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Conceptualizing Emotion Within Physical Education: Exploration of Antecedents and Outcomes Using the Control-Value Theory of Achievement Emotions

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CONCEPTUALIZING EMOTION WITHIN PHYSICAL EDUCATION: EXPLORATION OF ANTECEDENTS AND OUTCOMES USING THE CONTROL-VALUE THEORY OF ACHIEVEMENT EMOTIONS

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ABSTRACT

Investigating student emotions has gained attention in motivational literature because they represent mechanisms for interpreting experiences and behaviors. Physical education (PE) is critical to promoting skills and positive experiences that lead to an active and healthy lifestyle. Yet, in PE there is a dearth of information and theoretical evaluation of student emotions. To address this gap, this dissertation uses the *control value theory of achievement emotions* (CVTAE) as a lens to investigate student emotions, antecedents, and outcomes in PE-related settings.

The purpose of Study 1 was to investigate effects of an attribution-training treatment on participants' emotions and motivation toward a PE-related task. The experimental design tested appraisals of control as an antecedent of emotion. Female college students (N=144) were randomly allocated to three treatment groups: high-attribution (internal, high control; n=46), low-attribution (external, low control; n=49), and control (n=49), and asked to complete a novel physical task. The treatment consisted of video, feedback, and a written prompt. Results showed that students in the high-attribution group reported higher levels of enjoyment and lower levels of boredom following treatment, compared to the other groups. Group differences were not found regarding free-choice behavior.

The purpose of Study 2 was to examine relationships between student emotions in PE and self-reported in-class engagement, disruptive behavior, and leisure-time physical activity. Middle school students (N= 401) completed a longitudinal study evaluating relationships between emotions (enjoyment, pride, relief, anger, boredom, and shame) and outcomes. Results demonstrated unique associations between emotions and outcomes. Specifically, shame predicted higher behavioral engagement and less disruptive behavior, but had a negative

relationship with leisure-time physical activity. However, effect sizes revealed that emotions explained small amounts of variance in these outcomes.

This dissertation highlights three important areas: (a) significance of discrete emotions, (b) testing major assumptions of CVTAE, and (c) teachers modulating emotion. Discrete emotions present unique relationships with antecedents and outcomes. However, evidence for CVTAE was stronger for antecedents than for outcomes. Lastly, teachers may modulate emotional experiences of students using attribution training. In doing so, PE teachers can potentially facilitate higher levels of student motivation by enhancing adaptive and decreasing maladaptive student emotions.

CHAPTER 1. INTRODUCTION

Living a physically active lifestyle has major ramifications on short-term and long-term health. Participating in regular physical activity (PA) can improve the development of healthy muscles, tissues, and cardiovascular fitness, help maintain body weight, and reduce the risk of chronic diseases (World Health Organization [WHO], 2016). PA also reduces stress, increases energy, and improves self-confidence (Strong et al., 2005; U.S. Department of Health and Human Services [USDHHS], 2018). In schools, regular PA behaviors can enhance student engagement, cognitive capacity, learning, and academic achievement (Centers for Disease Control and Prevention [CDC], 2010, Harvey et al., 2017; Strong et al., 2005). Unfortunately, research shows that PA motivation and behavior declines from childhood through adulthood (Barkoukis, Ntoumanis, & Thøgersen-Ntoumani, 2010). Gaining a better understanding about how to facilitate PA motivation and behavior during the formative years is a crucial public health topic.

Physical education (PE) provides a structured environment in which students can achieve physical, cognitive, and affective outcomes that set the stage for lifelong PA (Society of Health and Physical Educators [SHAPE], 2014). Having structured PE in schools provides opportunities for students to develop healthy lifestyle habits, promote self-regulation skills, and receive support from teachers and peers (Garn, Simonton, Dasingert, & Simonton, 2017; Webster, Mîndrilă, & Weaver, 2011). Positive experiences assist students in setting and achieving PE-related goals (Yli-Piipari, Barkoukis, Jaakkola, & Liukkonen, 2013). Although achievement in PE should focus on helping students attain learning goals, they are often based on non-learning components (i.e., attendance, dressing out) which lacks discernment regarding future healthy behavior (Chen, Sun, Zhu, & Chen, 2014). Currently there is limited understanding about the connection between achievement motivation developed in PE and motivation for PA outside of

PE. One's motivational experience in her or his PE setting may impact future decisions and outcomes (Chen et al., 2014; Cox, Smith, & Williams, 2008).

Achievement Emotions

Achievement emotions are an encompassing way to understand students' motivational experiences and interactions in educational settings (Pekrun, Frenzel, Goetz, & Perry, 2007). Achievement emotions are linked specifically to achievement-related activities and outcomes (Pekrun, 2006). Although emotions like enjoyment are touted as critical to motivational behavior in PE, there is a dearth of research providing insight into emotions and their relationship with motivation. Motivation is defined by the energy and direction one uses to initiate and sustain actions and obtain outcomes (Linnenbrink & Pintrich, 2002). Motivation provides purpose to actions whereas emotion can be interpreted as the causal source of actions (Reeve, 2016; Simonton & Garn, in press). To better understand the intricacies of motivation and subjective experiences, emotions have been identified as markers that represent specific psychological and physiological outcomes (Fredrickson, 2001; Pekrun, Goetz, Titz, & Perry, 2002). In fact, evidence suggests that students use emotions such as enjoyment or boredom to interpret their classroom experiences (Daschmann, Goetz, & Stupnisky, 2014; Fredrickson, 2001). These emotional interpretations are linked with motivational behavior and engagement (Reschly, Huebner, Appleton, & Antaramian, 2008).

Emotions can be captured during an activity or be outcome-based, positive or negative, and activating or deactivating (Pekrun, 2017). The activating component of achievement emotions appears to overlap with other motivational theories such as achievement goal theory (AGT; Elliot, 2005). AGT research in PE has found connections among mastery-approach oriented individuals with positive-activating affect and adaptive behaviors with mixed findings

among performance-approach (activating) and avoidance (deactivating) orientations with affect and goals (Biddle, Wang, Kavussanu, & Spray, 2003). There is theoretical rationalization that approach-avoidance goals align closely with activating-deactivating emotions.

While emotions currently lack inclusion within popular motivational theories that are commonly applied to PE contexts, recent studies demonstrate that emotions relate to long-term changes such as decreases in PA behavior and attitudes about PE-related goals (Barkoukis et al., 2010; Yli-Piipari et al., 2013). The control-value theory of achievement emotions (CVTAE) theorizes that emotions represent key learning outcomes associated with students' well-being as well as important mechanisms that underpin adaptive and maladaptive achievement outcomes (Pekrun, 2006; Pekrun et al., 2002).

Control Value Theory of Achievement Emotions

The CVTAE highlights the central role of emotions in school settings while also providing a model of relationships among their antecedents and outcomes. CVTAE is founded on assumptions from related theories such as the Expectancy-Value Theory (Turner & Schallert, 2001), Attributional Theory (Perry, Chipperfield, Hladkyj, Pekrun, & Hamm, 2014; Weiner, 1985), and emotions effects on learning (Fredrickson, 2001). CVTAE includes four major constructs (Figure 1.1): the learning environment, control-value beliefs (appraisals), discrete emotions, and achievement-related outcomes (Pekrun & Linnenbrink-Garcia, 2014). The learning environment represents a distal antecedent predicting emotions and directly influences control-value beliefs (Pekrun, 2006). Characteristics of the learning environment include classroom climate, instructional style, autonomy support, feedback, and content selection to name a few. Control-value beliefs are considered proximal antecedents of discrete emotions. Control beliefs are self-evaluations of attribution to success/failure and the causality over actions

and outcomes (Perry et al., 2014). Value beliefs are subjective judgements of the importance and worth of activities and outcomes (Pekrun, 2006). Control-value appraisals are domain specific thus interpretations of their predicted emotions are also domain specific (Pekrun et al., 2007). Previous findings within CVTAE also suggest reciprocal relationships that Pekrun (2006) calls feedback loops. These loops suggest that the proposed causal ordering of the four constructs may work in multidirectional ways. For example, although control-value appraisals predict emotions, emotions that are experienced may in turn reinforce appraisals.

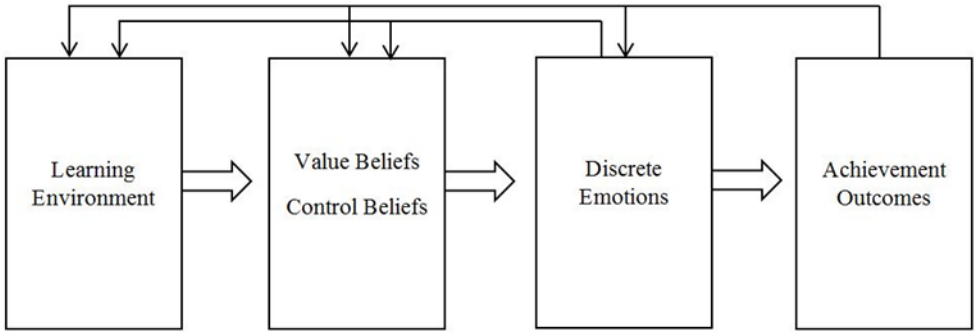

Figure 1.1. Visual representation of Control Value Theory of Achievement Emotion.

Emotions encompass students' subjective classroom experiences and are posited as predictors of outcomes such as achievement, behavior, learning, and engagement (Pekrun et al., 2002). The relationships from emotions to outcomes are referred to as the specific action tendencies (Fredrickson, 2001). Emotions elicit physical, psychological, motivational, and expressive actions that can be both adaptive and maladaptive in terms of reaching goals (Pekrun & Linnenbrink-Garcia, 2014). In summary, emotions represent mechanisms that further explain motivation and desired outcomes. There is limited evidence on achievement in PE leading to desired outcome behaviors (Cox et al., 2008; Wallhead & Buckworth, 2004; Wallhead, Hagger, & Smith, 2010; Yli-Piipari et al., 2013), thus understanding emotions may provide greater

insight into this relationship. Investigating the subjective experience in PE through emotions may fill gaps in explaining how PE environments can induce achievement motivation and contribute to future health behavior.

Purpose

The purpose of this dissertation was to use CVTAE as a lens to investigate achievement emotions in PE settings and tasks. This dissertation research highlighted both antecedents and outcomes associated with achievement emotions. Previous research in PE has rarely examined discrete emotions in a theoretically grounded manner. CVTAE is an achievement motivation framework used to systematically address this gap in two dissertation studies. The specific purpose of Study 1 was to investigate the effects of a control beliefs attribution training treatment on college learners' emotions and motivation toward a PE-related task. The specific purpose of Study 2 was to examine the relationships between student emotions in middle school PE and self-reported in-class engagement, disruptive behavior, and leisure-time moderate-to-vigorous PA (MVPA).

CHAPTER 2. ATTRIBUTIONAL-TRAINING OF CONTROL BELIEFS REGARDING A PHYSICAL EDUCATION TASK AS A PREDICTOR OF EMOTIONS IN FEMALES

Although there is substantial evidence for the importance of living an active lifestyle, research shows a steady decline of physical activity (PA) starting in childhood and continuing through adulthood (Centers for Disease Control and Prevention [CDC], 2014). Parallel to these findings research also shows a steady decline in PA enjoyment and enjoyment of physical education (PE) as age increases (Barkoukis et al., 2010). This is particularly meaningful because PE is a platform used to educate, inform, and engage learners for the purposes of adopting lifelong PA habits (Society of Health and Physical Educators [SHAPE], 2014). There is also evidence of reciprocal relationships between emotions and behaviors (Motl et al., 2001; Yli-Piipari, Layne, Hinson, & Irwin, 2018). Furthermore, developing positive emotions toward PA and PE are important outcomes independent of PA because affective outcomes are one of three essential learning domains of PE (SHAPE, 2014) and are representative of psychological well-being (Frenzel et al., 2007).

Emotions facilitate an affective attraction or repulsion to learning content or domains (Frenzel et al., 2007). Research shows that emotions are stronger predictors of future student enrollment and learning domain pursuits compared to cognitive competencies (Harackiewitz, Barron, Tauer, Carter, & Elliot, 2000). SHAPE (2014) identified enjoyment as a specific standard-focused outcome of an effective PE program as well. Emotions have recently been investigated in a more deliberate way using clearly defined and discrete constructs. Findings suggest that discrete emotions play an integral role in understanding motivation and behavior in PE (Garn et al., 2017; Mouratidis, Vansteenkiste, Lens, & Auweele, 2009; Yli-Piipari et al., 2013). In summation, emotions are an essential outcome of PE as they represent the perceived

quality of experience and a marker of one's willingness to engage (Simonton et al., 2017; Yli-Piipari et al., 2009).

Although research is promising regarding emotions in school settings, there have been inconsistent conceptual and operational tactics employed within the research (Pekrun, 2017). One reason could be the lack of theoretical justification for emotion's place within achievement motivation frameworks. Control value theory of achievement emotions (CVTAE; Pekrun, 2006) has been identified as a comprehensive framework to critically evaluate emotions.

According to the CVTAE two major constructs predict discrete emotions, the learning environment and control-value appraisals (Pekrun, 2006). The learning environment is posited as an indirect contributor to emotions but a direct contributor to control-value appraisals. It is theorized that perceptions of high control and value will induce positive-activating emotions, which facilitate adaptive motivational outcomes (Pekrun & Linnenbrink-Garcia, 2014). Pekrun et al. (2007) propose the learning environment as an ideal intervention point for students' achievement emotions. Specifically, research should focus on purposeful arrangement of the learning environment to help students increase control and value beliefs. One proposed method is called attributional training (AT; Weiner, 1985). AT targets messaging and learning environment manipulation that engages learners to attribute personal dimensions in motivational ways (Parker, Perry, Hamm, Chipperfield, & Hladkyj, 2016). In other words it teaches students to attribute personal ability resulting in success, to effort and practice, rather than outside causes. AT has been found to be a successful approach to enhance students' control beliefs in learning experiments and interventions (Parker et al., 2016; Perry et al., 2014). Given the importance of emotion and having a theoretical sound way to investigate its antecedents, the AT technique could enhance understanding of student emotions and the affective component of motivation.

Learning Environment and Emotions

As predicted within CVTAE, the learning environment influences students' perceptions of control and value (Pekrun, 2006). The learning environment is complex and can encompass a variety of social and instructional components. Social aspects of learning environments can include teacher and peer relationships, ability expectations, and social comparisons (McGregor & Elliot, 2002). The instructional climate is predominantly controlled by teachers and can be influenced by task difficulty, clarity of instruction, use of developmentally appropriate progressions, and content choices (Bryan & Solmon, 2012; Sánchez-Rosas & Esquivel, 2016). Control beliefs, specifically, can be influenced by learning environments that promote skill competency and allows students to experience challenge and success (Chipperfield, Hamm, Perry, & Ruthig, 2017).

Within CVTAE, control develops from a learning environment where students attribute success/failure to their actions versus external factors. These learning environments also promote the importance of effort and persistence regardless of ability. Similar to conceptions of ability (Molden & Dweck, 2006), students with high control appraisals believe increased effort will improve ability and increase the probability of positive emotional experiences and subsequent academic achievement. Within CVTAE, control beliefs encompass perceptions that one has influence on their current effort/performance and is responsible for resulting outcomes. However, if instructors or task design promote externally-driven outcomes, or perceptions that actions are out of one's control, then students are more likely to reduce control appraisals toward ability, increasing the likelihood of academic failure (Molden & Dweck, 2006; Pekrun, 2006). Thus, control appraisals can be considered action and/or outcome oriented. Control over action

focuses on students' developing judgments regarding capacity to initiate and perform learning tasks whereas action of outcomes focuses on desired results (Putwain et al., 2018).

The learning environment can also influence students' perceived value of the learning tasks. For example, students' value beliefs increase when instructors create immediate relevance of class content and promote the importance of learning activities (Webster et al., 2011). Also, selecting course content that connects to future PA for boys and girls of different ability levels increases perceived value and positive attitudes (Bryan & Solmon, 2012). In combination, the perceived content relevance and value of PE will shape students' beliefs over time. The relevance of regular PA on lifelong health is important but short-term markers of relevance may be necessary for students in middle or high school to maintain motivation (Webster et al., 2011). Value encompasses the perceptions of interest and worth a task represents to an individual and should be accounted for when evaluating one's emotion and motivation regarding a task (Simonton, Solmon, & Garn, in review). These beliefs can take time and reinforcement to generate beyond a single session. Although value is an essential antecedent for predicting emotions, this study focused on influencing control beliefs, specifically.

To date, little research in PE has examined how the learning environment affects students' emotional outcomes via AT manipulation. Initial studies using CVTAE in PE have found partial support for relationships between factors in the learning environment, student control and value beliefs, and emotions. For example, at the high school level, teacher clarity was associated with students' control and value beliefs and indirectly associated with enjoyment and boredom (Simonton, Garn, & Solmon, 2017). Another study utilizing CVTAE found that college students' perceptions of their teachers' autonomy support predicted control and value beliefs (Simonton et al., in review). Autonomy support was an indirect predictor of enjoyment

and boredom, via control and value. However, these studies relied on correlational research designs. More rigorous investigation of links between aspects of the learning environment in PE and control and value beliefs is needed to confirm major CVTAE assumptions.

Attribution Training

Attributions are the perceived causes of success/failure based on one's evaluation of their control over actions and outcomes (Weiner, 1985). AT and intervention treatments (Weiner, 1985) align with CVTAE's conceptualization of control appraisals and formation of positive and negative emotions (Pekrun, 2006, 2017). AT treatments enhance one's perceived capabilities of control and purposefully counter maladaptive thinking (Perry et al., 2014). The AT process typically consists of purposeful messaging, tasks, and feedback that attributes success to either the self or others and regarding one's effort and/or ability (Pekrun, Cusack, Murayama, Elliot, & Thomas, 2014; Perry et al., 2014). Following the AT treatment participants are often given tasks to elicit the intended treatment. Overall, treatment is meant to influence one's expectations, beliefs about actions and outcomes, and activate particular perceptions and feelings (i.e., emotions).

Causal attributions of control revolve around how one allocates ability regarding the initiation of tasks and their outcomes (Parker et al., 2016; Pekrun, 2006), these components have both physical and psychological ramifications. Based on previous findings regarding perceptions of control there is strong evidence for the proposed direct relationship between control attributions and emotions within CVTAE (Pekrun et al., 2014). For example, perceived control preserves and promotes resilience and goal engagement (Chipperfield et al., 2017). Attributing failure to outside sources and believing ability is fixed can lead to shame or hopelessness, however, when effort is believed as in one's control, motivational behavior is manifested (Parker

et al., 2016). Findings have linked boredom with low control beliefs which can undermine motivational behavior. However, one study using a randomized treatment design found that AT treatments can influence bored students, in particular, by increasing their control beliefs and reducing their chances of withdrawing from the class. (Parker, Perry, Chipperfield, Hamm, & Pekrun, 2018). AT treatments have been found successful in generating positive control beliefs of students in educational settings and in a few sport settings as well (Parker et al., 2018; Parker et al., 2016). Given the strong underpinnings of AT on the development of CVTAE and the need to understand emotion within PE-related contexts, it appears the AT could inform researchers on the predicted causal relationships between the environment, control, and emotions.

Emotions and Motivation

Although there is an array of discrete emotions that can be experienced in a PE/PA setting, this project has narrowed its focus on four emotion outcomes parceled by valence and activation: enjoyment, boredom, relief and anxiety. Enjoyment represents a positive-activating emotion often linked to mastery experiences, high control, and positively valued tasks (Pekrun, 2006). Boredom is a negative-deactivating emotion that results when tasks are considered too easy or too difficult, where perceived control is proficient but minimal effort is needed, where control abilities are seen as insufficient for participation or success (Daschmann et al., 2014; Pekrun, 2006). Enjoyment is often linked to intrinsic forms of motivation, meaning one continues to participate for the activity itself (Pekrun, 2006), while boredom is linked to reduced engagement and maladaptive behavior in-activity (Daschmann et al., 2014; Parker et al., 2018). Bored experiences can be especially prevalent in compulsory school classes where students have limited choices and tasks are seen as monotonous or not valued (Putwain et al., 2018).

Enjoyment and boredom have received the most attention in PE studies (Barkoukis et

al., 2012; Motl et al., 2001; Simonton et al., 2017; Yli-Piipari et al., 2013). Results have found that beliefs of task mastery, value, and academic control are all positive contributors of developing enjoyment and reduce the chances of boredom (Barkoukis et al., 2012; Simonton et al., 2017). The teaching environment, teacher functions, and class structures are all considerable contributors to emotions and their antecedents. Also, enjoyment in PE was identified as important mediators from PE experiences to PA behaviors (Motl et al., 2001; Yli-Piipari et al., 2013).

Relief is considered a positive, deactivating emotion driven by avoiding failure (Pekrun, 2017). Deactivation refers to the reduction in physiological reaction during the onset of the emotion. Individuals typically have adequate perceptions of control and experience relief following the avoidance of failure (Pekrun, 2006). Relief often works in opposition of positive emotions and aligns with negative emotions as it is prompted by avoidance motivation (Pekrun et al., 2014). Those who experience relief often perceive adequate control but anticipate failure in achieving the outcome and ultimately produce control abilities to avoid failure. The separation from relief and anxiety is the uncertainty that one has enough control over an action/outcome to avoid failure (Pekrun, 2006). Anxiety is a negative, activating emotion formed by feelings of minimal or uncertain control with anticipated feelings of failure either due to lack of ability or to forces beyond one's control (Frenzel, Pekrun, & Goetz, 2007; Ruthig, Perry, Hall, & Hladkyj, 2004). Activation of a negative emotion like anxiety can have adverse effects on one's cognitive ability (Pekrun, 2017) and body coordination (Yli-Piipari et al., 2009). Positive- activating emotions result in adaptive behaviors, deep learning, and engagement (Linnenbrink-Garcia, Patall, & Pekrun, 2016) whereas negative-deactivating emotions are linked to absenteeism, dropout, disengagement, and surface level learning (Daschmann, Goetz, & Stupnisky, 2014).

Relief will reduce one's motivation and continued effort and anxiety may draw student's attention away from the task, clouding their ability to coordinate their body, and focus attention on consequences of failure (Pekrun, 2017). Opposing potential outcomes also suggest that relief can be beneficial, instances when individuals realize they are prepared after feeling uncertain (i.e., realizing that one studied the correct material and now will pass an exam). The same has been identified with anxiety in sports. Although anxiety can be a detriment to performance, some individuals are most alert in optimal levels of anxiety (Yli-Piipari et al., 2009; Zeidner, 1998). Both may have strong relationships with extrinsic forms of motivation and may further explain variation in volitional behavior.

Emotions evoke a series of psychological (i.e., perceived failure), physiological (i.e., sweaty palms), and motivational (i.e., withdrawing; Pekrun, 2017; Shuman & Scherer, 2015) expressions. Because of these relationships, activating emotions are expected to increase motivation and deactivating emotions will reduce motivation. Another perspective on the interconnections between emotion and motivation suggests that emotion represents the tangible physical reaction a person has influencing participation whereas, motivation reflects the reason to participate (Karagiannidis, Barkoukis, Gourgoulis, & Kosta, 2015; Reeve, 2016). Consequently, reasons to engage in combination with positive physiological and psychological influence should increase motivation to participate. Motivation results from asking the questions, can I do it?, and why do I want to do it? (Linnenbrink-Garcia et al., 2016), whereas emotions result from the question, how will I feel about it? (Simonton & Garn, in press). Importantly, intrinsic motivation that leads to behavior arises from interest in the activity without an external reward or outcome in mind. Interest that spurs intrinsic motivation to act and results in a positive experience may facilitate enjoyable feelings. Most research shows a positive relationship

between enjoyment and intrinsic motivation (Ntoumanis, 2002; Yli-Piipari et al., 2009). To evaluate levels of motivation tied to one's emotional experience within this study, researchers adopted practices by Deci (1971) who explored free-choice activity time as an indicator of intrinsic motivation. By tracking emotions and free-choice participation time relationships between activating-deactivating emotions and intrinsic motivation can be further explored.

In conclusion, CVTAE emphasizes the importance of emotions in students' achievement motivation and situates the learning environment and control and value appraisals as emotional antecedents. Although recent research in PE has concluded that emotions help explain students' motivation (Barkoukis et al., 2010; Yli-Piipari et al., 2013), there is a lack of systematic evidence concerning how emotions are formed. Therefore, the purpose of this study is to investigate the effects of an AT treatment on participants' emotions and motivation toward a PE-related task.

Research Hypotheses

Hypothesis 1: Participants in the high AT group will report a more adaptive set of emotions toward the PE task compared to participants in the low AT and control groups. Specifically, participants will report higher levels of enjoyment and lower levels of relief, boredom, and anxiety compared to participants in the low AT and control groups.

Hypothesis 2: Participants in the high AT group will be more intrinsically motivated toward the PE task compared to participants in the low AT and control groups. Specifically, participants in the high AT group will spend more time in free-choice practice than participants in the low AT and control groups.

Methods

Pilot Testing

A pilot study consisting of 46 undergraduate students (*M* age= 21.02, SD= 1.53) was conducted in order to solidify treatment procedures. Of these participants 63% were female, 76% were White, and they self-reported academic year was senior (66%), junior (13%), sophomore (7%), and freshman (14%). Stratified randomized groups were created with an equal male/female ratio for each of the three treatment groups: (a) high AT; (b) low AT; and (c) control. The findings from this pilot were used to refine and adjust procedures as well as evaluate power of findings to determine appropriate sample size for the final study. Overall, no significant interactions were found between the groups emotions across time, although some mean changes were found as expected between the high AT and low AT groups. Given the mean differences between males and females on each of the emotion scales and motivation free-choice time, the researcher chose to analyze males and females separately. Following pilot analysis, mean differences were found for females although the sample size was small. Also, female student's traditionally tend to report lower levels of control or competence in skill abilities (Bryan & Solmon, 2012; Li, Lee, & Solmon, 2006), especially skills viewed as more masculine (Belcher, Lee, Solmon, & Harrison, 2003). Based on these findings, emotions and free-choice motivation needed further investigation specifically within female participants.

Participants and Setting

Participants for this study were 144 female students (high AT= 46; low AT= 49; control= 49) recruited from upper level kinesiology courses at a large university located in the Southeastern part of the USA reporting a mean age of 20.92 (SD= 2.13). The participants reported their race/ethnicity as 68% White/Caucasian, 24% Black/African-American, 4% Hispanic/Latino/Mexican-American, 2% Asian/Asian-American; 2% reported being Multi-

Racial. Approximately 65% of students reported their grade classification as seniors with the remaining 35% reporting juniors.

Recruiting and Protocol

Permission to complete the study was acquired from the researcher's Institutional Review Board. The researcher visited kinesiology courses in order to explain the study and recruit participants. All participants who agree to participate for the experiment were females between the ages of 18-22, in good physical health, and indicated low to no previous hockey experience and knowledge of the sport. Students completed an online survey, which included informed consent, demographic information and covariate variables (temperament and trait-control beliefs). Participants were then randomly assigned to one of the three treatment groups including high AT, low AT, and control (Phase 1; see Table 2.1 for all phases). They were asked to come into a laboratory setting for approximately 30 minutes to participate in light activity task.

Participants first viewed a standardized instructional video (approximately 2 minutes in length) regarding the hockey wrist shot and were informed they would be video recorded while performing three performance trials (10 total attempts per trial: broken into two sets of five wrist shots). Following the instructional video, all participants completed their first performance trial. Then participants took the first round survey consisting of emotions and covariates of perceived competence and value beliefs regarding the task (Phase 2). Following the survey, participants were informed the researcher must leave the laboratory area to input data. Participants were told data entry would take a few minutes and during that time they could practice with the equipment or relax and simply wait for the researcher to return. While the researcher stepped away, participants were video recorded to capture any activity that occurred during the three minutes timed by the researcher.

Table 2.1. Study one intervention protocol of Control Attributional Retraining.

PHASE 1	Baseline Data Collection	Students completed online survey on demographic, hockey experience, and interest. Trait control and temperament were collected as covariates.
	Block Random-ization	Those who (a) scored high on hockey experience/knowledge (b) who were not between the ages of 18-22 and (c) who had health issues that prevented them from executing the skill were excluded. Students were randomized into the three experimental groups: HCAT, LCAT, Control
PHASE 2	Instructional Video	All participants receive instructional video that informs the purpose of the hockey wrist shot and demonstrates major skills cues of the shot. Participants informed that researchers will film them performing three separate performance trials
	Trial 1	Participants used a hockey stick to strike 5 hockey pucks set up 25 feet from the pop up goal. Participants were not given feedback but were told to take 5 shots in a row, collect and repeat once.
	Emotions 1	Participants were asked to complete a survey of their emotions regarding the task they performed.
	Recording of Motivation 1	Participants were told that researchers must input the data and would return in a few minutes. Participants were also told, they were free to practice the wrist shot or just relax until the researcher returned, but to remain in lab area. Participants were video recorded to capture any and all practice time, no researchers are present.
PHASE 3	Treatment Video & Prompt	Participants viewed a treatment video that reinforced the treatment group they were in. (HCAT, LCAT, Control). All three videos were approximately the same length. Participants were given a short attribution consolidation prompt to complete.
	Trial 2	Participants were recorded on their second round of trials of the hockey wrist shot. Researchers gave a set of feedback statements congruent to each participant's treatment group. Participants completed 2 sets of 5 shots.
	Emotions 2	Following the treatment video and practice, students were asked to complete the emotion survey again. This round also asked a question regarding their video experience as a manipulation check.
	Recording of Motivation 2	Participants were told, data must be input and researchers would return in a few minutes, participants were free to practice the wrist shot or relax until the researcher returned, and remain in the lab area. Participants were video recorded to capture any and all practice time, no researchers are present.
Debrief	Exit Information	Researchers returned following the allotted time and stopped recording. Participants were told they would not need to perform the third round of trails and the purpose of the study was to evaluate students' emotions regarding the task. They were asked not to share their experiences

Design and Procedures

Study 1 used a pre-test/post-test control group randomized design (Kirk, 2013). The independent variable was control beliefs, conceptualized as participants' AT group assignment (Parker et al., 2016; Perry et al., 2014). Dependent variables were achievement emotions including enjoyment, boredom, relief, anxiety, as well as free-choice practice time conceptualized as motivation. Covariates were temperament, perceived competence, trait control, and task value. Researchers also tried to account for weather and class conditions so that both data points were collected under similar conditions.

Task. The experimental task was the hockey wrist shot, which represented a novel PE task for female college students in the southeastern region of the United States (Belcher et al., 2003 . Participants watched an instructional video of the wrist shot presented by a female instructor. In the instructional video, participants learned about the purpose of the wrist shot, which was to strike the puck into the air with a two-handed swinging motion to score a goal within the hockey net. The critical skill cues instructed to complete the hockey wrist shot were: ready, wrist snap, and follow through (Belcher et al., 2003). The ready position begins with the puck positioned on the ground at the participants' midline and in front of the stick. The hands should be in proper position on the stick (one hand near the top of the stick and one near the lower half closer to the puck). The stick is drawn back away from the puck and into the air to roughly waist-height. As the stick is swung back towards the puck the wrist snap phase is being initiated. The lower hand (hand closest to the puck) will rotate from a palm down (back swing) to a palm up position as the stick is quickly moved forward through the puck. During this motion the opposing hand (top hand), pulls the top of the stick down and back towards the target side him simultaneously as the bottom hand turns up. Naturally, as the stick strikes the puck and as

the motion continues the follow through cue is initiated as the top hand pulls the stick downward and the bottom hand reaches completely to palm up. The head of the stick (the flat end that makes contact with the puck) should proceed to be pointed towards the target while completing the follow through stage.

Treatment conditions. Each of the treatment groups watched a second video (Phase 3) that reinforced their respective AT treatment condition for the wrist shot after the first performance trial and free-choice time. The high AT and low AT treatment videos consisted of instructional messaging aligned to developing high or low feelings of control, respectively (see Appendix B). High AT instructional messaging focused on effort and practice, which were considered controllable causal attributions (Parker et al., 2016). Low AT instructional messaging focused on innate ability and external barriers to performance, which were considered uncontrollable causal attributions (Parker et al., 2016). Participants in the control group watched another version of the instructional video. All three treatment videos were approximately the same length. An attribution consolidation technique (Parker et al., 2018) was used following the treatment video to reinforce the AT message and connect to the participant's real life experiences. High AT participants were asked to summarize a time in which effort increased perceptions of control and helped them achieve success. Low AT participants were asked to reflect on a time in which their ability was out of their control and decreased their performance. Control groups were asked to summarize a previous sport-related experience.

Following the AT videos and attribution consolidation task, participants received feedback statements during their second round of performance trials to reinforce treatment conditions. One feedback statement came after the first 5 shots toward the goal and the second feedback statement came after the second 5 shots toward the goal within the trial. Each

participant received the same amount of feedback. Examples of statements the researchers provided the high AT group include, “The more times your practice and the more shots you take, the more you are going to improve”; “you are getting a lot better compared to the first couple times you tried the shot.” Feedback for the low AT group focused on one’s success being out of their control and that their current ability is not amenable for them to be successful. Examples include, “the wrist shot is mostly determined by your ability, you’re either good at it or you’re not very good at it”; “your success is based on your-hand eye coordination, you’ve either got it or you don’t.” Participants in the control group received general feedback, “good job” and “thank you.” The second round of surveys following intervention included all emotions as well as a treatment manipulation check regarding the messaging of the video and writing prompt.

After the second round of surveys, participants were again told that the researcher needed to step out for data entry and participants had the option to practice or relax. The participants were told they would perform their third trial of attempts when the researcher returned. Recording devices were used to capture any practice activity occurring during the three minutes when the researcher was out of the room. When the researcher actually returned, participants were told they would not need complete a third round of trials and were informed of the purpose of the study (Debrief). All participants were asked to not share any of their experiences regarding the experiment as they may affect future participants of the study. The low AT group received an additional special message to inform them that their ability was not fixed and to not leave the experience believing they could not improve on the task.

Threats to Internal Validity

Although control beliefs were manipulated for students in the high AT and low AT treatment groups toward the hockey task, it was possible that trait levels of control may

potentially confound the treatment effect. Therefore, trait control was measured and included in analyses as a covariate in order to reduce this potential threat to internal validity. Participants' temperament was also measured and included as a covariate in analyses as it is related to trait emotional regulation. Including temperament helped reduce the potential bias of participants' emotional predisposition prior to their study involvement. Lastly, in line with CVTAE, value beliefs toward the hockey task were included as a covariate in order to account for its potential impact on student emotions (Pekrun, 2006).

Measures

Demographics. Student's age, academic grade classification, and ethnic background were collected via self-report. They also reported physical health in terms of performing basic manipulative skills and identifying previous experience/knowledge in hockey.

Temperament. To evaluate trait-temperament as a potential covariate, the adjusted Behavioral Inhibition Scale (BIS) and the Behavioral Activation Scale (BAS; (Bjørnebekk, 2009; Carver & White, 1994) scales were used. The 6-item BIS scale signals sensitivity to punishment and inhibits ongoing behavior. An example item is, "I feel pretty upset when I think that someone is angry with me." The 13-item BAS elicits signals of reward, approach-based behavior and motivational reaction. There are three subscales to the BAS scale, which are, reward responsiveness, drive, and fun seeking. An example item of reward responsiveness is, "When I am doing well at something, I like to keep doing it." An example of drive is, "I do everything I can to get things I want." Lastly, an example of the fun seeking subscale is, "I am always willing to try something new if I think it will be fun." Both the BIS and BAS are scored on a scale of not true (1), somewhat true (2), true (3), and very true (4). Previous studies have found the scales

valid and reliable and suggest combing the subscales of the BAS as a single construct (Bjørnebekk, 2009).

Perceived Competence. The perceived competence subcomponent of the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989) was used to measure control beliefs regarding the hockey task. Perceived competence has often been used within CVTAE to represent control beliefs regarding tasks/domains as it is action-oriented toward performance of an activity (Putwain et al., 2018). The scale consisted of six-items measured on a seven-point scale ranging from, "very true" (7) to "not true at all" (1). Participants were prompted to rate how true each statement was regarding the hockey wrist shot task they just completed. One example item included, "I think I am pretty good at this task." One item, that was negatively worded, was removed due to statistical issues evaluated during piloting data. This meant the scale was successfully measured using a five-item measure.

Trait-Control Beliefs. The course-related causal attribution subscale (Perry et al., 2001) was used to evaluate trait control beliefs, specifically evaluating attributions of effort and ability. One item was adapted to be trait control measures regarding sport performance. Students were asked, "Rate whether you think ability or effort is more important to sport performance." The binary options were ability (1) to effort (2).

Emotions. Achievement emotions regarding the task was measured using subscales from the Achievement Emotions Questionnaire (AEQ; Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011), this scale has been found valid and reliable within the PE and PA setting (Garn et al., 2017; Simonton et al., 2017). Emotion subscales include enjoyment, boredom, relief, and anxiety. All emotions were prompted with, "For each question, think about the hockey wrist shot you just completed." An example item of the enjoyment subscale is, "I felt enjoyment." These

items were ranked on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). This scale was applied to boredom (i.e., "I got bored"), relief (i.e., "I felt relief), and anxiety (i.e., "when I thought about participating I felt uneasy"). There were four questions specific to each of the four emotions being measured.

Motivation. Intrinsic motivation was operationalized by the amount of free-choice practice time participants engaged in during 3-minute break periods occurring after trials 1 and 2. A similar method has been used to capture motivation where participants were left with a puzzle activity in a lab area (Deci, 1971), therefore we adopted the technique to reflect motivation to practice of the physical task used in our study. Participant free-choice practice time was recorded by video camera. Motivation time occurred when students engaged in wrist shot practice wrist including practice attempts, mock swings, stance development, and puck alignment. To fully capture one's motivation to be involved in the task, a short cognitive time was allotted following the task, akin to academic learning time in PE (Derri, Vasiliadou, & Emmanouilidou, 2004), Thus, puck collection was considered part of practice time as participants are likely still cognitively involved with the task and reactions to success and failure, however, a 15-second maximum limit was set. If a participant took longer than the allotted time, the timer was stopped and was not restarted until participants re-engaged into any of the aforementioned activity tasks. Activity time was analyzed and found to be reliable using inter-class correlations on 15% of the total videos recorded by the researcher and trained coding assistant (ICC= .94).

Task Value. A sub-scale of the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989) was used to collect subjective value and modified to be specific to the task. Items included specificity to usefulness, importance, and utility. An example item is, "I think that

doing this task is useful." All three items were measured on a scale from not true at all (1) to very true (7).

Manipulation Check. To evaluate the treatment video effectiveness participants responded to a single item regarding the messages delivered during the video. The question was, "According to the video, the main influence on performance for the hockey wrist shot is…" The binary answer options were ability (1) or effort (2).

Data Analysis

Prior to analysis, data was screened for input accuracy, missing data, normality, and outliers. Participants were removed from analysis if they reported prior experience or knowledge regarding hockey (*n*= 3), exceeded the age limit (*n*=10), or failed the manipulation check (*n*=2). Thus, a final total of 144 participants were used in the final analysis. Descriptive statistics and internal consistency estimates (see Table 2.2) were analyzed using composite variables with SPSS version 22. Relationships among all variables were evaluated using bivariate correlation estimates. A 3 x 2 (group x time) repeated-measures multivariate analysis of covariance (RM-MANCOVA) was used to evaluate main effects and interactions among the independent variables (group and time), the dependent variables (emotions and motivation), while accounting for several covariates (temperament, trait-control, value, and perceived competence). Significant interactions following the RM-MANCOVA were followed up using Sidak post hoc tests to identify group differences. This method is recommended given the complexity of the model and uneven treatment groups (Field, 2013). Adjusted mean scores and plots were used to probe interaction effects and partial-eta squared (η_p^2) was used to determine effect size.

Table 2.2. Correlations Estimates and Cronbach Alpha Coefficients.

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	T1ENJ	(.869)													
2	T1BOR	.420**	(.774)												
3	T1ANX	-.386**	.166*	(.873)											
4	T1REL	.619**	.128	-.560**	(.859)										
5	T MTV	.110	-.345**	.002	.002	1									
6	T2ENJ	.698**	-.340**	-.214**	.453**	.298**	(.875)								
7	T2BOR	-.219**	.623**	.244**	-.144	-.336**	-.357**	(.870)							
8	T2ANX	-.416**	.172*	.749**	-.536**	.010	-.294**	.316**	(.908)						
9	T REL	.461**	-.106	-.383**	.702**	.109	.570**	-.170*	-.387**	(.859)					
10	T2MTV	.055	-.212*	.104	-.067	.693**	.218**	-.245**	.035	.046	1				
11	VAL	.482**	-.312**	-.209*	.391**	.129	.479**	-.307**	-.175*	.329**	.169*	(.842)			
12	TEMP	.354**	-.129	-.369**	.412**	.108	.246**	-.067	-.321**	.297**	.073	.199*	(.829)		
13	PComp	.504**	-.191*	-.377**	.495**	-.103	.364**	-.054	-.279**	.361**	-.062	.283**	.225**	(.923)	
14	TCon	-.073	.049	-.075	-.112	-.096	-.128	.038	-.023	-.113	-.051	-.148	.085	-.090	1

Note. T1 ENJ= Enjoyment; T1 BOR= Boredom; T1 ANX= Anxiety; T1 REL= Relief; T1 MTV= Free-choice motivation; T2= represents the same variables measured following treatment. VAL= Value; TEMP= Temperament; PCOMP= Perceived competence; TCon= Trait control belief; Diagonal = Cronbach alpha estimates of internal consistency; ** $p < .001$, *$p < .01$.

Results

Main Analysis

Bivariate correlations and reliability scores for all composite variables can be found in Table 2.2. All variables with multiple indicators showed acceptable reliability scores ($\alpha > .70$) ranging from .774 (boredom) to .923 (perceived competence). All emotion variables shared significant relationships other than boredom and relief (T1 r= .128; T2 r= -.106). Free-choice motivation shared significant relationships with boredom (T1 r= -.345; T2 r= -.336) and enjoyment (T2 r= .298). Of the covariates, perceived task value shared significant relationships with all variables except free-choice motivation at time 1 (r= .129). Temperament shared

Table 2.3. Means and standard deviations for each experimental group.

	HAT	LAT	Control	Total
T1 ENJ	2.92 (.84)	2.99 (.83)	3.08 (.84)	2.99 (1.81)
T2 ENJ	3.34 (.75)	3.09 (.79)	3.15 (.76)	3.17 (.78)
T1 BOR	1.89 (.60)	1.76 (.69)	1.77 (.65)	1.81 (.67)
T2 BOR	1.48 (.54)	1.68 (.57)	1.49 (.54)	1.56 (.58)
T1 ANX	2.13 (.80)	2.18 (1.09)	1.80 (.79)	2.03 (.91)
T2 ANX	1.64 (.63)	1.79 (.89)	1.51 (.66)	1.64 (.74)
T1 REL	2.95 (.82)	2.90 (.82)	3.15 (.83)	2.99 (.82)
T2 REL	3.22 (.85)	3.06 (.73)	3.19 (.89)	3.13 (.84)
T1 MTV	1.32 (.92)	1.07 (.99)	1.07 (.95)	1.15 (.95)
T2 MTV	1.08 (1.00)	.596 (.82)	.649 (.84)	.752 (.91)

Note. ENJ= Enjoyment; BOR= Boredom; ANX= Anxiety; REL= Relief; MTV= Free-choice motivation; .T1 = Time point 1 measurements; .T2 = Time point 2 measurements; HAT= High Control attribution training; LAT= Low control attribution training; Control= Control group.

relationships with all variables as well except boredom (T1 *r*= -.129; T2 *r*= -.067) and motivation (T1 *r*= .108; T2 *r*= .073). Perceived competence also shared relationships with all variables except free-choice motivation (T1 *r*= -.103; T2 *r*= -.062) and boredom at time 2 (*r*= -.054).

Overall, the students who participated in this study had increased feelings of enjoyment and relief and lower levels of boredom and anxiety regarding the task (Table 2.3). Adjusted mean scores show an increase in enjoyment and relief scores over time and decreases in boredom and anxiety, regardless of treatment group.

The RM-MANCOVA produced an overall multivariate effect on time (Wilk's Λ= .889, $F(5, 132)$= 3.294, p= .008, η_p^2= .11, power= .886) as well as significant group by time interactions (Wilk's Λ= .851, $F(10, 264)$= 2.212, p= .018, η_p^2= .08, power= .914) . Post-hoc analysis relied on Greenhouse-Geisser epsilon corrections given the significant findings regarding Mauchly's test for sphericity and the uneven cell sizes between the groups (Tabachnick & Fidell, 2014). Results of follow up analysis for time, main effects revealed changes in enjoyment ($F(5, 132)$= 5.322, p= .023, η_p^2= .04, power= .630), boredom ($F(5, 132)$= 4.384, p= .038, η_p^2= .03, power= .547), and anxiety ($F(5, 132)$= 9.526 p= .002, η_p^2= .07, power= .865) over time. All significant time effects were linear (p< .05) and produced small effect sizes. These changes were qualified by differences over time between groups, for enjoyment ($F(10, 264)$= 4.168, p= .018, η_p^2= .06, power= .726) and boredom ($F(10, 264)$= 5.185, p= .007, η_p^2= .07, power= .821). This means that group differences were identified in enjoyment and boredom following intervention while accounting for the variance associated with several covariates. Significant covariate effects for enjoyment were found in temperament ($F(1, 132)$= 6.951, p= .009, η_p^2= .049, power= .745), value ($F(1, 132)$= 31.625, p< .001, η_p^2= .189, power= 1.00), and perceived competence ($F(1, 132)$= 19.933, p< .001, η_p^2= .128, power= .993). One significant

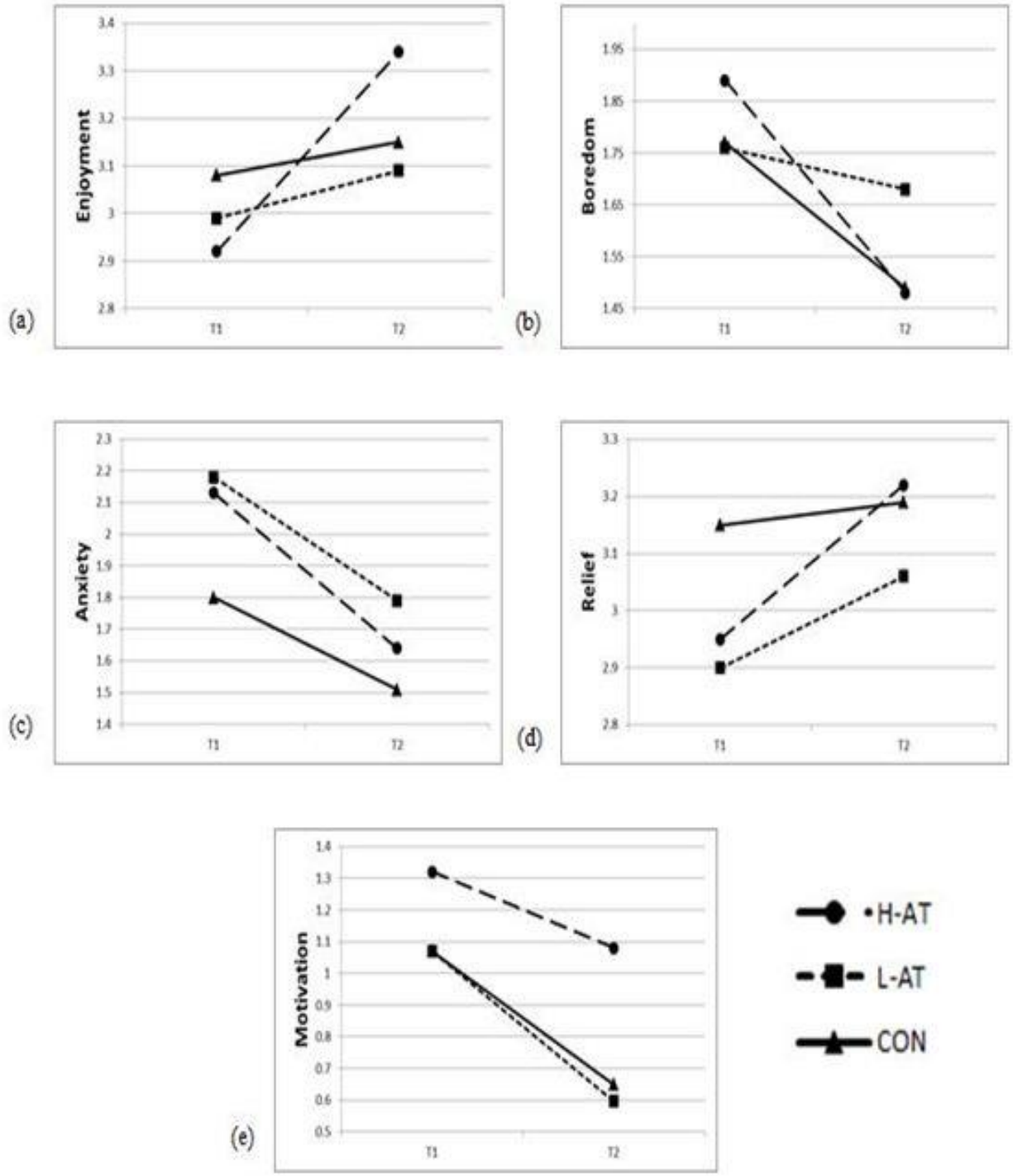

Figure 2.1. Post hoc Sidak adjusted mean square plots for Enjoyment; Boredom; Anxiety; Relief; Free-choice motivation. H-AT= High control attribution training; L-AT= Low control attribution training; CON= Control group.

covariate for boredom was also identified in value ($F(1, 132)= 11.240$, $p= .001$, $\eta_p^2= .076$, power= .914). Plots were created using the adjusted marginal means and Sidak corrected post hoc comparisons to highlight differences among the groups (Figure 2.1).

Enjoyment presented a common positive trajectory across time in all groups, but a sharper slope was present for the high AT group compared to control and low AT groups, respectively (Figure 2.1a). Boredom shared similar characteristics but in a negative slope where all groups were trending downward but both the change in the high AT and control groups demonstrated sharper declines compared to the low AT group (Figure 2.1b). These results suggested that the high AT and control group reported greater declines in boredom compared to the low AT group. Anxiety, relief, and free-choice motivation time were also included to highlight trends although there were no statistical differences found. All treatment groups showed a decrease in anxiety over time with the sharpest decline identified in the high AT group (Figure 2.1c). Relief, on the other hand, showed increases in all three groups with nearly identical increases identified in both the high AT and low AT groups (Figure 2.1d). Lastly, motivation trended downward in all three groups but did not have a significant interaction ($F(5, 132)= 1.906$, $p= .163$, power= .390; Figure 2.1e). It is important to note that students were only given a maximum of three minutes during each free-choice motivation section in the experiment.

Discussion

The purpose of this study was to investigate the effects of an AT treatment on emotion and motivation of females performing a PE-related task. It was hypothesized that individuals in the high AT treatment group would report high positive and adaptive emotions as compared to the low AT and control groups following intervention. Whereas low AT and control groups would report higher levels of boredom, anxiety, and possibly relief. Also, we hypothesized that

participants in the high AT group would demonstrate higher levels of intrinsic motivation by engaging in more free time activity with the task compared to the low AT and control groups.

Based on the results, hypothesis one was partially supported. Participants in the high AT group showed significantly higher levels of enjoyment over time compared to the low AT and control group. High AT also reported lower levels of boredom over time compared to the low AT group. These findings align with previous CVTAE (Pekrun, 2006) and Attributional Theory (Weiner, 1985) research. When individuals learn in an environment designed to reinforce adaptive thinking about actions and outcomes, they will report greater feelings of control and more positive learning experiences (Parker et al., 2018). These findings also support the notion that control beliefs are an antecedent of enjoyment and boredom in PE-related settings (Simonton et al., 2017). Reducing boredom is important because it acts as a major hindrance to student engagement in PE and PA behaviors (Barkoukis et al., 2010; Karagiannidis et al., 2015).

The way learners perceive their control beliefs is essential for explaining positive and negative experiences in PE. For example, believing that poor teaching leads to failure, or placing blame on equipment and task constraints as preventing success, can impair persistence and goal pursuit (Parker et al., 2018). Although control beliefs lend themselves to emotions differently, low control can become a barrier to motivated behaviors and may result in a bored student during PE. Overall, students with low control beliefs may be resistant to class activity and not find meaning in tasks or practices (Parker et al., 2018). Individualized feedback specific to task development, prompting effort and persistence, and providing challenging but achievable tasks, are examples of how high AT learning environments can help students attribute success to controllable factors (Molden & Dweck, 2006; Ommundsen & Kvalo, 2007; Parker et al., 2016;

Pekrun, 2006). These findings suggest that feelings of control will increase enjoyment and decrease boredom when completing a physical task.

In this study, the attribution consolidation technique was used to reinforce high AT and low AT treatment effects (Parker et al., 2018). Specifically, students connected personally relevant experiences to their learning condition. In PE, this technique could be meaningful as it is specific to students' real world experiences rather than a specific PE tasks. Individuals who relate personal experiences of control from outside experiences to PE can potentially reduce perceived barriers (Barr-Anderson et al., 2008; Shuman & Scherer, 2015). Theoretically, this process elicits deeper processing of information and draws connections from PE/PA experiences to their own lives (Parker et al., 2016), which may lead to transfer from PE to PA-related behaviors. Ultimately, increased feelings of control will enhance enjoyment and diminish feelings of boredom.

Interestingly, anxiety and relief did not show a significant time by group interaction. Anxiety in each group trended down over time. One major reason for this could be overcoming the initial anxiety of performing a novel task. However, anxiety may have reduced across trials as performing short bouts of practice with the task may increase participants' comfortability with the task. Within CVTAE, anxiety results from questioning feelings of control to whether success can be achieved or failure avoided and if one has the support to perform the task (Pekrun, 2006). Clearly, in all groups, students initially experienced anxiety which may have resulted from questioning the certainty they had of control over the task and resulting outcomes. Anxiety may spark an external investment of effort to avoid failure (Pekrun, 2017) however; the lack of consequences (e.g., grades or performance evaluation) may have alleviated anxiety during the

performance. Also, the simplicity of the task in combination with the lack of pressure (i.e., social comparison) could have attributed to the insignificant findings.

As anxiety diminished over time, relief trended upward. Relief can result when perceptions of control are concerned with whether the outcome was caused by the self or outside circumstances (Pekrun, 2006). Due to the nature of the low AT feedback focusing on ability outside of one's control and the generalized instruction in the control group, this trend might be expected; however, it was interesting to see its rise within the high AT group. Pekrun et al. (2011) suggests that relief can often occur following initial anxiety or when anxiety-inducing experiences progressively diminish. Also, enjoyment and relief shared a very similar pattern in all three groups, but particularly in the high AT group. However, relief is closely associated with avoidance forms of motivation (Deci, Ryan, & Koestner, 1999; Pekrun et al., 2004). Relief is often a sign that failure did not occur and may inhibit future behaviors involving these tasks which is not ideal for PE or PA-related behavior. Although relief is a positive emotion, it may cause students to lower standards and feel successful by simply avoiding failure (Pekrun et al., 2011). These motivational tendencies may be a real determinant for students in PE because students may not be motivated to pursue the tasks outside of PE, but simply to appease the teachers' requirements in class.

One important note is that relief is often experienced following a task or event; this suggests that intervention on students control beliefs immediately following performance may be essential for developing positive and motivational experiences (Pekrun et al., 2014). In one previous study, self-referenced feedback given to students promoted all positive emotions except relief (Pekrun et al., 2014). Instead, relief shared relationships with negative emotions that resulted from anticipation of normative feedback. Therefore, teachers who avoid generalized

feedback and provide specific attention may prompt control and produce more adaptive positive emotions. Contrary to previous research, the high AT group had similar levels of relief as the other groups. One explanation could be the deactivating nature of relief. For example, relief does not share positive relationships with intrinsic motivation but can be seen as tension-reducing or a relaxing state that is preceded by negative emotions (i.e., anxiety; Pekrun et al., 2004). Clearly, the nature of this experiment could have played a role in this as students tension diminished over time as they became more comfortable with the task and environment. However, because the learning process did not progress over several lessons such as within a PE setting, relief in the short term was similar among all experimental groups.

Hypothesis two was not supported by these results. There was no group by time interaction detected for students' free-choice motivation. It was anticipated that when students in the high AT group were given messages suggesting their effort and persistence during practice would increase performance, students would engage in more free-choice practice time. This is significant because enjoyment has been shown to increase active behavior whereas boredom can deter from volitional behavior (Cox et al., 2008; Yli-Piipari et al., 2013). One reason the interaction did not occur could be due to the simplicity of the task. Participants participated in two rounds of practice time which may have been more than enough time for students to feel confident in their recorded performances. In this study, volitional intrinsic motivation was the key behavioral construct of interest. Therefore, students were not prompted with a specific goal or performance markers (i.e., extrinsic goal) during the task performance, they were simply told to try their best during all performance attempts. One area of interest in motivational research is the translation from PE experiences to PA-related behaviors outside of school, specifically as it relates to student choices and volitional behaviors. For example, do experiences in PE prompt

volitional activity choices at home? Although our findings were not significant connecting experience to free-choice behaviors, research suggests that intrinsic levels of motivation are ideal for the translation of behavior over performance or reward-driven experiences (Bryan & Solmon, 2012; Deci et al., 1999).

Free-choice practice time did share a negative correlation with boredom at T1and a positive correlation with enjoyment and negative with boredom at T2 across all groups. These findings align with previous work that suggests intrinsic motivation and interest are associated with enjoyment positively and boredom negatively. This study aligned with previous research that individuals reporting high levels of enjoyment were significantly related to more free-choice practice time (Ommundsen & Kvalo, 2007; Yli-Piipari, Watt, Jaakkola, Liukkonen, & Nurmi, 2009). The negative trend of activity time in all treatment groups could be a result of the limited complexity of the task. There is reason to believe that control attribution feedback, content choice, and class design may lead to increased positive emotional experiences and to volitional practice time although more research is needed.

Limitations

This study has limitations that should be noted. First, the generalizability of findings is limited by age, sex, and geographical location. Also, all of the participants were volunteers. The hockey wrist shot has been identified as a novel task, especially for female students in the southeastern part of the U.S. However, it may not have provided sustained challenge over time given the amount of practice participants were afforded. Although the researchers did not want to put an extrinsically driven goal on the task, possibly reporting success rates after each performance trial would have changed emotions and free-choice motivation time. This type of feedback may further accentuate emotions like anxiety and relief as well. Even though

attributional control messaging was delivered to students, there was limited individualized instruction about the mechanics of the task. One major stimulus of control beyond attributional beliefs may be technical feedback to fine tune skill error (i.e., refinement). Future projects should consider feedback and messaging on both psychological and mechanical control aspects. Lastly, while the aim of this study was to have a controlled and individualized environment, the realities of most PE settings are that learning takes place in group settings. Therefore, consideration of group teacher feedback, peer comparison, and social interactions are all important considerations for future research in the development of attributional control beliefs.

Conclusion

In summary, control beliefs had significant associations with activity-related emotions enjoyment and boredom. This is particularly meaningful because enjoyment has positive associations with in class behaviors such as learning and engagement whereas boredom has negative associations. A teacher can contribute to strong and positive control beliefs by using attribution techniques. It is important to investigate how students personally attribute their abilities in PE and intervene if necessary. Also, relationships exist between enjoyment, boredom and free-choice activity time. The more control one feels, the more they enjoy the experience and the more likely they are to persist and practice.

CHAPTER 3. EMOTIONS IN PHYSICAL EDUCATION COURSES AS PREDICTORS OF BEHAVIORAL OUTCOMES

The Society of Health and Physical Educators ([SHAPE], 2014) suggests that achievement in physical education (PE) promotes living a healthy lifestyle and meeting recommended daily physical activity (PA). However, achievement in PE is often based on non-learning components such as dressing out and attendance (Michael, Webster, Patterson, Laguna, & Sherman, 2016), which does little to inform stakeholders on students' PE knowledge, skills, attitudes, and affective states. Teachers may also emphasize content that students find irrelevant, thereby limiting learning goals and engagement in PE (Bryan & Solmon, 2012; Webster et al., 2011). On top of these potential pitfalls, there is a lack of evidence connecting PE variables to PA-related behaviors and outcomes outside of class (Dishman et al., 2005; Wallhead et al.,2010).

Emotions have emerged as an integral component for understanding PE motivation and interpreting the translation of students' in-class experiences to everyday behaviors outside of school (Mouratidis et al., 2009; Pekrun, 2006). For example, students report enjoyment as an important element of being motivated and boredom as an explanation for lack of motivation in PE (Barkoukis, Koidou, Tsorbatzoudis, & Grouios, 2012; Ntoumanis, Pensgaard, Martin, & Pipe, 2004). Beyond providing interpretation of students' experiences, targeting emotions may be a productive approach to potentially connecting PE experiences to behaviors outside of PE because of their motivational characteristics (Motl et al., 2001; Mouratidis et al., 2009; Simonton et al., 2017). Although emotions are linked to a variety of adaptive school behaviors, such as learning, achievement, and engagement (Garn et al., 2017; Pekrun et al., 2002), they have received minimal attention within the PE motivational literature.

An overview regarding theoretical considerations for conceptualizing emotions and their unique relationships with adaptive and maladaptive tendencies is provided in the following

paragraphs. Finally, emotions are linked to three important behavioral outcomes of PE including engagement, disruptive behavior, and leisure-time PA.

Control Value Theory of Achievement Emotions

The control value theory of achievement emotions (CVTAE) framework was developed to highlight the importance of emotions in achievement motivation and to explain their relationships with academic and non-academic outcomes (Pekrun, 2006). Achievement emotions also represent meaningful outcomes in educational settings, underpinning students' school-related well-being (Pekrun & Linnenbrink-Garcia, 2014). Emotions are affective constructs that encompass both one's environmental interpretation as well as their perceptions of control and value beliefs regarding the learning domain or task (Pekrun, 2006). Operationalizing emotions reduces the ambiguity of interpretation and increases validity and reliability when trying to capture one's emotional experience.

Within CVTAE, emotions are classified by object focus, valence, and activation (Table 3.1). Object focus expresses the time in which emotions occur and are characterized as activity or outcome focused. Furthermore, outcome-focused emotions can be subdivided as prospective (i.e., before an event) or retrospective (i.e., after an event; Pekrun, 2006). The valence of emotions can either be positive or negative. Lastly, activation relates to the physiological reaction associated with the emotional experience, which can be activating or deactivating (Pekrun, 2017). In this study, three in-activity and three retrospective-outcome emotions were chosen to capture student emotions at two time points during the semester. Emotions include: (a) enjoyment (in activity, positive-activating), (b) boredom (in activity, negative-deactivating), (c) anger (in activity, negative-activating), (d) relief (outcome, positive-deactivating), (e) pride (outcome, positive-activating), and (f) shame (outcome, negative-activating; Pekrun, 2017).

Table 3.1. Achievement Emotions Classified by Valance, Activation, and Object Focus.

	Object Focus	
	In-Activity	**Outcome**
Activating	Enjoyment (+) Anger (-)	Pride (+) Shame (-)
Deactivating	Boredom (-)	Relief (+)

The unique activation and valance combinations of emotions lend themselves to predicting specific action tendencies (Fredrickson, 2001). Emotions trigger specific urges, actions, and thoughts that influence an individual toward adaptive and/or maladaptive outcomes (Shuman & Scherer, 2015). Specifically, positive activating emotions like enjoyment link to learning, persistence, and engagement (Pekrun et al., 2004). Negative-deactivating emotions like boredom promote tendencies such as amotivation, loss of focus, and loss of interest (Daschmann et al., 2014). Although more research has focused on enjoyment, boredom, and anxiety, less is known about retrospective positive-deactivating and negative-activating emotions such as relief, pride, shame, and anger.

Pride often results from high perceptions of control and value and is linked to successful experiences that provide positive feedback about competence and status (Gilchrist, Conroy, & Sabiston, 2017; Pekrun, 2006). Relief is a positive and deactivating emotion that often leads to avoidance behaviors (Pekrun et al., 2014). Relief and shame are considered outcome-related emotions and have similar internal appraisals, consisting of insufficient levels of control that are necessary for being successful. Thus, both emotions are drawn from anticipation of failure in achieving an outcome. When success is attained relief is experienced while failure leads to shame. Both emotions have relationships with avoidance forms of motivation (Deci & Ryan, 2002). Relief promotes minimal levels of participation that allows individuals to avoid

incompetence (Pekrun et al., 2004) whereas shame can be induced from wanting to succeed but feeling ability is inadequate to do so (Pekrun, 2006). These emotions may be especially relevant to PE because of the public nature of the learning environment and numerous opportunities for students to make self-comparisons.

Anger consists of strong appraisals of control but weak feelings of value toward a learning domain or activity, increasing the likelihood of aggression and reducing cognitive activation (Palmer, 2017; Pekrun, 2006; Pekrun et al., 2002). Shame, anger, and relief have been found to reduce levels of intrinsic motivation (Pekrun et al., 2002). Common action tendencies associated with each emotion can potentially help explain and predict achievement behaviors in PE.

Emotions and PE-related Outcomes

Student engagement during class and PA time outside of school are deemed critical student behaviors within a quality PE program (Barr-Anderson et al., 2008; Bryan & Solmon, 2012). SHAPE America (2014) suggests that PE can achieve these goals through quality learning experiences that result in students valuing and enjoying PA-related behaviors and skills. For example, enjoyment in PE has been found as an important factor for interpreting students' motivation and predicting PA (Dishman et al., 2005; Timo, Yli-Piipari, Anthony, & Jarmo, 2016; Motl et al., 2001). However, PA, engagement, and PE enjoyment show a steady decline from late elementary school through college (Barkoukis et al., 2010; Shen, Mccaughtry, Martin, Fahlman, & Garn, 2012; Yli-Piipari et al., 2013). Several researchers suggest that understanding students' emotional experiences can aid in understanding declines in engagement (Garn et al., 2017; Simonton & Garn, in press; Yli-Piipari et al., 2013) and potential transfer of PE experiences to leisure-time PA (Cox et al., 2008; Yli-Piipari et al., 2009, 2013).

PA behavior is a desired outcome of PE (SHAPE, 2014); however, there is limited information on how PE experiences translate to PA outside of PE (Cox et al., 2008; Wallhead et al., 2010). Enjoyment has been identified as a motivation-related characteristic positively associated with PA levels, understanding benefits of PA, and self-efficacy toward PA (Barr-Anderson et al., 2008; Dishman et al., 2005; Yli-Piipari et al., 2013). However, investigating a more diverse set of student emotions in PE may help explain links to leisure-time PA. For example, students who experience a positive emotion like pride in PE might be more likely to increase their leisure-time PA because of its positive and activating structure and links to previous achievement (Gilchrist et al., 2017).

In opposition, students who experience shame regarding their ability and performance in PE may feel less confident and competent to engage in PA on their own. Although boredom and anger are both negative emotions their activation levels provide distinction. For example, students may lose interest and withdraw from learning content they find boring, making it less likely for out-of-school PA engagement (Daschmann et al 2014). Anger may also deter leisure-time PA transfer because of increased levels of frustration (Palmer, 2017). Given these results on several emotions in isolation, it seems imperative to explore a number of intrinsic and extrinsic emotions simultaneously to increase our understanding on the translation of PE experiences to leisure time activity.

Engagement represents students' attraction to and willingness to pursue action in a learning domain (Skinner, Furrer, Marchand, & Kindermann, 2008). Positive engagement in PE can result from students finding meaning within course content, taking steps to improve through increased effort and motivation, and the relationships developed with peers and teachers (Shen et al., 2012). Behavioral engagement in the learning setting is considered the level of attention and

effort one is willing to display (Skinner et al., 2008). Given the physical nature of PE, it is particularly important that students' behavioral engagement is high in order to develop physical skills and abilities (Garn et al., 2017). Previous research suggests that engagement stems from positive and negative emotions. Specifically, positive activating emotions such as enjoyment broaden one's adaptive abilities and increase attention whereas negative deactivating emotions will hinder focus and cognition reducing engagement (Fredrickson, 2001; Reschly et al., 2008). It is also possible that the deactivating nature of relief may minimize behavioral engagement. One recent study found that boredom decreased changes in behavioral engagement in a one-semester college PE course (Garn et al., 2017). However, more research with a diverse set of emotions may help explain variation in students' behavioral engagement.

Researchers have also evaluated disruptive behavior in PE as it can reduce students' ability to stay engaged and impede teachers' ability to focus on student learning (Krech, Kulinna, & Cothran, 2010). Disruptive behaviors are those actions taken by students that reduce learning, teaching, and activity for themselves and classmates (Supaporn, Dodds, & Griffin, 2003). Specifically, disruptive behaviors have been identified as major barrier within PE taught in urban environments (Garn, McCaughtry, Shen, Martin, & Fahlman, 2011). Previous research shows that from a student perspective, disruptive behavior can result from a lack of motivation, reduced interest in the content, previous unsuccessful experiences, and reduced awareness of personal and social responsibility (Cothran, Kulinna, & Garrahy, 2009). The degree of disruptive behavior can vary from mild (e.g., giggling, talking out of turn) to more severe (e.g., bullying; Krech et al., 2010). Student perception of disruptive behavior may also be driven by apathy toward teacher rules and expectations. Thus, disruptive behavior can be rooted in management or task

demand issues and will have negative consequences related to student achievement in PE (Cothran et al., 2009; Garn et al., 2011).

Importantly, disruptive behavior may have major links to emotions such as boredom or anger in class based on their action characteristics (Garn et al., 2011) and may prevent students from reaching their PE potential and lead to distracting peers (Daschmann et al 2014; Palmer, 2017). Angry students may choose to be disruptive due to increases in aggression and reductions in interest in class content. Bored students often detract teachers' attention from facilitating learning flow within their classes. Likewise, students who enjoy or take pride in PE would likely have their attention focused on tasks and outcomes, reducing their opportunities to be disruptive. Attributions of control have been highlighted as a major source of disruptive behavior (Weiner, 1985). Previous findings infer that emotions resulting from outside locus of control or lower controllability are more likely to lead to disruptive behavior (Cothran et al., 2009). Although these are maladaptive outcomes within PE, understanding emotions may shed light on potential intervention and improved pedagogical strategies but further investigation is needed. Of importance in this investigation is exploring and understanding relationships between emotions and the aforementioned behavioral outcomes.

Research Purpose and Hypotheses

The purpose of this study was to examine the relationships between student emotions in PE and self-reported in-class engagement, disruptive behavior, and leisure-time moderate-to-vigorous PA (MVPA). The following research hypothesis guided this study:

H1: Student reports of enjoyment and pride will decline over the course of the semester.

H2: Student reports of relief, boredom, anger, and shame will increase over the course of the semester.

H3: Pride and enjoyment will positively predict students' leisure-time PA.

H4: Relief, boredom, shame, and anger will negatively predict students' leisure-time PA.

H5: Pride and enjoyment will positively predict students' behavioral engagement.

H6: Boredom, shame, anger, and relief will negatively predict students' engagement.

H7: Pride and enjoyment will negatively predict students' disruptive behavior.

H8: Boredom, shame, and anger will positively predict students' disruptive behavior.

H9: According to CVTAE, reciprocal relationships are anticipated between outcomes and emotions. Researchers did not present any a priori relationships due to lack of current research on this topic. However, reciprocal relationships were explored.

Methods

Participants and Setting

Participants for this study were 401 middle school students (*M* age= 11.98, *SD*= .884) enrolled in compulsory PE classes at two middle schools in the Southeast region of the USA. Students were 52% female and reported their ethnicity as being Black/African American (33%), White/Caucasian (32%), Asian/Asian-American (13%), multi-racial (8%), Hispanic/Latino/Mexican American (7%), while 4% reported "Other". Each PE class had mixed grades of students within each class session (6^{th}= 35%, 7^{th}= 37%, 8^{th}= 28%). All students were taught by certified PE teachers and had access to an indoor gymnasium and outdoor recreation area. Both schools utilized a multi-sport curriculum (e.g., volleyball, soccer, kickball, etc.,) and graded students on attendance/dressing out. Each PE class section held several full size classes in the same space at one time; this meant that 3-4 teachers and their classes were sharing the space during each class session. Class sizes ranged from 22-35. Class meetings ranged from 3-5 times a week and from 55 to 120 minutes per session. There were four teachers at school 1 that each saw three different classes per A and B day (6 total). There were three teachers at school two

that saw 5 different classes each day. At different points throughout the semester teachers co-taught, combining classes together for game play and at other times classes stayed separated. Class typically consisted of warm-ups (e.g., jogging, sit ups, push-ups, dynamic stretching) and activities mainly consisted of large-sided gameplay.

Procedures

In accordance to Institutional Review Board (IRB) requirements, permission to conduct the study was obtained from the researcher's institution. The researcher recruited local middle school PE teachers to participate and explained the purpose of the study. Following approval from administrators and teachers, parental consent and child assent forms were obtained from all participating students. The researcher collected data at two time points (T1= time point 1; T2= time point 2) throughout the semester. Data collection was conducted approximately at 4-5th and 11-12th weeks into the fall semester of 2018. At each time the researcher thoroughly explained the nature of the study to the participants before administering questionnaires. The researcher informed the participants there were no incorrect answers and was available for clarification or questions. During this time teachers were asked to step away as to not potentially influence students' answers.

Measures

Emotions. Achievement emotions regarding PE were measured using subscales from the Achievement Emotions Questionnaire (AEQ; Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011), this scale has previously been revised for PE and found to be valid and reliable with middle school students (Discrete Emotions in Physical Education Scale (DEPES); Simonton, Mercier, & Garn, 2018). Emotion subscales include enjoyment, relief, pride, boredom, shame and anger. An example item of the enjoyment subscale is, "I enjoy being in PE class.", relief, "After PE class, I

feel very relieved", pride, "I am proud of my performance in PE", boredom, "I get bored in PE class", shame, "When I participate in PE I feel like a fool", and anger, "I feel anger welling up in me during PE class". There were four items specific to each of the six emotions measured. These items were measured on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5).

Behavioral Engagement. Behavioral engagement was measured using a subscale created by Skinner et al. (2008). Behavioral engagement includes actions such as effort, involvement, and exertion during class-related activities. The scale consisted of six items. An example item is, "I try hard to do well in PE class." Measures were evaluated on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5).

Disruptive Behavior. Student self-reported disruptive behavior was measured using the disruptive behavior subscale from the Patterns of Adaptive Learning Scales (Midgley et al., 2000). The subscale consists of five items on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). An example item is, "I sometimes behave in a way during class that annoys my teacher." Midgley et al. (2010) has found the measure to be valid and reliable with adolescents and with PE students (Garn et al., 2011).

Physical Activity. The Global Physical Activity Questionnaire (GPAQ; Chu, Ng, Koh, & Müller-Riemenschneider, 2015) was used to measure students' self-reported weekly PA behavior. Questions focus on moderate-intensity and vigorous-intensity activities in a typical day as it pertains to the recreational (leisure) activity component. For example, participants were asked, "In a typical week, how many days do you do moderate-intensity sports, fitness, or recreational (leisure) activities that cause a small increase in breathing or heart rate such as brisk walking, cycling, swimming, or volleyball for at least 10 minutes continuously?" Answers

consisted of 0-7 rankings signifying how many days a week these activities are done. This question is followed up by, “How much time do you spend doing moderate-intensity sports, fitness, or recreational (leisure) activities on a typical day? Participants should think of a typical day he/she can recall easily in which he/she engaged in recreational moderate-intensity activities. The participant should only consider those activities undertaken continuously for 10 minutes or more.” Possible answers during a typical day will vary and participants were asked to list the amount of time in hours and minutes. This process is repeated for the vigorous-intensity questions. Results were combined to create a moderate-to-vigorous physical activity (MVPA) construct representing average minutes of MVPA per week, which is recommended by the GPAQ analysis manual (Chu et al., 2015).

Data Analysis

The full information maximum likelihood (FIML; Enders, 2010) method was used to account for missing data (T1 <05%; T2 <11%). FIML is a desired strategy compared to a list-wise deletion because it produces reliable estimates and maintains analytical power (Enders, 2010). In total, 401 students participated at T1 and 386 at T2. To address H1 and H2, overall mean changes of emotions from T1 to T2 were tested using a repeated measures-multivariate analysis of variance (RM-MANOVA). Post-hoc pairwise univariate analysis was used following significant results. Following mean comparisons, factor structure was evaluated using a confirmatory factor analysis (CFA) and Cronbach alpha coefficients were used to measure internal consistency of all factors. Two CFAs were used as preliminary analysis to test construct validity of the measures. CFAs consisted of all latent variables (emotions, behavioral engagement, and disruptive behavior) first at T1 and then T2, to also confirm factor structure and as prelude analysis for factor invariance. Following sufficient factor structure the following steps

were taken to establish that indicators of the latent variables were invariant over time (Brown, 2015; Little, 2013).

Measurement invariance. Measurement invariance over time provides evidence that change happens at the construct level and not at the indicator level (Little, 2013). Change at the indicator level would suggest measurement bias across time. Testing measurement invariance consisted of running a series of increasingly restrictive CFA models beginning with a configural model. The initial configural model allowed all T1 and T2 parameters to be freely estimated, acting as a baseline model. After establishing a baseline, the first restrictive model tested was referred to as the weak invariance model. Weak invariance constrained all matching factor loadings to be equal across the two time points. This provides evidence that the relationship between each latent factor and its indicators are equivalent across time. The final restrictive model tested was called the strong invariance model where all matching factor loadings and item intercepts were constrained to be equal across time points (Little, 2013). Strong invariance provides evidence that measurement scales function similarly across time. As each model becomes stricter, fewer parameters are estimated which leads to parsimony and greater statistical power in the model.

Interpreting invariance across time began with comparing subsequent models by evaluating changes in chi-square (χ^2). Because χ^2 is considered overly sensitive to sample size, other fit indices were also used to compare models (Chen, 2007). This includes changes in the Comparative Fit Index (CFI) of 0.01 (or greater) and root mean square error of approximation (RMSEA) of 0.015 (or greater) are considered appropriate for determining invariance between nested models (Chen, 2007; Cheung & Rensvold, 2002).

Structural equation modeling. Structural equation modeling (SEM) was then used to explore relationships between emotions and outcomes over time (H3-H8). SEM consists of evaluating both a measurement model and structural model. Similar to the CFA, the measurement model is a comparison of the implied data covariance to the observed data covariance. In other words, it provides evidence on how well the data fits the proposed factor structure. The structural model uses path analysis for the estimation of relationships among factors (Kline, 2016). Robust maximum likelihood estimation (MLR) estimation procedures were used to account for potential departures from normal distribution properties. The first step taken for the longitudinal SEM analysis was to run an autoregressive model in which all latent constructs measured at T1 predicted themselves at T2. This model provides evidence on the stability/change of each factor across the two time points. Next, a cross-lagged model was tested to evaluate the hypothesized predictive relationship between emotions and behavior outcomes while accounting for previous baseline responses. A reciprocal model of outcomes predicting emotions was also conducted (H9).

Model criteria for judging acceptable fit are similar among CFAs and SEM (Hu & Bentler, 1999). Robust chi-square estimates (χ^2) based on the degrees of freedom (df) and p-values report absolute fit index (Hu & Bentler, 1999). Global fit indices including CFI, RMSEA, and the Tucker-Lewis Index (TLI) were also used for evaluating model fit. CFI and TLI indices compare observed data to poor fitting models and scores are represented on a scale from 0 – 1 and a score .90 is considered adequate whereas a .95 or higher is considered good fit (Hu & Bentler, 1999). RMSEA also accounts for the degrees of misfit per degrees of freedom in comparison to the perfect model; adequate scores are .08 or lower and .06 and lower are considered good fit.

Results

Preliminary Analysis

All means, correlational relationships, and Cronbach's Alpha scores for each variable at both time points can be found in Table 3.2. All Cronbach's Alpha scores were above .70. To evaluate H1 and H2, the results of the RM-MANOVA showed a multivariate effect for time (Wilk's Λ= .858, F(6, 222)= 6.130, p< .001, η_p^2= .14). Contrary to H1 and H2, post hoc pairwise analysis showed significant positive increases over time for enjoyment (F(6, 222)= 5.470, p= .020, η_p^2= .03) and pride (F(6, 222)= 7.492, p= .007, η_p^2= .03). Follow-up analyses also showed significant decreases over time for relief (F(6, 222)= 23.799, p< .001, η_p^2= .10) and shame (F(6, 222)= 9.795, p= .002, η_p^2= .04). Boredom (p= .259) and anger (p= .079) did not show a significant change over time.

Following these results the initial stages of invariance testing began. First, CFA analysis was conducted on all latent factors at T1 and T2 (see Table 3.3). Results showed adequate scores for each time point. Configural model testing was conducted next and also showed adequate scores on multiple fit indices. As can be seen on Table 3.3 the weak and strong invariance models produced similar model fit estimates and were deemed longitudinally invariant. Model parameters and estimates for the latent constructs within the strong model can be found on Table 3.4. These findings support the construct validity of the DEPES. Although the CFI scores dipped just below the .90 mark in weak and strong invariance models, it is important to consider their theoretical and statistical complexity. When multiple emotions are measured at once the chances of shared variance among related emotions indicators increases because some emotions share characteristics (e.g., pride and enjoyment; shame and anger), which can undermine model misfit. The strong model was retained because departures from the criteria were relatively small, .002 (CFI) and .010 (TLI).

Table 3.2. Descriptive Statistics, Coefficient Alphas, and Bivariate Correlation Estimates for Study 2.

	Variable	1	2	3	4	5	6	7	8	9	10	11
1	T1 ENJ	1										
2	T1 PRI	.761**	1									
3	T1 REL	-.258**	.056	1								
4	T1 BOR	-.773**	-.540**	.235**	1							
5	T1 ANG	-.630**	-.478**	.334**	.667**	1						
6	T1 SHA	-.411**	-.523**	.191**	.369**	.694**	1					
7	T1 MVPA	.361**	.656**	.107*	-.032	-.085	-.251**	1				
8	T1 BE	.539**	.513**	-.010	-.576**	-.396**	-.164*	-.021	1			
9	T1 DB	-.131*	-.181**	-.055	.278**	.228**	.030	.160*	-.476**	1		
10	T2 ENJ	.824**	.673**	-.177*	-.688**	-.569**	-.415**	.170*	.578**	-.134*	1	
11	T2 PRI	.604**	.761**	-.059	-.475**	-.409**	-.420**	.232**	.552**	-.129*	.886**	1
12	T2 REL	-.337**	-.143	.754**	.331**	.367**	.277**	-.109*	-.129*	.027	-.252	-.143
13	T2 BOR	-.634**	-.454**	.147*	.764**	.549**	.353**	-.042	-.548**	.334**	-.801**	-.651**
14	T2 ANG	-.516**	-.395**	.285**	.451**	.694**	.621**	-.068	-.416**	.236**	-.609**	-.556**
15	T2 SHA	-.423**	-.464**	.171*	.372**	.592**	.855**	-.209**	-.259**	.057	-.448*	-.498*
16	T2 MVPA	.113*	.189*	-.019	-.139*	-.158*	-.204**	.357**	.129*	-.045	.100	.087
17	T2 BE	.576**	.562**	-.039	-.529**	-.472**	-.270**	.042	.603**	.486**	.754**	.703**
18	T2 DB	-.180*	-.269**	.066	.255**	.226**	.059	.076	-.343**	.486**	-.087	-.051
	M	3.12	3.22	3.15	2.75	1.89	2.13	41.11	3.99	1.81	3.33	3.33
	SD	1.46	0.85	0.98	1.12	0.83	0.96	41.01	0.75	0.85	1.12	0.88
	Alpha	.904	.715	.773	.847	.797	.824	n/a	.837	.875	.900	.749

Table 3.2 cont'd

	Variable	12	13	14	15	16	17	18
1	T1 ENJ							
2	T1 PRI							
3	T1 REL							
4	T1 BOR							
5	T1 ANG							
6	T1 SHA							
7	T1 MVPA							
8	T1 BE							
9	T1 DB							
10	T2 ENJ							
11	T2 PRI							
12	T2 REL	1						
13	T2 BOR	.466**	1					
14	T2 ANG	.519**	.812**	1				
15	T2 SHA	.545**	.673**	.851**	1			
16	T2 MVPA	-.044	-.003	-.024	-.054	1		
17	T2 BE	-.122	-.600**	-.531**	-.324**	.019	1	
18	T2 DB	.260*	.258*	.532**	.457**	-.019	-.200	1
	M	2.84	2.65	2.00	1.97	50.19	3.93	1.91
	SD	0.94	1.11	0.83	.97	42.31	0.81	0.96
	Alpha	.768	.862	.781	.864	n/a	.862	.906

Note. T1 ENJ= Enjoyment; T1 PRI= Pride; T1 REL= Relief; T1 BOR= Boredom; T1 BOR= Boredom; T1 ANG= Anger; T1 MVPA= Moderate-to-vigorous physical activity; BE= Behavioral Engagement; DB= Disruptive Behavior; T2= represents the same variables measured following treatment. Alpha = Cronbach alpha estimates of internal consistency; Note. **<.001, *= <.05.

Table 3.3. Goodness-of-Fit Statistics for Estimated Models of Invariance.

Model	χ^2	df	p-value	CFI	TLI	RMSEA	90% RMSEA CI	Δ CFI	Invariance?
Time 1	994.628	500	<.001	.910	.899	.050	.046-.055	n/a	n/a
Time 2	1060.779	501	<.001	.903	.892	.055	.051-.060	n/a	n/a
Configural	2532.980	1587	<.001	.900	.889	.041	.039-.043	n/a	n/a
Weak	2573.475	1617	<.001	.899	.890	.041	.038-.043	.001	Yes
Strong	2622.755	1640	<.001	.898	.890	.041	.039-.043	.002	Yes

Note. χ^2= Chi-square value; df= Degrees of freedom; CFI= Comparative Fit Index; TLI= Tucker-Lewis Index; RMSEA= Root Mean Square Error of Approximation; CI= Confidence Intervals; Δ= change.

Main Analysis

First, an auto-regressive baseline model was run and results showed a less than acceptable fit ($\chi^2(2298)= 3940.486$, $p<.001$, CFI= .875, TLI= .869, RMSEA= .044). Within this model each T1 variable predicted itself at T2. A latent longitudinal cross-lagged model (Little, 2013) tested predictive relationships between the six discrete emotions and specified behavioral outcomes (H3-H8). The cross-lagged model was ultimately a better fit than the autoregressive model ($\chi^2(2254)= 3897.778$, $p<.001$, CFI= .883, TLI= .874, RMSEA= .04). Regression pathways that were clearly non-significant were pruned from the model in order to increase parsimony (Kline, 2016).

Findings from the pruned cross-lagged structural model can be found in Table 3.5. Overall, the autoregressive model explained 11.5% of the variance for T2 leisure-time MVPA whereas the pruned cross-lagged model explained 16% of the variance. Shame was the only predictor of MVPA (H3 & H4). The autoregressive model accounted for 38.3% for behavioral engagement and 37.9% of the variance for disruptive behavior. The pruned cross lagged model resulted in several significant emotional predictors and accounted for 38.6% for behavioral engagement and 39.1% of the variance for disruptive behavior. Pride and shame were positive predictors and anger a negative predictor of behavior engagement (H5 & H6). For disruptive behavior (H7 & H8), pride and shame were negative predictors whereas enjoyment and boredom were positive predictors. It should be noted that enjoyment and shame produced opposing relationships than was hypothesized. Overall, only shame predicted all three outcomes.

Interestingly, the pruned model also revealed reciprocal relationships between behavior outcomes and emotions (H9). Significant relationships included T1 behavioral engagement as a positive predictor of T2 pride and T1 disruptive behavior as positive predictor of T2 boredom.

Table 3.4. Strong Invariance CFA results for all latent variable indicators.

	λ (SE)	λ^2	u^2	*Yi*
ENJ.1	.995 (.037)	.852	.274	3.023
ENJ.2	.968 (.039)	.773	.403	2.448
ENJ.3	1.175 (.036)	.844	.288	1.939
ENJ.4	1.127 (.036)	.872	.204	2.512
PRI.1	.663 (.042)	.660	.565	3.731
PRI.2	.864 (.040)	.767	.412	2.957
PRI.3	.679 (.061)	.550	.698	2.442
PRI.4	.719 (.051)	.568	.678	2.141
REL.1	.737 (.055)	.571	.674	2.566
REL.2	.953 (.046)	.767	.411	2.674
REL.3	.875 (.049)	.704	.504	2.494
REL.4	.802 (.050)	.625	.609	2.186
BOR.1	.976 (.045)	.745	.445	2.142
BOR.2	1.021 (.042)	.729	.469	1.983
BOR.3	1.087 (.041)	.791	.375	2.117
BOR.4	.992 (.047)	.754	.431	1.894
ANG.1	.759 (.045)	.673	.547	1.827
ANG.2	.821 (.045)	.716	.487	1.850
ANG.3	.676 (.050)	.648	.580	1.891
ANG.4	.735 (.044)	.743	.448	1.867
SHA.1	.879 (.048)	.734	.461	1.795
SHA.2	.897 (.047)	.756	.429	1.722
SHA.3	1.060 (.048)	.780	.391	1.662
SHA.4	.782 (.046)	.732	.465	1.876
BE.1	.680 (.052)	.633	.600	3.639
BE.2	.785 (.051)	.707	.500	3.490
BE.3	.503 (.045)	.610	.628	5.130
BE.4	.780 (.039)	.841	.293	4.263
BE.5	.746 (.043)	.798	.364	4.218
DB.1	.934 (.046)	.799	.361	1.628
DB.2	.977 (.043)	.827	.316	1.624
DB.3	.853 (.041)	.841	.293	1.687
DB.4	.871 (.046)	.760	.423	1.714
DB.5	.691 (.049)	.750	.438	1.763

Note. ENJ= Enjoyment; PRI= Pride; REL= Relief; BOR= Boredom; ANG= Anger; SHA= Shame BE= Behavioral Engagement; DB= Disruptive Behavior. λ (SE)= Factor Loading and Standard Error; λ^2= Standardized Factor Loading; u^2= Unique Variance; *Yi*= Intercept.

Table 3.5. SEM Results: Measurement Model and Significant Predictive Relationships.

Measurement Model	χ^2	df	p-value	CFI	TLI	RMSEA
Pruned Model	3920.577	2274	<.001	.882	.875	.043

Direct Effects	*B*	*SE*	β	R^2
MVPA2				.160
SHA	-.389	.182	-.130	
MVPA1	.320	.091	.310	
DB2				.386
ENJ	.369	.143	.289	
PRI	-.317	.120	-.248	
BOR	.341	.112	.267	
SHA	-.172	.122	-.135	
DB1	.658	.068	.516	
BE2				.391
PRI	.282	.097	.220	
SHA	.215	.097	.168	
ANG	-.263	.113	-.205	
BE1	.538	.092	.420	
PRI2				.406
BE	.191	.081	.147	
PRI1	.736	.074	.568	
BOR2				.386
DB	.142	.048	.111	
BOR1	.746	.048	.548	

Note. Emotions: ANG= Anger; BOR= Boredom; ENJ= Enjoyment; PRI= Pride; REL= Relief; SHA= Shame; Outcomes: BE= Behavioral Engagement; DB= Disruptive Behavior; MVPA= Moderate-to-vigorous Physical Activity. χ^2= Chi-square value; df= Degrees of freedom; CFI= Comparative Fit Index; TLI= Tucker-Lewis Index; RMSEA= Root Mean Square Error of Approximation.

The autoregressive model accounted for 36.1% of the variance in pride and 36.2% in boredom at baseline. The pruned model identified the reciprocal relationships accounting for approximately 40.6% and 38.6% of pride and boredom, respectively.

Discussion

The purpose of this study was to examine the relationships between PE emotions and self-reported in-class behavioral engagement, disruptive behavior, and leisure-time MVPA from a CVTAE perspective. Within CVTAE, emotions are theorized to predict behavioral outcomes in and out of class. One goal of this study was to begin testing the efficacy of relationships between emotions and select behavior outcomes within PE.

Findings for H1 and H2 were in opposition from the hypothesized trends except for boredom and anger, which showed no significant changes. Current literature has repeatedly shown decreases in enjoyment over a school year and across grades in PE ranging from elementary school to college (Barkoukis et al., 2010; Shen et al., 2012; Yli-Piipari et al., 2013). However, results showed increases in enjoyment and pride over time. One possible reason for the opposing results could be due to measurements being eight weeks apart compared to six to eight months, or even one or more years. Student emotions may fluctuate during shorter intervals, which may not necessarily reflect long-term variation. In other words, emotions may possess both state-like and trait-like qualities similar to other psychological variables such as self-concept (Morin, Maiano, Marsh, Janosz, & Nagengast, 2011). PE content at the time of data collection may have also influenced student reports of emotions.

Emotions Predicting Outcomes

Shame was the only emotion that predicted T2 MVPA (H3 and H4). This may be particularly informative for motivation research in PE on several fronts. These findings revealed

that students' elevated feelings of shame (i.e., negative extrinsically focused) but not enjoyment (positive intrinsically focused) predicted leisure-time MVPA. Yet, enjoyment has continuously been identified as an ideal mechanism for fostering PA (Karagiannidis et al., 2015; Salllis, Prochasks, & Taylor, 2000; Wallhead & Buckworth, 2004; Yli-Piipart et al., 2009). However, there is limited evidence that links enjoyment in PE to leisure-time MVPA (Cox et al., 2008; Wallhead & Buckworth, 2004). The fact that other emotions did not predict MVPA is puzzling. Possible reasons could be potential overlap in closely related emotions which potentially shadows significant contributors (Pekrun et al., 2002). In response to these concerns, research has limited or separated emotions in similar analysis to reduce this issue (Daniels et al., 2009; Pekrun et al., 2002, 2009). Also, relationships may be more prominent between in-class emotions to in-class behaviors and outcome-related emotions to out-of-class behaviors.

Pekrun (2006, 2017) identifies separation in emotions by *object focus* including in-activity and outcome-related emotions. Although in-activity emotions like enjoyment and boredom receive a lot of attention (Barkoukis et al., 2012; Ntoumanis et al., 2004; Yli-Piipari et al., 2013), shame (outcome-related) resulting from not feeling capable, not succeeding, or embarrassment, may provide insight into whether leisure-time MVPA is transferred outside of PE. It may be important to find ways to reduce externally driven negative emotions such as shame. Based on our results, students who experience shame may be difficult for teachers to point out because they appear engaged and not disruptive. However, students may be putting forth effort and experiencing higher than normal failure rates when engaged. Teachers should track success levels of students, if failure occurs often, the task should be adjusted at the individual level. Also teachers should reduce large-sided and overtly competitive games.

Activities of this nature that pit students of different skill abilities against one another may facilitate judgement by peers.

Results show that three emotions predicted T2 behavioral engagement. As hypothesized (H5 & H6), pride positively and anger negatively predicted behavioral engagement. However, shame was a positive predictor of behavioral engagement. In previous research, shame often works in opposition of pride (Deci & Ryan, 2002; Pekrun et al., 2002). For example, pride is related to ego-enhancement and achieving external goals whereas shame can be avoidance-related deter individuals from pursuing an activity (Deci & Ryan, 2002; Pekrun et al., 2009). However, shame can also work as an external motivator with a drive to avoid looking incompetent but often results in failure (Goetz et al., 2016; Pekrun, 2006). These results could show shame may be associated with behavioral engagement as a way to avoid incompetence (Pekrun et al., 2002; Tangney, Stuewig, & Mashek, 2007).

Anger, as expected, was a negative predictor of behavioral engagement (H6). Anger is considered an in-activity emotion that results from one who perceives the activity as controllable but shares negative task value (Pekrun, 2006). This emotion may be particularly important to understand in PE given students general lack of perceived relevance and value towards some PE content (Michael et al., 2016; Webster et al., 2011). Beyond students not valuing an activity, students who experience continued failure may feel anger as well. For example, students who perform poorly and attribute failure to external sources often experience boredom (Mouratidis et al., 2009). Students have also reported failure as a negative bias toward PE as a whole (Ladwig et al., 2018).

Lastly, four emotions predicted T2 disruptive behavior (H7 & H8). As expected pride held a negative relationship with disruptive behavior and boredom had a positive predictive

relationships. Often, those who felt pride in achieving success spent their efforts being engaged, which reduced time/reason for disruptive behavior (King & Gaerlan, 2014; Pekrun et al., 2002). Likewise, students who became bored or felt angry during class may be more likely to engage in disruptive behavior (Daschmann et al., 2014; Palmer, 2017). Research within PE pedagogy suggests that boredom results from tasks being too easy or too difficult for students (Rink, 2014; Sanchez-Rosas & Esquivel, 2016). Although boredom can lead to sitting out or absenteeism (Daschmann et al., 2014), the results from this study also suggest a relationship with being disruptive as well. Ultimately, teachers who execute pedagogical techniques that maximize challenge, provide sound rationale, and incorporate appropriate pacing of tasks can reduce feelings of boredom and anger. Several basic teacher functions like lesson/unit progression and evidence-based instructional models should be utilized.

Paradoxical relationships were identified in the findings with enjoyment sharing a positive and shame a negative relationship with disruptive behavior. Enjoyment infers intrinsic levels of motivation and pursuit of task mastery (Deci & Ryan, 2002; Pekrun et al., 2009), yet students perceived themselves as disruptive in class. In contrast students who felt shame, or performed to avoid looking incompetent, perceived they do not engage in disruptive behavior. The activating nature of shame may explain the motivation to engage and limit disruptive events (Pekrun et al., 2002). Our findings suggest that enjoyment may lead to greater levels of disruptive behavior which may result from a traditional, status quo PE experience. Students may enjoy PE comparatively to other academic subjects, but see little value in the material. The limited stimuli produced in status quo PE limits student arousal and attention (Webster et al., 2011). These relationships represent uniquely understudied action tendencies of emotion.

Overall variance attributed from emotions to both disruptive behavior and behavioral engagement was minimal. A few possible reasons for the limited variance are offered. The first being, emotions may play a less significant role in PE behavior than originally hypothesized. Within the context of PE, beliefs and values may play a more predominant role in predicting behavior then emotion unlike previous findings in other academic settings (Dishman et al., 2005; Pekrun et al., 2011). There was limited change in the three behavioral outcomes overtime and the lack of variation in PE may limit emotions influence on behaviors as well.

Lastly, the reciprocal relationships found suggest that behavioral engagement predictive of pride and that disruptive behavior was predictive of boredom. Although emotions may be associated with achievement, the internal and external feedback following achievement may in turn influence student emotions. Pekrun et al. (2002) suggests these reciprocal relations are often characteristics of short term causation and result in emotions and behaviors that trend in parallel ways. Our results show that the more engaged one is the more pride they may feel in PE. Also, disruptive behaviors may produce feelings of boredom in class over time as well. Overall, empirical evidence of reciprocal relationships between behaviors and emotions in PE is limited. Understanding in class behaviors in PE and intervening early-on may have a significant impact on long-term emotional experiences for students.

Limitations and Future Research

This study is not free of limitations and they should be considered for future research. Although these emotions have been found valid and reliable in previous studies, related emotions displayed high correlations. Overlap among emotions with shared characteristic may create multicollinearity in the structural model. As mentioned previously, Pekrun and colleagues (2004, 2007, & 2011) reported similar findings without multicollinearity. However, future research may

need to distinguish which emotions are of interest and provide specificity regarding object focus of emotions. In other words, there should be caution in measuring emotions with related valance and activation but different object focus. Relationships amongst emotions are an empirical reality and distinction in conceptual differences is warranted.

Second, the final SEM model fit fell below the desired fit indices and provides caution for interpreting results. However, in an extremely complex analysis with related constructs, these numbers could be anticipated. Future research needs to enhance emotion measurement and consider selecting specific emotions to reduce overlap. Also, this study was strictly self-reported data; future studies should consider other objective measures to evaluate student behaviors and experiences. Consideration should be given to teacher perceptions of students' in-class behavior. Lastly, future research should consider other desired cognitive and physical outcomes of PE. For example, important outcomes such as cognitive and physical skills/tactics tests to evaluate achievement in PE. It is inevitable, the more we understand about subjective experiences in PE and outcomes, the better we understand motivation. Thus, future research should include a multi-dimensional approach to understanding emotion.

Practical Implications

Teachers should be aware that student emotional experiences are associated with in-class and out-of-class behaviors. Emotions evolve from feelings of control and value, which means teachers, can help facilitate student emotional experiences through class design, feedback, and content choice (Pekrun, 2006; Simonton & Garn, in press). Teachers should encourage students to take pride in their accomplishments, work ethic, and persistence. It is acceptable to encourage achievement and pride in PE as it may influence leisure time choices. Students who are bored may be disruptive so identifying these students and making the tasks more relevant may help

students find meaning (Cothran et al., 2009; Webster et al., 2011). This also means that teachers can reduce behavior problems when they select content of interest and provide tasks that allow students to improve. In congruence, teachers should use techniques like intra-task variation and curriculum models to guide complexity and challenge at a developmentally appropriate level (Rink, 2014; Sanchez et al., 2016; Wallhead et al., 2010).

Students experiencing shame from PE will require special awareness from teachers as they may appear engaged, however, they may be experiencing avoidance motivation. Teachers should consider individual tracking of task success, reducing on-the-spot performances for students who are not comfortable, and providing technical control feedback more often. Improved performance and reduced feelings of shame can result in greater success. To gauge emotional temperature (Rink, 2014), teachers should also consider journaling for older students. Include occasional questions about progressions, success, feelings about competency, and allow students to be open. This should allow teachers to look for shame-related signs and intervene.

Conclusions

In conclusion, it appears that several PE emotions share relationships with behavioral outcomes like engagement, disruptive behavior, and leisure time MVPA. However, these relationships account for less variation then hypothesized. Ultimately, emotions may play a smaller role than anticipated in explaining engagement and disruptive behavior when considering their previous levels in the context of PE. Although multiple emotions were associated with behavior in unique ways, evidence supporting CVTAE assumptions remain unclear. PE teachers in this study delivered traditional content, which may limit variation in student emotional experiences because of the similarity of day-to-day content (e.g., always large-sided games).

Shame was the only emotion that predicted all outcomes. Understanding shame in PE may be of particular importance because students' abilities are often on display for others to see and compare to others. In some cases shame may result from one feeling they lack the ability to complete the task (Pekrun, 2006). If this is true, there is potential for instructional intervention where recognizing these students and alleviating feelings of uncertainty may change their emotional experience. Repeated instances of anticipated failure or minimal levels of competence may in turn promote an undesirable level of motivation regarding PE. Although students may appear engaged and not disruptive, these experiences may have negative ramifications on leisure activity time. Shame may be an under-researched emotion that encompasses both intrinsic and extrinsic motives in PE and may aid in translation to active behaviors outside of school.

The results of this study provide questions regarding the assumptions of CVTAE, specifically the relationship between emotions and outcomes. The ability to measure emotions needs improvement in the context of PE. Also, researchers need to be aware of redundancies when making measurement choices to reduce overlap. Emotions need to be specifically selected based by object focus and in-class or out-of-class behaviors. Thus, future research should continue to distinguish discrete emotions with quality measurement and explore other important outcomes associated with the PE experiences.

CHAPTER 4. GENERAL DISCUSSION

The purpose of this dissertation was to investigate emotions in PE-related settings using the control value theory of achievement emotions (CVTAE; Pekrun, 2006). Emotions represent important elements of student motivation (Garn et al., 2017; Linnenbrink-Garcia et al., 2016; Pekrun, 2017; Simonton et al., 2017). However, a dearth of evidence is available regarding relationships between motivation and emotions within PE settings (Mouratidis et al., 2009; Simonton & Garn, in press). In the current achievement motivation literature, emotions are often not considered as seminal outcome of interest for PE students. Instead, emotions are often evaluated as ancillary to outcomes like PA (Dishman et al., 2005). Typically, when emotions are investigated, only limited scopes, such as enjoyment or boredom, are evaluated (Cox et al., 2008; Yli-Piipari et al., 2009, 2013). This dissertation helps advance these current limitations and provides findings on three main areas of interest in PE settings: (a) significance of evaluating discrete emotions; (b) testing major assumptions of CVTAE; (c) teachers' modulating emotion.

Significance of Evaluating Discrete Emotions

Discrete emotions are important aspects of motivation because they help students define and evaluate their performances and contextual interactions. Pekrun (2006, 2017) postulated that measures of general affect do not provide clear understanding about specific motivational action tendencies associated with discrete emotions. Measuring affect may limit the ability to separate motivational tendencies resulting from enjoyment versus relief or anger versus shame. Each emotion is influenced differently by antecedents and has unique relationships with particular outcomes.

Findings from this dissertation support the notion that control antecedents can influence discrete positive and negative emotions (Study 1). Students' enjoyment and boredom were

impacted by attribution training in Study 1 whereas feelings of relief and anxiety were not. Similarly, discrete emotions shared distinct relationships with outcome behaviors in and outside of PE in Study 2. Negative emotions such as boredom related to increases in disruptive behavior while anger related to decreases in behavioral engagement. Therefore, combining negative emotions into a composite construct of negative affect will likely mask specific characteristics of student emotions.

Measurement of discrete emotions in PE has focused on enjoyment and boredom, which are activity-related (Cox et al., 2008; Yli-Piipari et al., 2013) However, outcome-related and externally driven emotions need consideration as well. This dissertation found relationships between activity-related feedback and activity-related emotions whereas outcome-related emotions were related to outcome behaviors. For example, attribution training that focused on in-activity pursuits such as effort, practice, and skill improvement were impactful solely to activity-related emotions. In congruence, none of the activity-related emotions had a significant relationship with leisure MVPA.

Outcome emotions may have a stronger relationship with out of class behaviors because outcome-related emotions revolve around activity outcomes (i.e., success or failure). Emotions like shame are developed as a result of failure in the outcome. These feelings may prompt someone to not engage in that behavior on their free time because they anticipate failure. This may shed light on the relationship between PE achievement (or lack thereof) and behaviors outside of PE because individuals will not likely partake in behaviors they previously failed at. Pride and shame are success and outcome oriented as compared to enjoyment and boredom which facilitate interest within the process rather than the outcome. Outcome-related emotions provide (or remove) confidence and appeal to engage in behaviors.

Testing Major Assumptions of CVTAE

Because of the comprehensive nature of CVTAE, testing the full model in any single study represents a difficult task. Previous research has isolated parts of the theory in order to test CVTAE assumptions. Within this dissertation, both, task specific (Study 1) and domain (Study 2) perspectives of emotions were evaluated with both middle school and college students. Stronger evidence was found for proximal antecedents of task-specific emotions in college students compared to relationships between domain emotions and outcomes in middle school PE students. One reason for this could be task specificity of the emotions under investigation. Although emotions are often organized at the domain level (Pekrun, 2006), measuring them at the task level may be a better practice because it provides students with a more specific object to evaluate their emotions.

There are limited studies that evaluate antecedents of emotions using experimental designs. Instead, most researchers to date implement observational designs that are often cross-sectional (Frenzel et al., 2007; Mouratidis et al., 2009; Pekrun et al., 2009; Simonton et al., 2017). Using an experimental approach, Study 1 provided strong evidence for the link between control beliefs as manipulated by attribution training and enjoyment and boredom. Experimental research allows for beliefs like control to be manipulated and researchers to investigate any distinct changes in emotion as control beliefs were influenced. Study 1 also focused on the individual versus evaluating the trends of a large group. The isolation of each construct and potentially the interaction of each construct should be studied in a controlled environment to feel confident in the hypothesized relationships of CVTAE.

Lastly, hybrid models and modifications of CVTAE may be necessary as it relates to the PE contexts. Control-value appraisals may play a more direct role on behavior than originally

hypothesized in more traditional classroom research (Pekrun et al., 2002). This could mean that appraisals in PE, or motivational beliefs, about one's ability may play a larger role then their emotion on behavior. Control-value beliefs still influence emotion but also directly contribute to behavior. Hybrid models that position appraisal beliefs and emotions together should be tested. Overall, a more comprehensive approach is necessary when testing CVTAE because of its limited use and support in PE settings to date. Intervention and experimental studies should take precedence over cross-sectional and observation studies to test relationships proposed by the CVTAE.

Teachers Modulating Emotion

Researchers suggest that although students may be motivated to engage in a behavior, emotion is the source of activation that prompts the psychological and physiological reaction (Pekrun, 2017; Reeve, 2016). Teachers can be an environmental tool to modulate student emotions and behaviors. Control-attribution training appears to be a fruitful tactic to improving enjoyment and decreasing boredom when students perform physical tasks. Attribution training encourages students to place emphasis on effort, persistence, practice, and the awareness that each student can have influence over their ability (Parker et al., 2016, 2018). Therefore, training teachers on how to use attribution training effectively during their instruction appears to be a logical step in advancing the application of CVTAE to PE classroom.

Another important consideration for modulating student emotions is providing links to real life experiences. Attribution training suggests that consolidating beliefs across school and life are essential for control improvement (Perry et al., 2014). This approach has been proven to influence control but may also influence student value. Value-inducing instruction and content also seem like a logical area where teachers can serve to modulate emotional experiences.

Teachers should consider providing sound rationale and personal relevance for content choices and consistently reinforce this information to students (Webster et al., 2011).

Lastly, teachers can facilitate positive and reduce negative emotions by recognizing positive and negative student behavior. In association with the reciprocal relationships between behavior and emotions found in Study 2, a sound positive management plan addressed early and often may induce positive emotions and reduce negative emotions. Management strategies should focus on proactive approaches like interesting and engaging activities, but should also reduce disruptive behavior by establishing clear expectations. Teachers may also implore emotion-regulation skills to increase positive and decrease negative emotions (Matthews, Zeidner, & Roberts, 2002). Components include recognizing emotions, managing them, and using emotions for action and goal attainment.

Future Research

More research is needed using attribution training as a pedagogical tool for linking control beliefs to both the person and to their task. Although providing students with control feedback regarding effort, persistence, and individualized improvement was supported in Study 1, it is also important for PE teachers to consider other instructional practices that can enhance control beliefs such as task cues and correcting errors (Perry et al., 2001; Rink, 2014). There is reason to believe the major learning assumptions addressed in several evidence-based instructional models (e.g., Sport Education, Skills Theme, etc.) provide control and value messaging. Future investigation should consider evaluating these models and best practices to establish their relationships between emotions and their antecedents.

Research on emotion in other academic areas has pointed out the importance of evaluating emotional experiences at the domain level (Pekrun et al., 2004, 2011). However, it

may be prudent to also evaluate emotions at the task/unit level. Emotions can fluctuate across a semester but can also change weekly, daily, or even within a singular lesson as environmental information changes appraisals of control and value. Much like other subjects in school, PE represents a domain with a constant shift in emphasis over a semester or year where multiple sports, activities, or skills are focused on. PE is often restricted in delivering bi-weekly units in short sessions a few times a week (Rink, 2014). This inconsistency of developing sustained competence, motivation, and appreciation in short sporadic doses have been identified as problematic in PE (Cothran & Ennis, 1999; Garn, Morin, & Lonsdale, 2018).

Consideration for tracking emotions from content unit to unit should be considered. Emotions would be tied to specific activities which may remove ambiguity found from evaluating emotions in a global perspective. Also, testing of hybrid CVTAE models may be more appropriate for the PE context. For example, researchers could evaluate task beliefs and emotions as co-predictors of PE-related outcomes. In accordance with all recommendations of future research, emotion measurement needs further investigation. Although a larger taxonomy is posited to provide more information, measuring emotions with similar valence and activation is problematic. Special consideration for the object focus of the emotion is warranted.

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APPENDIX A. EXTENDED REVIEW OF THE LITERATURE

Exploring relationships between achievement emotions and motivation in physical education

Achievement emotions are multifaceted processes that affect students' learning and behavior (Linnenbrink-Garcia, Patall, & Pekrun, 2016). Achievement emotions also provide a mode for understanding how students experience classroom activities and interactions (Pekrun, 2006). Frenzel, Pekrun, and Goetz (2007) make persuasive arguments for studying achievement emotions because they: (a) represent key outcomes of students' subjective well-being and psychological health; (b) influence students' motivation, learning, and achievement; and (c) connect learning tasks, content, and classroom events to students' actions and interactions. Evidence also supports links between emotions and student engagement (Fredricks, Blumenfeld, & Paris, 2004) and self-regulated learning (Pekrun, Goetz, Titz, & Perry, 2002). Despite these meaningful links, few educational theories focus on student emotions in the classroom (Pekrun, 2006). Achievement emotions can provide a window into understanding students' experiences and behaviors in physical education (PE). Increasing positive emotions while limiting negative emotions during PE has the potential to help students' solve problems, increase engagement, and enhance learning (Fredrickson, 2001; Reschly, Huebner, Appleton, & Antaramian, 2008; Skinner, Furrer, Marchand, & Kindermann, 2008).

PE represents an academic subject where students' achievements are germane to their future health (Society of Health and Physical Educators [SHAPE], 2014). Although achievement should be recognized as student attainment of learning goals in PE, it is often encoded as a grade based on trivial routines such as attendance and dressing out (Michael, Webster, Patterson, Laguna, & Sherman, 2016). Because PE grades often consist of non-learning components, they provide minimal insight into students' achievement or future health behavior. However,

exploring students' emotional experiences may be a productive approach for understanding important outcomes in PE (Dishman et al., 2005; Michael et al., 2016; Webster, Mîndrilă, & Weaver, 2011). For example, understanding the sources of positive and negative emotions in PE may provide links to outcomes such as physical activity (PA) and engagement in and out of school (Garn, Simonton, Dasingert, & Simonton, 2017). Individuals often report enjoyment as a facilitator and boredom as a barrier to engaging in leisure-time PA (Ntoumanis, Pensgaard, Martin, & Pipe, 2004; Wallhead, Garn, Vidoni, & Youngberg, 2013).

The purpose of this review is to explore the literature on achievement emotions current standing in PE research. We investigate how learning environment factors in PE lead to student emotions and examine how achievement emotions link to student motivation and desired outcomes in PE. The first section of this review presents the Control-Value Theory of Achievement Emotions (CVTAE; Pekrun, 2006) as a theoretical framework to investigate antecedents and outcomes of achievement emotions. This framework served as a lens to scrutinize the current view of student emotions within PE. CVTAE provides both conceptual and operational explanations of emotions and their relationships with motivation and desired behaviors. Literature from academic areas is also included because CVTAE is predominantly been used in educational psychology research. Next, we highlight relationships between PE learning environments and student outcomes. In the final section we summarize current findings, potential gaps in the literature, and offer support for researching on emotion in PE using the CVTAE.

Achievement Motivation and Achievement Emotions

Motivation is defined as one's energy and direction toward goal-related activities that can be initiated and sustained (Linnenbrink & Pintrich, 2002). Exploring motivation in educational

settings is important in predicting students' success, learning (Linnenbrink & Pintrich, 2002) and adoption of healthy lifestyles (Wallhead & Buckworth, 2004). Emotions and motivation are closely intertwined yet conceptually different (Linnenbrink-Garcia et al., 2016). Motivation involves the energy and direction to pursue a goal (i.e, can I do it?, why do I want to do it?; Linnenbrink-Garcia et al., 2016) whereas emotions reflect physiological and psychological processes that coordinate one's subjective experiences (i.e., how will I feel about it?) Thus, students' answers to "can I do it", "why do I want to do it" and "how will I feel about it" work together to drive or inhibit students' behavior and achievement. For example, a student may think she can run a mile in 7 minutes (I can do it) but may see little value in doing so (I don't want to do it) because she experiences anxiety thinking about the pain it would cause (It will make me feel bad).

Achievement goal theory (AGT) has framed a great deal of research on motivation in school settings (McGregor & Elliot, 2002) and there appears to be well suited to explore discrete student emotions. Mastery goals focus on striving for self-referenced competence and/or task mastery. Performance goals focus on striving for competence relative to others (McGregor & Elliot, 2002). AGT results often show links between mastery goals and intrinsic motivation whereas performance goals are generally associated with extrinsic motivation or amotivation (Linnenbrink & Pintrich, 2002; McGregor & Elliot, 2002). Mastery and performance approach goals emphasize striving for self-referenced and/or criterion-referenced success, respectively. Mastery and performance avoidance goals emphasize avoiding self-referenced or criterion-referenced failure. Mastery and performance-approach goals are typically related to adaptive outcomes while performance avoidance goals are associated with maladaptive outcomes (Pekrun et al., 2014). However, relations between mastery avoidance goals and outcomes are less clear.

Research shows that performance-approach individuals will focus on outperforming others and show persistence while performance-avoidance individuals will be motivated to avoid looking incompetent in comparison to others (Linnenbrink & Pintrich, 2002). Thus, one who endorses mastery or performance approach goal orientations are likely to experience positive emotions whereas performance-avoidance orientations share relationships with negative emotions.

One review of AGT research within PE exemplifies the current dialogue about motivation and emotional research (Biddle, Wang, Kavussanu, & Spray, 2003). Interestingly, studies were mostly cross-sectional and showed mastery-approach goals shared moderate relationships with adaptive behaviors and positive affect, but revealed mixed findings among performance goals and affect (Biddle et al., 2003). As will be discussed later, many studies measure affect and discrete emotions interchangeably (Mouratidis, Vansteenkiste, Lens, & Auweele, 2009). However, enjoyment and boredom generally received the most attention in the PE achievement motivation literature (Barkoukis, Koidou, Tsorbatzoudis, & Grouios, 2012; Yli-Piipari, Barkoukis, Jaakkola, & Liukkonen, 2013). Mastery goals are often moderately and positively related to enjoyment and performance goal are mixed and likely predict emotions such as anxiety, pride, shame or relief (McGregor & Elliot, 2002; Mouratidis et al., 2009). Limiting the scope to only a few emotions may prevent researchers from understanding students' subjective experience and levels of motivation in PE. Thus, future research needs to focus on a diverse set of discrete emotions rather than positive and negative affect due to unique outcomes associated with discrete emotions. Overall, failure to conceptualize achievement emotions in a robust theoretical framework has limited the scope of research on emotions in PE, which may reduce understanding about students' subjective experiences and levels of motivation in PE.

The Control-Value Theory of Achievement Emotions

The CVTAE integrates the critical role of student emotions into a comprehensive achievement motivation framework. CVTAE is grounded in assumptions from Expectancy-Value Theory (EVT; Turner & Schallert, 2001), Appraisal Theory and Attribution Theory (AT; Weiner, 1985), and the effects of emotions on learning and performance (Fredrickson, 2001; Zeidner, 1998). CVTAE includes four basic constructs: the learning environment, control-value beliefs, discrete achievement emotions, and achievement-related outcomes. In contrast to other motivational theories (Wigfield & Eccles, 2002), emotions are theorized as being central to understanding student motivation (Pekrun & Linnenbrink-Garcia, 2014).

Characteristics of the learning environment such as teachers' instruction style, opportunities for autonomy, and feedback have distal relationships with discrete emotions (Pekrun, 2006) in addition to students' subjective appraisals of control and value as proximal predictors of emotions. Control appraisals (i.e., can I do it?) are evaluations about one's ability including attributions of success/failure and perceived causality over actions and/or outcomes (Frenzel et al., 2007). Students are likely to feel higher levels of control when they have higher appraisals of ability (Parker, Perry, Chipperfield, Ham & Pekrun, 2018). Positive control appraisals lead to positive emotions and sustained levels of effort and persistence. Value appraisals (i.e., why do I want to do it?) relate to one's evaluation of the intrinsic and extrinsic worth of achievement activities or outcomes (Pekrun, 2006). Appraisals of value are closely related feelings of relevance and interest (Pekrun, 2017). Therefore, positive value appraisals increase the likelihood that students will experience satisfaction and positive emotions (Gao, 2009; Pekrun, 2006).

For example, a PE class that emphasizes mastery-based instruction can help students develop feelings of control over content, performance, and learning and enhance students' value beliefs, helping them cultivate appreciation for the importance of PE content, performance, and learning. The emotional experience in PE can lead to behavioral and cognitive outcomes. However, in the PE literature CVATE assumptions are theoretical and need greater supporting evidence to determine their efficacy.

Emotions are operationalized as a phenomenon in which an individual's feelings evoke a series of psychological, physiological, cognitive, motivational, and expressive processes (Shuman & Scherer, 2015). Achievement emotions are differentiated by object focus, which can be considered either activity-related or outcome related (see Table A.1). For example, students may experience enjoyment when participating in a learning task (i.e., activity-related object focus) or pride after performing well on a learning task (i.e., outcome-related object focus). Outcome-related emotions can be further parceled into retrospective and prospective outcome beliefs (Pekrun, 2006). Students may feel anxiety prior to a learning task (i.e., prospective outcome-related object focus) or shame after performing poorly on a learning task (i.e., retrospective outcome-related object focus). Emotions can also be grouped according to valence (positive vs. negative) and degree of activation (activating vs. deactivating; Frenzel et al., 2007). For example, positive- activating emotions such as enjoyment result in adaptive behaviors, deep learning, and engagement (Linnenbrink-Garcia et al., 2016). The opposite is true for negative-deactivating emotions like boredom, which are linked to absenteeism, dropout, disengagement, and surface level learning (Daschmann, Goetz, & Stupnisky, 2014).

In contrast to other motivational theories (Wigfield & Eccles, 2002), emotions are central to understanding student motivation in CVTAE (Pekrun & Linnenbrink-Garcia, 2014). The

CVTAE framework signifies that emotions develop through specific environmental and subjective appraisals of a task or domain. Pekrun (2006) also suggests that the learning environment, control-value beliefs, discrete emotions, and student outcomes may have reciprocal effects called feedback loops. Feedback loops point out that causal ordering may work in multiple directions. For example, feelings of enjoyment may reinforce control and value beliefs and shape future perceptions of the learning environment.

Table A.1. Achievement Emotions Classified by Valance, Activation, and Object Focus.

	Positive		**Negative**	
Object Focus	**Activating**	**Deactivating**	**Activating**	**Deactivating**
Activity	Enjoyment	Relaxation	Anger	Boredom
Outcome Prospective	Hope	Contentment	Anxiety	Hoplessness
Outcome Retrospective	Pride	Relief	Shame	Sadness

Note. Adapted from Pekrun's (2006) taxonomy of emotions.

Emotions prompt and inhibit specific actions, thoughts, and outcomes (Garn et al., 2017; Pekrun et al., 2009). These specific action tendencies (Fredrickson, 2001) lead to adaptive and maladaptive outcomes such as skill development, achievement, or behavior. In other words, emotions represent a mechanism that can help explain behavioral and cognitive outcomes in PE. Therefore, investigating the ideal set of emotions in PE can potentially lead to improved understanding about the facilitation of optimal student outcomes in PE. For example, emotions like enjoyment elicit actions like continued participation and engagement. Unlike previous theory that posits direct relationship from environmental factors to students outcomes, Pekun (2006) believes that emotions are the proximal predictor of outcomes in academic settings. it stands to reason that investigating emotions in PE could lead to understanding the translation of

PE experiences to behaviors outside of school. The CVTAE framework appears well suited for explaining student outcomes related to PE by potentially providing evidence for relationships between learning experiences and behavior outcomes through the use of emotions.

Discrete Emotions vs. Affective States

Clustering emotions into a composite construct, typically referred to as affect, has reduced the ability to clearly explain students' subjective experiences (Pekrun et al., 2009; Simonton, Garn, & Solmon, 2017). Terms such as affect and mood have been used interchangeably with emotion; however, there are differences. All three terms represent subjective feelings but can be differentiated by specificity, intensity, time, and antecedents. Affect is a term that encompasses multiple emotions in a general omnibus group or state (i.e., positive or negative affect) and is considered a generalized sense or feeling (Pekrun & Linnenbrink-Garcia, 2014). Mood is less intense and generally do not have object-related causes meaning its antecedents are due to overall prolonged characteristics and can be void of specific antecedents. Emotions are more intense, shorter lived than mood, more specific than affect, and linked to a person, task, or event (Pekrun, 2006; Pekrun & Linnenbrink-Garcia, 2014). An important distinction covered in this review is the specificity that emotion brings compared to measures of affect.

As mentioned previously, affect is considered a general construct in which several discrete emotions are combined. For example, positive affect can include enjoyment, relief, and pride whereas negative affect could include boredom, anger, and anxiety. Discrete emotions within positive and negative affective states promote different outcomes, which may go undetected when combining emotions into a composite affect construct. Fredrickson (2001) and Mouratidis et al. (2009) argue that one should carefully consider the underlying differences

between affect and emotions. Pekrun's taxonomy of discrete emotions classifies emotions in terms of object focus, valance, and activation. Initial studies in PE support the use of discrete emotions. One example is reported by Garn et al. (2017), who revealed that boredom predicted changes in student engagement whereas anger did not. If boredom and anger had been collectively represented as negative affect these findings would not have been evident. In short, research that currently examines affect rather than discrete emotions fails to delineate the specific psychological and physiological responses that result.

Mouratidis et al. (2009) showed how disentangling emotions from affect can provide information related to student motivation in upper elementary PE. Results identified connections among mastery goal orientation and positive activating emotions such as enjoyment, hope, and pride and performance goal orientations with both activating and deactivating emotions such as anxiety, anger, shame, and pride. Performance goal orientation positively predicted pride, a retrospective outcome emotion, but had no relation with enjoyment, an activity-based emotion, or hope, a prospective outcome emotion, suggesting that different forms of positive emotions are related to different forms of motivation. Yet, mastery oriented persons shared the strongest relationship with enjoyment. Evidence shows that positive activating emotions are linked with mastery goals and promote persistence, effort, and accepting personal challenge (Yeager & Dweck, 2012), whereas deactivating emotions lead to amotivated characteristics such as avoiding help or nervousness (Linnenbrink-Garcia et al., 2016; Pekrun et al., 2009). This is a considerable note for PE because motivational action tendencies tied to discrete emotions may have stark differences in outcome behaviors. For example, a performance goal orientation may lead to either *relief* or *pride,* both outcome-based emotions have different resulting motivational behavior. One who feels relief may demonstrate maladaptive forms of motivation and avoid a

task or only participate to avoid failure. A person who experiences pride will likely display intrinsic and extrinsic motivation, through persistence and investigation to achieve and validate their ability. In this scenario, relief shares a relationship with undesired forms of motivation whereas pride elicits many motivational components that lead to volitional behavior.

Pekrun (2006) and Pekrun, Frenzel, Goetz, and Perry (2007) call for more integrative frameworks, including: (1) measuring and distinguishing discrete emotions and, (2) evaluating emotions as both mediators and outcomes. In summary, measuring affective constructs that consolidate discrete emotions into broad categories can limit the ability to understand finer nuances and complexities of one's motivation and subjective experiences. Measuring discrete emotions appears better suited for addressing students' unique adaptive and motivational tendencies (Mouratidis et al., 2009). CVTAE is a theoretical framework that emphasizes the connection between discrete emotions and motivation, yet it has been used sparingly in PE settings despite promising results in initial studies (Garn et al., 2017; Simonton et al., 2017).

A Deeper Look at Antecedents of Emotions

According to Pekrun (2006) emotions are predicted by one's control and value appraisals. Control beliefs are domain specific perceptions of influence over actions and outcomes. Encompassed within control beliefs are constructs similar to those used in EVT (Turner & Schallert, 2001) and AT (Weiner, 1985), which include expectancy outcomes, perceived competence, and attributions of success/failure specific to any task or domain. Value is defined as the perceived intrinsic and/or extrinsic worth of the domain/task (Frenzel et al., 2007). Intrinsic value is linked to interest and intrinsic forms of motivation whereas extrinsic value is as the subjective importance of a task (Frenzel et al., 2007). Traditional explanations of value have often included enjoyment in the definition or, vice versa, with intrinsic value used to define

enjoyment (Turner & Schallert, 2001). However, Pekrun (2006) postulates that perceived value does not define emotions like enjoyment but are predictors of emotions. The antecedent relationship is essential for understanding CVTAE, exploring the formation of different emotions, and measuring experiences reliably. Therefore, in review of the literature it is particularly important to evaluate the constructs and how they are measured. CVTAE models have provided empirical evidence in academic fields that suggest perceptions of high/low control and value are proximal predictors of discrete emotions (Pekrun et al., 2009; Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011). Evidence also showed control and value constructs mediated the relationship between perceived teacher quality and emotion (Sánchez-Rosas & Esquivel, 2016).

Although CVTAE has been used sparingly in PE and PA situations, the closely related EVT has been used (Chen, Sun, Dai, & Griffin, 2017). It would appear meaningful to apply the same reasoning that was used in academics, to use CVTAE in lieu of EVT, for potential benefits inspecting emotions in PE settings. Reasons include understanding emotion as a major outcome, further explanation of nuances within the subjective experience, and using emotions when interpreting motivational experiences. One study in PA research, although CVTAE was not used as the framework, highlighted the potential for using CVTAE to predict enjoyment and PA. Appraisal beliefs self-efficacy (i.e., control) and perceived benefits (i.e., value) of PA were found to predict enjoyment (Barr-Anderson et al., 2008). This study points out the potential for exploring personal factors as direct predictors of emotion compared to environmental ones. Apropos with CVTAE it is critical to not only use proximal factors to explain emotions but to explain how the environment formed those beliefs. In PE, it is logical to assume that teachers and

the class environment must be conducive for one to develop higher control and positive value beliefs to reap the benefits of positive emotional experiences.

Two studies by Simonton (et al., 2017) and Simonton, Solmon, & Garn (in review) utilized the CVTAE to suggest that teacher behaviors shared indirect relationships with student emotion via control-value beliefs. Results found that value beliefs shared the strongest relationships to positive emotions and mediated the relationship from environmental factors. Another study in high school PE showed teachers who communicated content relevance (i.e., content value) to students increased positive affect toward the course and intention to take the course in the future (Webster et al., 2011). Although this study used affective profiles over discrete emotions to measure student experiences, the instruction had a major influence on value and suggests further investigation. This study is relevant to CVTAE as it may be a way in which the environment can be used to intervene and increase students' value appraisals. In conclusion, control-value beliefs are seen as proximal antecedents to predicting discrete emotions. Although there has been limited researcher in PE and PA, there is evidence to suggest further investigation is warranted. Lastly, if control-value beliefs are the key components to achieving positive emotions in PE more research is needed about the environments role influencing control-value beliefs.

Learning Environment and Emotions

According to CVTAE (see Figure A.1), the learning environment plays a distal role in predicting student emotions and a proximal influence on control and value beliefs (Pekrun, 2006). Current motivational literature suggests that classroom climate structures influence explain variation in students' goal orientation and motivation (Barkoukis et al., 2012). Both the social and instructional components of the environment must be considered because both climate

and instruction are associated with one's control and value appraisals (Pekrun, 2017). An area of interest within the PE literature and in exploring discrete emotions lies in the learning environment. Next, we examine learning environment constructs such as motivational climate, autonomy-enhancing opportunities, and lesson and content design components.

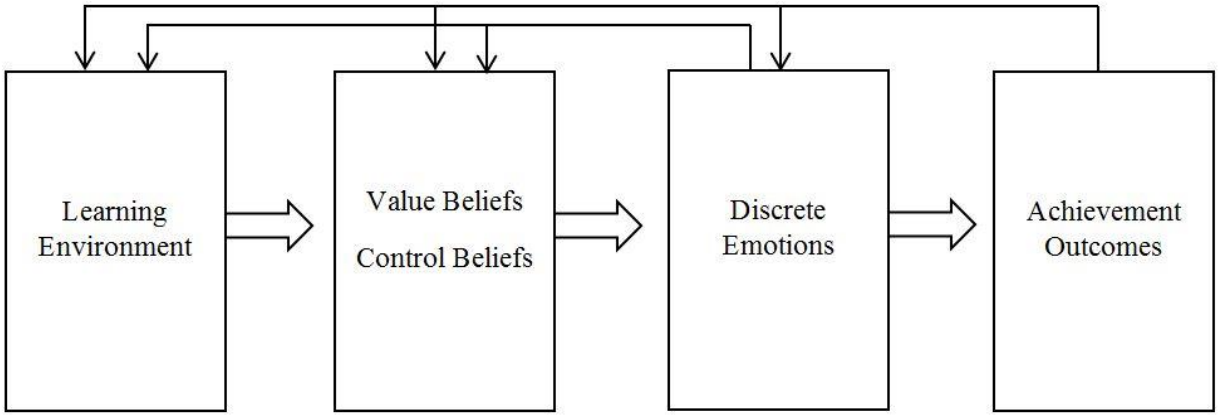

Figure A.1. Visual representation of Control Value Theory of Achievement Emotion.

Motivational climate

The motivational climate is a measure of classroom structures that facilitate different types of motivation through achievement goals (Ames, 1992). There are two dimensions of the motivational climate: mastery and performance. Mastery climate structures are associated with task development and self-improvement such as emphasizing skill development, allowing students to work at their own pace, encouragement, focusing on self-improvement, promoting social interaction, and using a variety of self-evaluative feedback. In. Performance climate structures are focused on competition and social comparison such as traditional sport participation and elimination games (Reinboth & Duda, 2006). Correlational studies demonstrate that student perceptions of mastery climates in PE are associated with feelings of enjoyment

while performance climates are associated with feelings of anxiety and lower satisfaction within high school aged students (Barkoukis, Ntoumanis, & Thorgersen-Ntoumani, 2010; Biddle et al., 2003; Spray et al., 1999).. Several studies within PE have found associations with mastery climates and outcomes such as future intention and PA as well (Bryan & Solmon, 2012; Garn, McCaughtry, Shen, Martin, & Fahlman, 2013).

Other research in PE suggests that investigation into the motivational climate could be supplemented using the CVTAE and focusing on emotion and its' related antecedents. Instruction that provides clarity, value, quality cognitive and physical demands are important instructional tools that impact motivational climate (Webster, 2010) and emotion (Simonton et al., 2017). For example Webster et al. (2011), states that instruction specific to value appears necessary to make content within PE appealing to students. This example highlights the teacher's influence on a major antecedent of emotion (i.e., value) that may be overlooked from an affective perspective. Students' who are instructed on task importance and contribution to other goals will reflect an overall positive value appraisal from the environment (Pekrun, 2006). Therefore, proper pedagogical strategy and content development that align with a master climate may play an important role influencing control and value beliefs. Other instructional components and ways to conceptualize the environment may be necessary to understand the relationship between the environment and the antecedents of emotion.

Autonomy-Enhancing Opportunities

Providing students with opportunities to experience learning autonomy is another key learning environment element identified in CVTAE (Linnenbrink-Garcia et al., 2016). Specifically, Pekrun (2006) suggests that providing students with opportunities to make important learning decisions enhances their control and value appraisals. Teachers can provide

opportunities for autonomy by allowing students to self-regulate aspects of their learning and make choices about content as well as recognizing students' perspectives and minimizing pressure (Linnenbrink-Garcia et al., 2016; Pekrun, 2006). Autonomy enhancing opportunities may provide distinct connections to control and value appraisals and indirectly related to emotions such as enjoyment (Cox, Duncheon, & McDavid, 2008). For example, control appraisals increase when students regulate their pace of learning (Parker et al., 2018) and are provided with meaningful choices (Garn et al., 2013). .

Intervention studies within PE, focused on need-supportive teaching environments have shown both teacher and student benefits including perceived positive changes in the learning environment and motivation (Aelterman, Vansteenkiste, Van den Berghe, De Meyer, & Haerens, 2014). The improvement in perceived autonomy support may increase students' self-regulation and potential contextual transfer of active behaviors (Cox et al., 2008). Promoting autonomy opportunities during PE may transfer of active behaviors outside of PE. For example, Wallhead, Hagger, and Smith (2010) targeted student experiences in PE using a needs supportive curriculum model to investigate contextual transfer to afterschool PA. Results showed an increase in autonomous forms of motivation in PE would transfer into motivation to participate in lunch time PA opportunities. These findings would support theory that need supporting environments are related to students' motivation in class. If need supportive teaching increases autonomous forms of motivation it appears likely it will also have effects on students' emotional experience in class. For instance one review reported that student experiences within need supporting PE had the strongest effect on enjoyment in class (Wallhead & Buckworth, 2004). The same review highlighted that achieving positive psychological well-being, such as enjoyment, was critical for determining one's motivation. Although research suggests that need-

supporting environments lead to enjoyment, motivation, and fulfilling basic needs (Barr-Anderson et al., 2008; Cox et al., 2008), these studies are limited in explaining how emotions assist in capturing one's experience within particular environments.

Based on the findings, relationships between a need-supporting environment and enjoyment would be useful in understanding how the environment directly influences control and value given they are the direct antecedents explaining emotion (Pekrun, 2006). The need supporting environment may also be conducive for intervening on one's control-value beliefs because of considerations for how things are taught (i.e., instructional) and promoted (i.e., social). Investigation is limited positing the environment as an indirect predictor of emotion as theorized within CVTAE (Simonton et al., 2017). The current literature is limited investigating how a need-supporting environment could influence control-value and emotions, there appears to be several logical connections for future investigation

Instructional Design and Content Choice.

The quality of instructional design and content choice are two additional learning environment constructs that need consideration when using CVTAE to evaluate emotions in PE. Instructional design encompasses lesson goals, clarity, developmental appropriateness, task progression and difficulty, and PE-pedagogy (Rink, 2014; Sánchez-Rosas & Esquivel, 2016). Clarity of instruction and task purpose have been found to be associated with students' control and value appraisals in PE (Simonton et al., 2017; Webster et al., 2011). The process of quality content development is essential for gaining competency to prompt enjoyment and future participation of PA (Barr-Anderson et al., 2008). Overall, feelings of competency is a major underlying structure necessary for higher levels of motivation (Wigfield & Eccles, 2002) and is influenced more by the instructional design than the social environment (Ryan & Deci, 2000).

Gaining competency through mastering skills is necessary to participate successfully in activities and prompt both enjoyment and future participation (Barr-Anderson et al., 2008). The development of skills is predominately based on instruction, task progression, task difficulty, and goals presented by the instructor (Rink, 2014; Sánchez-Rosas & Esquivel, 2016). Previous quantitative and qualitative research found that monotonous teacher pedagogy is a major influence of boredom in class (Daschmann et al., 2014). Within CVTAE, evaluating the design quality and content of PE lessons can shed light on students' control and value appraisals (Pekrun, 2006, 2017).

Content choice has also been suggested as a major barrier for students success in PE. Specifically, traditional content that is sport- and team-based can present physical and psychological limitations to low-skilled and female students (Bryan & Solmon, 2012; Garn et al., 2013; Shen, Mccaughtry, Martin, Fahlman, & Garn, 2012). Skill demands and content choice that marginalize students with diverse abilities can prevent students from developing feelings of control and value toward PE (Bryan & Solmon, 2012; Simonton et al., 2017). Content that does not promote increased control and value beliefs leads to a variety of negative and deactivating emotions (i.e., boredom, anger, or helplessness; Pekrun et al., 2009). Therefore, considerations of instruction, developmentally appropriate progression, task design, and overall content choice appear to have logical links to the antecedents of achievement emotions.

In combination, the aforementioned studies have found connections in which CVTAE may shed deeper understanding in the relationship between the learning environment, control and value beliefs, and achievement emotional. In many former studies, learning environment characteristics represent direct predictors of student motivation and outcomes. However, CVTAE theorists postulate the environment is an indirect predictor, working through students' discrete

emotions. Thus emotions are outcome markers that represent and help explain one's experiences (Pekrun, 2006) or in other words, motivational mechanisms in PE . Pekrun (2017) offers evidence to support the mediating role of control-value appraisals between environmental constructs and emotions. Therefore, evaluating the direct relationship between the environment to emotion may by an oversight. Further investigation can help establish the role of learning environment characteristics as a direct predictors of students' control-value appraisals and indirect predictors of emotions.

Emotions and Outcomes

The CVTAE framework posits that students' emotional experiences predict achievement outcomes. Students experience a number of omnipresent emotions before, during, and after PE (Pekrun & Linnenbrink-Garcia, 2014). Prospective and retrospective emotions occur before and after activities take place whereas class-related emotions occur during direct involvement in class activities. Because emotions are domain specific, they may predict similar PE/PA experiences that occur in other settings. Participation in PA and engagement during class are two desirable student outcomes in PE that receive extensive attention in the motivation literature (Garn et al., 2017; Yli-Piipari et al., 2013). The CVTAE framework posits that students' emotions predict achievement outcomes, such as student performance, learning, and cognitive processing (Pekrun et al., 2009). This direct link from emotions to outcomes underscores a specific action tendency (Fredrickson, 2001). To reiterate, an emotion triggers a variety of predictable urges, ideas, and actions. For example, the action response generated from a positive activating emotion such as enjoyment includes focused engagement and continued behavior. In terms of motivation, a desired outcome would result from an approach action tendency and maladaptive behaviors result from deactivating emotion action tendencies. Activating emotions refers to the level of

physiological reaction caused by the emotions, for example, an activating emotion such as enjoyment increases arousal and a deactivating emotion like boredom decreases arousal (Pekrun, 2006). One potential oversight in PE motivation literature is situating emotions as direct predictors to outcomes and meditators between experiences and behaviors, although there is promising evidence in students from upper elementary through college (Motl et al., 2001; Mouratidis et al., 2009; Simonton et al., 2017; Yli-Piipari et al., 2013).

Defining the characteristics of discrete emotions and measuring them accurately enhances researchers' abilities to understand their direct and mediating effects. Pekrun's (2006) CVTAE taxonomy of emotions provide a comprehensive picture of how students feel about diverse school subjects and learning tasks. Through a variety of qualitative and empirical findings the Achievement Emotions Questionnaire (AEQ) was created based on the CVTAE (Pekrun et al., 2002). These studies demonstrate robust relations with outcomes such as motivation, learning strategies, cognitive abilities, self-regulation, and academic achievement. (Pekrun et al., 2002). Emotions as predictors of the aforementioned outcomes include enjoyment, anger, and boredom (activity-related emotions), joy, shame, pride, and anger (retrospective outcome-related), and lastly hope, relief, hopelessness, and anxiety (prospective outcome-related). According to CVTAE, when emotions are separated discretely by valence, focus, and activation their antecedents and relationships can be more accurately conceptualized compared to ambiguous interpretation without a theoretical base. This is critical because emotions can influence specific outcomes such as cognitive resources, achievement, learning, and interest differently (Dishman et al., 2005; Pekrun, 2006; Pekrun et al., 2002).

Overall, there has been meaningful research using the AEQ tool predicting academic performance and attainment (Frenzel et al., 2007; Pekrun et al., 2009). If emotions can be

conceptualized as a mode for understanding students experiences in a particular domain (Linnenbrink-Garcia et al., 2016) then emotions also represent a focal point in which student motivation can be explained. For example, the action responses generated from particular discrete emotions signal the endorsement of an approach versus avoidance tendency. Thus, these are seminal findings that help explain emotion's affiliation with motivation and performance. Emotions developed in PE could come to represent a mechanism in which specific actions and outcomes are initiated. Major areas in need of future research include a better acuity and a more accurate conceptualization of how PE experiences relate to PA behavior, internalized skills, and resources developed during the PE.

PA Behavior

One desired outcome of PE is for students to appreciate and enjoy PA in a way they choose to participate in it regularly (SHAPE, 2014). There is currently limited evidence on how PE experiences transfer to PA outside of PE (Cox et al., 2008). CVTAE studies consistently find direct links between emotions and adaptive learning outcomes (Pekrun et al., 2002). More work is needed to determine if these positive results will translate to PE outcomes such as regular PA participation. Only a select number of studies to date have provided insight into the connections between emotions and PA. A few recent studies have found that PE enjoyment was a direct determinant of PA and mediated the relationship between motivation in PE to PA outside of school (Cox et al., 2008; Yli-Piipari et al., 2013). Yet, others found that enjoyment in PE did not play a role in differentiating students' amount of PA outside of PE (Carroll & Loumidis, 2001). The latter study highlights the concerns surrounding measurement issues and may be misleading. The emotion enjoyment was measured using the interest factor consisting of a cluster of indicators specific to enjoyment, interest, and value, resulting in enjoyment not playing a role in

PA. Review of the related articles shows variation in defining, measuring, and interpreting emotions. A consensus on operational definitions of emotions and using a multidimensional framework would improve the interpretations and generalizations of these findings.

The context of PE does not necessarily mimic the context one chooses for PA outside of school, which means behaviors developed in PE may not transfer. But, Pekrun (2006) proposes that emotions explain behavior regardless of context. These outcomes are directed by one's emotional experience and are often multifaceted and can include behavioral, social, and intellectual recourse. To summarize, an emotion triggers a variety of predictable urges, ideas, and actions. Specific emotions are linked to specific actions and internal resources. Research is needed to help determine the extent that student emotions in PE translate to PA participation. Barr-Anderson et al. (2008) provided an intervention targeting PE enjoyment and found that student enjoyment was associated with PA levels, perceived benefits of PA, and efficacy for leisure time PA. Other studies have also found that students' PE enjoyment is a determinant of PA (Cox et al., 2008; Dishman et al., 2005; Yli-Piipari et al., 2013). Yli-Piipari et al. (2013) concluded that reduced enjoyment explained students' maladaptive behaviors and decrease in PA participation. Other researchers have also documented a declining trend between enjoyment, and PA (Barkoukis et al., 2010)

Pekrun (2006) situates emotions as a marker that fills a major gap in explaining the variability of human experiences and resulting behavior or achievement. Comparable studies in PE and PA include findings that factors influencing enjoyment significantly predict PA and self-efficacy (Dishman et al., 2005). Using CVTAE would most likely explain more of one's volitional behavior because it would include a greater variety of contributing constructs. Another major limitation in the literature is the measure of PA enjoyment versus PE enjoyment (Barr-

Anderson et al., 2008), which is often left unspecified. PA is one component of a PE class and presents a limited portion of the subjective experience. Results have suggested that PA enjoyment and PE enjoyment are related but conceptually different constructs (Motl et al., 2001). Measuring class emotions provides a more comprehensive perspective than measuring emotions representing one aspect of the class. Also, given that PA may not have contextual transfer to outside activity choices the holistic class experience or outcomes related to class may more fully explain PA choices outside of school.

Given the physiological and psychological actions resulting from emotions (Fredrickson, 2001), a framework such as CVTAE may help explain volitional behaviors like PA. A consensus on operational definitions of emotions and using a multidimensional framework would improve the interpretations (Pekrun & Linnenbrink-Garcia, 2014) and generalizations of these findings. Contextual transfer of PA experiences appears to be a prime candidate for research in which emotions may theoretically aid understanding about behavior change (Cox et al., 2008). Lastly, CVTAE could possibly add to the literature because considering a greater scope of emotions may provide information regarding nuances of students' subjective experiences that lead to choices about leisure time PA.

Engagement

Student engagement is important to PE because it is a domain specific outcome related to achievement outcomes and student success (Fredricks et al., 2004; Reschly, Huebner, Appleton, & Antaramian, 2008). Engagement can be defined as attraction to and involvement in school, and consists of a combination of behavioral and emotional dynamics associated with action, goal direction, and persistence (Skinner et al., 2008). In PE, engagement involves active participation both physically and psychologically, which are necessary for active behavior and learning (Garn

et al., 2017). Engaged learners in PE will draw appeal to class and to PA in which they will theoretically value and demonstrate effort and motivated behavior (Shen et al., 2012). Emotions are predictors of engagement. Positive experiences allow one to build and explore a variety of resources and adaptive abilities which can increase engagement, whereas, negative emotions often lead to a lack of engagement, reduced cognition, and inability to focus which impede well-being and learning (Fredrickson, 2001; Reschly et al., 2008). Engagement is a catalyst for academic, social, and emotional competency (Reschly et al., 2008). Findings provide indispensable evidence for emotions eliciting features necessary for engagement.

Skinner et al. (2008) provides several considerations regarding positive experiences and engagement: (a) incorporating positive and negative emotions in comprehensive models is pivotal to understanding antecedents of engagement, (b) positive experiences are likely malleable through instruction, (c) increasing positive experiences will enhance engagement more directly than the environment; determinants of emotion should also be targeted. Although the PE learning environment has traditionally been evaluated as a direct predictor of engagement, the proposed causal ordering of CVTAE suggests emotions are the more proximal predictors.

Engagement can be perceived as a strong social signal as to the student's relationship with the teacher and or/peers (Skinner et al., 2008). For example, perceptions of autonomy support and relatedness showed positive associations to both behavioral and emotional engagement (Shen et al., 2012). However, these results showed environmental support had positive associations to behavioral and emotional engagement, but only accounted for 13% and 17% of the contributing variance, respectively (Shen et al., 2012) showing limited variance was explained using these distal constructs. In contrast, Garn et al. (2017) found that proximal discrete emotions' (enjoyment, anger, boredom) predicted changes in engagement and accounted

for more variance (behavioral = 39%; emotional = 40%) during a one semester college PE course. These findings point out those emotional experiences were proximal predictors of engagement compared to the environment. Engagement allows students to maximize their effort during class time, which can increase their competence and better prepare them for future PA choices (Shen et al., 2012). As enjoyment and PA decrease across the grade levels, it may be important to consider engagement in PE class given its strong relationship with motivation and internalization of course content (Garn et al., 2017; Yli-Piipari et al., 2013).

In conclusion, PA and engagement are important PE outcomes, yet there is still uncertainty about the role of motivational constructs in their development and fluctuation over time (Garn et al., 2017). The CVTAE provides a comprehensive framework that can potentially improve understanding about the links between emotions and important outcomes like PA and engagement. When emotions are posited as mediators between experiences and outcomes or as proximal predictors of outcomes, more of the subjective experience is likely to be explained. Activating and deactivating emotions will theoretically be associated with approach and avoidance motivation leading to distinctly different adaptive and maladaptive behaviors. Exploring diverse emotions in PE can help establish better associations with student outcomes because of their predictable action tendencies. The lack of clearly defining and measuring a broad set of PE-related emotions hinders the ability to understand action tendency outcomes. Exploration into the mediating effect of emotions to outcomes from experiences could fill a major gap in explaining PE's link to PA. Therefore, PE research could benefit from thorough investigations on student emotions.

Practical Implications

The findings of this exploration suggest a relationship between behavior and emotion. Pekrun (2006) implies that understanding emotions presents practical opportunities to intervene and influence student interest, development, and social connection to the learning environment. Also, he denotes that emotions are seminal to psychological health and well-being independent of their functional relevance. Following assumptions of the theory, control-value beliefs can be influenced by the learning environment to promote greater feelings of control and causality as well as developing value within the domain. Teachers can use attributional retraining techniques (Skinner et al., 2008) to focus student attention on control and value appraisals through instruction, motivational climate, and autonomy-enhancing teaching practices (Aelterman et al., 2014; Barr-Anderson et al., 2008). While few intervention based research has been done within CVTAE, there is evidence that teacher training and short term interventions can have a positive impact on instruction and student experience (Barr-Anderson et al., 2008). As mentioned previously, achievement in PE often consists of non-learning routines and does not provide a marker in which future behavior is likely to be determined. With information about how emotional experience can influence future behavior, teachers may have an opportunity to intervene to influence the antecedents of desired emotions.

Specially, control can be enhanced through task development such as proper extensions, refinements, and authentic application (Rink, 2014). In PE, control related beliefs could be influenced by teachers promoting a master climate in which individual skill and tactical progression is enforced. This means that teachers must be trained to use specified pedagogical content knowledge (PCK) and specialized content knowledge (SCK) to guide students through a series of tasks in which they gain mastery at their own pace (see Ward et al., 2017). Overall

improvements made when providing quality tasks such as instructional clarity, quality demonstrations, and developmentally appropriate tasks should increase both control and value (Pekrun, 2006; Simonton et al., 2017).

Given the links between intrinsic value and intrinsic motivation it seems particularly important that teachers and the learning environment increase intrinsic and positive value and reduce and extrinsic or negative value (Frenzel et al., 2007; Pekrun, 2006). Goals regarding student ability and PA for lifelong health promoted in PE are long term and do not provide immediate importance to students (Webster et al., 2011). Inherently, it is suggested that intrinsic forms of motivation and value are necessary for student success in a unique class like PE because the penalties of being unhealthy are less evident and the rewards often appear less meaningful to students. Content can contain long-term or extrinsically valued goals (i.e., heart health) but it must also provide immediately relevant value to students as well (Simonton et al., 2017; Webster et al., 2011). Lastly, teachers should recognize or be trained to evaluate student emotion either through written word or by getting to know their students and analyzing their reactions and body language. This could be formal or informal but teachers who perpetually force students to partake in activities in which successful is sparse or lacks meaning will result in students' experiencing negative emotions like boredom (Daschmann et al., 2014).

Teachers must be trained to use a variety of instructional and curricular models that promote individualized control and value beliefs, reduce monotony, and prevent ambiguity of student demands. While these items address many of the pedagogical concerns, content choice in PE appears particularly important as it can marginalize students and prevent students from gaining a sense of control and internalized value. It may be important for teachers to train students to be aware of regulating their emotions and how emotions may influence their

perception, motivation, and overall well-being (Pekrun, 2017). Given the major goals of PE, these types of reflection and self-awareness skills may be influential in overall student health and well-being.

Directions for Future Research

CVTAE appears to be a viable framework to explore emotions related to student motivation and outcomes in PE. Affective research is predominant in PE research but has potentially undercut findings about student experiences. Future research needs to recognize discrete emotional experiences as a critical outcome of one's experience in PE. Emotions represent a substantive marker in which an individual can make sense of her/his relationship with a task/event providing a more transparent explanation of motivation. Two important future directions for exploring emotions in PE would be (a) exploring the environment as an antecedent of developing emotions and (b) studying the connection between emotions and select behavioral and psychological outcomes. Researchers must address construct measurement issues and utilize dynamic modeling methods for analysis. Also, given the multidimensional nature of emotions and CVTAE, dynamic modeling methods such as Structural Equation Modeling (SEM) and Multilevel Modeling will be necessary for analysis between constructs and over time.

Major gaps in the literature include, examining environmental factors that impact determinants of emotions. According to Pekrun (2006), emotions should be measured based on domain specificity because, by implication, emotion antecedents are domain specific. Intervention and experimental studies that promote perceptions of control and modeling value of activities and outcomes of PE would allow researchers to evaluate student perceptions as antecedents of emotions. PE should have influences from both the social and instructional aspects of the environment to develop positive values associated with class content and build

higher perceptions of control. Developing task demands, improving quality of instruction, and value induction are suggested areas of environmental manipulation (Pekrun, 2006). This would allow researchers to not only evaluate the causal relationships that lead to emotions but to investigate the environment's ability to change developing emotions regarding the tasks. There is a need for a framework like CVTAE to explain more of the subjective experience. This includes the exploration of the environment directly influencing the determinants of emotion and the resulting emotion as a critical outcome of the learning experience.

Another major gap includes using a variety of discrete emotions to predict behaviors and outcomes such as level of PA, contextual transfer of PA, and learner engagement. Several studies have insufficiently defined (Carroll & Loumidis, 2001) and measured a limited number of emotions (Barkoukis et al., 2012; Yli-Piipari et al., 2013) and often view them as ancillary to motivation and related outcomes (Biddle et al., 2003). Assessment of a variety of discrete emotions with clear conceptualized definition and causal placement could be guided by a mature theory like CVTAE. Although a series of cross-sectional and longitudinal studies have been conducted connecting emotions to a variety of outcomes, it appears that experimental and intervention-based methodology are needed to investigate the intricacies of outcomes like PA and engagement. Following the process used in educational psychology, researchers may need to approach measurement qualitatively and explore student emotions domain specifically. Quantitative measures would also be used to test assumptions of emotions both in terms of their antecedents and to the desired outcomes under investigation. Emotions need to be investigated through self-report methods and potentially in controlled environments with special consideration of capturing real time emotions. Predicting outcomes like objective PA time, sedentary time, and engagement would provide new information to the motivational literature

about one's subjective experience in PE. In conclusion, emotions are critical markers about experience and predictors of future behavior, therefore it is important to recognize them as a major construct in understanding motivation.

Conclusion

Student emotions activate achievements, behaviors, and skills in school settings (Linnenbrink-Garcia et al., 2016). Although motivation is often conceptualized intrinsically and extrinsically, emotions provide distinct feedback of an individual's motivational status (Dishman et al., 2005). Understanding discrete emotions and their antecedents can provide additional information about motivation and psychological well-being. CVTAE models the learning environment as a direct predictor of control and value appraisals, which in turn, predict positive and negative emotions. Discrete emotions are classified by their object focus, activation, and valence (positive, negative; Pekrun, 2016). Measuring discrete emotions provides a more detailed explanation of student motivation and subjective experiences. Research in PE has acknowledged enjoyment as a proximal influence on PA behavior (Barkoukis et al., 2012; Yli-Piipari et al., 2013), and that interventions should target emotions in anticipation for influencing behaviors like PA (Cox et al., 2008; Dishman et al., 2005). However, interpretation of experiences can be enhanced by investigating a variety of properly defined and measured emotions. Emotion may potentially help explain the transfer of motivation developed in PE to leisure-time PA, but contextual transfer needs further investigation (Cox et al., 2008; Wallhead et al., 2010; Yli-Piipari et al., 2013). Unlike previous research utilizing CVTAE (Frenzel et al., 2007), research in PE does not usually consider achievement emotions as important outcomes or mechanisms to explain the learning environment and related outcomes. Therefore, investigating

discrete emotions through the CVTAE in PE can make a unique contribution in explaining meaningful outcomes.

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APPENDIX B. STUDY ONE IRB APPROVAL

ACTION ON EXEMPTION APPROVAL REQUEST

Institutional Review Board
Dr. Dennis Landin, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu
lsu.edu/research

TO: Kelly Simonton
Kinesiology

FROM: Dennis Landin
Chair, Institutional Review Board

DATE: March 6, 2018

RE: **IRB#** E10935

TITLE: Attributional-training of control beliefs as a predictor of emotions in females regarding a physical education task

New Protocol/Modification/Continuation: New Protocol

Review Date: 3/6/2018

Approved X **Disapproved**_____

Approval Date: 3/6/2018 **Approval Expiration Date:** 3/5/2021

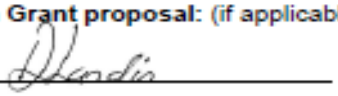
Exemption Category/Paragraph: 2a

Signed Consent Waived?: Yes

Re-review frequency: (three years unless otherwise stated)

LSU Proposal Number (if applicable):

Protocol Matches Scope of Work in Grant proposal: (if applicable)

By: Dennis Landin, Chairman 

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –
Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. **SPECIAL NOTE: When emailing more than one recipient, make sure you use bcc. Approvals will automatically be closed by the IRB on the expiration date unless the PI requests a continuation.**

* *All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.lsu.edu/irb*

APPENDIX C. STUDY ONE INFORMED CONSENT

PARTICIPANT CONSENT FORM

1. Study Title:	Examining change in positive and negative emotions regarding physical activity and sedentary time in males
2. Performance Site:	LSU campus
3. Investigators:	The following investigators are available for questions about this Study M-F, 8:00 a.m. – 4:30 p.m. Mr. Kelly Simonton (225)-578-2714 Dr. Alex Garn (225)-578-5954
1. Purpose of Study:	The purpose of this study is to explore control-value beliefs, emotions, and PA behaviors of college aged males. The investigation involves weekly tracking of the variables to measure individual change over a 5-week time period.
5. Subject Inclusion:	LSU Students
6. Number of Subjects:	100 Male students
7. Study Procedures:	Male students from large undergraduate classes in Kinesiology at LSU will be recruited. All students will complete consent, demographic information online following the recruitment session. Participants will be emailed a link each week with access to a survey. They are then asked to complete the survey for five consecutive weeks. Students will be given a 24-hour window to complete each of the 5 minute weekly surveys.
8. Benefits:	There are no direct benefits of this study. However, the information gathered from this study has the potential to extend understanding on factors related to class enjoyment.
9. Risks:	There are no foreseeable risks related to this research project. All participants will be informed of potential safety risks while performing the physical task. The investigators will be the only persons with access to the data and recordings.
10. Right to Refuse:	Subjects may choose not to participate or to withdraw from the study at any time without penalty or loss of any benefit to which they might otherwise be entitled.
11. Privacy:	Results of this study may be published, but no names or identifying information will be included in the publication. Subject identity will remain confidential unless disclosure is required by law.
12. Signature:	The study has been discussed with me and all of my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have any questions about subject's rights or other concerns, I can contact Dr. Dennis Landin, Institutional Review Board, (225) 578-8692. ***An electronic signature of the participant will be required at the opening of the online survey which states,* I agree to participate and give consent to use my information in the study described above.**

APPENDIX D. STUDY ONE INSTRUMENTATION

AT Survey 1

Age: How old are you? (write in) _____

Ethnicity (please circle below):

Black/African American Asian/Asian-American

White/Caucasian Hispanic/Latino/Mexican American

American Indian/Native Pacific Islander Multi-Racial

Other (please specify)_____

Grade Classification (please circle one):

Senior Junior Sophomore Freshman Graduate Student

Do you currently have health issues that would prevent you from particpating in completing basic motor skills?

1. No, I am not injured and can perform basic motor skills.

2. Yes, I am injured or have health concerns.

Please indicate a truthful reponse based on your perception to the following questions.

Please rate each statement below using the scale listed to the right.		
1. Please rate your **knowledge** in the sport of hockey.	1 (little to no knowledge)	2 (knowledge)
2. Please rate your **experience** regarding the sport of hockey.	1 (little to no experience)	2 (experience)

For each of the following statements, please rank how true each statement is about you. Reference the scoring scale to be accurate.	**Not true at all of me**	**Is partly true of me**	**Is fairly true of me**	**Is very true of me**
1. I feel pretty upset when I think that someone is angry with me.	1	2	3	4
2. I am hurt when people scold me or tell me that I have done something wrong.	1	2	3	4
3. I become very nervous and fearful when something bad happens to me.	1	2	3	4
4. I feel worried when I think I have done poorly at something.	1	2	3	4
5. I worry about making mistakes.	1	2	3	4
6. In new situations I am fearful compared with friends.	1	2	3	4
Please rank the following statements based on how true they are about you. (Check score rankings to be sure you are answering accurately)	**Not true at all of me**	**Is partly true of me**	**Is fairly true of me**	**Is very true of me**

1. When I am doing well at something, I like to keep doing it.	1	2	3	4
2. I am thrilled when good things happen to me.	1	2	3	4
3. I feel excited and full of energy when I get something I want.	1	2	3	4
4. I get really excited when I see an opportunity to get something I want.	1	2	3	4
5. I get very excited when I get close to winning a contest.	1	2	3	4
6. I do everything I can to get things I want.	1	2	3	4
7. When I want something, I usually do whatever it takes to get it.	1	2	3	4
8. When I see an opportunity to get something I want, I take it right away.	1	2	3	4
9. Nobody can stop me when I want something.	1	2	3	4
10. I am always willing to try something new if I think it will be fun.	1	2	3	4
11. I crave excitement and new sensations.	1	2	3	4
12. I often do things on the spur of the moment.	1	2	3	4
13. I will often do things for no other reason than that they might be fun.	1	2	3	4

Please circle the number which is the most correct statement about what you believe.

Rate to which degree you believe the following statement.	Natural Ability									Effort
1. Rate whether you think ability or effort is more important to sport performance.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

AT Survey 2 (Pre-Intervention)

The following questions pertain to feelings you may have experienced during this activiey. Please indicate how you felt when parcitpating. Read instructions carefully.

For each question below, think about the hockey wrist shot trials you just completed.	**Disagree a lot**	**Disagree**	**Neither Agree / Disagree**	**Agree**	**Agree a lot**
3. I felt enjoyment.	1	2	3	4	5
4. My enjoyment made me want to continue to participate.	1	2	3	4	5
5. It's so exciting I could participate for extended amounts of time.	1	2	3	4	5
6. I enjoy participating so much it energizes me	1	2	3	4	5
7. I got bored.	1	2	3	4	5
8. I think about what else I could be doing rather than this.	1	2	3	4	5
9. Because I got bored my mind began to wander.	1	2	3	4	5
10. I started yawning because I was so bored.	1	2	3	4	5

11. Thinking about participating makes me feel uneasy.	1	2	3	4	5
12. I felt scared to participate.	1	2	3	4	5
13. Because I was so nervous, I wanted to skip out on participating.	1	2	3	4	5
14. When I thought about participating, I felt anxiety.	1	2	3	4	5
15. I feel relieved.	1	2	3	4	5
16. I felt carefree.	1	2	3	4	5
17. I felt at ease.	1	2	3	4	5
18. I felt relaxed.	1	2	3	4	5

Rate how true these statements are based on the hockey wrist shot you just completed.	**Not True at all**		**Somewhat True**				**Very True**
1. I think that doing this task is useful.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2. I think this task was important to do.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3. I think doing this task could help me.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

Rate how true these statements are based on the hockey wrist shot you just completed.	**Not True at all**		**Somewhat True**				**Very True**
1. I thought I was pretty good at this activity.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
2. I thought I did pretty well at this activity, compared to other participants.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
3. After working at this activity for a while, I felt pretty competent.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
4. I am satisfied with my performance at this task.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
5. I was pretty skilled at this activity.	**1**	**2**	**3**	**4**	**5**	**6**	**7**

AT Survey 2 (Post-Intervention)

For each question below, think about the hockey wrist shot trials you just completed.	**Disagree a lot**	**Disagree**	**Neither Agree / Disagree**	**Agree**	**Agree a lot**
1. I felt enjoyment.	1	2	3	4	5
2. My enjoyment made me want to continue to participate.	1	2	3	4	5
3. It's so exciting I could participate for extended amounts of time.	1	2	3	4	5
4. I enjoy participating so much it energizes me	1	2	3	4	5
5. I got bored.	1	2	3	4	5
6. I think about what else I could be doing	1	2	3	4	5

rather than this.					
7. Because I got bored my mind began to wander.	1	2	3	4	5
8. I started yawning because I was so bored.	1	2	3	4	5
9. Thinking about participating makes me feel uneasy.	1	2	3	4	5
10. I felt scared to participate.	1	2	3	4	5
11. Because I was so nervous, I wanted to skip out on participating.	1	2	3	4	5
12. When I thought about participating, I felt anxiety.	1	2	3	4	5
13. I feel relieved.	1	2	3	4	5
14. I felt carefree.	1	2	3	4	5
15. I felt at ease.	1	2	3	4	5
16. I felt relaxed.	1	2	3	4	5

Answer the following question in regards to the video you watched before trials.		
1. After performing the hockey wrist shot, what do you believe was the main influence on your performance?	1. Ability	2. Effort
Answer the following question in regards to the video you watched before trials.		
1. According to the video, the main influence on performance for the hockey wrist shot is…	1. Ability	2. Effort

Skill Instructional Video Script

Instructional Video Script- Hockey Wrist Shot

Today you will be performing the hockey wrist shot. The purpose of this shot is to strike the puck off the ground and send it towards the goal. Ideally, you want the puck to leave the ground and hit the goal towards the top area. [example demonstration, full speed]. When you perform the shot, do your best to not just slide the puck across the ground. There are three critical skill cues when performing the wrist shot: they are ready, wrist snap, and follow through. Ready position begins with the stick on the ground behind the puck and with your body slightly aimed toward your intended target. Place the hand closest to the puck toward the middle to lower end of the stick and the opposing hand toward the top end of the stick [demonstrate]. The stick is then drawn back and off the ground away from the puck as the bottom hand will slowly raise the stick up and your palm will be facing the ground. Bring the stick to waist height before swinging the club back down toward the puck [demonstrate in slow motion]. The back swing and approach back towards the puck will happen in a quick motion when done at full speed. As you approach the puck you begin the second phase called the wrist snap. As you make contact with the puck your bottom hand will quickly pull up causing the palm to face up. Simultaneously, your top hand will pull the top of the stick down. This causes the puck to leave the ground as you make

contact. As you move through the wrist snap your shot will naturally lead to the follow through position which will also end around waist height. The head of the stick should end pointing to the target and the stick will be roughly perpendicular to the ground. Let's see the skill cues in slow motion again. Now in full speed. After this video you will try the hockey wrist shot in three separate trials. Each trial consists of 3 sets of 5 shots towards the goal. Researchers will be recording those sets as you perform the hockey wrist shot.

Treatment Video Scripts and Congruent Feedback

High Control Attribution Training (HCAT) Treatment Video

You have just completed the first round of trials using the hockey wrist shot. Although the wrist shot is a difficult task, you can improve your performance in a short amount of time with high effort and practice. Effort and practice are under your control. If you put in high effort and practice using all the skill cues, you can achieve expertise in even one day! During practice time it is important to keep up your effort and get as many quality practice trials as possible. The more quality wrist shot trials that you complete during practice, the more likely you will improve your performance. One major focus during practice should be to properly utilize the skill cues: ready, wrist snap, and follow through. During practice time, make sure you concentrate on using these skill cues. If at any time you feel yourself struggling with the wrist shot, try to focus on the skill cues and increase effort during practice because it will help improve your performance. Remember, you control effort and effort is the key to being successful when performing the wrist shot!

The researchers will be asking you to point out all the things you did that helped you improve today at the end of the trials. Next, the researcher will have you perform a second round of trials using the wrist shot.

HCAT Appropriate Feedback during Trial 2

- "The more times you practice and the more shots you take the more you are going to improve."
- "You are getting better compared to the first couple times you tried the shot."

Low Control Attribution Training (LCAT) Treatment Video

You have just completed the first round of trials using the hockey wrist shot. The hockey wrist shot is a difficult task. In most cases, if you aren't a "hockey" person, you won't be very good at the wrist shot. The wrist shot takes a lot of hockey ability. There is also a great deal of luck involved, especially if you don't play hockey. Ability and luck are not under your control. If you were a hockey player, you probably have more ability and control over your wrist shot performance. Although the researchers will ask you to perform the wrist shot again during trials, your performance will most likely not change very much from your first set of trials unless you

get lucky. Real hockey players have personalized equipment. This is also a major barrier for your performance today because you don't have a stick that fits your body-size. The wrong sized stick often prevents you from lifting the puck appropriately. Although you don't have much control over your performance, please complete all the wrist shot trials. Who knows you might get lucky and make a few!

As you complete the required trials try to think about things that prevented you from completing the task successfully. The researcher will ask you about these barriers when you are finished. Next, the researcher will have you perform a second round of trials using the wrist shot.

LCAT Appropriate Feedback during Trial 2

- "The wrist shot is mostly determined by your ability, you're either good at it or you're not very good at it."
- "Your success is based on your hand-eye coordination, you've either got it or you don't."

Control Group Attributional Treatment Video

As a review, the purpose of this shot is to strike the puck and send it towards the goal. Ideally, you want the puck to leave the ground and hit the goal towards the top. Do your best to not just slide the puck across the ground. The three critical skill cues of the wrist shot are: ready, wrist snap, and follow through. Ready position begins with the stick on the ground behind the puck and your body slightly toward the target. One hand is lower, closest to the puck and the opposing hand toward the top of the stick. The stick is drawn back away from the puck as the bottom hand rises with your palm facing the ground. Bring the stick to waist height before swinging the club back down toward the puck. The back swing and approach towards the puck will happen in a quick motion when done at full speed. As you approach the puck you begin the second phase called the wrist snap. At contact with the puck, your bottom hand will quickly pull up while your top hand will pull the stick down. Naturally, the follow through position will end with the stick head pointing towards the target perpendicular to the ground. Next, the researcher will record you performing the second round of trials.

Control Group Feedback during round 2 trials:

- "Good job"
- "Nice try"

APPENDIX E. STUDY 2 IRB APPROVAL

ACTION ON EXEMPTION APPROVAL REQUEST

Institutional Review Board
Dr. Dennis Landin, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu
lsu.edu/research

TO: Kelly Simonton
Kinesiology

FROM: Dennis Landin
Chair, Institutional Review Board

DATE: August 15, 2018

RE: **IRB#** E11144

TITLE: An investigation of relationships between student emotions and outcomes in physical education

New Protocol/Modification/Continuation: New Protocol

Review Date: 8/15/2018

Approved X **Disapproved**

Approval Date: 8/15/2018 **Approval Expiration Date:** 8/14/2021

Exemption Category/Paragraph: 2a

Signed Consent Waived?: No

Re-review frequency: (three years unless otherwise stated)

LSU Proposal Number (if applicable):

Protocol Matches Scope of Work in Grant proposal: (if applicable)

By: Dennis Landin, Chairman

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –
Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. **SPECIAL NOTE: When emailing more than one recipient, make sure you use bcc. Approvals will automatically be closed by the IRB on the expiration date unless the PI requests a continuation.**

* *All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.lsu.edu/irb*

APPENDIX F. STUDY TWO INFORMED CONSENT

ADMINSTRATOR CONSENT FORM

1. Study Title: An investigation of relationships between student emotions and outcomes in physical education.

2. Performance Site: Louisiana Middle Schools in the greater Baton Rouge area.

3. Investigators: The following investigators are available for questions about this study, M-F, 8:00 a.m. – 4:00 p.m.

   Mr. Kelly Simonton (225)-578-5954

   Dr. Alex Garn (225)-578-5954

4. Purpose of Study: The purpose of this study is to investigate a model of class-related emotions and related behavioral and cognitive outcomes in middle school physical education. This study can provide detailed information for researchers and teachers about the power of emotions in relation to both adaptive and maladaptive behaviors. The implications of findings could aid in our understanding of how to structure physical education classes that facilitate emotional patterns that optimize student outcomes.

5. Subject Inclusion: Middle school students who are enrolled in physical education classes.

6. Number of Subjects: 250 Middle School Students

7. Study Procedures: Middle school physical education teachers in the greater Baton Rouge area will be contacted to get initial permission to visit classes and recruit participants for the study. Students that agree to participate in the study will obtain parental permission and provide assent. The researchers will visit the classes twice throughout the semester and administer the surveys to the students. Surveys will address students' perceptions of their enjoyment, boredom, relief, and shame in class. As well as their engagement and disruptive behavior. Also, their recreational physical activity time and sedentary time outside of school. Demographic information including age, gender, and ethnicity will also be collected. The surveys will take approximately 15 minutes. Students will not place their names on the survey so results will remain completely

anonymous.

8. Benefits: There will be no specific benefits to the participants.

9. Risks: There are no foreseeable risks related to this research project. All informed consent sheets will be separated from each of the surveys. Furthermore, surveys and informed consent will be stored in secure but separate cabinets.

10. Right to Refuse: Subjects may choose not to participate or to withdraw from the study at any time without penalty or loss of any benefit to which they might otherwise be entitled.

11. Privacy: Results of this study may be published, but no names or identifying information will be included in the publication. Subject identify will remain confidential unless disclosure is required by law.

12. Signature: The study has been discussed with me and all of my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have any questions about subject's rights or other concerns, I can contact Dennis Landin, Institutional Review Board, (225)-578-8692. I agree to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

Administrator Signature: _____ Date: _____

PARENTAL CONSENT FORM

1. Study Title: An investigation of relationships between student emotions and outcomes in physical education.

2. Performance Site: Louisiana Middle Schools.

3. Investigators: The following investigators are available for questions about this study, M-F, 8:00 a.m. – 4:00 p.m.

   Mr. Kelly Simonton (225)-578-5954

   Dr. Alex Garn (225)-578-5954

4. Purpose of Study: The purpose of this study is to investigate a model of class-related emotions and related behavioral and cognitive outcomes in middle school physical education. This study can provide detailed information for researchers and teachers about the power of emotions in relation to both adaptive and maladaptive behaviors. The implications of findings could aid in our understanding of how to structure physical education classes that facilitate emotional patterns that optimize student outcomes.

5. Subject Inclusion: Middle school students who are enrolled in physical education classes.

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8. Benefits:	There will be no specific benefits to the participants.
9. Risks:	There are no foreseeable risks related to this research project. All informed consent sheets will be separated from each of the surveys. Furthermore, surveys and informed consent will be stored in secure but separate cabinets.
10. Right to Refuse:	Subjects may choose not to participate or to withdraw from the study at any time without penalty or loss of any benefit to which they might otherwise be entitled.
11. Privacy:	Results of this study may be published, but no names or identifying information will be included in the publication. Subject identify will remain confidential unless disclosure is required by law.
12. Signature:	The study has been discussed with me and all of my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have any questions about subject's rights or other concerns, I can contact Dennis Landin, Institutional Review Board, (225)-578-8692. I agree to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

Parent Signature: _____ Date: _____

The study subject has indicated to me that he/she <u>is unable to read</u>. I certify that I have read this consent form to the subject and explained that by completing the signature line above, the subject has agreed to participate.

Signature of Reader: _____ Date: _____

CHILD ASSENT FORM

I, _____, agree to be in a study to help understand emotional experiences in physical education. I will complete the surveys that give my perceptions of my positive and negative emotions that I experience during a typical class. I will also share other experiences like my engagement and disruptive behavior that I may display during class. Also, I will share my physical activity time and sedentary time that I experience outside of class.

Student Signature: _____ Age_____ Date _____

Witness*_____ Date_____

APPENDIX G. STUDY TWO INSTRUMENTATION

MS PE Surveys

Age: How old are you? (write in) _____

Gender (please circle): Male Female

Ethnicity (please circle below):

Black/African American Asian/Asian-American

White/Caucasian Hispanic/Latino/Mexican American

American Indian/Native Pacific Islander Multi-Racial

Other (please specify)_____

The following questions pertain to feelings you may experience DURING class. Please indicate how you feel, typically, during class.

	Disagree a lot	Disagree	Neither Agree / Disagree	Agree	Agree a lot
17. I enjoy being in PE.	1	2	3	4	5
18. I am proud of my performance in PE.	1	2	3	4	5
19. I get embarrassed in PE.	1	2	3	4	5
20. I enjoy participating in PE so much that I get energized.	1	2	3	4	5
21. I get bored in PE.	1	2	3	4	5
22. When I finish with PE class, I finally can breathe easy again.	1	2	3	4	5
23. Because I get bored in PE my mind begins to wander.	1	2	3	4	5
24. Thinking about the quality of PE makes me angry.	1	2	3	4	5
25. It's so exciting that I could stay in PE for hours.	1	2	3	4	5
26. When I participate in PE I feel like a fool.	1	2	3	4	5
27. I feel frustrated in PE class.	1	2	3	4	5
28. I am proud of how much I know in PE.	1	2	3	4	5
29. I think about what else I could be doing rather than PE.	1	2	3	4	5
30. After PE class, I feel very relieved.	1	2	3	4	5
31. Doing well in PE makes me feel important.	1	2	3	4	5
32. After PE class, I feel freed.	1	2	3	4	5
33. My enjoyment of PE makes me want to participate.	1	2	3	4	5

34. After my classmates watch me perform in PE I feel like I want to crawl in a hole.	1	2	3	4	5
35. Because I'm angry I get restless in PE class.	1	2	3	4	5
36. I like the attention I get for being good in PE.	1	2	3	4	5
	Disagree a lot	Disagree	Neither Agree / Disagree	Agree	Agree a lot
37. I am ashamed of my skills in PE.	1	2	3	4	5
38. I feel anger welling up in me during PE class.	1	2	3	4	5
39. I started yawning because I get so bored during PE.	1	2	3	4	5
40. After PE class I feel like I lifted a weight off my shoulders.	1	2	3	4	5

The following statements refer to your current physical education class.

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1. I try hard to do well in this class.	1	2	3	4	5
2. In class, I work as hard as possible.	1	2	3	4	5
3. When I'm in class, I participate in activities.	1	2	3	4	5
4. I pay attention in this class.	1	2	3	4	5
5. When I'm in class, I listen and follow directions very carefully.	1	2	3	4	5
6. When I'm in class, I feel good.	1	2	3	4	5
7. I am interested in this class.	1	2	3	4	5
8. This class is fun.	1	2	3	4	5
9. I enjoy this class.	1	2	3	4	5
10. When we work on something in class, I get involved.	1	2	3	4	5

Please circle the degree to which each statement applies to you in your current PE class.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. I sometimes annoy my teacher during PE class.	1	2	3	4	5
2. I sometimes get into trouble with my teacher during PE class.	1	2	3	4	5
3. I sometimes behave in a new way during PE class that annoys my teacher.	1	2	3	4	5
4. I sometimes don't follow my teacher's directions during PE class.	1	2	3	4	5
5. I sometimes disturb the lesson that is going on in PE class.	1	2	3	4	5

Please answer the following questions as it relates to your RECREATIONAL physical activity. Activity that you do outside of school and work only.

1. Do you do any **vigorous-intensity** sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate like [running or football] for at least 10 minutes continuously?
Activities are regarded as vigorous intensity if they cause large increases in breathing and/or heart rate.

1. Yes 2. No

2. In a typical week, on how many days do you do **vigorous-intensity** sports, fitness or recreational (leisure) activities? *"Typical week" means a week when the participant is engaged in his/her usual activities.* ***Valid responses range from 1-7***.

Number of days (please write) _____

3. How much time do you spend doing **vigorous-intensity** sports, fitness or recreational activities on a **typical day**? *Think of a typical day you can recall easily in which you engaged in recreational vigorous-intensity activities. The participant should only consider those activities undertaken continuously for 10 minutes or more.* (if you exercise for one-hour in a typical day write 60, for 60 minutes)

Minutes: _____

4. Do you do any **moderate-intensity** sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate such as brisk walking, [cycling, swimming, volleyball] for at least 10 minutes continuously? *Think about recreational moderate-intensity activities only. Activities are regarded as moderate intensity if they cause small increases in breathing and/or heart rate.*

1. Yes 2. No

5. In a typical week, on how many days do you do **moderate-intensity** sports, fitness or recreational (leisure) activities? *"Typical week" means a week when the participant is engaged in his/her usual activities.* ***Valid responses range from 1-7***.

Number of days (please write) _____

6. How much time do you spend doing **moderate-intensity** sports, fitness or recreational (leisure) activities on a typical day? *Think of a typical day you can recall easily in which you engaged in recreational moderate-intensity activities. The participant should only consider those activities undertaken continuously for 10 minutes or more.* (if you exercise for one-hour in a typical day write 60, for 60 minutes)

Minutes: _____

The following question is about sitting or reclining at work, at home, getting to and from places, or with friends including time spent sitting at a desk, sitting with friends, traveling in car, bus, reading, playing cards or watching television, but do not include time spent sleeping.

7. How much time do you usually spend sitting or reclining on a typical day?
Consider total time spent sitting reading, watching television, using a computer, playing video games, resting etc. The participant should ***not*** *include time spent sleeping*. (If you sit at school for 4 hours a day and watch TV for 2 hours you would have 6 hrs of sitting or reclining, you would write 360 minutes)

Minutes:_____

Thank you for completing the survey!

VITA

Kelly L. Simonton Jr., was born in Cheyenne, Wyoming and raised in Wheatland, Wyoming. He received his bachelor's degree from the University of Wyoming in Kinesiology with an emphasis in K-12 Physical Education Teacher Education. Kelly moved to Louisiana to attend Louisiana State University to pursue higher education and earn a master's degree. His interests guided him toward an advanced knowledge regarding achievement motivation, specifically about the influence of teacher pedagogy and the subjective student experience. After completing his master's degree in 2016, he stayed at Louisiana State University to pursue a doctoral degree. Kelly has worked in the Physical Education Teacher Education department at Louisiana State training pre-service teachers and has maintained a line or research focusing on emotion and motivation in Physical Education settings. He is a candidate to graduate in May 2019 and plans to begin working in higher education as an Assistant Professor.