7
Age	24.77	5.43	28.19	9.76
	N	*%*	*N*	*%*
GPA				
< 2.0	0	0	1	2.2
2.0 – 2.5	9	11.3	7	15.2
2.5 – 3.0	21	26.3	10	21.7
3.0 – 3.5	26	32.5	16	34.8
3.5 – 4.0	25	31.3	13	28.3

Intercorrelations of predictor and dependent variables. Table 4 summarizes the means, standard deviations, and intercorrelations of participants' scores on the key measures. Both Academic Contingencies of Self Worth ($r = .21, p < .05$) and Math Self Efficacy ($r = .39, p < .01$) were positively related to participant's final exam score. Interestingly, the interaction of ACSW and MSE was more strongly correlated with participant's exam score ($r = .43, p < .01$) than either of these self-esteem variables considered separately. People high in both ACSW and MSE got higher test scores, refuting the second group of hypotheses advanced (IIa though IId). The additive total of ACSW and MSE was predictive of final exam scores. However, when examining the correlation between ACSW and MSE it became clear that these two variables do not

appear to interact in a linear fashion. A scatter plot of ACSW and MSE was examined for potential nonlinear patterns of relationship, but none was found (See Figure 1).

Figure 1

Scatterplot of ACSW and MSE Reports
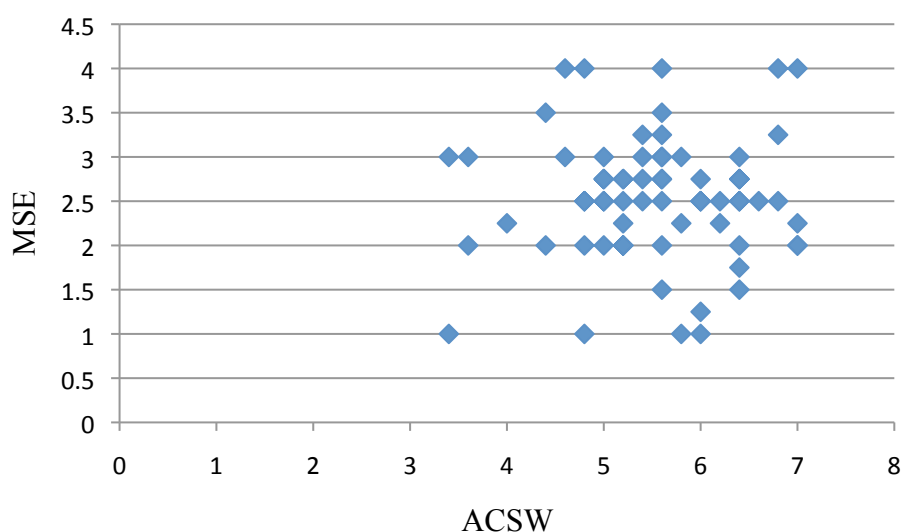
Academic CSWs and MSE were each positively related with participant's reported GPA ($r = .31, p < .01$; $r = .23, p < .01$, respectively). Having an academically contingent self worth was not related to a person's age, but greater MSE was related to age, positively ($r = .20, p < .05$).

Participants who scored more highly on the pre-test items also reported significantly higher math self-efficacy ($r = .35, p < .01$) and were more likely to have completed a greater number of math courses ($r = .32, p < .01$). Furthermore, those who reported taking more math courses, and likely to have spent more time studying the subject, were also more likely to report higher MSE ($r = .21, p < .05$). Scores on pre-test items were also positively related to participant's GPA ($r = .18, p < .05$). As was expected, those who scored more highly on the pre-test items also scored more highly on

the final exam ($r = .46$, $p < .01$) which provides further evidence to use this as a control variable in the final analyses.

Participants who reported higher GPAs scored more highly on the final exam ($r = .22$, $p < .05$) and they reported having more prior math courses ($r = .19$, $p < .05$). Older participants also demonstrated better outcomes on the timed test ($r = .22$, $p < .05$), reported having taken more math courses ($r = .21$, $p < .05$), and a higher overall GPA ($r = .31$, $p < .01$). In addition, participants who scored more highly on pre-test items also scored more highly on the final exam ($r = .46$, $p < .01$).

On average, participants correctly answered just over half of the math questions correctly ($M = 1.62$, $SD = 3.85$), and those who scored more highly were also somewhat more likely to have taken more math courses in the past ($r = .19$, $p < .01$) and to have reported higher GPAs ($r = .22$, $p < .05$). The amount of time a participant spent on the math task items ($M = 7$ minutes 42.9 seconds, $SD = 3$ minutes, 15.3 seconds) was not significantly related to performance on either the pre-test items or the test items, nor to other variables like gender, GPA, age, or math experience.

Table 4

Intercorrelations of ACSWs, MSE, Exam Score, and Time spent on Exam

Variable	M	SD	1	2	3	4	5	6	7
1. Academic CSW	5.52	.87							
2. Math Self-Efficacy	2.57	.69	.01						
3. Exam Score	1.62	3.85	.21*	.39**					
4. Exam Time (seconds)	463	195	.11	.16	.06				
5. Pre-Test Score	1.62	.79	.09	.35**	.46**	.01			
6. GPA	3.20	.50	.31**	.23**	.22*	.05	.18*		
7. Prior Math Courses	3.09	2.00	-.07	.21*	.19*	-.10	.32**	.19*	
8. Age	26.0	7.49	.03	.20*	.22*	.13	.01	.31**	.21*

Note: [a] = 126. *p < .05, **p < .01.

Gender differences in exam outcomes. An independent samples t-test and a chi-square analysis tested for gender differences in math exam score and practice item choice, respectively. T-test results revealed a significant gender difference in exam test scores, $t(124) = -3.60, p < .001$, with men ($M = 3.14, SD = 3.44$) scoring higher than women ($M = .70, SD = 3.81$) on the exam. Accordingly, participants' gender was controlled for in later regression analyses involving math test performance. The chi-square analysis indicated a non-significant effect for gender $\chi^2 (1, N=126) = .64, p = .43$ with regard to participants' decision to accept or refuse additional practice items. Therefore, controlling for gender was not necessary in later logistic regression analyses involving the prediction of self-handicapping behavior.

Primary Analyses

   **Logistic regression of ACSW and MSE in the prediction of practice item
choice.** A logistic regression was conducted to assess whether the predictor variables,
ACSW and MSE, significantly predicted whether or not students chose additional
practice items and thus exhibited less self-handicapping behavior. Table 5 presents the
findings related to this analysis. For the purpose of predicting binary categorical
decisions, using variables that are nominal, logistic regression analysis is appropriate
(Tabachnick & Fidell, 2007). In this analysis, the dependent variable, choice, was coded
1 for those that chose additional practice items and 0 for no additional items. This model
included participants' scores on the required and completed pre-test items in order to
control for prior math abilities. When the predictor variables are considered together,
there was no significant difference between those students who chose additional practice
items and those who do not $\chi 2$ (3, N=126) = 2.89, p = .30[1]. Participant's scores on the
pre-test items remained significant in predicting the choice to take additional practice
items, as previously described in the section addressing intercorrelations of these
variables. The model, however, is not significant, and therefore the contributions of the
predictor variables will not be interpreted. The hypotheses advanced regarding the
predictors of those who will choose not to have additional practice items, and thus self-
handicap, (Hypotheses Ia through Id) were not supported.

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[1] A logistic regression was completed that did not include the control variable of pre-test
score. This regression further confirmed that ACSW and MSE did not predict significant
differences in choice to practice

Table 5

Logistic Regression of the Contributions of Academic CSW and Math Self-Efficacy on Practice Item Choice

Predictor	Accepters $N = 53$		Decliners $N = 73$		B	Wald Statistic	Odds Ratio
	M	SD	M	SD			
Constant	-	-	-	-	-.79	.34	.45
Pre-Test Score	1.43	.75	1.75	.79	-.72	7.24**	.49
Academic CSW	5.57	.85	5.50	.89	.10	.22	1.11
Math Self-Efficacy	2.51	.23	2.52	.71	.43	2.10	1.53

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

Hierarchical regression predicting math exam scores. A hierarchical regression analysis was conducted to determine the contributions of ACSW and MSE to the prediction of math test performance. Table 6 presents these findings. Participant gender and scores on the required pre-test items were simultaneously entered in Block 1 to control for participant` variability in math ability. ACSW and MSE were then entered into the second block. Controlling for gender, this combination of variables significantly predicted final exam score, $F(4,121) = 10.99$, $p < .001$. In this model, ACSW and MSE significantly contributed to the overall equation and explained a significant variance in math test performance. The beta weights presented in Table 6 suggest that greater feelings of self-efficacy contribute most to predicting exam score, as well as highly academic contingent self-worth. The adjusted R squared value, controlling for gender, was .17. This indicates that 17% of the variance in the final exam score was explained by the model. When participants' prior abilities were controlled for, by including the total scores on the pre-test items, the model continued to significantly predict final exam scores, $F(5, 120) = 13.25$, $p < .001$. With the addition of the pre-test scores, the model

improves to explain 33% of the variance (adjusted *R* squared, .33). In addition, higher

scores on pre-test items appear to contribute the most to predicting final exam scores,

followed by high self-efficacy, and then academically contingent self-worth. When the

interaction term of self-efficacy and academically contingent self-worth is added as

another block (Table 7) the change in R squared was nonsignificant.

Table 6

Hierarchical Multiple Regression Analysis of the Contributions of Academic CSW and Math Self-Efficacy in the Prediction of Math Test Scores

	Predictor	*B*	*SE B*	β
Block 1	Gender	1.89	.62	.24**
	Pre-Test Score	2.04	.38	.42**
Block 2	Gender	1.87	.59	.24**
	Pre-Test Score	1.57	.39	.32**
	Academic CSW	.86	.33	.19*
	Math Self-Efficacy	1.30	.44	.23**

Note: R^2 = .25** for Block 1; ΔR^2 = .09** for Block 2.
p <.05, **p* < .01

Table 7

Hierarchical Multiple Regression Analysis of the Contributions of Academic CSW, Math Self-Efficacy, and their Interaction in the Prediction of Math Test Scores

Predictor		B	$SE\ B$	β
Block 1	Gender	1.89	.62	.24**
	Pre-Test Score	2.04	.38	.42**
Block 2	Gender	1.87	.59	.24**
	Pre-Test Score	1.57	.39	.32**
	Academic CSW	.86	.33	.19*
	Math Self-Efficacy	1.30	.44	.23**
Block 3	Gender	1.93	.60	.24**
	Pre-Test Score	1.57	.39	.32**
	Academic CSW	1.69	1.25	.38
	Math Self-Efficacy	3.11	2.64	.56
	Interaction ACSW*MSE	-.33	.46	-.39

*Note: $R^2 = .25$** for Block 1; $\Delta R^2 = .09$** for Block 2; $\Delta R^2 = .00$ for Block 3.*

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

Chapter V

Discussion

Self-esteem has been shown to be a complex construct (Crocker et al., 2003; Kernis, 2005), and one that has not been consistently related to indicators of positive adjustment and adaptation (Baumeister et al., 2003). In the present study, two specific indicators of self-esteem related perceptions--contingencies of self-worth and self-efficacy--were examined in relation to important academic performance outcomes. Previous literature had examined each of these constructs separately, but, until very recently, no prior studies had concurrently examined these correlates of self-esteem, or their possible interaction in effecting academic performance outcomes. This was an important research direction because of both the impact and similarities each of these concepts had on performance. Specifically, vulnerabilities in one's self-esteem related to low feelings of efficacy or highly contingent self-worth have influential outcomes on task persistence, disengagement, effort, overall performance, and effects on motivation and interest (Kernis, 2003; Lent, Brown, & Hackett, 2000). Each concept appeared to affect self-esteem in unique ways, and it was hypothesized that these two variables would interact to incrementally predict motivational vulnerabilities and consequently poorer academic performance. More specifically, this study analyzed the contributions of academically contingent self-worth (ACSW) and math self efficacy (MSE) perceptions to test-related self-handicapping behavior and actual math test performance.

The proposed hypotheses in this study were partially supported by the data collected: both academic contingencies of self-worth and math self-efficacy significantly contributed to performance on a math task, even when previous skill and gender were

controlled for. Though both constructs have similarities in their relationship to a person's overall self-esteem, the lack of improvement in the model including their interaction indicates that they each, individually, have unique contributions to this overarching construct as evidenced by performance. This finding is especially critical, indicating that ACSW and MSE create unique vulnerabilities in an individual's self-esteem and will affect a person in differing ways.

Interaction Model

Both sets of this study's hypotheses assumed an interaction between academic contingencies of self-worth and level of math self-efficacy. However, lack of correlation and lack of perceivable linear pattern in the scatterplot evidenced that the ACSW and MSE were not related in expected ways. A study published after this study's data collection also did not find a relationship between ACSW and Self-Efficacy (Lawrence & Williams, 2013). Similar to the current study, these authors originally hypothesized a pattern between these two self-esteem constructs, especially because a highly contingent self-worth strongly related to lowered performance and motivation (Crocker et al., 2006, Lawrence & Crocker, 2009) as did low self-efficacy (Bandura, 1993). Based on the similarity of Lawrence and Williams' (2013) and the current study, ACSW and MSE may describe two separate processes for an individual, likely because of their differing origins.

Inconsistency in theory. Social cognitive career theory asserts that self-efficacy is a belief about one's abilities that is based on prior evidence and experiences of success, regardless of task domain or apprehension about failing (Lent, Brown, & Hackett, 1994). If there are previous experiences of success with specific tasks or skills, social cognitive theory reasons that individuals will continue to predict success and feel confident in their

task- and performance-related capabilities, and will persist with such future tasks regardless of their perceived difficulty or its impact on feelings of self-worth (Bandura, 1986). In contrast, previous experience with success or failure in a particular domain, and beliefs about personal ability, may not be as strong of an influence on the contingent domain of self-worth an individual holds as are other motivational factors. The contingent domain can be held for a variety of reasons including interest, perceived outcomes like financial gain, or familial influence (Crocker & Wolfe, 2001). Therefore, as a result of these different origins and influences (previous success for self-efficacy and domain for contingencies of self-worth) MSE and ACSW will likely have differing effects on self-esteem. Each theory could interpret an experience of success in different ways leading to differential outcomes.

In addition to these differences in origin, the ACSW literature assumes that students disengage from a threatening or difficult task when their beliefs about their abilities are low; however; this theory only infers that the belief is the mechanism that causes the self-handicapping behavior or disengagement. Previous studies had not empirically evaluated whether beliefs about one's abilities, or self-efficacy, were related in meaningful ways to ACSWs and academic outcomes. This study did evaluate the hypothesized relationship between these two self-esteem correlates and found that, contrary to the implications of the CSW literature, level of self-efficacy did not affect the relation of academic contingent self-worth to task performance, as no statistical association was found.

Evaluation apprehension. Instead it is likely that no statistical relationship was found between MSE and ACSW because a stronger catalyst, evaluation apprehension,

needed to be evoked, and the sample of participants were too similar in respect to key variables. Previous studies found that individuals are more likely to display maladaptive behaviors, like disengagement and lowered performance, when they believe their abilities are being evaluated or when these tasks are relevant to their self-validation goals (Burhans & Dweck, 1995, Crocker et al., 2006, Lawrence & Crocker, 2009). In fact, Lawrence and Williams (2013) also examined ACSW and MSE, and they surmised that a significant association was not found between these variables because the task used in the study did not prime an evaluation condition. These authors speculated that participants did not feel their abilities were being assessed, nor was the task important to validating their worth, and therefore the task did not cause evaluation apprehension in these students. The present study attempted to evoke evaluation apprehension by informing participants that their performance on this task was indicative of their math abilities and measured their strengths and weaknesses in academics. Though these instructions were meant to prime an evaluation condition in an area (academics) that would be important to those with highly ACSW, the study setting and alleged outcome were likely not evocative enough, because class credit was rewarded regardless of test performance. In the experiment, the specific outcome of the math exam may not have been sufficiently meaningful to the participants, was not felt to be a true reflection of their abilities, or was not considered representative of their contingent domains self-worth. Students experience the most evaluation apprehension when the outcome is in an important domain, reinforcing to their self-worth, and the quality of the outcome is especially valuable to achieving their goals, like a good grade on the final exam for an important course (Crocker & Park, 2004).

Sample characteristics. The sample examined in the present study also displayed some unexpected characteristics, which may additionally explain the absence of support for hypothesized interaction of ACSW and MSE scores in predicting performance outcomes. Specifically, the participants recruited for this study were very similar to each other with respect to their ACSW and MSE scores, year in college, and GPA, and they were different than a more typical undergraduate population. Sampling from a group of students with several similarities may not have provided enough variability to identify meaningful patterns in their responses. This sample was high achieving, with the GPA ($M = 3.20$) and years of college completed ($M = 3.2$) both being above average. In addition, this sample reported unexpectedly high levels of math self-efficacy ($M = 2.57$, out of a total 5) as well as high degrees of academically contingent self-worth ($M = 5.52$, out of a total 7). In fact, only seven participants reported having a low ACSW out of all 126 participants, which is markedly different than previous college populations sampled (Crocker et al., 2003, Crocker & Wolfe, 2001). Previous studies found that degree of contingency was significantly related to varying levels of difficulty with academic outcomes, like performance and motivation. Restricted range in ACSW and MSE scores would not have displayed the same patterns of responding, and this may have contributed to the non-significant finding. This is especially likely, as previous studies found that highly contingent students displayed a vulnerable self-esteem, which includes some amount of self-doubt, or low self-efficacy (Crocker et al., 2006). In contrast, the current study's sample reported both high levels of ACSW and MSE. Considering that these students were far along in their college careers and were highly successful, it is possible that academics were both important to them and they felt confident in their abilities to

complete a math task, especially if this task was considered non-threatening or its outcome irrelevant to their academic self-esteem. A non-threatening task would not activate the vulnerable self-esteem structure, which is assumed to contribute to increased self-doubt.

Predictors of Self-Handicapping

As was previously shown, persons with unstable or vulnerable self-esteem will engage in self-enhancement at the expense of learning (Molden & Dweck, 2000). If students anticipate doing poorly on a task, they may engage in reduced effort and persistence so as to provide a plausible argument for the reason performance suffered, thereby enabling them to retain a sense of competence and efficacy despite their actual performance outcome (Rhodewalt & Tragakis, 2002). Individuals with optimal or stable self-esteem, however, will not be susceptible to self-handicapping behavior when encountering a difficult task (Kernis, 2003). Their self-esteem remains stable regardless of task difficulty. Results of the logistic regression analysis in the present study appear to support this previous finding, as participants did not engage in significant self-handicapping behavior as predicted by ACSW or MSE. As previously described, the current sample reported generally high MSE scores, and were no more or less likely to self-handicap than their low MSE counterparts. Self-efficacy is related positively to an individual's self-esteem (Bandura, 1993), and the current findings could imply that participants felt confident in their math abilities, and these abilities were not susceptible to threat in this condition. In other words, participants may have maintained high levels of optimal self-esteem that did not waver when encountering a difficult task.

Although participants in the present study were no more likely to self-handicap, it was expected that those with high levels of MSE would be less likely to engage in this maladaptive behavior. Students with high self-efficacy, as this sample endorses, are more likely to hold mastery goals rather than performance goals. In other words, students with high self-efficacy pursue opportunities for learning and growth as opposed to self-enhancement (Bandura, 1993). The participants in this study were no more or less likely to pursue the opportunity to practice additional items no matter what their math self-efficacy level, even though it was stated in the practice items' instructions that, "individuals who receive additional practice are more likely to earn a high score on the final test." These results appear to conflict with previous findings, though this could be the result of having a low number of students who endorsed low MSE. Once again, our study's sample appeared to be homogenous in regard to varying degree of MSE. This uniformity in the sample likely affected the model's ability to assess differences within this group.

Academic contingent self-worth similarly failed to significantly predict self-handicapping behavior in the present study. The current study's findings replicate an earlier study in which ACSW did not relate to self-handicapping in conditions where the task was easy or in a condition where the task was not primed with a performance goal (Niiya et al., 2010). When students in that study were primed with a performance goal (they were told the exam would measure intelligence), higher degrees of ACSW significantly predicted the use of self-handicapping strategies. This finding appears to further support the reasoning that the experimental conditions of the present study did not effectively activate evaluation apprehension in participants. If a student did not consider

that the math exam as a valid indicator of their math abilities, and consequently did not believe that failure would threaten their feelings of worth, they likely would feel no reason to protect their vulnerable self-esteem with self-handicapping.

One additional explanation is relevant to high achieving students, such as those who participated in this study. Paunonen and Hong (2010) found that students with higher grades in a particular course were able to better predict their grades on future tests in that course than were students with lower grades. The current sample did report an above average GPA and may have been better able to accurately predict their need for additional practice, especially with their high degree of previous experience with math. In fact, the best and only significant predictor of choice to self-handicap was prior math performance. It seems that the better a participant's ability is on similar math problems the less they felt they needed additional practice on these items. This appears to be an accurate prediction, as participants' prior math performance was the best predictor of exam score.

Predictors of Exam Performance

While the overall hierarchical regression model predicted approximately 33% of the variance, previous math ability explained 17% of the variance in final exam score. Though prior math experience was included as a control variable in the regression, this finding reveals that course-relevant experience and practice was the best predictor of academic performance. One's ability did not appear to be affected by beliefs about the particular task domain or how efficacious the participants perceived themselves to be. This finding further confirms that one's prior experiences and developed abilities are

good predictors of future outcomes, and are the best predictors out of the self-esteem variables this study analyzed.

Social cognitive career theory states that math self-efficacy is a better predictor of academic performance than even ability, under stressful conditions (Dunning, Heath, & Suls, 2004). It considers that those with high self-efficacy will employ additional adaptive strategies like interest, persistence, motivation, and coping strategies to manage stress in difficult conditions that typically affect performance, even for individuals with high ability (Thiede, 1999). The current study's findings contradict this assertion; however, this may be further evidence that this experiment's math test was not threatening to participants, and that prior experience is a better predictor than individual performance related beliefs' in benign (i.e., non-threatening) performance situations. The two self-esteem constructs analyzed did have predictive qualities relative to final exam score. Math self-efficacy, or one's belief about their math capabilities, was a better predictor than ACSW of exam score; both MSE and ACSW significantly and additively predicted approximately 9% of additional criterion variance, even after controlling for gender and previous math experience.

As previous research shows, high math self-efficacy is related to beneficial academic outcomes including better academic performance (Schunk, 1994). Consistent with previous findings, this study found that individuals who reported a high degree of math self-efficacy also had higher scores on the math exam. Students with highly contingent academic self-worth did not appear affected by the threat of failure as they also evidenced better performance on the study's math exam. This is consistent with previous literature that shows, when a student is not concerned about a performance

outcome being a reflection of their worth, and the task is important to them, those with high CSW will outperform their counterparts. When students base their self-worth highly on a particular domain, they will devote more time and effort to that particular domain, resulting in better performance outcomes (Crocker et al., 2003). These highly contingent participants did not appear to be significantly affected by the threat of failure in this experiment, unless there was an additional factor which buffered the effects of threat, but was not evaluated in this experiment.

Gender differences. Gender was included in this model as a control variable because significant gender differences were found in exam scores. Gender explained approximately 9% of the variance in exam scores, with males performing significantly better than females. Male participants scored an average of 3.14 out of 8 questions to female's average score of .70. This difference is substantial, and similar findings have been replicated in other studies that assessed math abilities as a representation of academic ability (Lawrence & Williams, 2013). Furthermore, the current study used math questions from a GRE test where gender differences have been found on the math portion, with males scoring higher than females at a four to one ratio (Bornheimer, 1994). The females' performance on this math task did not appear to be a reaction to a gender-based stereotype threat. The present study was careful not to prime possible stereotype threats by placing the demographic questionnaire after the exam and measures assessing self-esteem traits. However, this task was presented as a "math exam," which could have nonetheless activated this stereotype for some participants.

Intercorrelations of Key Variables

The correlation matrix further confirmed these findings, as participants reporting higher ACSW and MSE scores were more likely to report higher GPAs, an indicator of their overall academic performance. Participants' reported measures of academic performance are consistent with self-efficacy literature that prior performance is the best indicator for future performance and is predictive of beliefs about one's abilities and these beliefs result in positive academic outcomes (Bandura, 1993). Participants who had more experience with math courses did better on the pre-test items, on the final exam, and also reported higher GPAs and MSE scores. Students' age was also positively related to higher GPAs, more confidence in one's math skills, as well as having more years of college and experience with math courses, and, in general, with more academic activities. Could having additional experience with a particular task buffer the effects of a vulnerable or contingent self-worth on academic outcomes? In a stressful and difficult condition, even if a student's self-worth is invested in academics, could previous experience be a more influential variable than task domain, and keep self-efficacy and performance outcomes protected from threat? This may explain why students with both an ACSW and a higher amount of previous math experience appeared less likely to self-handicap, and related positively to final exam score and overall academic GPA, indications that their self-esteem was less susceptible to threat. It would be beneficial to further evaluate previous experience's relationship to ACSW in a meaningful and threatening condition.

Study Limitations

While this study contributed valuable information to the self-esteem literature, some additional limitations should be considered when interpreting the results. First, as a result of participants' completing self-report measures, it should be noted that their endorsements could be subject to response bias. Participants were asked to complete a measure evaluating the importance of success in academics to their self-worth, in an academic setting, for a class requirement, and the study was described as a math task that would provide information regarding academic performance. Participants might have felt more inclined to answer that success in academics was central to their self-worth's stability because they were primed by the exam environment. This measurement and the environment may have contributed to the higher than typical reports of highly academic contingent self-worth and possibly limited the range in responses. Similarly, only the 5-item academic subscale was used from the full 35-item CSW scale. Although this is psychometrically appropriate, assessing students on all seven CSW subscales may have provided a more complete picture of student's true domains of importance. Crocker and Park (2004) theorized that while one domain remains dominant for an individual's worth, a person may hold a second sub-domain that can influence decision-making and performance. Assessing only for the prevalence of the academic domain may have elicited more positive endorsements than if other competing domains were concurrently assessed, which may have included the dominant domain for some participants, while ACSW was of secondary importance. Furthermore, if a separate, valid measure of math academic contingencies of self-worth were available, it may have made a stronger showing in the current model.

The task in general was limiting because of its single-course nature. To gain a more complete picture of ability, self-efficacy, and persistence, that is more generalizable to the college student population, it would have been beneficial to assess reading and writing ability as well as crystallized knowledge. Perhaps this would have elicited various patterns in responding that were not apparent in this limited course analysis. In addition, students were recruited from one particular course of study (education) at a southern undergraduate university, and this sampling could have limited the variability of responses. Students in this particular college may be more inclined to math related tasks or may be more likely to hold a higher degree of ACSW than individuals their age not enrolled in a university or in a different course of study. Finally, this study was limited by the recruitment strategies used. Students participated in this, and other research studies, to fulfill a course requirement for an undergraduate class. If participants had chosen to participate for a different goal, perhaps only to contribute to science or for a moderate amount of money, their feelings regarding the importance of the task may have changed their beliefs regarding the relevance of doing well on the experiment's exam. For example, if participants completed the measures of ACSW and MSE in an important college class before an exam, this may have created a more threatening condition with which we could assess self-handicapping and performance. The constraints of the reward that could be offered to participants was a limitation in this study and could be corrected in future analysis.

Directions for Future Research

The limitations for this study suggest possible directions for future research. As recently stated, conducting this experiment in a more threatening and valued

environment, such as in an actual college course, would be beneficial to better understanding how ACSW and MSE relate to academic outcomes. Previous studies have continually found that vulnerabilities in self-esteem are activated when evaluation apprehension is successfully primed. Furthermore, the variable through which ACSW affects academic outcomes has only been hypothesized to be evaluation apprehension. Further inquiry into what mediates this relationship, possibly test anxiety or perfectionism, would be valuable to future research directions. In a future study, the inclusion of a measure of state anxiety would be helpful in assessing participant's level of apprehension just before taking the final exam. Practically, this investigation would be crucial for interventions in the classroom, therapy session, or for parents to use. Knowing which unconscious process best predicts self-handicapping in a vulnerable self-esteem structure would be beneficial in reinforcing opposing beliefs. Emphasis on learning or mastery goals, as opposed to performance enhancement, has been used beneficially in classroom settings after they were identified as being important to maintaining high self-esteem and consequent improved persistence and performance (Eccles & Wigfield, 2002).

Further assessing contingent self-worth domains through the use of the entire 35-item CSW scale would be a beneficial future direction when examining the relationship between self-efficacy and important outcomes. In addition, the key variables of contingent self-worth and self-efficacy should be examined in other identified contingent domains, like competition or familial support. This could extend the sports psychology field by identifying additional psychological processes that affect players' performance. In terms of academics, evaluating participants in differing subject areas would provide a

more complete, generalizable, and useful picture for students who are involved in differing courses of study with varying academic abilities. This would be especially important for gender and racial minorities as they pursue non-traditional majors and may experience stereotype threat. Though our sample was ethnically diverse, evaluating particular cultural groups of students would be an important future direction for this specific experiment. Most previous studies examining contingencies of self-worth limited their analysis to White participants only, so as to limit the possible confounding effects of stereotype threat (as in Lawrence & Williams, 2013). It would be important, and especially beneficial in a university with a highly diverse population, to use a similar experiment with students of only one ethnic minority group. This inquiry may provide different insights into the unique strengths and obstacles a particular group faces in a challenging academic environment with valuable and important outcomes like career readiness and potential financial earnings.

Closing Remarks

Despite its limitations, the findings of this study also have some implications for counseling college students. It is valuable to understand how one's self-esteem may be bolstered by persisting with practice and experience in an area of weakness. Being able to identify helpful strategies to promote practice in weak areas, and presenting these in a non-evaluative provoking way, will likely help protect self-esteem and limit maladaptive processes like self-handicapping or poorer performance. For example, self-instructional practice using computer software provides feedback in an impersonal and private manner. Providing feedback in an overly critical and evaluative manner may promote further negative psychological processes that are evident in a vulnerable self-esteem, such as

cognitive distortions and self-deprecating thoughts (Kernis, 2005). Further evaluating how these self-esteem structures are related, and in which evaluation conditions, could lead to improving affect and feelings of worth which may lessen symptomology found in mood disorders.

In an applied setting, such as a classroom, identifying the importance of practice and the effect of previous experience on academic outcomes is influential in motivating students to persist even on threatening tasks. While the importance of practice has previously been asserted, it continues to be useful for teachers and students to consider, especially when students experience discomfort or adversity in their chosen course of study. Students in non-traditional majors, who may experience stereotype threat based on gender or ethnicity, may find it helpful to continually reaffirm and reinforce their abilities with the understanding that the best predictor of future outcomes appears to be previous experiences. Therefore, a teacher's or student's focus could be on previous instances of success as an intervention to re-affirm the student's abilities and accomplishments in a particular course of study.

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Appendix A

Measure of Self-Efficacy

(Spencer, Steele, & Quinn, 1999)

Self-Efficacy Measure

For each of the following items, please circle the choice that is closest to your level of agreement with the statements. These statements ask about your opinion. There are no right or wrong answers.

    A. I am uncertain I have the mathematical knowledge to do well on this test.

        1. Strongly Agree   2. Agree   3. Disagree   4. Strongly Disagree

    B. I am concerned about whether I have enough mathematical ability to do well on the test.

        1. Strongly Agree   2. Agree   3. Disagree   4. Strongly Disagree

    C. I doubt I have the mathematical ability to do well on the test.

        1. Strongly Agree   2. Agree   3. Disagree   4. Strongly Disagree

    D. I can handle this test.

        1. Strongly Agree   2. Agree   3. Disagree   4. Strongly Disagree

Appendix B

Academic Contingencies of Self-Worth Scale

(Crocker, Luhtanen, Bouvrette, & Cooper, 2003)

Contingencies of Self-Worth Scale

INSTRUCTIONS: Please respond to each of the following statements by circling your answer using the scale from "1 = Strongly disagree" to "7 = Strongly agree." If you haven't experienced the situation described in a particular statement, please answer how you think you would feel if that situation occurred.

		Strongly Disagree	Disagree	Disagree Somewhat	Neutral	Agree Somewhat	Agree	Strongly Agree
1.	My opinion about myself isn't tied to how well I do in school.	1	2	3	4	5	6	7
2.	Doing well in school gives me a sense of self-respect.	1	2	3	4	5	6	7
3.	I feel better about myself when I know I'm doing well academically.	1	2	3	4	5	6	7
4.	My self-esteem is influenced by my academic performance.	1	2	3	4	5	6	7
5.	I feel bad about myself whenever my academic performance is lacking.	1	2	3	4	5	6	7

Appendix C

GRE Math Exam

(Educational Testing Services, 2003)

Math Test

This test is an assessment of your math abilities. Your performance on this test will help us determine your strengths and weaknesses in solving math problems. Please choose the best answer.

1.   **Column A**   **Column B**

       .25% of .25   6.25 x 10

      (A) Column A's quantity is greater.

      (B) Column B's quantity is greater.

      (C) The quantities are the same.

      (D) The relationship cannot be determined from the information given.

2.   If 25 students in one class had an average of 93% and 20 students from another class had an average of 98%, approximately what is the average in percent of all 45 students?

      (A) 94

      (B) 97

      (C) 95.5

      (D) 95.2

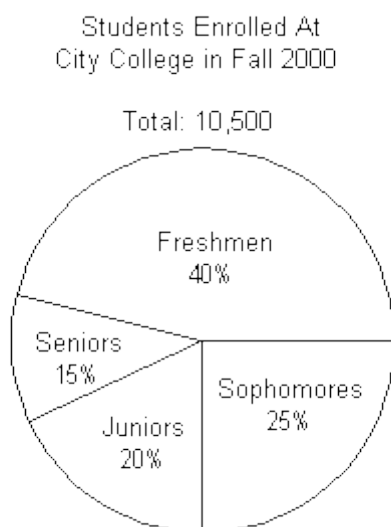   (E) 93

3. A water treatment plant is built with two cylindrical tanks to contain water for a town. Each tank has a radius of 10 feet and a depth of 20 feet. If there are about 7.5 gallons in a cubic foot of water, approximately how many gallons of water can be treated at the plant at any one time?

(A) 6280

(B) 12560

(C) 94200

(D) 2000

(E) 47100

4.

Students Enrolled At
City College in Fall 2000

Total: 10,500

Freshmen
40%

Seniors
15%

Sophomores
25%

Juniors
20%

If enrollment was 17% higher for freshmen at City College in the Fall 2000 semester than the Fall 1999 semester, approximately what was the enrollment of freshman in the Fall 1999 semester?

(A) 3590

(B) 4200

(C) 2415

(D) 1785

(E) 4914

5.   3, 3, 4, 4, 5, 5

Column A   **Column B**

Mode of the numbers listed   Standard deviation of the numbers listed

(A) Column A's quantity is greater.

(B) Column B's quantity is greater.

(C) The quantities are the same.

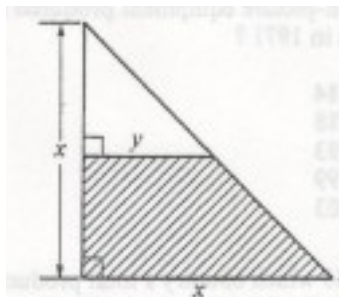(D) The relationship cannot be determined from the information given.

6.   What is the solution(s) to $\dfrac{9}{10}x^2 - \dfrac{18}{5} = 0$?

(A) x = 0

(B) x = 2, x = -2

(C) x = 3, x = -3

(D) x = 6, x = -6

(E) x = 9, x = -9

7.   If x, y, and z are positive integers and $3x = 4y = 7z$, then the least possible value of $x + y + z$ is

(A) 33

(B) 40

(C) 49

(D) 61

(E) 84

8.   Which of the following expresses the area of the shaded region in the figure below?

(A) $\dfrac{x^2 - y^2}{2}$

(B) $\dfrac{x^2 + y^2}{2}$

(C) $x^2 - y^2$

(D) $\dfrac{x^2 + xy}{4}$

(F) $\dfrac{x^2 - xy}{4}$