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THE ROLE OF EMOTION AND EMOTION BELIEFS IN ACHIEVEMENT MODELS

A Thesis in

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by

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ABSTRACT

The purpose of this study is to examine the effects of emotion beliefs on emotions and goal-setting involved in the academic setting. Specifically, I examined whether (a) learning-related emotions experienced prior to exams predicted grades, (b) emotion beliefs moderated this relationship between emotion and grades, (c) exam performance predicted outcome-related emotions after exams, (d) outcome-related emotions predicted changes in goal-setting from before to after an exam, and (e) whether the relationship between emotion and goal-setting shifts was moderated by emotion beliefs. Undergraduate students (N = 329) responded to questionnaires about their emotions and goal orientations across two primary waves of data collection which coincided with their first two Introduction to Psychology exams. Multiple regression analyses revealed preliminary evidence to support the inclusion of emotion beliefs in models of academic achievement.

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Chapter 1

Introduction

From the anger arising from an onerous problem set, to the pride from a project well-received, the emotions evoked during the learning process have been increasingly recognized as important predictors of achievement in the classroom. Although models of academic achievement originally focused on cognition, they have now begun to incorporate emotions as well. Broadly speaking, this process began with early studies of academic achievement which centered on goal setting theory, which demonstrated that the types of goals that people set for their achievement are related to the quality of their performance outcomes, such as exam grades or GPA (Zimmerman, Bandura, & Martinez-Pons, 1992; Elliot, McGregor, & Gable, 1999; Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000). Later studies built on these earlier findings to show that this process is mediated by the types of emotions related to those goals and experiences before, during, and after the learning process (i.e., *achievement emotions*; Pekrun, Elliot, & Maier, 2009). Additionally, after learning has been evaluated (e.g., an exam graded), resulting emotions related to the evaluation may also influence subsequent performance (a second exam) through the shifting of goals, resulting in a reciprocal relationship between goals and emotion (Putwain, Larkin, & Sander, 2013). Thus, research on this topic has demonstrated that emotions are clearly important to academic achievement.

The incorporation of emotion into these models of achievement, however, has been somewhat simplistic relative to the goal-orientation aspects of the model. Just measuring emotional states may not be enough to understand how affective processes contribute to successful learning outcomes. I argue that to more fully capture the role of emotions in influencing academic achievement, there must be a consideration of individual differences

contributing to variations of emotional experience, and to the dynamic influence of emotions on goal-setting as they relate to academic experiences. Specifically, I propose that by also attending to the implicit theories people hold about the malleability of emotion (emotion beliefs), we can understand what leads people with similar emotional responses to different achievement outcomes. Below I briefly review each aspect of contemporary achievement models to provide a conceptual foundation, but will focus on the emotional components for the purposes of the current study.

Intelligence Beliefs and Goal Orientation

The proposed role of emotion beliefs in relation to academic emotions draws heavily from foundational research demonstrating that people's beliefs about their intelligence can limit or promote classroom success (Dweck & Leggett, 1988; Blackwell, Trzesniewski, & Dweck, 2007). These "implicit beliefs" about the malleability of intelligence, also referred to as "lay theories," or "mindsets," influence the types of goals people set for themselves, which in turn influence learning-related behaviors. These beliefs about intelligence are often included in achievement models as a predictor of the types of goals people set for themselves, as summarized in Table 1-1 (Blackwell, Trzesniewski, & Dweck, 2007).

Table **1-1**: Relationships between implicit beliefs about intelligence and achievement goal subtypes.

Implicit theory of intelligence	Definition of competency	Motivation valence
Incremental belief *Intelligence can be improved*	**Mastery Goals** *Competency is acquiring new knowledge*	**Mastery-approach** *Strive to improve competency* **Mastery-avoidance** *Strive to avoid incompetency*
Entity belief *Intelligence is fixed*	**Performance Goals** *Competency is performing better than others*	**Performance-approach** *Aim to demonstrate competency* **Performance-avoidance** *Avoid demonstration of incompetence*

There are two general lay beliefs held about intelligence: either intelligence is viewed as a fixed trait, or it is seen as a skill that can be improved upon with effort (Dweck & Leggett, 1988; Dweck, Chiu, & Hong, 1995). This first belief (intelligence as a fixed trait), referred to as an *entity* mindset, leads people to choose performance-focused goals which lead them to either garner praise from others and reaffirm their perceived level of intelligence, or to avoid the demonstration of incompetency. From the entity perspective, success is viewed as a sign of intelligence, while failure is seen as a sign of intellectual deficiency; as intelligence is seen as fixed, the possibility of growth through failure is not considered. The second belief (intelligence as a malleable trait), called an *incremental* mindset, leads people to place relatively more value on the process and intrinsic value of learning, rather than the performative outcome. Individuals with an incremental mindset view intelligence as a skill that can be improved, leading them to set goals related to mastering skills and increasing knowledge.

It is important to note that while this construct is typically discussed using language that may imply that entity and incremental mindsets are separate variables, mindsets towards intelligence are actually measured as the opposing ends of a single bipolar dimension (Theory of Intelligence Scale; Dweck, 1999). Thus, the measure used to assess this belief provides a single

score, with lower scores representing more entity views, and higher scores reflecting more incremental views towards intelligence. The implication of this is that a person may score high (more incremental) or low (more entity), or somewhere in between, but would not have separate scores for both entity and incremental beliefs (Blackwell, Trzesniewski, Dweck, 2007). Thus, when referring to implicit beliefs throughout this paper, the terms "entity belief" or "incremental belief" refer to the opposing ends of a bipolar construct. The merits of this approach to the study of entity and incremental beliefs will be discussed further when considering emotion beliefs (see below).

Implicit beliefs about intelligence are related to the types of achievement goals that individuals set for themselves. These goals, in turn, can promote behaviors or attitudes that either foster the learning process itself or that lead to a focus on outcomes. There are two broad categories of goal orientation: mastery and performance. *Mastery goals* are set by students who define competency as the accumulation of knowledge (related to incremental beliefs), while *performance goals* are set by students who see competency as a comparison between them and their peers, as demonstrated by visible achievement or failure (entity beliefs; Dweck, 1986; Elliot & McGregor, 2001). Mastery goals, seen as the more adaptive goal-type to hold, have been generally related to higher school performance and greater positive affect, while performance goals often predict poorer performance and greater negative affect (Dweck & Leggett, 1988; Elliott & Dweck, 1988; Linnenbrink, 2005).

As a result of inconsistencies across the goal orientation literature in predicting achievement when using a dichotomous mastery-performance goal approach, researchers later proposed additional sub-categories of goals with the intention of better capturing the variation in outcomes (Elliot & McGregor, 2001; Pekrun, Elliot, & Maier, 2009). For example, not all performance goals lead to wholly negative outcomes; if a person is motivated to approach a performance situation, their goals and outcomes are quite different than those who are motivated

to avoid performance (Elliot, McGregor, & Gable, 1999). This resulted in a 2 x 2 achievement goal model, where mastery and performance goals were each bifurcated into approach- and avoidance-type goals based on motivation valence (Elliot & McGregor, 2001; Elliot & Covington, 2001).

Performance-approach goals are held by people who do attempt to engage academically, but are motivated to seek successes as validation of their intelligence. This occurs because competency is defined through a comparison with others, and the positive expectations for success lead these people to approach situations where their competency can be demonstrated. *Performance-avoidance goals* are held by people who avoid performance situations out of fear of failure, and therefore confirmation that they have low intelligence, particularly compared to others (e.g., "A poor grade tells me I am not as smart as my peers,"). In contrast to performance-approach goals, performance-avoidance goals are often related to lower enjoyment of classes and lower grades (e.g., Church, Elliot, & Gable, 2001; Elliot & McGregor, 2001; Harackiewicz et al., 2002), while performance-approach goals usually predict higher performance in school relative to performance-avoidance goals (e.g., Elliot & Church, 1997; Harackiewicz et al., 2002; Urdan, 2004).

Mastery-approach goals lead people to aim for task-based aptitude for the sake of learning because they view success as increasing knowledge, and focus on their positive expectations of learning (e.g., "I enjoy exams because they reflect my understanding of studied topics,"). *Mastery-avoidance* goals are held by people who share the belief that increases in knowledge reflect competency, but largely focus on avoiding incompetence (e.g., "I am engaged and interested in the learning process because I worry about failing exams,"). Mastery-avoidance goals are typified by people who strive for perfection because they are motivated to avoid any errors. Studies demonstrate that mastery-approach goals are a gold standard for positive outcomes; they are often linked with higher performance compared to other goal orientations

(Elliot & McGregor, 2001), as well as deeper processing during learning (Elliot, McGregor, & Gable, 1999). Additionally, Van Yperen, Elliot, and Anseel (2009) found that mastery-avoidance goal orientation predicted poorer performance compared to the other three orientations. Others have found that while mastery-avoidance goals predicted worse performance compared to mastery-approach, they were still preferable to performance-avoidance goal setting (Elliot & McGregor, 2001). These distinctions, and the relationships between beliefs about intelligence and achievement goals, are outlined in Table 1.

Achievement Emotions

More recently, research has pointed to the influence that a variety of positive and negative emotions can have on students and their learning process above and beyond only measuring goal orientation (Pekrun, Goetz, Titz, & Perry, 2002). In these learning contexts, these emotions are labeled either *achievement* or *academic emotions*. As previously outlined, implicit in goal orientations are motivation valences associated with either positive or negative expected outcomes (i.e., positive valence associated with learning for approach goals, negative valence with avoidance goals); however, specific emotions such as happiness or boredom are also experienced in learning contexts. This line of research was later integrated with goal orientation and implicit beliefs about intelligence into a cohesive model of achievement (Pekrun, Elliot, & Maier, 2009).

Emotion, as defined both in achievement research and the broader emotion literature, refers to an affective episode with cognitive, physiological, and behavioral features (Scherer, 2000; Pekrun, Elliot, & Maier, 2009). From this perspective, emotions are viewed as distinct from both mood and affect; moods are more general and less intense than emotion, while affect is the overall summation of negatively and positively valenced emotions and moods (Pekrun, Elliot, &

Maier, 2009; Tellegen, Watson, & Clark, 1999). Achievement emotions can be positive (e.g., pride, hope) or negative (boredom, hopelessness) in valence (Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011). Achievement emotions can also be differentiated into *activity-related* or *outcome-related* (Goetz, Frenzel, Pekrun, Hall, & Lüdtke, 2007). Activity-related emotions are experienced during or elicited by the activity in question, such as frustration arising from struggling with a difficult exam question or enjoyment of an interesting class lecture. Outcome-related emotions, however, are evoked by the outcome (or expected outcome) of an evaluativeprocess or assessment: anxiety from a fear of failure, or pride at a successful paper grade (Pekrun, Elliot, & Maier, 2009).

Activity- and outcome-related emotions can both be found during three distinct aspects of the learning process (Pekrun, Goetz, Titz, & Perry, 2002). *Class*-related emotions occur in anticipation of, during, and after being in the social context of a classroom. *Learning*-related emotions occur before, during and after studying course material. *Test*-related emotions arise before and during an exam, and after receiving feedback on the exam. By breaking down emotions by these specific contexts, it is possible to narrow the focus of an investigation to a specific step of the learning process.

Despite the delineation of several specific achievement emotions across this literature, studies examining multiple specific emotions are relatively rare. Instead, it is far more common for researchers to select one or two emotions to focus on or to examine emotional valence, more broadly (positive and negative affect, often comprising specific emotion items; Huang, 2011). Positive and negative affect have been found to be strong predictors of achievement goal adoption, demonstrating that emotion valence can be helpful to examine in these models when study questions do not focus on specific emotions. The focus on valence rather than specific emotions in the literature in this area may be further supported by the fact that valence (positive or negative) along with focus (activity or outcome) are the two primary distinctions in the

achievement emotion model (Pekrun, Elliot, & Maier, 2006). While examining specific emotions may be helpful in studies that are interested particularly in the role of discrete kinds of emotion such as boredom, the purpose of this study is to examine emotion in broader terms. Thus, for the purposes of this investigation, specific emotions will be collapsed by valence (positive or negative). Previous studies have found that while specific emotions may vary in the degree to which they relate to outcomes, achievement emotions most often follow the same pattern within a valence group when predicting overall patterns of performance outcomes—positive emotions with higher performance, and negative emotions with poorer performance (e.g., Pekrun, Elliot, & Maier, 2006; 2009). Table 2-1 and Table 2-2 outline specific emotions that fall into the learning-related and test-related categories, and the emotions that will be measured and then collapsed into positive and negative groups for this investigation (i.e., learning activity-related and test outcome-related emotions) are in bold.

Table **2-1**: **Learning**-related emotions across valence and focus which occur around knowledge acquisition.

	Positive	Negative
Activity-related	**Enjoyment**	**Boredom, anger**
Outcome-related	Hope, pride	Anxiety, shame, hopelessness

Table **2-2**: **Test**-related emotions across valence and focus, which occur around exam performance.

	Positive	Negative
Activity-related	Enjoyment	Anger
Outcome-related	**Hope, pride, relief**	**Anxiety, shame, hopelessness**

Academic performance in the general student population has been modeled as an outcome of achievement goal orientation, where this relationship is mediated by achievement emotions (Pekrun, Elliot, & Maier, 2009). Theoretically, both mastery goals and performance-approach goals are expected to predict higher performance, mediated through greater positive activity-related and outcome-related emotions, respectively. Performance-avoidance goals, however, are expected to predict lower performance via the experience of higher negative emotions. Academic emotions have been found to explain up to 29% of variance in course grades (Ketonen & Lonka, 2012). This indicates that emotions provide important information about the learning process, and deserve additional investigations into how emotion can be used to help students as a tool for improvement rather than a barricade against motivation and perseverance when obstacles arise.

In one test of these hypotheses, Pekrun, Elliot, and Maier (2009) measured undergraduates' goal orientations, academic emotions, and exam performance. They found evidence that setting mastery goals provoked positive activity-related emotions (enjoyment) and less negative activity-related emotions (boredom, anger), leading to higher academic performance. Positive outcome emotions (pride and hope) were evoked by performance-approach goals, while negative outcome emotions (anxiety, hopelessness, and shame) were related to performance-avoidance goals, when controlling for performance. In relation to performance,

performance-approach goals predicted higher exam grades, mastery goals weakly predicted higher exam grades, and performance-avoidance predicted lower exam grades.

However, there are inconsistent findings linking performance goals to positive/negative emotion and achievement, with some studies finding the expected pattern of results suggested by the general theory (e.g., performance-approach with positive emotions, performance-avoidance with negative emotions), and other studies finding null or discordant relationships when emotion was used a mediator (Pekrun, Elliot, & Maier, 2009). For example, the aforementioned relationships found between performance-approach goals and hope and pride were not evident or much weaker in another study, as was the relationship between performance-avoidance and shame (Pekrun, Elliot, & Maier, 2006). There are additional inconsistent findings linking performance goals to positive and negative emotion, and achievement, with some studies finding the expected pattern of results suggested by the general theory (e.g., performance-approach with positive emotions, performance-avoidance with negative emotions), and other studies finding null or discordant relationships when emotion was used a mediator (Pekrun, Elliot, & Maier, 2009). Additionally, mastery goals are inconsistently related to hopelessness, shame, and enjoyment, and are only weakly related to performance. Unexpectedly, learning activity-related enjoyment was not predictive of exam grades, and positive emotions were only a partial mediator between performance-approach goals and grades. Performance-avoidance goals have been inconsistently related to negative affect (Sideridis, 2003, 2005).

The inconsistencies noted above may be due to unmeasured moderators that influence individual differences in emotion. Thus, an important step in using emotions in this way would be to examine when and why similar emotional responses can lead to variations in subsequent behavior. One suggestion given by Pekrun, Elliot, and Maier (2009) to explain the fluctuating correlations across studies and unexpected results is that there are unmeasured processes

occurring between goals and performance. The present study will focus on emotion beliefs as one factor that may explain additional variance in models of achievement and emotion.

Emotion Beliefs

Paralleling the work on implicit beliefs about intelligence, Tamir, John, Srivastava, and Gross (2007) have identified two types of beliefs that people tend to hold about the nature of emotion: entity theories and incremental theories. As mentioned above in the discussion of intelligence beliefs, incremental and entity beliefs represent opposing sides of a bipolar scale (Dweck, 1999). Emotion entity theorists were described as people who hold more strongly the belief that emotions are fixed and cannot be altered, only either experienced in whole or completely suppressed. Incremental theorists, in contrast, believe more strongly that emotion is a malleable experience that can be self-regulated. From these descriptions, a four-item questionnaire (Implicit Theories of Emotion Scale, ITES; Tamir et al., 2007) was created and used to measure these beliefs in a sample of incoming college freshman. The ITES yields a single score for each person where higher scores indicate more incremental views, and lower scores represent more entity views, and middle scores falling somewhere in between these opposing views. Those with more incremental beliefs were more likely to have increased amounts of social support, experience more positive and less negative affect, less depression, greater psychological well-being, and better social adjustment as compared to entity theorists, which speaks to the importance of accounting for these beliefs in research and practice. While closely related to beliefs about intelligence, emotion beliefs have only a weak correlation with intelligence beliefs, suggesting that holding entity beliefs about one does not directly relate to beliefs in the other domain (r = .27, Tamir et al., 2007).

The ITES has since been regularly used in subsequent studies of emotion beliefs (e.g., Kappes & Schikowski, 2013; De Castella et al., 2014). However, this brief scale does raise concerns, as there is not sufficient evidence demonstrating that the bipolar unidimensional structure (with emotions viewed on a single spectrum from rigid to malleable) is accurate, or if the emotion belief construct is composed of two orthogonal dimensions representing entity and incremental beliefs separately. Conceptually, it is possible that emotion beliefs are better captured by a two-factor model (as this would mirror the wording used to describe "entity" and "incremental theorists" as separate in this literature). However, given that it is difficult to imagine an individual who believes both that emotions are both fixed and malleable at the same time, the current one-factor structure may in fact be the most theoretically appropriate.

Psychometrically, there are concerns given that the ITES was not created following typical scale construction guidelines (such as those described by Clark and Watson, 1995). Rather, based on the description of the scale provided, items were generated to follow the structure of the original Theory of Intelligence Scale and were not further tested beyond internal validity measures (Dweck, 1999). Researchers have tried to circumvent this measure through the creation of the Emotion and Regulation Beliefs Scale (ERBS; Veilleux et al., 2015). While the ERBS does provide a near alternative to the ITES, the ERBS does not directly address the belief about malleability of emotion. Instead, the ERBS measures the beliefs that emotions can influence self-control, restrict behavior, and that emotion regulation is worthwhile. These beliefs, while related, do not fully resolve this issue. Until the ITES is subjected to a more stringent factor analysis it is unclear whether this scale can be accurately portrayed as capturing one underlying dimension.

The psychometric concerns about the ITES and the related questions about the construct it is trying to capture suggest there should be some caution in moving forward when employing this measure. There are also, however, several advantages to using the ITES. First, it most closely

matches the conceptualization of this construct as a continuum from flexibility to rigidity about emotions, which is consistent with my own views of the construct. Second, using the ITES allows for a more direct comparison of the results of the present study with other studies in the literature. Third, the internal consistency of the ITES has been demonstrated in past research, though the internal consistency does not speak to the factor structure of the measure. Given this latter caveat, the ITES data collected in this study will be subjected to a factor analysis to confirm the assumed structure of the scale.

Emotion beliefs and learning

The influence of emotion beliefs can also be seen in short time spans. A subsequent study demonstrated that entity theorists (individuals endorsing more entity beliefs about emotion) experienced greater levels of negative emotion when watching stressful movie scenes compared to people with more incremental views of emotion (Kappes & Schikowski, 2013). In this study, holding stronger entity beliefs was related to greater use of distraction during movie scenes that elicited negative affect, while holding stronger incremental beliefs was related to a greater use of reappraisal to alter their negative affective response. As might be expected given these tendencies, entity theorists displayed a greater propensity for experiential avoidance (as opposed to accepting negativity) by choosing to end the movie clip early, while incremental theorists were more likely to sit with the discomforting feelings aroused by the film and finish the movie clip.

The emotion beliefs framework provides a way to differentiate these types of response styles to emotional experiences. Just as viewing intelligence as more malleable orients students to engage in behaviors that foster learning (Dweck, 1986), it is expected that viewing emotion as malleable will encourage students to regulate achievement emotions to enhance learning. While feeling boredom during a study session or self-directed anger after receiving a poor exam grade

may be automatic responses for some students, the mindset towards how those emotions are to be handled could differentiate those students who choose to regulate and persevere versus those who continue to dwell on that emotional state. For example, the experience of hopelessness at an exam grade might only promote growth when individuals believe in the ability to change that emotional state. While that negative emotion signals to the student that something went wrong, if a student has an entity view of emotion they would not likely think to engage in strategies to change their experience of the hopelessness. Allowing their hopelessness to fester would likely lead to behaviors (or lack thereof) that reflect the feeling that nothing can change, instead of attempting to improve. A student with an incremental view of emotion would not view hopelessness as a fixed state; rather, they would understand that they have the ability to shape hopelessness into a more productive state. Thus, emotion beliefs may be an important mechanism that has been overlooked in previous iterations of achievement models.

In addition to the conceptual contribution that emotion beliefs can make to achievement models, they may also prove to be an especially important piece of the puzzle because they can offer a potential point of intervention. If we turn to the work on implicit beliefs about intelligence (which the emotion beliefs literature is heavily based on), there are numerous examples of attempts to modify beliefs leading to successful interventions in the classroom. While beliefs about intelligence have been shown to be both fairly stable across time and quite influential on academic success (Blackwell, Trzesniewski, & Dweck, 2007), research also demonstrates that these beliefs can be altered with relative ease using short interventions, leading to impactful changes in behavior (Aronson, Fried, & Good, 2002). This ability to shift mindsets from one pole towards the other with short interventions holds true across different domains of implicit beliefs: personality (Yeager, Trzesniewski, & Dweck, 2013), willpower (Job, Dweck, & Walton, 2010), and even weight-loss (Burnette, 2010). Emotion beliefs are a far newer concept than beliefs about intelligence, and interventions or manipulations of emotion beliefs have not yet been

demonstrated, but it is plausible that altering beliefs about the malleability of emotion will be similar to altering beliefs about the malleability of intelligence, given their common foundation. This would mean that emotion beliefs could serve as a simple target for interventions for students whose emotions hold them back from achieving greater success. First, however, their importance in models of achievement needs to be demonstrated.

Shifts in Goals and Emotions

Emotion is theorized to guide our behaviors by acting as a feedback system that evaluates and shapes motivation and goals (Baumeister, Vohs, DeWall, & Zhang, 2007). As a reactive system, emotion plays an important role in how achievement goals shift and adapt to successes and failures in academics. In a study of reciprocal effects between achievement goals and academic emotions, Putwain, Sander, and Larkin (2013) found reciprocal relationships between specific outcome-related emotions and all four types of goals. Undergraduate students were studied at three time points, from the beginning of their first year to the beginning of their second year of college. Mastery-approach goals were reciprocally related to positive outcome-related emotions, while mastery-avoidance goals were reciprocally related to negative outcome-related emotions and hope. Stronger performance-approach goals were reciprocally related to positive outcome-related emotions (excluding pride), while mastery-avoidance goals were reciprocally related to negative outcome-related emotions (excluding anger) and hope. This suggests that the avoidance-approach dimension is a primary factor in relating emotion to goals.

Emotion beliefs are expected to act as another mechanism in this feedback system: if emotions are fed into the system, they shape and are shaped by the beliefs that then shift the experience and effects of emotion, as illustrated in Figure 1-1. One specific suggested mechanism for how emotion beliefs influence affect, well-being, and distress is propelling people towards

greater or less use of cognitive reappraisal through beliefs about personal efficacy in regulation (De Castella et al., 2013). This model posits that emotion beliefs guide selection of emotion regulation strategies, which in turn leads to the increase or decrease of positive and negative affect following subsequent outcomes. While the authors acknowledge that there is likely a bidirectional relationship between emotion regulation and emotion beliefs, they argue that the role emotion beliefs play in driving regulation selection is important and causal in nature. As such, it is expected that the addition of emotion beliefs in the academic achievement models reviewed above can help to more fully explain the relationship between academic emotions and performance. However, it should be noted that the present study does not address the mechanism of how emotion beliefs may work in the model, as their usefulness must first be established.

When looking specifically at the emotions that arise during learning and evaluative experiences, it is expected that these beliefs would moderate the influence of academic emotions on performance. While the effects of these beliefs can be examined during a single event (e.g., an exam), it also follows that emotion beliefs would also influence the effects of emotions and their related cognitions with each emotional input during the learning process. Two specific points in the learning process are of interest to this investigation due to their relative impact: learning emotions that influence the process of learning, and outcome emotions after performance feedback that influence subsequent goal setting.

Updating the Achievement Model

Existing models of achievement focus on goal orientation and academic emotions as predictors of performance outcomes; I propose that this model would be improved by the addition of emotion beliefs in two key parts of this model, as seen in Figure 1-1. Emotion beliefs were expected to serve as a measurement of individual differences in the ways people respond to their

emotional experiences. While emotional responses to studying are driven partly by the goals previously set by students, the variation in emotion regulation strategies and perceived self-efficacy of using those strategies may influence how those emotions affect performance, which may be captured by measuring beliefs about the malleability of emotion. Additionally, we can use emotion beliefs to look at how emotions that arise from performance feedback change the goals that are set for the next cycle of learning, as the affective component of goals (avoidance or approach) may be susceptible to change through this mechanism.

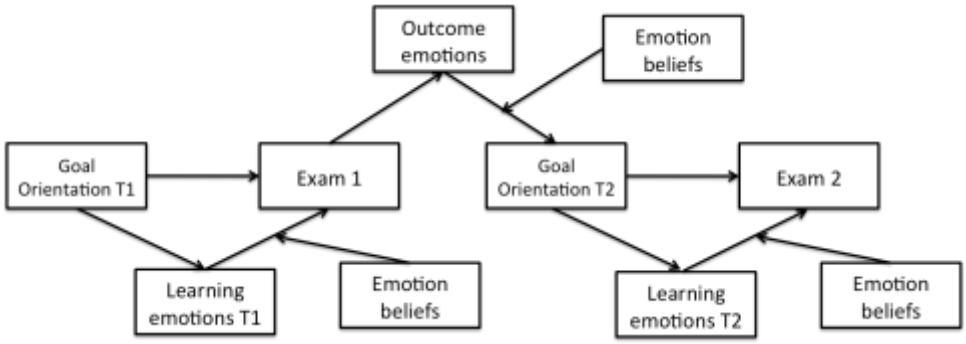

Figure **1-1**: Hypothesized conceptual achievement goal and emotion model across study's two time points. T1 and T2 span two exams during a college course, with emotion beliefs as a proposed moderator between learning-related emotions and performance outcomes, and between outcome-related emotions and goal orientation.

The current study first seeks to clarify inconsistencies in the relationships between learning goals, academic achievement, and academic emotions, by introducing emotion beliefs into the model. The second overall aim is to understand the effect that emotion beliefs may have on subsequent goals and emotions. This is a preliminary test of the importance of emotion beliefs in achievement models, and therefore only hypothesized relationships that related to emotion beliefs were tested. Specifically, the hypotheses for this investigation are as follows:

H1. In line with past research, activity-related learning emotions measured prior to an exam are expected to predict exam grades during both time points. As outlined in Figure 2-2,

positive learning-related emotions will be related to higher performance; and negative learning-related emotions will be related to lower performance.

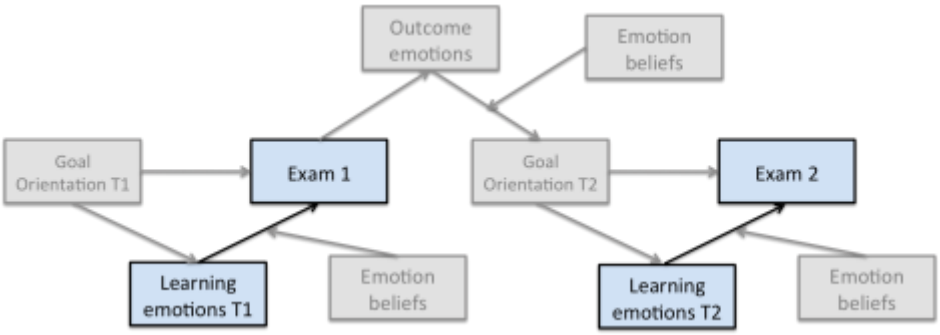

Figure **2-2**: Total model with H1 variables highlighted, across two exams.

H2. Emotion beliefs (coded as a single score, where a higher number indicates more incremental views, and a lower number indicates more entity views) are expected to moderate the relationship between activity-related learning emotions and performance on exams, such that students endorsing relatively higher entity emotion beliefs will have lower exam scores as negative affect increases, but students holding relatively higher incremental beliefs will have scores less dependent on negative affect level. Conversely, students endorsing higher entity emotion beliefs will have scores less dependent on positive affect level, while students endorsing higher incremental beliefs will have higher grades as positive affect increases. This is expected to be observed during both exams measured, as illustrated in Figure 2-3.

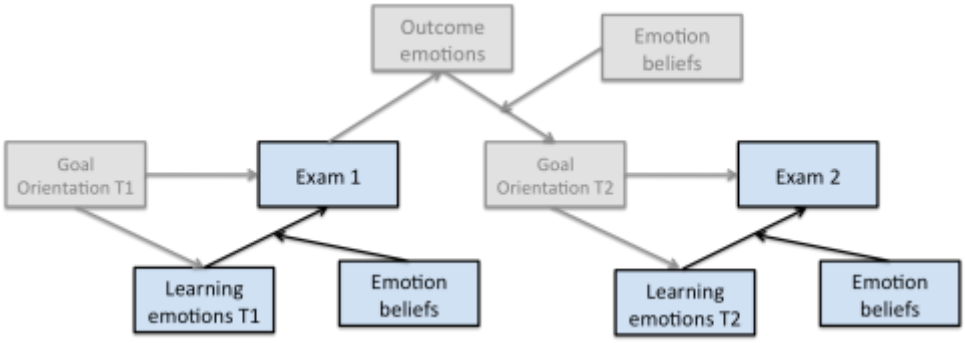

Figure **2-3**: Total model with H2 variables highlighted, across two exams.

H3. After receiving feedback on exam grades, it is expected that higher performance on the first exam will be related to subsequent higher positive test-related outcome emotions (composite of enjoyment, hope, pride, and relief), and lower performance related to subsequent higher negative test-related outcome emotions (composite of anger, anxiety, hopelessness, and shame), as in Figure 2-4.

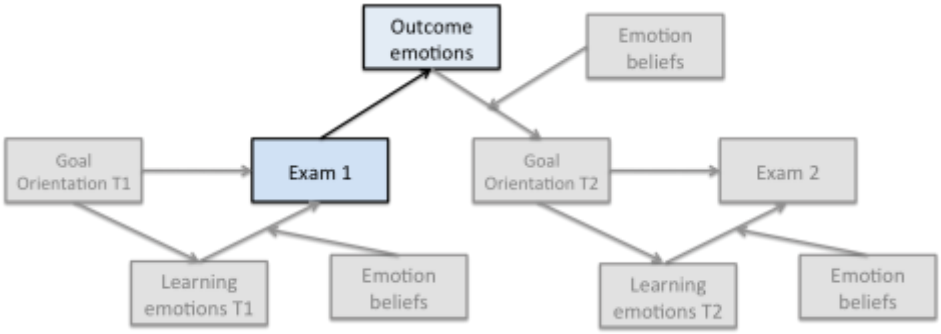

Figure **2-4**: Total model with H3 variables highlighted, across two exams.

H4a. Consistent with previous research, test-related outcome emotions are expected to be related to shifts in reported achievement goal orientations from before to after the first exam, with greater negative test-related emotions related to increases in performance- and mastery-avoidance goals, and greater positive test-related emotions related to increases in performance- and mastery-approach goals, as in Figure 2-5.

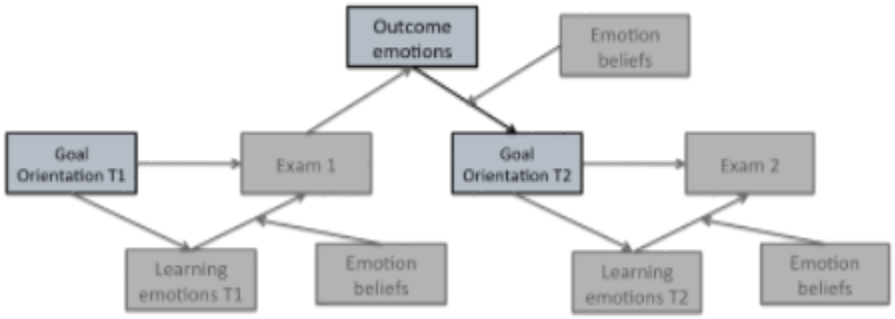

Figure **2-5**: Total model with H4a variables highlighted, across two exams.

H4b. This relationship between test-related outcome emotions and goal orientations shifts is expected to be moderated by the emotion belief variable, such that with scores reflecting relatively higher incremental beliefs, negative emotion will not be as strongly related to decreases in approach goals and increases in avoidance goals; and with scores reflecting higher entity beliefs, negative emotion will be more strongly related to increases in avoidance goals and decreases in approach goals, as in Figure 2-6.

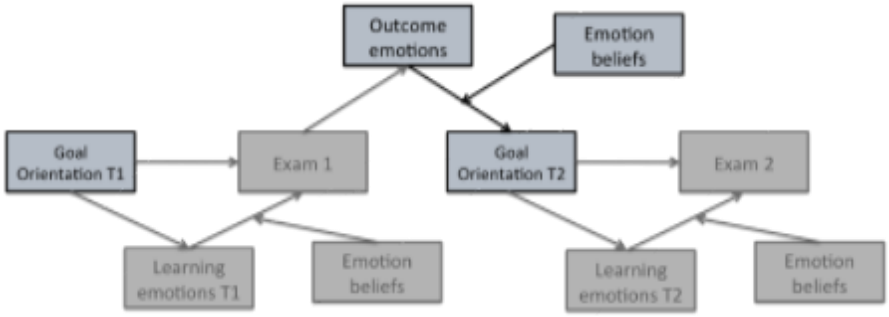

Figure **2-6**: Total model with H4b variables highlighted, across two exams.

Chapter 2

Method

Participants

Participants were 329 undergraduate students (250 women, 75 men, 4 transgender/other gender, *M* age = 18.6) enrolled in three sections of introductory psychology classes, and identified using the Psychology Department subject pool. Participants were provided course credit for their participation in the study. Participant demographics are reported in Table 3.

Measures

Demographics

Eleven questions were used to collect information on participant age, gender, sexuality, race, marital status, year in undergraduate education, employment, parent education level, degree of importance of grade in target class, and whether the class had been taken previously.

Implicit Theories of Emotion Scale (ITES; Tamir et al., 2007)

Four items are used to assess this bipolar construct of implicit beliefs of the malleability of emotion (degree emotions range from entity or fixed to incremental or malleable). The scale is composed of two incremental-framed items (e.g. "If they want to, people can change the emotions that they have"), and two entity-framed items (e.g. "The truth is, people have very little control

over their emotions") where responses are indicated on a scale from 1 (*strongly disagree)* to 5 (*strongly agree)*. Scores are created by reverse scoring entity item responses and averaging the four responses, such that higher scores reflect more incremental theories of emotion and lower scores reflect more entity theories.

While inter-correlations between the four items ranged from 0.20-0.64, the four items were found to assess this construct with adequate reliability ($\alpha = .73$). However, as the bipolar unidimensional structure of this scale has not been supported in the literature using typical scale construction analyses (e.g., factor analysis), I conducted a confirmatory factor analysis to test the presumed one-factor structure. As the scale only has four items and three items per factor are often necessary to test factor structure, a two-factor solution failed to converge and was unable to find good fit. The one-factor model was found to be marginally acceptable following suggested cut-off criteria for fit indexes, by both an absolute index of model fit (SRMR = .07) and a relative index (CFI = .85; Hu & Bentler, 1999). Given the marginal fit, other models would ideally have been compared; however, the limited number of items in the scale made this impossible to do. Therefore, the one-factor structure of the scale was retained and used for study analyses.

Achievement Emotions Questionnaire (AEQ; Pekrun, Goetz, Titz, & Perry, 2002)

Positive and negative emotions experienced while studying and after exams were measured using items from the AEQ, which identifies class-related discrete emotions that occur before, during, and after studying or examinations. As the discrete emotions captured by the AEQ were not of interest to this investigation, items related to specific emotions were collapsed into positive and negative emotion variables based on valence. Responses were made on a 1 (*Strongly Disagree*) to 5 (*Strongly Agree*) scale. While the original instructions assess typical or trait-like emotional reactions, alternative instructions are provided in the AEQ manual and were used to

measure state-like emotions experienced during specific courses (e.g., "Attending classes at university can induce different feelings. This part of the questionnaire refers to emotions you may have experienced after completing the exam in this course,").

Two subscales of the AEQ were completed by participants: emotions during studying and after examinations; emotions occurring outside of these parameters were not measured. The learning-related (studying) emotion subscale uses 75 items to measure eight emotions, three emotions of which are during the studying process (a target of this investigation): enjoyment items were used to as an index of positive activity-related emotion prior to both exams (Exam 1 α = .64, Exam 2 α = .60), while boredom and anger items were averaged together to create a negative activity-related learning emotion score (Exam 1 α = .87, Exam 2 α = .88). The test-related emotion scale of the AEQ uses 77 items to assess eight emotions, six of which are outcome-related: hope, pride, and relief items were averaged together to create a positive outcome-related test emotion score (α = .89), and anxiety, shame, and hopelessness items were averaged to create a negative outcome-related test emotion score (α = .95). The appropriateness of the new factor structure of the scale after emotions were collapsed into positive and negative emotion categories was evaluated through three confirmatory factor analyses, for Exam 1 and Exam 2 activity-related learning emotions and for outcome-related test emotions. Across the three tests of the two-factor structure (positive and negative emotion), the models were found to be acceptable by an absolute index of model fit (SRMR = .07, .07, .07), and a marginal fit by a relative index (CFI = .80, .81, .85).

Achievement Goal Questionnaire-Revised (AGQ-R; Elliot & Murayama, 2008)

This 12-item scale measures the 2 x 2 framework of the achievement goal model, conceptualized as the crossing of competency (mastery and performance) and valence (approach

and avoidance) aims. Each of these four goals were calculated separately, as conceptually multiple goals may be held at one time: mastery-approach goals (aim to understand and learn fully; α = .58-.59), mastery-avoidance (aim to learn fully out of fear of incomplete mastery; α = .59-.63), performance-approach goals (aim to perform well compared to others; α = .57-.61), and performance-avoidance (aim is to avoid poor performance; α = .57-.58). Responses are given on a scale of 1 (*does not correspond at all*) to 7 (*corresponds exactly*), and summed for each of the four categories.

Positive and Negative Affect Schedule (PANAS-X; Watson & Clark, 1999)

The PANAS-X is a 60-item measure that will be used to control for self-rated trait-level affect, so that the effects of state-level achievement emotions are demonstrated to affect outcomes above and beyond how people usually tend to feel. Each item is an emotion word (e.g., "lonely" or "distressed") that participants will respond to with the degree to which they feel that emotion. Discrete emotions are grouped into two higher-order dimension scales which were found to have adequate reliability: Negative Affect (α = .94) and Positive Affect (α = .93). To control for trait-level affectivity, participants will be instructed to indicate to what extent they have felt each of the queried emotions in general, rather than currently or around a specific event, using a scale ranging from 1 (*very slightly or not at all*) to 5 (*extremely*). Scores will be created by calculating the mean response to questions within the Negative Affect scale and Positive Affect scale.

Shipley-2, Vocabulary Subtest (Shipley, Gruber, Martin, & Klein, 2009)

This 40-item scale will be used to control for intelligence, by measuring crystallized cognitive ability. The Shipley-2 provides an estimate of full-scale IQ normed for age based on a

sample of 2,826 individuals. Each item consists of a target vocabulary word and four possible responses. The participant is instructed to select the response word that matches the meaning of the target word (e.g., "large" matched to "big").

Procedure

This study was conducted across two primary waves of data collection intended to coincide with the first and second exams administered in participants' class, referred to as Exam 1 and Exam 2, as illustrated in Figure 4. In each wave for baseline measurements, participants completed questionnaires about learning goals, academic emotions, emotion beliefs, demographics, social desirability, trait affectivity, and verbal ability. Then, after each exam, de-identified exam scores were received from the professor for the course section. Following the completion of each exam, participants completed the academic emotions scale again, to compare pre- and post-exam emotion states that may have shifted because of the testing experience and may influence subsequent performance.

Upon completion of the online informed consent form, subjects were sent an email confirming participation in the study, and a participant-specific URL linked to their subject ID number to fill out demographic, social desirability, trait affectivity, emotion beliefs, achievement goals, and baseline cognitive functioning questionnaires (via qualtrics.com). One day before the first exam, participant-specific links to access the Achievement Emotions Questionnaire (learning subscale) were emailed to participants. Two days after the first exam, subjects were emailed participant-specific links to the Achievement Emotions Questionnaire (test subscale). After both exams, the professor and teaching assistant for each course were emailed an excel file that contained instructions for sending secure and unidentified participant grades to the experimenter.

These procedures were repeated for the second exam of the courses. The first round of questionnaires with demographic, social desirability, trait affectivity, and baseline cognitive functioning questionnaires were not completed again, but all other measures were given per above procedures.

Analytic strategy

The goal of this study was *not* to test the model as a whole, but rather to examine pieces of it as it related to the hypothesized role of emotion beliefs, as a preliminary test. Therefore, the hypotheses in this study were selected because they were either directly related to the emotion belief variable or were variables with relationships that were expected to be influenced by the emotion belief variable, and were therefore examined separately. The visualization of the model as a whole (see Figures 3-7) is not intended to serve as a direct statistical model, but instead as a conceptual framework for the individual parts being tested here. As such, linear regression was chosen to test the proposed relationships separately. Future research that builds on these findings might include using path analysis to examine the relationships tested in this study in context with each other. If initial evidence towards the inclusion of the emotion belief variable is found, future studies can take a broader approach by testing the whole model.

For analyses of Hypotheses 1 and 2, learning-related activity academic emotions were conceptually and statistically grouped by valence (positive or negative). Learning-related outcome emotions (hope, pride, anxiety, shame, and hopelessness) were not included in these analyses because the focus is on emotions arising from the *process* of learning, rather than the *outcome* of learning. Participant response scores for emotions within a valence category were averaged together into positive learning-related activity emotion (enjoyment) and negative learning-related activity emotion (boredom and anger). Specific emotions were not the focus of

this study, as specific expectations about how, for example, boredom may uniquely predict outcomes compared to anger in the context of emotion beliefs were not relevant to this initial attempt to show that emotion beliefs were useful to include in studies of achievement. Demonstrating that emotion beliefs are related to positive and negative emotion in this setting provides simple yet compelling evidence towards their usefulness, that can be built upon in future studies.

Similarly, in analyses of Hypotheses 3 and 4, test-related outcome emotions were grouped by valence (positive or negative). Activity emotions were not examined in this step, because the focus of these test-related emotions in the model is the resulting emotions from the exam outcome (e.g., completing the exam and feeling relief), which only conceptually relates to outcome-related emotions. Participant response scores for emotions within a valence category were averaged together to result in two scores: positive test-related outcome emotion (composite of hope, pride, relief items) and negative test-related outcome emotion (anxiety, shame, hopelessness items).

Chapter 3

Results

Preliminary Analyses and Descriptive Statistics

All analyses were done in R 3.3.2 (R Core Team, 2017). Preliminary data cleaning removed eight participants who did not complete all four waves of data collection. Shipley-2 IQ scores and exam grades were examined for possible outliers using Tukey's method for detecting outliers, which identifies scores above or below the first and third quartile (Tukey, 1977). Two participants had IQ scores below this range, while ten participants had exam scores below this range (and none above). However, removal of these participants from the primary analyses did not cause any significant changes to results, and were therefore retained.

Data collection online did not force participants to respond to each question before continuing with the survey, resulting in missing data across variables ranging from 0 to 45 missing cases. Examination of missing cases suggested that emotion-rating variables at the final time point, after the second exam, were the most affected, suggesting that effort for some participants declined across the study. In a given analysis, cases were excluded if data was missing for any variables used.

Descriptive statistics for the primary study variables across each time point are displayed in Tables 4 through 7, along with counts of missing cases per variable. Pearson product-moment correlations between the primary variables used for analyses across time points are presented in Table 8.

H1 Results: Learning activity emotions and exam grades

Multiple regression analyses were used to test if the positive and negative activity-related learning emotions measured prior to an exam significantly predicted participants' grades for exam 1, and again for exam 2. For each model, PANAS-X (positive and negative emotion), and Shipley-2 (IQ) scores were included in analyses to control for the effects of trait-level emotion and intelligence. Trait-level emotion was expected to possibly confound the role of state-level learning emotions, as trait emotionality likely influences the likelihood of experiencing positive or negative state emotions, such as learning emotions. Intelligence was also controlled for, given the importance it holds for success in academics. For ease of presentation, I will only focus on the relationship between learning emotions and exam grades, though higher IQ was consistently related to higher exam grades.

For Exam 1, the full regression model explained 10.5% of the variance in test scores (R^2 = .10, $F(6, 267) = 6.33$, $p < .001$). As hypothesized, higher negative learning activity emotions significantly predicted lower exam grades ($\beta = .25$, $t = -2.26$, $p < .05$). Inconsistent with hypothesis 1, positive learning activity emotions were not related to exam scores. Regression tables for analyses are presented in Tables 9 through 18.

For Exam 2, the full regression model explained 9.5% of the variance in test scores (R^2 = .09, $F(6, 242) = 5.32$, $p < .001$). Again, as expected, higher negative learning activity emotions significantly predicted lower exam grades ($\beta = .27$, $t = -2.49$, $p < .05$). However, no other variables, including positive learning activity emotions, were significant predictors of Exam 2 grades. This analysis was repeated, with the addition of Exam 1 grades as additional predictor to test whether controlling for earlier performance would lead to similar results. However, only

Exam 1 grades significantly predicted Exam 2 grades ($\beta = .52$, $t = 10.73$, $p < .001$), and no learning activity emotion variables were significant predictors of grades, inconsistent with the hypothesis.

The analyses for both Exam 1 and Exam 2 were repeated, with the inclusion of the four goal orientation variables collected at baseline, as goals were conceptually linked to both exam grades and learning emotions. However, none of the four goals were significant predictors of exam grades, nor did their inclusion change the relationships of the primary study variables with exam grades.

H2 Results: Emotion beliefs as moderator of learning activity emotions and grades

To test the second hypothesis that emotion beliefs act as a moderator between activity-related learning emotions and performance on either exam, multiple regression analyses were used to look at how both positive and negative learning activity emotions interacted with emotion beliefs to predict performance (grades).

For Exam 1, there was a significant main effect for negative learning activity emotions, such that higher negative learning activity emotion was related to lower exam scores ($\beta = .25$, $t = -2.00$, $p < .05$), but there was no main effect of emotion beliefs nor was there a significant interaction between negative learning activity emotions and emotion beliefs. Inconsistent with hypothesis 2, the results for positive learning activity emotions prior to exam 1 revealed no significant main effects nor an interaction.

These analyses were repeated for Exam 2 scores and positive and negative learning activity emotions. The overall models were not significant for either positive or negative test activity emotion and no significant main effects or interactions were found.

H3 Results: Exam grades predicting test outcome emotions

Multiple regression analyses were performed to test if performance on Exam 1 significantly predicted participants' subsequent positive and negative test-related outcome emotions. As in Hypothesis 1, Shipley-2 scores were included in analyses to control for the effects of intelligence on exam scores, but PANAS scores were not included as they were not conceptually related to exam scores.

Results demonstrated that as predicted, higher Exam 1 scores significantly predicted lower negative outcome emotions ($\beta = -.22$, $t = -6.42$, $p < .001$). Additionally, it was found that higher Exam 1 scores significantly predicted higher positive outcome emotions ($\beta = .14$, $t = 5.17$, $p < .001$).

H4a Analyses: Test outcome emotions predicting goal orientation shifts

To test whether positive and negative test outcome emotions after the first exam predicted shifts in goal orientation scores, regression analyses were performed in separate models for each of the four goal orientations. Goal orientation change scores were computed by subtracting T2 scores from T1 scores for each of the four goal orientations.

Contrary to the expected findings, neither negative test outcome emotions ($\beta = .06$, $t = 0.58$, *ns*) nor positive outcome emotions ($\beta = .03$, $t = 0.39$, *ns*) were significant predictors of change in mastery-approach goal orientation ($R^2 = .001$, $F(2, 281) = 0.18$, *ns*). This pattern held true for all other models, as test outcome emotions were not significant predictors of any of the four goal orientation change scores.

H4b Analyses: Emotion beliefs as moderator of test outcome emotions and goal shifts

To test whether the relationships between test outcome emotions and shifts in goal orientation are influenced by emotion beliefs, the regression models from H4a were repeated, with the addition of emotion belief scores included as a moderator variable. Positive and negative test outcome emotion variables were run in separate models, for a total of eight regression models.

Stronger entity emotion beliefs were associated with a decrease in mastery-avoidance goal orientation ($\beta = -.42$, $t = -2.26$, $p = .02$). This main effect was qualified by a significant interaction between emotion beliefs and negative test outcome emotion ($\beta = .17$, $t = 2.05$, $p = .04$), as visualized in Figure 7. People with weaker entity emotion beliefs (stronger incremental emotion beliefs) and higher negative emotion showed little change in their mastery-avoidance goal orientation. However, people with stronger negative test outcome emotion and entity beliefs showed an increase in mastery-avoidance goal strength from the first to second exam, while people with less negative test outcome emotion and stronger entity emotion beliefs showed a decrease in mastery-avoidance goal strength. In other words, mastery-avoidance goals are strengthened when both high negative emotion and high entity beliefs are present. These findings provide support towards the hypothesis that emotion beliefs alter the relationship between learning emotion and goal shifts, but this is only true for negative test outcome emotion, and not positive.

A second significant interaction emerged in the performance-avoidance goal model. Similar to the mastery-avoidance model, there was a main effect suggesting that stronger entity emotion beliefs related to a decrease in performance-avoidance goals ($\beta = -.34$, $t = -2.08$, $p = .04$).

Again, there was a significant interaction between emotion beliefs and negative test outcome emotion ($\beta = 0.15$, $t = 2.08$, $p = .04$); following the same pattern as mastery-avoidance goal shifts, and illustrated in Figure 8. These findings support the hypothesis that emotion beliefs alter the relationship between test outcome emotion and goal shifts, but this is only true for negative test outcome emotions and avoidance-type goals. Specifically, negative test outcome emotion only led to shifts in avoidance goals when people held strong entity emotion beliefs; in this case, low negative test outcome emotion was related to a decrease in goal strength, and high negative test outcome emotion was related to an increase in performance-avoidance goals. No other models had significant main effects or interactions.

Chapter 4

Discussion

The purpose of this study was twofold: first, to examine the relationships that form the foundation of the achievement model; second, to understand how the novel inclusion of beliefs about emotion as a moderator could qualify the relationships between achievement goals and academic emotions as they predict academic performance, both concurrently and over time. The previous documentation of inconsistencies in predicted relationships across achievement models has called for investigation of unexamined variables that may explain why, for example, mastery-avoidance goals may be related to either positive or negative outcomes across studies.

The findings of this study continued the pattern of inconsistencies that paints what appears to be a complicated picture, with support both for and against the expected hypotheses. Importantly, however, some preliminary evidence was found to support the inclusion of emotion beliefs in models of academic achievement. The pattern of results in this study point to both the importance of attending to the multiple moving parts of the achievement model and their dynamic relationships with each other over time.

Replicated relationships within the achievement model

One set of questions in this study tested the hypotheses (1 and 3) concerning the basic assumptions of the model: whether learning activity-emotions predicted exam scores, whether exam scores predicted test outcome-emotions, and if test outcome-emotions predicted shifts in goal orientation (for previous examples, see Pekrun et al., 2011; Daniels et al., 2009; Linnenbrink & Pintrich, 2002). Mixed support was found for these initial hypotheses. The expectation that the

emotions experienced during the process of learning and studying would predict performance on both exams was partially supported. Those reporting greater state-level negative emotion had lower average test scores, but unexpectedly, positive state-level emotions did not appear to predict grades. This finding is partially consistent with previous literature, and supports the idea that experiences of negativity that occur while learning can limit understanding of class material, as measured through exams (e.g., Pekrun, Elliot, & Maier, 2009).

The question of whether performance on the first exam predicted the valence of emotions after the first exam was answered as expected. Lower Exam 1 scores were indeed related to greater negative test-related outcome emotions and lower positive test-related outcome emotions, as well as greater trait-level negative emotion and lower trait-level positive emotion. This is consistent both with previous research and common sense—receiving a poor grade often leads to feeling sad or angry, while a high grade can inspire joyfulness or pride. However, that trait-level emotions (i.e., PANAS ratings) were also significant predictors in these models suggests that the influence of emotional quality on achievement likely carries out over time as well as immediately. Emotions do not exist within a vacuum, and the tendency of a person to have high or low negative emotion can predict the likelihood of having negative responses in a given situation.

Third, I examined whether test-related outcome emotions predicted shifts in achievement goal orientations from before to after the first exam. Previous studies suggested that affective experiences predicted goal adoption (e.g., Daniels et al., 2009); however, in this study, neither positive nor negative test-related outcome emotions predicted shifts in the strength of any of the four goal orientations measured. Given the finding that emotion beliefs moderated these relationships, it seems that the link between emotional responses to performance situations are not directly linked to changes in goals; rather, this link appears to depend on how people respond to their emotions. However, variables beyond emotion beliefs that were unmeasured may also be at play. Goal orientation in this study was measured as a state-based quality, in reference to a

particular course. However, approach and avoidance motivations can also be studied at the level of personality, and have been considered foundational aspects of temperament (Elliot & Thrash, 2002). Approach and avoidance temperament have been linked closely to goal orientation, and if this had been measured and accounted for in analyses, perhaps clearer links to emotion would have emerged.

The analyses presented in this study also speak to the conceptual and psychometric structure of the emotion belief scale (ITES; Tamir et al., 2007). Previous studies have not yet provided evidence that the emotion belief construct is best represented as a single dimension, a question raised by the possible mismatch between the structure of the scale and the language used to discuss emotion beliefs. The one-factor model is statistically supported by my results, which is consistent with how emotion beliefs have been measured previously. Simultaneously believing emotions are fixed *and* malleable at the same time is an unlikely circumstance, and therefore, finding that these beliefs form opposing sides of a single dimension is more consistent with this conceptual approach rather than a view of these beliefs as orthogonal.

Novel additions to the achievement model

The second set of hypotheses focused on the role of emotion beliefs in the achievement model. The beliefs were included to capture the variation in how people respond to their emotional experiences, which could serve as a target for intervention around academic emotions. Additionally, the change that emotions provoked in goal orientation after performance feedback was expected to be altered by beliefs about emotion, through the affective component of goals (avoidance or approach). While mixed support was found for these hypotheses, emotion beliefs were found to be important in some cases, suggesting that they be studied further in the context of achievement models and classroom interventions.

First, the relationship between activity-related learning emotions measured prior to the exam and grades (which was partially supported in the previous section) was expected to be moderated by beliefs about emotion. However, this was not supported by the results, which also showed that emotion beliefs were not correlated with either exam score, although were weakly correlated with academic emotions across time points. This pattern of results suggests that if emotion beliefs are relevant to achievement, it is not a direct relationship.

One possible explanation for this seeming lack of importance of emotion beliefs in the relationship between emotion and performance is that academic emotions are qualitatively different than those outside of this setting; perhaps the emotion beliefs measured in this study were more relevant to people outside of academic environments, while another set of beliefs are activated in school settings. This opens up the question of context in the emotion belief field—are these beliefs consistent across environments, or are different sets of beliefs about the malleability of emotion activated separately? While the role of context in shaping beliefs has not yet been addressed elsewhere, the framework provided by the knowledge and appraisal personality architecture model (KAPA; Cervone, 2004) suggests that relatively static beliefs about the world can be activated across different situations, and be altered by the affective quality of those contexts. It would therefore be consistent to expect that latent beliefs are not uniform across experiences, and shift to the demands of the situation (for related discussion, see Veilleux, Salomaa, & Pollert, 2017).

While there was no direct relationship between emotion beliefs and performance, interactions did emerge between negative academic emotions and emotion beliefs, when predicting mastery-avoidance and performance-avoidance goal shifts. This qualification of the relationship suggests that negative emotion is more likely to change goal strength when (1) people strongly believe that emotions are fixed, not malleable, and (2) the goals in question are avoidance-focused. People with greater negative emotion after a test who believe their negativity

cannot be regulated are more motivated to avoid failure, to escape a continuation of their current emotional state. Conversely, people who experienced less negative emotion after an exam decreased their avoidance goals, despite their belief that emotions are fixed, possibly because their relative lack of negative feelings signaled less reason to avoid future failures.

The relationship found between entity beliefs about emotion and increases in avoidance-type goals is supported by previous research on emotion beliefs. Believing that emotion is fixed has been related to experiential avoidance in the face of negative emotion (Kappes & Schikowski, 2013). Further, entity beliefs also predict more negative ratings of mood after a negative experience, and a lower willingness to re-enter the negative experience even with incentives. While these findings are based on a study about aversive movie clips, it has clear implications for the academic setting, where students are expected to return to the classroom even after a difficult exam.

The flipside of this finding implies that incremental emotion beliefs (in which emotions are seen as malleable) could curb snowballing avoidance in classroom settings. Avoidance-based goals (both mastery- and performance-type) have been linked to poorer outcomes for students, as they turn students' focus to fear of failure (Elliot & McGregor, 2001). Experiencing negative emotion after a difficult exam is likely inevitable; however, the trajectory towards higher avoidance goals may be minimized if those emotions are seen as immutable rather than transient.

Limitations and Future Directions

Several possible limitations of this study should be addressed and discussed in the context of future research on this topic. While one aim of this study was to establish common ground with other studies, several issues arose that limit the ability to do so. Primarily, these issues include concerns about the difficulty of the course, the effort of the participants, and the

heterogeneity of measures used across the achievement literature. While the results suggest that emotion beliefs may play a role in moderating academic emotions and shifts in goal orientations, they should be interpreted in light of these concerns.

First, the participants were enrolled in an Introductory Psychology course, and all indicated that they expected to pass the course with a grade of "C" or higher at the beginning of the study. That 90% of the students expected to earn a "B" or higher suggests that this course was not perceived by the students as particularly difficult. The ease of this course suggests that (1) there was little variation within the sample in exam scores, (2) students likely had little emotional investment or arousal in a course that was overwhelmingly seen as easy to pass, and (3) achievement goals may not have been highly relevant if the expected outcome was passing without much struggling.

Should this study be replicated with students enrolled in a more challenging course, factors such as achievement goals and academic emotions may become much more relevant, and evidence to support other expected relationships from this study may be found. Further, the results would be more applicable for students struggling in those difficult courses, as they could speak to possible strategic targeting of goals, emotions, or emotion regulation skills to improve academic achievement. Using a sample of students who either have a history of low grades or difficulty with emotion regulation (e.g., anxious during exams) to look at emotion beliefs is also recommended: these are populations who are at risk and could most benefit from this line of research (as in Sideridis, 2005; Aronson, Fried, & Good, 2002). Contrasting these students with others without these problems could also highlight the differences in how deeply academic emotions affect grades or which goals are more used.

Effort of the students is not something that was measured, but may have been a concern in this study. The number of missing answers for questionnaires increase throughout the study as seen in Tables 4 through 7, and by the final time point, up to 45 missing cases for a variable were

observed. An attention check item should be used in future studies, to separate participants who are paying attention to the surveys from those who may be clicking at random or skipping questions. This may also be confounded with academic achievement in itself, as there is reason to assume that higher achieving students may also be more conscientious (Tross, Harper, Osher, & Kneidinger, 2000), and therefore more likely to complete the questionnaires fully and attentively.

The results of the present study are to some degree dependent on the way academic emotions were measured and parsed apart. For example, here emotions were collapsed across valence (positive or negative) and focus (outcome- or activity-related), but other studies have included these distinct emotions (e.g., Pekrun, Elliot, and Maier, 2009). The decision to collapse these variables was made because of the complexity of the analyses needed in this study and the general lack of distinction between emotions within these categories found in previous studies (e.g., Pekrun, Elliot, and Maier, 2009; Daniels et al., 2009). Additionally, there are multiple ways of grouping and defining achievement goals, including the 2 x 2 framework (Elliot & McGregor, 2002) used by this study, a trichotomous goal model (Elliot & Thrash, 2002), using a combined profile of goals (Pintrich, 2000), or using cluster analyses (Meece & Holt, 1993). Although the exploration and debate over the best way to structure goal orientations is necessary for the advancement of the field, it also creates difficult when trying to compare results across approaches.

The analyses presented in this study are considered preliminary evidence for the inclusion of the emotion belief construct in achievement models. In this first step, only the pieces of the achievement model that provided a foundation for or directly included emotion beliefs were examined; however, after finding some support for this construct, next steps should include a confirmatory test of these relationships in the context of the broader model. Path analysis is one viable strategy for accomplishing this goal, as it could examine whether these direct or indirect relationships fit together as theorized.

Conclusion

In closing, the current model of achievement goals and emotion has numerous moving parts, which contributes to the difficulty of testing each relationship reliably. While issues such as consistency of measurement muddy the waters, conceptual concerns such missing moderators are targets for future studies, as individual differences may lead goals and emotions to operate differently across classrooms and students. As demonstrated in this study, students' beliefs about the malleability of emotion may not affect emotion's role in performance in a direct relationship, but may obliquely influence the way negative emotions shape future motivation through encouraging avoidance-focused goal orientations. The goal of this line of research is to identify and promote best practices for students in their learning process. This study provides the first steps towards doing so; the link between achievement and beliefs points to possible future avenues of research that could help students understand how their basic beliefs about the world—from intelligence to emotion—can influence their academic potential.

Appendix

Tables of All Statistical Tests

Table **1-1**: Demographic characteristics of participants at time of first data collection.

	N	**Range**	**Mean (SD)**
Age	329	18-23	18.6 (0.9)
Years in college	329	1-5	1.5 (0.8)
	N		**Percentage (%)**
Gender			
Male	75		22.8
Female	250		76.0
Transgender/Other gender	4		1.2
Race/Origin			
White	242		73.6
African-American, Black	21		6.4
Hispanic, Latino, Spanish	9		2.7
Asian, Asian-American	38		11.6
Other	1		0.3
More than one	24		7.3
Sexual identity			
Heterosexual	309		94.0
Gay/lesbian	8		2.4
Bisexual	9		2.7
Asexual	3		0.9
Ever married	0		0
Expected grade in course			
A	147		44.7
B	149		45.3
C	33		10.0

Taken course previously	31	9.4
Highest parent education		
Some high school	4	1.2
High school graduate	43	13.1
Some college/technical	36	10.9
College/tech graduate	135	41.0
Advanced degree	111	33.7
Employment status		
Unemployed	275	83.6
Part-time	52	15.8
Full-time	2	0.6

Table **2-1**: Descriptive Statistics for Data Collection 1 Study Variables.

Variable	*M*	*SD*	Observed Range	*N*
Shipley-2 IQ	112.8	11.8	67-135	329
PANAS-positive	3.4	0.6	1.6-4.9	319
PANAS-negative	2.3	0.6	1.3-4.3	318
ITES	2.71	0.8	1.0-5.0	326
AGQ-Mastery Approach	4.1	0.6	2.7-5.0	329
AGQ-Mastery Avoidance	3.7	0.8	2.0-5.0	323
AGQ-Performance Approach	4.1	0.7	2.0-5.0	325
AGQ-Performance Avoidance	4.0	0.7	2.0-5.0	325

Table **2-2**: Descriptive Statistics for Data Collection 2 Study Variables.

Variable	*M*	*SD*	Observed Range	*N*
Enjoyment	3.1	0.6	1.5-4.8	326
Hope	3.6	0.6	1.0-5.0	325
Pride	3.5	0.6	1.2-5.0	324
Anger	2.7	0.7	1.0-4.7	323
Anxiety	3.1	0.7	1.2-4.9	320
Shame	2.8	0.7	1.0-4.6	321
Hopelessness	2.5	0.7	1.0-5.0	320
Boredom	2.8	0.7	1.0-4.7	323
Positive Activity Emotions	3.1	0.5	1.5-4.8	326
Negative Activity Emotions	2.8	0.6	1.0-4.4	318

Table **2-3**: Descriptive Statistics for Data Collection 3 Study Variables.

Variable	*M*	*SD*	Observed Range	*N*
AGQ-Mastery Approach	3.9	0.6	2.3-5.0	324
AGQ-Mastery Avoidance	3.6	0.7	1.7-5.0	324
AGQ-Performance Approach	3.8	0.6	1.2-5.0	323
AGQ-Performance Avoidance	3.8	0.6	2.0-5.0	324
Enjoyment	3.1	0.5	1.3-4.8	312
Hope	4.0	0.7	2.0-5.0	327
Pride	3.3	0.6	1.0-5.0	319
Relief	3.3	0.6	1.2-4.7	313
Anger	2.0	0.6	1.0-4.9	318
Anxiety	2.5	0.8	1.0-4.6	321
Shame	2.1	0.7	1.0-5.0	318
Hopelessness	2.0	0.7	1.0-4.7	323
Positive Outcome Emotions	3.6	0.5	2.1-4.8	308
Negative Outcome Emotions	2.2	0.6	1.0-4.4	310
Exam 1 *z*-scores	0.0	1.0	-4.5-1.7	324
Exam 1 raw scores	82.0	9.5	32.5-100	324

Table **2-4**: Descriptive Statistics for Data Collection 4 Study Variables.

Variable	*M*	*SD*	Observed Range	*N*
Enjoyment	3.1	0.5	1.7-5.0	290
Hope	3.5	0.7	1.0-5.0	292
Pride	3.5	0.7	1.0-5.0	289
Anger	2.6	0.7	1.0-4.7	288
Anxiety	3.0	0.7	1.0-4.9	286
Shame	2.7	0.8	1.0-4.9	284
Hopelessness	2.4	0.7	1.0-4.8	280
Boredom	2.8	0.6	1.0-4.4	294
Positive Activity Emotions	3.0	0.5	1.7-5.0	298
Negative Activity Emotions	2.7	0.6	1.1-4.6	285
Exam 2 *z*-scores	0.0	1.0	-5.4-1.4	321
Exam 2 raw scores	85.8	8.0	37.9-100	321

Table **3-1**: Correlations Between Primary Emotion Variables

* $p < .05$, ** $p < .01$, *** $p < .001$, *Note*: DC1-4 = Data collection time points 1-4

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Shipley-2 IQ	—																			
2. Exam 1	.22***	—																		
3. Exam 2	.18**	.57***	—																	
4. PANAS-Pos	-.01	-.16**	-.07	—																
5. PANAS-Neg	-.06	-.08	-.08	-.21***	—															
6. ITES	-.16**	-.05	-.06	-.19***	.14*	—														
7. DC1 AGQ-MApp	.22***	.19**	.12*	.06	-.03	-.09	—													
8. DC1 AGQ-MAvo	.16**	.17**	.21***	.07	-.05	-.04	.45***	—												
9. DC1 AGQ-PApp	.12*	.19**	.12*	.03	.00	.01	.69***	.55***	—											
10. DC1 AGQ-PAvo	.11*	.07	.11*	.14*	.01	-.03	.54***	.51***	.65***	—										
11. DC3 AGQ-MApp	.17**	.11*	.09	-.03	.00	-.07	.43***	.26***	.35***	.33***	—									
12. DC3 AGQ-MAvo	.18**	.08	.08	.07	-.04	-.10	.26***	.49***	.29***	.20***	.46***	—								
13. DC3 AGQ-PApp	.09	.09	.13*	-.04	-.08	.01	.38***	.29***	.48***	.34***	.64***	.46***	—							
14. DC3 AGQ-PAvo	.08	.02	.08	.08	.02	-.02	.34***	.28***	.36***	.42***	.65***	.44***	.65***	—						
15. DC2 Pos Emotion	.10	-.02	.05	.25***	-.04	-.19***	.15**	.13*	.06	.10	.13*	.20***	.09	.14*	—					
16. DC2 Neg Emotion	-.12*	-.20***	-.27***	-.16**	.29***	.15**	-.09	-.11	-.14*	-.02	.00	-.12*	-.04	-.06	-.32***	—				
17. DC3 Pos Emotion	.12*	.31***	.15**	.22***	-.17**	-.04	.16**	.25***	.20***	.23***	.25***	.28***	.26***	.19**	.23***	-.18**	—			
18. DC3 Neg Emotion	-.22***	-.39***	-.32***	-.23***	.33***	.15*	-.05	-.18**	-.12*	-.13*	-.06	-.09	-.04	-.02	-.12*	.39***	-.46***	—		
19. DC4 Pos Emotion	.10	.12*	.18**	.24***	-.12*	-.15*	.10*	.14*	.01	.11	.13*	.15*	.11	.11	.62***	-.34***	.29***	-.22***	—	
20. DC4 Neg Emotion	-.10	-.20***	-.25***	-.19**	.26***	.16**	.02	-.06	-.03	.01	.00	-.18**	-.04	-.06	-.32***	.71***	-.18**	.43***	-.42***	—

Table **4-1**: Standardized regression coefficients predicting grades on exams 1 and 2 from Hypothesis 1.

	Dependent variable:		*Dependent variable:*
	Exam 1 *z*-score		Exam 2 *z*-score
Negative learning emotion	-0.238** (0.108)	Negative learning emotion	-0.261** (0.105)
Positive learning emotion	0.025 (0.108)	Positive learning emotion	0.210* (0.124)
IQ	0.018*** (0.005)	IQ	0.016*** (0.005)
Negative PANAS	-0.178* (0.110)	Negative PANAS	-0.053 (0.105)
Positive PANAS	-0.346*** (0.096)	Positive PANAS	-0.144 (0.091)
Constant	0.118 (0.841)	Constant	-1.082 (0.842)
Observations	274	Observations	249
R^2	0.124	R^2	0.116
Adjusted R^2	0.107	Adjusted R^2	0.098
Residual Std. Error	0.939 (*df* = 268)	Residual Std. Error	0.872 (*df* = 243)
F Statistic	7.558*** (*df* = 5, 268)	F Statistic	6.389*** (*df* = 5, 243)
Note:	*p<0.1;**p<0.05;***p<0.01		

Table **4-2**: Standardized regression coefficients predicting exam 1 grades from Hypothesis 2.

	Dependent variable:
	Exam 1 *z*-score
Emotion beliefs	-0.367 (0.348)
Negative learning emotions	-0.673** (0.342)
EBs x Neg learning emotions	0.125 (0.123)
Constant	1.918** (0.948)
Observations	291
R^2	0.045
Adjusted R^2	0.035
Residual Std. Error	0.991 (*df* = 287)
F Statistic	4.456*** (*df* = 3; 287)

	Dependent variable:
	Exam 1 *z*-score
Emotion beliefs	0.618 (0.436)
Positive learning emotions	0.524 (0.388)
EBs x Pos learning emotions	-0.218 (0.137)
Constant	-1.440 (1.249)
Observations	299
R^2	0.012
Adjusted R^2	0.002
Residual Std. Error	1.005 (*df* = 295)
F Statistic	1.154 (*df* = 3; 295)
Note:	*p<0.1;**p<0.05;***p<0.01

Table **4-3**: Standardized regression coefficients predicting exam 2 grades from Hypothesis 2.

	Dependent variable:		*Dependent variable:*
	Exam 2 *z*-score		Exam 2 *z*-score
Emotion beliefs	0.416 (0.333)	Emotion beliefs	0.147 (0.431)
Negative learning emotions	0.017 (0.336)	Pos. learning emotions	0.472 (0.394)
EBs x Neg. learning emotions	-0.153 (0.120)	EBs x Pos. emotions	-0.062 (0.139)
Constant	0.030 (0.915)	Constant	-1.251 (1.235)
Observations	263	Observations	268
R^2	0.070	R^2	0.030
Adjusted R^2	0.059	Adjusted R^2	0.019
Residual Std. Error	0.893 (df = 259)	Residual Std. Error	0.911 (df = 264)
F Statistic	6.486^{***} (df = 3; 259)	F Statistic	2.718^{**} (df = 3; 264)
		Note:	*p<0.1;**p<0.05;***p<0.01

Table **4-4**: Standardized regression coefficients predicting outcome emotion from Hypothesis 3.

	Dependent variable:		*Dependent variable:*
	Negative outcome emotion		Positive outcome emotion
Exam 1 *z*-score	-0.221*** (0.034)	Exam 1 *z*-score	0.140*** (0.026)
IQ	-0.008** (0.003)	IQ	0.001 (0.002)
Constant	3.022*** (0.338)	Constant	3.429*** (0.261)
Observations	294	Observations	292
R^2	0.172	R^2	0.099
Adjusted R^2	0.166	Adjusted R^2	0.092
Residual Std. Error	0.570 (*df* = 283)	Residual Std. Error	0.435 (*df* = 281)
F Statistic	29.370*** (*df* = 2; 283)	F Statistic	15.350*** (*df* = 2; 281)
		Note:	*p<0.1;**p<0.05;***p<0.01

Table **4-5:** Standardized regression coefficients predicting mastery goals from Hypothesis 4a.

	Dependent variable: Mastery-appr. change
Positive outcome emotion	0.055 (0.095)
Negative outcome emotion	0.026 (0.066)
Constant	-0.488 (0.425)
Observations	284
R^2	0.001
Adjusted R^2	-0.006
Residual Std. Error	0.643 (*df* = 281)
F Statistic	0.179 (*df* = 2; 281)

	Dependent variable: Mastery-avoid. change
Positive outcome emotion	0.068 (0.109)
Negative outcome emotion	0.130* (0.077)
Constant	-0.675 (0.490)
Observations	279
R^2	0.010
Adjusted R^2	0.003
Residual Std. Error	0.747 (*df* = 276)
F Statistic	1.431 (*df* = 2; 276)
Note:	*p<0.1;**p<0.05;***p<0.01

Table **4-6**: Standardized regression coefficients predicting performance goals from Hypothesis 4a.

	Dependent variable: Perform-appr. change		*Dependent variable:* Perform-avoid. change
Positive outcome emotion	0.136 (0.098)	Positive outcome emotion	-0.030 (0.099)
Negative outcome emotion	0.135* (0.071)	Negative outcome emotion	0.124* (0.071)
Constant	-1.061** (0.441)	Constant	-0.397 (0.447)
Observations	282	Observations	281
R^2	0.014	R^2	0.016
Adjusted R^2	0.007	Adjusted R^2	0.009
Residual Std. Error	0.678 (*df* = 279)	Residual Std. Error	0.676 (*df* = 278)
F Statistic	2.009 (*df* = 2; 279)	F Statistic	2.328* (*df* = 2; 278)
Note:			*p<0.1;**p<0.05;***p<0.01

Table **4-7**: Standardized regression coefficients predicting mastery approach goals from Hypothesis 4b.

	Dependent variable: Mastery-appr. change
Negative outcome emotion	-0.190 (0.197)
Emotion beliefs	-0.136 (0.153)
EBs x Neg. outcome emotion	0.072 (0.068)
Constant	0.127 (0.433)
Observations	296
R^2	0.004
Adjusted R^2	-0.006
Residual Std. Error	0.631 (df = 292)
F Statistic	0.428 (df = 3; 292)

	Dependent variable: Mastery-appr. change
Positive outcome emotion	-0.007 (0.264)
Emotion beliefs	-0.037 (0.357)
EBs x Pos. outcome emotions	0.020 (0.097)
Constant	-0.300 (0.973)
Observations	294
R^2	0.003
Adjusted R^2	-0.007
Residual Std. Error	0.640 (df = 290)
F Statistic	0.282 (df = 3; 290)
Note:	*p<0.1;**p<0.05;***p<0.01

Table **4-8**: Standardized regression coefficients predicting mastery avoidance goals from Hypothesis 4b.

	Dependent variable: Mastery-avoid. change
Negative outcome emotion	-0.315 (0.236)
Emotion beliefs	-0.416** (0.184)
EBs x Neg. outcome emotion	0.168** (0.082)
Constant	0.669 (0.519)
Observations	291
R^2	0.031
Adjusted R^2	0.021
Residual Std. Error	0.755 (df = 287)
F Statistic	3.072** (df = 3; 287)

	Dependent variable: Mastery-avoid. change
Positive outcome emotion	-0.095 (0.307)
Emotion beliefs	-0.104 (0.411)
EBs x Pos. outcome emotion	0.025 (0.112)
Constant	0.235 (1.130)
Observations	288
R^2	0.001
Adjusted R^2	-0.010
Residual Std. Error	0.746 (df = 284)
F Statistic	0.064 (df = 3; 284)
Note:	*p<0.1;**p<0.05;***p<0.01

Table **4-9**: Standardized regression coefficients predicting performance avoidance goals from Hypothesis 4b.

	Dependent variable: Perform-avoid. change
Positive outcome emotion	-0.110 (0.289)
Emotion beliefs	0.043 (0.383)
EBs x Pos. outcome emotion	-0.007 (0.104)
Constant	0.129 (1.063)
Observations	290
R^2	0.008
Adjusted R^2	-0.002
Residual Std. Error	0.673 (df = 286)
F Statistic	0.781 (df = 3; 286)

	Dependent variable: Perform-avoid. change
Negative outcome emotion	-0.275 (0.210)
Emotion beliefs	-0.341** (0.164)
EBs x Neg. outcome emotion	0.152** (0.073)
Constant	0.386 (0.464)
Observations	293
R^2	0.033
Adjusted R^2	0.023
Residual Std. Error	0.666 (df = 289)
F Statistic	3.285** (df = 3; 289)
Note:	*p<0.1;**p<0.05;***p<0.01

Table **4-10**: Standardized regression coefficients predicting performance approach goals from Hypothesis 4b.

	Dependent variable: Perform-appr. change
Positive outcome emotion	-0.245 (0.277)
Emotion beliefs	-0.409 (0.373)
EBs x Pos outcome emotion	0.115 (0.101)
Constant	0.593 (1.019)
Observations	292
R^2	0.006
Adjusted R^2	-0.005
Residual Std. Error	0.673 (df = 288)
F Statistic	0.557 (df = 3; 288)

	Dependent variable: Perform-appr. change
Negative outcome emotion	0.069 (0.209)
Emotion beliefs	-0.049 (0.164)
EBs x Neg outcome emotion	0.013 (0.073)
Constant	-0.364 (0.460)
Observations	292
R^2	0.010
Adjusted R^2	-0.0001
Residual Std. Error	0.668 (df = 288)
F Statistic	0.994 (df = 3; 288)
Note:	*p<0.1;**p<0.05;***p<0.01

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