GENDER DIFFERENCES IN ACHIEVEMENT EMOTIONS: A CONTROL-VALUE
THEORY APPROACH

by

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STATEMENT BY AUTHOR

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Table of Contents

Abstract

The current study examines whether there are gender differences in general academic contexts within three achievement emotions: prospective outcome emotions, retrospective outcome emotions and activity emotions. I combined Pekrun's control-value theory with the Achievement Emotion Questionnaire (AEQ) to assess participants' achievement emotions. Discriminant function analysis revealed statistically and practically significant gender differences in prospective outcome emotions and activity emotions, but not in retrospective outcome emotions. Moreover, females scored higher on three achievement emotions: prospective outcome emotions, retrospective outcome emotions, and activity emotions than males in this study. The current study filled in the gap of prior studies which have not explored gender differences in three achievement emotions: prospective outcome emotions, retrospective outcome emotion and activity emotions, in general domains. Future studies could replicate the current study and explore if other factors would influence the impact of gender on achievement emotions, for example, culture and age. Additionally, researchers could try to apply achievement emotions to improve students' academic performance.

Keywords: gender, achievement emotions, control-value theory, linear discriminant function analysis, Achievement Emotion Questionnaire

Introduction

It is common for students to experience emotions while studying. For example, if the student is interested in what they are learning, they might feel enjoyment during studying; however, if the student is not interested in what they are learning, they might feel bored during studying. Likewise, before an exam the student might feel anxiety, whereas after the exam they might feel relief. Research has revealed emotions impact cognitive resources (Pekrun, 2006), motivation (Pekrun, 2006), learning strategies (Isen, 2000), self-regulation (Artino, 2012), and academic performance (Pekrun, 2006). Therefore, exploring what emotions students experience, why students have different emotions in different learning situations, and how to apply emotions to our life is significant and important.

An emotion is a conscious experience that includes enjoyable or painful mental activities (Panksepp, 2005; Cabanac, 2002). From the James-Lange theory (James, 1884; Lange, 1885) to the component process model (Scherer, 1987), there are several notable models of emotion. The current study focuses on exploring whether there are gender differences in achievement emotions broadly, and, more specifically, their three dimensions: prospective outcome emotions, retrospective outcome emotions, and activity emotions.

Achievement/academic emotions are related to achievement activities (e.g., reviewing learning materials, taking an exam) or outcomes (e.g., success or failure). Pekrun (2010) proposed the control-value theory on achievement emotions, where achievement emotions are categorized in three dimensions: prospective outcome emotions, retrospective outcome emotions, and activity emotions. Prospective outcome emotions are emotions experienced when success could be obtained or failure could be avoided (Pekrun, 2006, 2007). Retrospective outcome emotions are emotions experienced when one tries to find the reason for previous outcomes; the

cause of outcome could come from the self, other people, or some situations (Pekrun, 2006).

Activity emotions focus on the action (e.g., reading articles, doing the assignment), not the

outcome (e.g., whether passing the exam or not; Pekrun, 2007). Although prior research has

explored gender differences in achievement emotions (Pekrun, 2006, 2010, 2011; Frenzel, 2007),

no prior studies to my knowledge have investigated gender differences in prospective outcome

emotions, retrospective outcome emotions, and activity emotions. The present study examines

whether such gender differences in achievement emotions exist, and, if present, how they are

manifested in achievement emotions. It is hypothesized that gender differences exist in

prospective outcome emotions, retrospective outcome emotions, and activity emotions.

Moreover, the present study could encourage more college students and college professors to

care about students' achievement emotions. For college students, female and male students could

use different achievement emotions to develop self-regulated learning strategies, motivate

themselves to study, and achieve better academic performance. For college professors, they

might want to think about how to help students experience more positive achievement emotions,

for example, enjoyment and hope.

What is an Emotion?

An emotion is a conscious experience that includes enjoyable or painful mental activities

(Panksepp, 2005; Cabanac, 2002), and includes affective, cognitive, motivational, expressive,

and peripheral components working together in a coordinated process (Damasio, 2004; Scherer,

1984). Importantly, an emotion is distinct from a mood: Emotions are uncontrollable, behavioral,

and brief, whereas moods are controllable, cognitive, and enduring (Beedie, 2005).

There are several noted theories regarding emotions. One of the earliest, advanced by

James and Lange (James, 1884; Lange, 1885), proposed external events stimulate physical

responses which then give way to emotions (e.g., people feel sad because they cry). In contrast

with the belief that physical responses precede emotions, Cannon (1929) proposed individuals

experience emotions and physical responses simultaneously (e.g., feeling angry alongside an

increase in heart rate and sweating). However, these prior two theories only emphasize the

relationship between emotions and physical responses. Schachter (1962) criticized existing

theories because in his view they did not consider the cognitive side in emotions, thus leading

him to propose his two-factor theory: Emotions are based on physical arousal *and* cognitive

interpretation. For example, an individual attending a basketball game may cognitively interpret

the arousal associated with intensely cheering on their favorite team play as excitement.

Based on Schachter's two-factory theory, Scherer proposed the component process

model. In the component process model, he claimed that an emotion involves five components:

cognitive, physiological, motivational, expressive, and affective (Scherer, 1984). For example, a

single event, such as seeing a worm, might involve the following: (1) a cognitive evaluation of

the event(s) or object(s) (e.g., evaluating that the worm is dangerous); (2) a physiological

reaction (e.g., increase in heart rate); (3) a motivational component to prepare a course of action

(e.g., one wants to run away from this worm); (4) an expressive component including facial or

vocal expression of emotions (e.g., screaming); and (5) an affective component involving

subjective feelings of the event(s) or object(s) (e.g., fear and nervousness). Scherer later

extended his theory and proposed that an emotion is a response to either external or internal

events (Scherer, 1987).

Despite Scherer's criticism of Schachter's theory, some theorists proposed adaptations of

the two-factory theory. Lazarus (1986) extended Schacter's two-factor theory by claiming two

appraisals contributed to the response to stress: the tendency to perceive stimuli as a threat and

how people evaluate and assess threatening events. For example, individuals who think roller

coasters are dangerous may very well experience fear of riding them, but other individuals who

think roller coasters are fun will likely experience excitement or enjoyment from riding them. In

summary, there are various theories of emotion. Based on individual aspects of these theories,

Pekrun (2006, 2010, 2011) proposed his theory of achievement emotions, an important domain

in emotions.

What is an Achievement/Academic Emotion?

Pekrun (2010) proposed achievement/academic emotions as emotions related to

achievement activities (e.g., reviewing the learning materials, taking an exam) or outcomes (e.g.,

success or failure). For example, if a student is working on an assignment (i.e., an achievement

activity), they may experience enjoyment because they answer all the questions correctly.

Therefore, the enjoyment they experience is best classified as an achievement emotion. However,

not all emotions are achievement emotions. Some social emotions (e.g., empathy) are not

typically included in prominent achievement emotion theories because social emotions are

directed towards other people or other circumstances (Pekrun, 2010). Pekrun (2011) developed

an instrument which includes nine achievement emotions: enjoyment, hope, pride, relief, anger,

anxiety, shame, hopelessness, and boredom. There are two types of emotions included in

achievement emotions: activity emotions and outcome emotions. Activity emotions are

experienced during achievement-related activities (e.g., enjoyment from learning or boredom

from attending an uninteresting class) and outcome emotions refer to the outcomes achievement-

related activities. For example, students may feel anxious before the exam, and after getting a

bad grade on the exam they might feel shame or hopelessness. In outcome emotions, there are

two emotions: prospective outcome emotions and retrospective outcome emotions. I will discuss the details of these two outcome emotions later.

Moreover, achievement emotions can be classified as state achievement emotions and trait achievement emotions (Pekrun, 2006). For state achievement emotions, achievement emotions are unstable because emotions could occur in a given situation then disappear (e.g., a student might experience anxiety before an exam, but after the exam the anxiety might disappear). In contrast, trait achievement emotions are stable because they are habitual and reoccur (e.g., trait test anxiety; Spielberger, 1976). In the current study, I will focus on trait achievement emotions.

Achievement emotions are important in academic areas, as different emotions differentially affect cognitive resources (Pekrun, 2006), motivation (Pekrun, 2006), learning strategies (Isen, 2000), self-regulation (Artino, 2012), and academic performance (Pekrun, 2006). For cognitive resources, both positive and negative emotions use cognitive resources; therefore, cognitive resources for tasks are decreased (Pekrun, 2006; Meinhardt & Pekrun, 2003). For motivation, achievement emotions could influence intrinsic or extrinsic motivation (Pekrun, 2006). Enjoyment could strengthen one's intrinsic motivation to study and could be arousing when you want to get a good grade. For learning strategies, achievement emotions could guide students' use of different learning strategies (Isen, 2000). For example, if a student experiences enjoyment during studying, they might use more flexible and creative learning strategies, but if the same student experiences boredom during studying they might resort to rigid strategies like simple rehearsal. For self-regulation, enjoyment could facilitate self-regulation, especially in metacognition and elaboration (Artino, 2012). However, the influence of achievement emotions on academic performance is complex, as effects from a single emotion may be either positive for

some and negative for others. For example, anxiety results in either positive or negative influences on academic performance. For some students, anxiety could increase their motivation to study and they might get good grades, but for other students, anxiety could be debilitating and decrease their motivation to study, resulting in poor grades (Pekrun, 2006). Thus, educators should heavily weigh achievement emotions, as guiding students to feel enjoyment, hope, and pride in studying could increase motivation and application of self-regulated learning strategies, in turn prompting better academic performance. Simultaneously, it is also important to explore why students feel hopelessness, anger, anxiety, or boredom when studying so as to reduce these achievement emotions which might impair motivation, self-regulation, and academic performance.

What is Control-Value Theory?

Pekrun (2006) also proposed control-value theory, rooted in prior theories such as Lazarus' transactional stress model, self-concept of ability, self-efficacy expectations and control beliefs about anxiety, and Weiner's attributional approach (Pekrun, 2010). To better inform Pekrun's control-value theory, I first review models from Lazarus and Weiner.

Lazarus claimed people have two appraisals when processing information: primary and secondary appraisals (Lazarus, 1977, 1984). Primary appraisals refer to the evaluation of the stressor or threatening event(s), whereas secondary appraisals refer to evaluations of whether the stressor is controllable and appropriate coping resources (Lazarus, 1977, 1984). For example, a student may experience anxiety before an exam because the primary appraisal process leads them to conclude the exam is threatening, and the secondary appraisal process leads them to conclude they cannot effectively cope. The other fundamental basis of control-value theory is attribution theory (Weiner, 1972,1985). In attribution theory, Weiner (1972, 1985) proposed

people try to find causes of events or behaviors; these causes are referred to as attributions, with certain attributions generating different emotions. For example, success perceived as lucky might produce surprise; however, success perceived as effortful might produce calmness. Moreover, attributions are important in the emotion process. For example, success (and failure) perceived as the result of internal attributions, like personality and ability, might increase (or decrease) the level of self-esteem (Weiner, 1972, 1985). In summary, Pekrun used control appraisals and value appraisals to explain achievement emotions, and he claimed that the causes in attribution theory, such as locus, stability, and controllability (Weiner, 1985) impact perceived control in achievement emotions (Pekrun, 2006). Therefore, Lazarus's cognitive appraisals and Weiner's attribution theory are important fundamentals for Pekrun's control-value theory.

Pekrun developed control-value theory based on Lazarus' transactional stress model and Weiner's attribution theory. These two prior theories solely focused on outcome emotions and neglected activity emotions. Therefore, Pekrun sought to broaden the theory and focused on both activity and outcome achievement emotions. In control-value theory, achievement emotions include two appraisals: control and value. Control appraisals come from the term "subjective control," proposed by Skinner (1996), in reference to how much control individuals perceive they have over their own actions. An individual's assessment of subjective control could influence their behavior and emotion. Pekrun (2006) explained control appraisals include causal expectancies and causal attributions. Causal expectancies refer to the relationships between causes and future effects (prospectively; Pekrun, 2006). For example, a student is facing an exam and invests much effort in studying for it. The effort invested would have some impact on the exam. Causal attributions refer to the relationship between causes and past events (retrospectively; Pekrun, 1988). For example, a student who earns a bad grade on the exam might

determine the poor grade was the result of ineffective studying. Beyond control appraisals, which include causal expectancies and causal attributions to explain achievement emotions, Pekrun (2010) also used value appraisals to explain achievement emotions. Value appraisals refer to perceived importance of activities and outcomes, with positive values related to success and negative values related to failure (Pekrun, 2010). There are two aspects in value appraisals: extrinsic values and intrinsic values. Intrinsic values focus on learning more knowledge, and extrinsic values focus on attaining external awards (e.g., good grades or money). Based on the category of value and control appraisals, achievement emotions are assigned separately to prospective outcome emotions, retrospective outcome emotions, and activity emotions (Pekrun, 2006; see Figure 1).

Based on Pekrun's categorization, anticipatory joy, hope, hopelessness, anticipatory relief, and anxiety are prospective outcome emotions. Prospective outcome emotions refer to emotions experienced when success could be obtained or failure could be avoided, and they are seen as the combination of outcome expectancy and outcome value (Pekrun, 2006, 2007). For example, a student that approaches their assignment seriously or values that assignment (positive value appraisal) and thinks they are capable of completing it (high control appraisal) will feel anticipatory joy. In contrast, even if the student approaches the assignment seriously (positive value appraisal), if they are incapable of completing it (low control appraisal) they might feel hopelessness. The preceding examples are based on a student who has positive value appraisals during studying. What if the student does not? It is similar to above, but the value appraisals are switched from positive to negative. For example, if a student only wants to prevent failure, thus not pursuing success in the assignment (negative value appraisal), and they feel they are capable of completing the assignment (high control appraisal), this student might experience anticipatory

relief while studying. In contrast, when this student focuses attention on preventing failure in the assignment (negative value appraisal), and they feel they are incapable of completing the assignment (low control appraisal), this student might experience hopelessness. In summary, the achievement emotion(s) students experience during studying (i.e., prospective outcome emotions) is based on a combination of value appraisals and control appraisals.

Different from prospective outcome emotions, retrospective outcome emotions reflect emotions experienced when trying to determine the reason of outcomes (Pekrun, 2006). Value appraisals in retrospective outcome emotions relate to Weiner's attribution theory. In attribution theory, Weiner proposed that some emotions related to success or failure do not rely on subjective control (control-independent emotions), but others do rely on subjective control (control-dependent emotions; Weiner, 1985). Therefore, according to attribution theory, if emotions do not rely on subjective control, success would produce joy and failure would produce sadness. If emotions rely on subjective control and an individual attributes success (or failure) to themselves (effort, ability), they might feel pride (or shame). Similarly, if emotions rely on subjective control and an individual attributes success (or failure) to some external factor (task difficulty, others' performance), they might feel gratitude (or anger; Pekrun, 2007). In summary, the achievement emotion(s) students experience during studying (i.e., retrospective outcome emotions) is also based on a combination of value appraisals and control appraisals.

Prospective and retrospective achievement emotions relate to outcomes, but what achievement emotions are linked to students' experiences during activities? Emotions related to achievement activities are activity emotions (Pekrun, 2007). Activity emotions, like prospective and retrospective emotions, rely on perceived controllability (i.e., control appraisals) and perceived importance of the task (i.e., value appraisals). When the task is positively valued and it

is highly controllable, enjoyment occurs. When the task is negatively valued and it is still highly

controllable, anger occurs. When the task is either positively or negatively valued and it is not

controllable, people will feel frustration. When the task is neither positively nor negatively

valued and it is either high or low controllable, people might feel boredom. For example, if a

student thinks the task is too simple, he will be bored during the task (Pekrun, 2006). In

summary, the principal difference between activity emotions and outcome emotions is activity

emotions focus on achievement activities while outcome emotions focus on achievement

outcomes. The similarity among these three achievement emotions is that they all rely on control

appraisals and value appraisals. When students experience enjoyment, anger, frustration and

boredom in reference to academic activities, Pekrun labels these emotions as activity emotions. A

classification diagram of achievement emotions by type (prospective outcome, retrospective

outcome, and activity) and attributions is provided in Figure 1.

     In the present study, I focus on prospective outcome emotions, retrospective outcome

emotions, and activity emotions according to Pekrun's control-value theory. As I mentioned

above, achievement emotions influence cognitive resources, self-regulation, motivation, and

academic performance; therefore, it is necessary to further explore achievement emotions.

Moreover, there is an existing gap in the literature. Prior studies exploring achievement emotions

have mainly focused on specific achievement emotions (e.g., anxiety; Goetz, 2013); few studies

have focused on Pekrun's three dimensions of achievement emotions. Therefore, in the present

study, I address this gap by exploring if there are gender differences in these three dimensions of

achievement emotions.

Object Focus	Appraisals		Emotion
	Value	Control	
Outcome/Prospective	Positive (Success)	High	Anticipatory joy
		Medium	Hope
		Low	Hopelessness
	Negative (Failure)	High	Anticipatory Relief
		Medium	Anxiety
		Low	Hopelessness
Outcome/Retrospective	Positive (Success)	Irrelevant	Joy
		Self	Pride
		Other	Gratitude
	Negative (Failure)	Irrelevant	Sadness
		Self	Shame
		Other	Anger
Activity	Positive	High	Enjoyment
	Negative	High	Anger
	Positive/Negative	Low	Frustration
	None	High/Low	Boredom

Figure 1. The Control-Value Theory (Pekrun, 2006)

What is Gender?

Sex difference is one term used to describe differences between men and women, but researchers have criticized this term because it suggests a biological basis for differences and is used too broadly (McHugh, 1986; Unger, 1979). An alternative, gender differences, describes the traits and behaviors of men and women based on culture (Unger, 1979). Therefore, gender is a social term, not a biological term. However, there are still arguments revolving around distinguishing sex and gender. In the present study, I use the concept of gender to examine differences in achievement emotions.

Gender Differences in General Emotions

Individuals typically experience different emotions in different situations, but do males and females experience different emotions when they encounter the same situation? When addressing this question, one must consider the prominent gender stereotype that females are more emotional than males (Broverman, 1972). This gender stereotype has been connected to happiness and sadness in females but connected to anger in males (Birnbaum, 1980). Prior researchers have attempted to break down the gender stereotype in emotion and reconstruct the relationship between gender and emotion (Kelly, 1999; Lafrance, 1992; Shields, 2006).

In the gender differences literature, researchers often explore whether males and females experience and express different emotions when they both encounter the same situation. Fischer (2004) proposed that for Westerners, men reported experiencing more powerful emotions like anger; however, women reported experiencing more powerless emotions like sadness and fear. Importantly, Simon (2004) claimed cultural differences in social position lead women to report experiencing more negative feelings (e.g., anxiety and sadness) than men, and men to report experiencing more positive feelings (e.g., calmness and excitement) than women (Simon, 2004). Beyond concluding gender differences in experiencing emotions are attributable to cultural factors, some researchers claim stereotype beliefs cause men and women to experience different emotions. Grossman (1993) claimed women are more likely to experience more intense emotions than men because women are more likely to endorse stereotype beliefs of emotions. Moreover, he found that after controlling for stereotype beliefs, gender differences in the experience of emotions vanished (Grossman, 1993). Therefore, gender differences in emotions might come from other factors. Once we control these factors, gender differences might disappear. However, Kring (1998) claimed that even when we do not consider other factors which might influence

gender differences, there still could be no gender differences in emotions by using self-report to assess participants' emotions. In the experiment, participants reported their emotions after watching happy or sad films, and the results showed women did not report experiencing more emotion than men (Kring, 1998). In summary, prior research has revealed gender differences, but those differences may be the result of culture and stereotype beliefs. Moreover, there could be no gender differences in experiencing emotions when using self-report methods.

Beyond emotional experience, researchers have also investigated whether there are gender differences in emotional expression. Kring (1998) showed that when viewing the same films, females were more emotionally expressive than males. Consistent with Kring (1998), Simon (2004) explained women express more emotion than men because in the United States, society encourages women to express their emotions freely. Beyond adults, Chaplin (2013) found there are gender differences in child and adolescent emotion expression, and the difference is related to age and specific social contexts. For example, girls show more positive emotion expression than boys when they become adolescents and when they are with unfamiliar adults (Chaplin, 2013). In summary, these references on gender differences in emotion expression claimed that females express more emotions than males, and the differences not only occurs in adults, but also in children and adolescents. The prior studies attributed the difference to social pressure or social rules.

In conclusion, prior researchers have explored gender differences in general emotions, with some of them reporting the presence of gender differences in experiencing emotions (Fischer, 2004; Simon, 2004), and the others reporting the presence of gender differences in expressing emotions (Kring, 1998; Chaplin, 2013). No matter whether discussing experiencing or expressing emotions, most references ascribe the gender differences to social factors like

social rules or stereotype beliefs. In the present study, I am interested in examining gender differences, or the lack thereof, in achievement emotions, and I will not include social factors in my study. Although prior studies confirmed gender differences in general emotions, few studies explored gender differences in achievement emotions. Therefore, more research is needed.

Gender Differences in Achievement Emotions

Pekrun's control-value theory emphasizes gender in achievement emotions through a claim that the frequency and intensity of achievement emotions differ by gender (Pekrun, 2006). Specifically, Pekrun claimed achievement emotions depend on control and value appraisals, and because women and men evidence differences in perceived control (control appraisals) and academic values (value appraisals) they have different emotional experiences (Pekrun, 2006). In order to confirm this assumption, Frenzel and Pekrun (2006) conducted an experiment on elementary students' achievement emotions in mathematics where no gender difference in the relationship between appraisals and emotions was found; however, girls reported lower mean scores on perceived control. Therefore, girls reported less enjoyment and more anxiety and shame than boys in mathematics.

Pekrun also did other studies which tried to explain gender differences in achievement emotions in mathematics, in his study in 2011, he examined gender differences in five achievement emotions, in general domains. Based on the results, he claimed that female and male students reported different achievement emotions in different situations. For example, when students attended classes, female students reported more enjoyment and less anger than males. When students were learning, female students reported more anxiety then males. If students were taking exams, female students reported more anxiety and less hope than males. However, no

matter the situation, there were no gender differences for other achievement emotions like hopelessness and boredom (Pekrun, 2011).

Beyond Pekrun's contributions, Goetz (2008) explored if boys and girls experienced different levels of enjoyment in mathematics and language class, and determined boys reported more enjoyment in mathematics than girls, but girls reported more enjoyment in language class than boys. Another study examining prospective gender differences in math anxiety determined that although there were not gender differences in state math anxiety, girls reported more habitual (i.e., trait) math anxiety than boys (Goetz, 2013). One explanation for these findings rests with competency beliefs: Girls' habitual anxiety may stem from beliefs they cannot compete in mathematics. Frenzel (2007) also examined gender differences in enjoyment and anxiety in mathematics and found gender differences in achievement emotions in mathematics come from individual gender and gender ratio of the class. For example, he claimed that for individual gender, males reported higher levels of enjoyment and less anxiety in mathematics than females. However, if a class has many more boys than girls, students report less enjoyment and more anxiety in mathematics. Frenzel called this kind of class as "male-dominated class". This kind of class would have more negative achievement emotions, and if girls were in "male-dominated class", they reported more negative emotions (e.g., more anxiety and less enjoyment; Frenzel, 2007). In summary, these references confirmed gender differences in some specific achievement emotions like enjoyment and anxiety, and in some specific domains like mathematics and language class. Moreover, these references attributed gender differences to other factors like competency beliefs and gender ratios.

Researchers have explored gender differences in achievement emotions based on Pekrun's control-value theory. However, prior research has been limited in terms of specific

achievement emotions (e.g., enjoyment and anxiety) and in specific domains (e.g., mathematics and language class). The current research aims to address this gap by examining whether there are gender differences in sets of achievement emotions in general domains.

Novel Contributions

The purpose of the current research is to examine whether there are gender differences in prospective outcome emotions, retrospective outcome emotions, and activity emotions. Prior research has focused on gender differences in selected individual emotions (e.g., anxiety, enjoyment; Goetz, 2008, 2013). No studies to my knowledge have explored gender differences in the following three categories of emotions: prospective outcome, retrospective outcome, and activity emotions. For example, with regard to prospective outcome emotions (e.g., anxiety, hope, and hopelessness) there is evidence of gender differences at the emotion level (e.g., anxiety) but there are no investigations of the set of prospective emotions. Therefore, the present study is situated to fill a gap in the existing achievement emotion literature.

Another gap in the existing literature revolves around domain-general gender differences. Pekrun (2006) claimed achievement emotions are organized in domain-specific ways in control-value theory (Pekrun, 2006); however, gender differences in achievement emotions might exist in general domains. After all, the Achievement Emotions Questionnaire (AEQ), assesses students' habitual achievement emotions experienced across achievement situations, meaning domain-general (Pekrun, 2005, 2011). In the present study the AEQ assesses domain-general achievement emotions of female and male students with different majors (e.g., pre-nursing, psychology, marketing). Therefore, the current study extends existing domain-specific approaches by using a domain-general assessment to examine gender differences within a domain-general context (i.e., a general education courses).

Research Questions and Hypotheses

In the current study, the research question is whether there are gender differences in achievement emotions, from a domain general perspective.

Pekrun (2011) confirmed gender differences in five achievement emotions in general domains. In that study, the AEQ was used to assess students' nine achievement emotions in general domains. The results yielded gender differences in five achievement emotions. For example, female students reported more class-related enjoyment (the achievement emotions experienced when students attend the class) and less class-related anger than male students. Moreover, female students reported more learning-related anxiety (the achievement emotions experienced when students are learning), more test anxiety (the achievement emotions experienced when students are taking the exam), and less test-related hope than male students. However, Pekrun (2011) showed that there were no significant differences for other emotions like hopelessness and boredom. Due to Pekrun (2011) confirming gender differences in specific achievement emotions (e.g., anxiety and hope) and the fact these specific achievement emotions are categorized within three dimensions in Pekrun's (2006) control-value theory, I hypothesize that there will be gender differences in three dimensions of achievement emotions: prospective outcome, retrospective outcome, and activity emotions in general domains.

Method

Participants

Participants were 145 undergraduates (38 males, 104 females, 2 non-binary, 1 missing) from a public university in the Southwestern United States. Participants were enrolled in one of two general education courses, received partial course credit for participating, and were from varying class years (54 freshmen, 44 sophomores, 30 juniors, 14 seniors) and majors (e.g., pre-

nursing, psychology, public health, undecided, etc.). Unfortunately, due to the small sample sizes

of the non-binary and missing gender groups those groups were excluded from analyses.

Procedure

Participants completed select survey items as part of a larger survey assessing

achievement emotions, self-regulated learning strategies, work avoidance, and parenting style.

Measures

A shortened version of the Achievement Emotions Questionnaire (AEQ; Pekrun, 2005)

assessed participants' achievement emotions. The AEQ is a self-report measurement meant to

assess college students' achievement emotions. It has 232 items and includes three subscales:

class-related emotions (emotion experienced when students attend the class); learning-related

emotions (emotion experienced when students are learning); and test-related emotions (emotion

experienced when students are taking the exam). The AEQ also measures achievement emotions

during three periods: before studying, during studying, and after studying.

Prior researchers have routinely used a shortened version of the AEQ. For example, only

using anxiety items (Goetz, 2013) or select subscales (Artino, 2012). Therefore, the current study

used the learning-related emotions subscale of the AEQ. There are 75 items in the learning-

related scale, but due to time constraints participants completed only 24 items. In order to inform

this decision, we consulted item-total correlation (r_{it}), which represents the correlation between

scores on the item and sum scores across all items on the same emotion subscale. If an item has

higher r_{it} that means the item is more similar to the other items (Everitt, 2002; Field, 2005) and

thus may better represent the emotion or construct being measured. Based on this standard, I

chose the three items with the highest r_{it} for each of the eight achievement emotions. Participants

were presented with a series of statements (e.g., I enjoy the challenge of learning the material)

and rated their agreement on a 5-item Likert scale (1 = *strongly disagree*; 5 = *strongly agree*). The Cronbach's alpha of prospective outcome, retrospective outcome and activity emotions were: .65, .66, .88, respectively, which means the scores are reliable enough to analyze.

Results

Analysis Plan

Linear discriminant function analysis (LDFA) was used to analyze the data. Linear discriminant function analysis is a method to determine whether a set of variables discriminates between two or more groups (Cohen, 2003). In the present study, the dependent variable is gender, which includes females and males. The independent variables are the three achievement emotions in each set: prospective outcome emotions (anxiety, hope, hopelessness), retrospective outcome emotions (pride, anger, shame), and activity emotions (anger, enjoyment, boredom).

Assumptions

Before conducting linear discriminant function analysis, I checked a number of assumptions underlying the analysis. Relationships among emotion variables made it impossible to calculate Mardia's multivariate skew and kurtosis statistics (i.e., covariance matrices were not invertible), I looked at univariate skew and kurtosis to judge whether scores on each emotion variable were univariate normal. Skew and kurtosis for each achievement emotions were near to 0 (within -1.5 to 1.5), therefore, scores on each emotion are univariate normal (see Table 1). The second assumption tested was homogeneity of covariance matrices. Box's *M* test was conducted on the three sets of achievement emotions (see Table 2). The *p* values for prospective outcome emotions, retrospective outcome emotions, and activity emotions were all larger than .05, indicating group covariance matrices were approximately equal (assumption is met).

Table 1

Skew and Kurtosis of Achievement Emotions

Achievement Emotions	Skew	Kurtosis
Anxiety	-0.18	-1.13
Enjoyment	-0.31	-0.36
Hope	-0.31	-0.49
Pride	-0.44	-0.45
Anger	0.21	-0.67
Shame	0.38	0.00
Hopelessness	0.68	-0.34
Boredom	0.05	0.00

Table 2

Box's M test on Achievement Emotions

Achievement Emotions	x^2	df	p
Prospective	4.55	6	.60
Retrospective	10.59	6	.10
Activity	9.279	6	.16

Linear Discriminant Function Analysis

The first step is to specify the null and alternative hypotheses for these tests. The null hypothesis is there is no weighted sum of independent variables (prospective outcome emotions, retrospective outcome emotions, activity emotions) that differentiates between male and female groups, which means the two groups come from populations with equal centroids (equal means on all emotions analyzed). The alternative hypothesis is there is at least one weighted sum of independent variables that differentiates between male and female groups, which means the two groups come from populations with unequal centroids. Second, I ran statistical significance tests

and explored the resulting weighted sums to examine whether gender groups differed on each of

the three sets of achievement emotions. Note, because there are two gender groups, I can only

test for one weight sum for each set of emotions. Results of the significance tests may be found

in Table 3. For prospective outcome emotions and activity emotions, the null hypothesis is

rejected because $p < .001$ and $p=.003$, respectively. Therefore, male and female groups differed

on the sets of prospective outcome emotions and activity emotions. However, for retrospective

outcome emotions, male and female groups did not statistically significantly differ, with $p =.556$.

Practical significance was also explored. For prospective outcome emotions, 19.3% of the

variance between groups was explained by the weighted sum of anxiety, hope, and hopelessness.

For retrospective outcome emotions, 1.5% of the variance between groups was explained by the

weighted sum of pride, anger, and shame. For activity emotions, 9.5% of the variance between

groups was explained by the weighted sum of anger, enjoyment, and boredom. Therefore, males

and females practically significantly differ on prospective outcome emotions and activity

emotions, but not on retrospective outcome emotions. In conclusion, males and females are

statistically and practically significantly different on the set of prospective outcome emotions and

activity emotions, but neither statistically nor practically significantly different on the set of

retrospective outcome emotions.

Table 3

Canonical Discriminant Analysis for Achievement Emotions

Achievement Emotions	Wilk's *Lambda*	*p*	*Canonical R²*
Prospective	.807	<.001	.193
Retrospective	.985	.556	.015

Activity	.905	.003	.095

*Note. *p < .05, **p < .01, ***p < .001*

Additionally, I explored the linear combinations of independent variables (Table 4) produced by the analyses. Discriminant function analysis provides weights for each achievement emotion that allow construction of an axis or dimension of prospective outcome emotions, retrospective outcome emotions, and activity emotions. For prospective outcome emotions (anxiety, hope and hopelessness), the new axis would be:

Prospective Outcome Emotions = 0.55 *Anxiety - 0.10 * Hope-0.29 * Hopelessness (1)

For retrospective outcome emotions (pride, anger and shame), the new axis would be:

Retrospective Outcome Emotions = -0.33 * Pride + 0.14 * Anger - 0.33 * Shame   (2)

For activity emotions (anger, enjoyment and boredom), the new axis would be:

Activity Emotions = -0.27 * Anger - 0.41* Enjoyment + 0.18 * Boredom   (3)

These coefficients along with standardized coefficients are in Table 4. Additionally, I checked the correlation between each achievement emotion score and scores on the new axis are presented in Table 4. For example, in prospective outcome emotions, the correlation between anxiety and the new axis is 0.82.

Table 4

Linear Combinations of Achievement Emotions

Achievement Emotions		Raw Coefficients	Standardized Coefficients	Structure Coefficients
Prospective	Anxiety	0.55	1.26	0.82
	Hope	-0.10	-0.25	-0.43
	Hopelessness	-0.29	-0.87	0.13

Retrospective	Pride	-0.33	-0.83	-0.68
	Anger	0.14	0.43	-0.34
	Shame	-0.33	-0.91	-0.33
Activity	Anger	-0.27	-0.83	0.13
	Enjoyment	-0.41	-1.02	-0.79
	Boredom	0.18	0.71	0.47

Finally, I used discriminant function analysis to describe the gender difference in these three achievement emotions by referring to the means on raw composites (Table 5). For prospective outcome emotions, females had higher scores than males. On average, females reported high anxiety, low hope, and low hopelessness. In contrast, males, on average, reported low anxiety, high hope, and high hopelessness. For retrospective outcome emotions, females had higher scores than males, which means females, on average, reported low pride, low shame, and high anger, whereas males, on average, reported high pride, high shame, and low anger. For activity emotions, females had higher scores than males, which means females, on average, reported low anger, low enjoyment, and high boredom. However, males, on average, reported high anger, high enjoyment, and low boredom. In summary, there are gender differences in prospective outcome, retrospective outcome, and activity emotions.

Table 5

Composite Scores of Achievement Emotions

Achievement Emotions	High Scores Indicate	Low Scores Indicate	Group Means
Prospective	High Anxiety Low Hope Low Hopelessness	Low Anxiety High Hope High Hopelessness	Female have higher mean scores than male (1.52>0.42)

Retrospective	Low Pride High Anger Low Shame	High Pride Low Anger High Shame	Female have higher mean scores than male (-5.11>-5.39)
Activity	Low Anger Low Enjoyment High Boredom	High Anger High Enjoyment Low Boredom	Female have higher mean scores than male (-1.93>-2.66)

Discussion

Summary

In the present study, I investigated whether there are gender differences in prospective outcome emotions, retrospective outcome emotions, and activity emotions in general domains (participants came from different majors like nursing, engineering and psychology). I hypothesized males and females would self-report differences in prospective outcome emotions, retrospective outcome emotions, and activity emotions. My results revealed partial support for my hypothesis: male and female participants reported statistically and practically significant different levels of prospective outcome emotions (hope, hopelessness, anxiety) and activity emotions (enjoyment, anger, boredom). However, participants' self-report was not significantly different in retrospective outcome emotions (pride, shame, anger). Moreover, based on the scores of males and females, I found females had higher scores on the weighted sum scores of all three sets of achievement emotions: prospective outcome, retrospective outcome, and activity emotions than males. Note, this does not indicate that females are higher on all emotions. Rather, this indicates females are higher on emotions that had positive coefficients in the discriminant analysis and lower on emotions that had negative coefficients compared to males.

Relationship to Prior Research

Consistencies and inconsistencies between results reported in this thesis and previous literature are reviewed below. However, it is important to remember that the findings presented here are from multivariate analyses on sets of emotions, whereas previous literature has mainly used univariate analyses. Thus, findings are not directly comparable.

Consistencies. The results from the current study are partially consistent with prior studies. Simon (2004) claimed women report experiencing more negative feelings like anxiety than men due to cultural differences. In the present study, female participants reported higher levels on anxiety than males. Other research also confirmed that females reported higher anxiety than males. For example, Pekrun (2006) found girls reported more anxiety than boys in mathematics. Moreover, Pekrun (2011) found female students reported more anxiety when they are learning. Moreover, Goetz (2008) determined girls reported more habitual anxiety (trait-related anxiety which is stable and not easily changed by the environment) in math than boys. Finally, Goetz (2007) determined girls reported more anxiety than boys in mathematics. In summary, these prior studies support the present study, which confirmed that female reported more anxiety than males.

Beyond examining gender differences in anxiety, prior studies also confirmed that females reported less enjoyment than males, which is consistent with the present study. Pekrun (2006) found girls reported less enjoyment than boys in mathematics. Similarity, Goetz (2007, 2008) and Frenzel (2007) also confirmed boys/males reported more enjoyment than girls/females in mathematics. In summary, these prior studies support the present study, which confirmed that female reported less enjoyment than males.

Prior studies mostly focused on examining gender differences in enjoyment and anxiety, and did not mention other achievement emotions. One exception is Goetz (2007), where girls

reported less pride than boys in mathematics. Moreover, Fischer (2004) determined men reported experiencing more powerful emotions like anger more than women. These results are consistent with the present study: female participants reported lower scores on pride and anger than males.

In conclusion, some of the results from prior studies are consistent with the present study. However, prior studies focused on examining gender differences in selected achievement emotions like enjoyment and anxiety in specific domains like mathematics. The current study revealed gender differences in achievement emotions extend beyond domain-specific levels and may be domain general differences, though further research is needed to replicate this finding.

Inconsistencies. Although there are some results in the prior studies which are consistent with the present study, there are still some results which are inconsistent with the current study. Pekrun (2006) claimed girls reported more shame than boys in mathematics; however, females reported less shame than males in the current study. Similar to Pekrun's finding, Goetz (2007) claimed that girls reported more hopelessness and shame than boys in mathematics. In the present study, females reported less shame and hopelessness than males. One reason for these inconsistencies may be that Pekrun and Goetz conducted their research within a specific domain (e.g., mathematics); the present study focused on general domains. If the study focused on a specific domain like mathematics, not on general domains, participants might report more achievement emotions, because of other factors like mathematics-related cognition (e.g., perceived value, content difficulty; Goetz, 2013; Pekrun, 2006).

Summary of findings. In conclusion, the present study confirmed gender differences in some achievement emotions. For example, females reported less enjoyment and more anxiety than males, which is consistent with prior studies (Pekrun, 2006; Frenzel, 2007). However, the present study also found results which are inconsistent with prior studies. For example, females

reported less shame and hopelessness than males. Moreover, the present study revealed gender differences in other achievement emotions. For example, females reported more boredom and less hope than males, which researchers have not documented in prior studies. Therefore, these are novel contributions of the present study.

Strengths

First, the current study is the first to my knowledge to combine a control-value framework (Pekrun, 2006) with the Achievement Emotions Questionnaire (AEQ; Pekrun, 2011) to examine gender differences in three dimensions of achievement emotions: prospective outcome emotions, retrospective outcome emotions, and activity emotions. Prior studies have not examined gender differences in these three dimensions of achievement emotions. Second, the present study focused on examining gender differences in achievement emotions in general domains, whereas prior studies focused on specific domains like mathematics (Pekrun, 2006; Goezt, 2007). Therefore, the current study widened the research of exploring gender differences in achievement emotions from domain-specific to domain-general. A third strength is the analysis method used in the present study. Compared to the prior studies, which used means (Pekrun, 2011), multilevel modeling (Goetz, 2013), and MANOVA (Frenzel, 2007) to test gender differences in achievement emotions, the present study used discriminant function analysis. Therefore, the present study is the first to use discriminant function analysis to examine gender differences in achievement emotions. By using this analysis method, I could determine if female and male participants were different on three sets of achievement emotions rather than on individual emotions in isolation.

Limitations

Although this study addressed gaps in the existing literature, it was not without several limitations. One limitation revolves around the gender ratio of the sample (38 males and 104 females). This gender imbalance might have influenced results. Therefore, the results stemming from the current study may not generalize to other samples with different gender ratios. The current research used self-report to assess participants' achievement emotions: Participants rated their level of agreement regarding each item. Prior research suggests that social factors may render it easier for females to report their achievement emotions than males (Simon, 2004). Therefore, in the self-report questionnaire, female participants might be more willing to report their achievement emotions than male participants, resulting in what appears to be gender differences in the current study. Finally, other variables might have impacted participants' answers on the three categories of achievement emotions. For example, if the participant earned a poor grade on an exam before he or she answered the questionnaire, this participant might have reported more anger (retrospective outcome emotion or activity emotion) or hopelessness (prospective outcome emotion) in the questionnaire. In the current study, the AEQ was intended to assess participants' trait achievement emotions; however, some participants might have reported their state achievement emotions which are unstable and easily influenced by other factors.

Future Studies

In the future, research could extend and build on the current study's exploration of the impact gender might have on achievement emotions in several ways. Future studies should balance the gender ratio of participants to examine whether similar results to those reported in the current study would emerge. In addition, future studies could consider other variables which

might influence achievement emotions (e.g., age, culture, and race; Chaplin, 2013; Kring, 1998; Simon, 2004). Finally, future studies could try to explore how events in participants' lives affect how they respond on the AEQ. A mixed-method approach involving participant interviews and completion of the AEQ could be a candidate design for future research.

In conclusion, the present study tested the impact of gender on achievement emotions and confirmed females and males report differently in learning-related achievement emotions in general domains. Moreover, there are some strengths and limitations in the present study and future studies could try to fix these limitations and further explore gender differences in achievement emotions. Additionally, I hope the present study could be applied to educational settings and help more students get better academic performance by using achievement emotions.

APPENDIX

The Achievement Emotions Questionnaire (AEQ)

This questionnaire is modified from The Achievement Emotions Questionnaire (AEQ; Pekrun, 2005). It includes eight learning-related achievement emotions: enjoyment, hope, pride, anger, anxiety, shame, hopelessness and boredom. There are 24 items in this questionnaire.

Instructions

Studying at college can induce lots of feelings, this questionnaire is to assess your emotions experienced during studying. Before answering the questions, please recall some situations which include the emotions you experienced.

Strongly Disagree				Strongly Agree
1	2	3	4	5

Enjoyment

1. I enjoy the challenge of learning the material.

2. I enjoy dealing with the course material.

3. I am so happy about the progress I made that I am motivated to continue studying.

Hope

4. I feel confident when studying.

5. I feel optimistic that I will make good progress at studying.

6. My sense of confidence motivates me.

Pride

7. I'm proud of myself.

8. I think I can be proud of my accomplishments at studying.

9. Because I want to be proud of my accomplishments, I am very motivated.

Anger

10. Studying makes me irritated.

11. I get annoyed about having to study.

12. I get so angry I feel like throwing the textbook out of the window.

Anxiety

13. I get tense and nervous while studying.

14. I worry whether I'm able to cope with all my work.

15. While studying I feel like distracting myself in order to reduce my anxiety.

Shame

16. I feel ashamed.

17. I feel ashamed when I realize that I lack ability.

18. Because I have had so much troubles with the course material, I avoid discussing it.

Hopelessness

19. I feel hopeless.

20. I'm resigned to the fact that I don't have the capacity to master this material.

21. I feel so helpless that I can't cope with it.

Boredom

22. Studying for my courses bores me.

23. The material is so boring that I find myself daydreaming.

24. I would rather put off this boring work till tomorrow.

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