

UNDERSTANDING STUDENTS' MOTIVATION IN PHYSICAL EDUCATION:
INTEGRATION OF EXPECTANCY-VALUE MODEL AND SELF-EFFICACY
THEORY

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FOREWORD

This dissertation consists of three manuscripts which will be submitted for publication. All the three studies, Chapter 2, Chapter 3, and Chapter 4, are quantitative studies. The manuscripts investigate middle school students' motivation and the factors that influence motivation from the perspectives of the expectancy-value model of achievement choice and self-efficacy theory.

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ABSTRACT

The purpose of this dissertation was to integrate the expectancy-value model of achievement choice and self-efficacy theory among middle school students, with the goal of better understanding students' motivational beliefs and the factors that influence these beliefs. Three quantitative studies were conducted to address this purpose. In study 1, the expectancy-value model constructs (expectancy-related beliefs and subjective task values) and self-efficacy theory constructs (self-efficacy and outcome expectancy) were measured in a sample of 225 students and were used to predict students' in-class activity levels during a 2-week follow-up. Results of path analyses yielded that the hypothesized model fit the data well. Specially, self-efficacy had the greatest effect on activity levels followed by subjective task values. Expectancy-related beliefs and outcome expectancy indirectly predicted activity levels via self-efficacy. The overall variances in self-efficacy and in-class activity levels explained by the model were 54% and 23%, respectively.

Study 2 investigated how students' motivation toward physical education changed over the course of one school year among 206 students, and how grade and gender affected motivation. The results highlight that, self-efficacy and subjective task values were significant predictors of students' intention for future participation in physical education across cohorts. This longitudinal study revealed a consistent decline in the mean levels of the study variables. However, there were no gender differences for any of the study variables. Study 3 examined the effects of two different learning contents (soccer and fitness) on students' motivational beliefs (self-efficacy, subjective task values, and outcome expectancy) and their in-class activity levels. The results suggest that students reported higher scores in self-efficacy and outcome expectancy toward

fitness than they did toward soccer. Nevertheless, students exhibited significantly higher in-class activity levels in the soccer class than they did in the fitness stations class. The results were interpreted from the perspectives of expectancy-value model and self-efficacy theory, and the educational implications were provided for physical education teachers and practitioners.

CHAPTER 1: INTRODUCTION

The rapid rise of obesity among America school children is partly due to physical inactivity and could lead to future health problems such as cardiovascular disease and diabetes (U.S. Department of Health & Human Services [USDHHS], 1996, 2001). School physical education programs have the potential to increase physical activity levels for all children and therefore, can play a critical role in promoting public health (Wallhead & Buckworth, 2004). However, research documents poor student motivation for active participation and low in-class activity levels in physical education. Further research is required to gain a better understanding of the relations of children's motivational beliefs and in-class activity levels, with the goal of encouraging children to be more physically active and adopt a healthy lifestyle.

As a central construct of motivation, expectancy beliefs represent the key idea that most individuals will not choose to do a task or continue to engage in a task when they expect to fail. It is important to note, however, that the influence of expectancy beliefs is only observed when adequate incentives (i.e., perceived importance and outcome values) for behaviors are presented (Bandura, 1986; Pintrinch & Schunk, 1996). Accordingly, researchers must consider both expectancy beliefs and the related incentives when investigating children's motivation. Currently, there are a variety of motivation theories that include these constructs in some form. Among them, the expectancy-value model and self-efficacy theory have frequently been applied in sport and educational contexts (Bandura, 1986, 1997; Eccles et al., 1983), and each has shown promise in explaining students' motivation and achievement outcomes. These two theories, however, have been examined separately in past work in physical education. Eccles and Wigfield (2002) have argued that there is a need for theoretical integration in the field, particularly with

respect to theories that incorporate expectancy beliefs and incentives. Therefore, this study was an initial attempt to integrate the expectancy-value model and self-efficacy theory.

EXPECTANCY-VALUE MODEL OF ACHIEVEMENT CHOICE

The expectancy-value model of achievement choice was proposed by Eccles and her colleagues (Eccles et al., 1983). According to this model, students' achievement performance, the amount of effort exerted, persistence, and choice of achievement tasks are influenced by their expectancy-related beliefs and the values they attach to achievement tasks.

Expectancy-related Beliefs

In the Eccles et al. model (1983), expectancy-related beliefs consist of both beliefs about ability and expectancies for success. Beliefs about ability are defined as individuals' evaluations of their competence in different achievement tasks. Expectancies for success refer to individuals' beliefs about how well they will do on an upcoming task and are closely related to their beliefs about ability. Research focusing on students' expectancy-related beliefs about different tasks in physical education demonstrates that this construct plays a crucial role in students' motivation and influences their achievement outcomes such as performance in a running program (Xiang, Chen, & Bruene, 2005; Xiang, McBride, & Bruene, 2004a, 2006).

Subjective Task Values

According to Eccles et al. (1983), subjective task values are defined as incentives for engaging in different tasks. Attainment value (importance), intrinsic value (interest), and utility value (usefulness) comprise important aspects of subjective task values. Importance concerns the personal importance of doing well on the task in terms of salient aspects of one's self-schema and core personal values (e.g., achievement needs and competence needs). Interest refers to the enjoyment an individual gets from performing the task or the subjective interest the individual

has for the task. Some researchers consider this component similar to the construct of personal interest (Pintrich, Ryan, & Patrick, 1998). Usefulness refers to how a task fits into an individual's current or future goals. In physical education, there is some evidence to suggest that subjective task values are a critical dimension affecting achievement outcomes.

Similar to the predictive utility of these two constructs in academic domains (Eccles et al., 1983; Schunk, 1991; Stipek & Mac Iver, 1989), empirical studies in sport and physical education indicate that individuals' expectancy-related beliefs predict their achievement performance and the amount of effort exerted, whereas subjective task values predict both individuals' actual and anticipated task choice, and engagement (Eccles & Harold, 1991; Cox & Whaley, 2004; Xiang et al., 2004a, 2005, 2006; Xiang, McBride, & Bruene, 2004b). For example, students' expectancy-related beliefs made a significant contribution to the prediction of their one-mile running performance, while interest and importance were predictors for intention to future participation in running (Xiang et al., 2004a, 2006).

SELF-EFFICACY THEORY

Self-efficacy theory comes from social cognitive theory and includes self-efficacy and outcome expectancy as major constructs (Bandura, 1986, 1997). This theory proposes that an individual's achievement behavior can be explained and predicted by self-efficacy and outcome expectancy.

Self-efficacy

Self-efficacy, a situational-specific expectancy belief, refers to beliefs about one's capabilities to learn or perform behaviors at designated levels (Bandura, 1986, 1997). Generally, individuals who feel efficacious are more likely to perform better, try new behaviors, use effective strategies, expend more effort on those behaviors, and persevere longer when they

encounter challenges. In particular, higher self-efficacy leads to greater persistence and better performance than lower self-efficacy. In physical education, children with higher self-efficacy tend to choose to participate in physical education, attribute failure to lack of effort, and have higher future self-efficacy than those with lower self-efficacy (Chase, 2001).

Outcome Expectancy

Outcome expectancy, defined as incentives within the self-efficacy theory, refers to a person's beliefs concerning the likely outcomes of a behavior (Bandura, 1997; Rodgers & Brawley, 1991). As the importance of an outcome and the degree of its influence can have a great deal of variability among individuals, it is crucial not to presume that outcomes could always act as incentives for motivated behavior (Maddux, 1995; Rodgers & Brawley, 1991, 1996). As a result, Maddux and his colleagues (1986) modified self-efficacy theory by adding outcome values as a component of this theory. Rodgers and Brawley (1991) further proposed that outcome expectancy is formed by the interaction of two factors: (a) outcome likelihood, which refers to the probability that a certain action will lead to a certain outcome; and (b) outcome values, which refer to the values the individual assigns to the possible outcomes of the behavior. This form of conceptualization is in line with the theoretical foundation which highlighted the importance of incentives in influencing behavior (Bandura, 1986, 1997) and, therefore should have considerable value in examining students' motivation and achievement behaviors. One recent study (Gouda & Dermtizaki, 2004) found that outcome expectancy was moderately related to students' perceived usefulness of physical education and intrinsic motivation toward physical education.

Research focusing on the ways self-efficacy and outcome expectancy might operate together to impact motivation and achievement outcomes has produced mixed findings, with

some indicating that outcome expectancy accounted for little variance in behavior or intentions after self-efficacy was considered (Dzewaltowski, 1989; Dzewaltowski, Noble, & Show, 1990; Rovniak, Anderson, Winett, & Stephen, 2002), whereas others suggesting that both constructs were independent predictors of behavior or intentions in sport and physical activity (Dasharnais, Bouillon, & Godin, 1986; Gao, 2008; Gao, Xiang, Lee, & Harrison, in press; Rodgers & Brawley, 1993, 1996; Rodgers & Gauvin, 1998). In light of these differences in research findings, this dissertation investigated these two constructs simultaneously in physical education.

Specifically, in the first study, the mediating role of self-efficacy on students' motivational beliefs and in-class activity levels was examined with the prospective data. Study two aimed to investigate the age-related changes and gender differences of the motivational beliefs over the course of one school year, and the patterns of relationships among the motivational beliefs and intention for future participation over time. In the third study, the effects of two different curricular activities on students' motivation and in-class activity levels were examined.

CHAPTER 2: EXAMINING THE MEDIATING ROLE OF SELF-EFFICACY IN AN INTEGRATIVE FRAMEWORK

There are conceptual similarities and differences between the expectancy-value model and self-efficacy theory. In particular, self-efficacy is similar to expectancy-related beliefs in several ways. First, both self-efficacy and beliefs about ability are personal views about one's perceived capability. Second, self-efficacy is defined as future-oriented beliefs (long-term or short-term), which shares some characteristics with expectancies for success. Albeit there are conceptual similarities, self-efficacy differs from expectancy-related beliefs in that self-efficacy judgments are more situation-specific and are used by individuals in reference to some type of goal (Bandura, 1986, 1989; Pintrich & Schunk, 1996), while expectancy-related beliefs refer to contextual beliefs such as beliefs in one's ability in a sub-domain (e.g., physical, social, academic).

Likewise, there is an important conceptual distinction between expectancies for success and outcome expectancy. These two constructs are similar in that both involve the anticipated outcome of engaging in a task. However, expectancies for success represent the assignment of a probability of a "successful" outcome while outcome expectancy focuses on the anticipated outcome of the motivated behavior. Bandura (1997) argued that expectancy-value theorists historically have focused on outcome expectancy, but Wigfield and Eccles (2000) contend that in their work they measured individuals' own expectancies for success but not outcome expectancy within the self-efficacy theory. Indeed, these researchers considered their expectancy construct more similar to Bandura's self-efficacy construct, whereby outcome expectancy might play the role of providing incentives which may have the same function as subjective task values in the expectancy-value model.

In addition, it is clear that the values an individual places on either the task (subjective task values) or the outcome (outcome values) could affect his or her achievement motivation and behaviors, but the two constructs are conceptually different. Subjective task values concerns an individual's perceived beliefs about interest, importance, and utility of a task or domain. In contrast, outcome values refer to how certain outcomes relative to others are more desirable for different individuals. Specifically, a person who values the outcome or finds the outcome more attractive will be more motivated to attain the outcomes. Although Bandura (1997) proposed that the motivating potential of anticipating outcomes is largely determined by the perceived values that an individual places on the task, it is possible that an individual values a task as the result of outcome values he or she has for the task.

Currently, one of the thorniest problems to confront the study of these motivation theories is the causality and direction of causality. This chick-or-egg question has been an important focus of the expectancy-value model and self-efficacy theory (Bandura, 1997; Pajares, 1996; Wigfield & Eccles, 1992). It is well documented that expectancy-related beliefs and self-efficacy are theoretically and empirically similar. Recently, researchers have suggested that self-efficacy is more accurate in predicting achievement behaviors than global or contextual level expectancy beliefs (i.e., expectancy-related beliefs) (Hu, McAuley, & Elavsky, 2005; Moritz, Feltz, Fahrbach, & Mack, 2000). Indeed, expectancy-related beliefs and self-efficacy can be located within the same stage of generality in Vallerand's (1997) hierarchical model of motivation. Vallerand presented a motivation sequence in three stages of generality: global (i.e., self-concept), contextual (i.e., expectancy-related beliefs), and situational (i.e., self-efficacy). According to this model, beliefs at the situational level result from a top-down effect of beliefs at the higher level (i.e., contextual) in the hierarchy (Vallerand, 2001). More specifically, it is

proposed that expectancy-related beliefs should have a strong impact on self-efficacy, and in turn, self-efficacy would affect motivated behaviors. Findings in academic domains support this postulation by stating that self-efficacy mediates other self-beliefs on subsequent achievement (Bandura & Schunk, 1981; Bouffard-Bouchard, 1990; Schunk & Hanson, 1985). Pajares and Johnson (1996) also suggested that students' writing self-efficacy had a direct effect on their writing performance and played the mediation role between writing self-concept and performance.

Bandura (1986, 1997) argued that the outcome expectancies individuals endorse are largely dependent on their judgments of what they can accomplish. He posited that self-efficacy influences behavior both directly and indirectly through outcome expectancy (1997). That is, self-efficacy would affect outcome expectancy, and in turn, outcome expectancy would affect behavior. However, others have argued that outcome expectancy causally precedes self-efficacy. For example, previous studies have shown that when valued incentives are offered, self-efficacy can be increased for behaviors in exercise and physical activity (Corcoran & Rutledge, 1989; Kirsch, 1982). It follows that decreasing expected aversive outcomes and increasing expected positive outcomes of physical activity would increase self-efficacy for physical activity. Therefore, it is possible that, for physical activity contexts, including physical education, outcome expectancy can operate to influence self-efficacy (Gao, Lee, & Harrison, in press; Williams, Anderson, & Winnet, 2005).

Another concern focuses on the direction of causality of self-efficacy and subjective task values. Although Bandura (1986) acknowledged that individuals are more likely to strive on tasks they value, few studies have examined how individuals' valuing of different tasks plays a role in their self-efficacy. Wigfield and Eccles (1992) argued that students' subjective task values

could influence the magnitude of self-efficacy. In their study with high school students, Randhawa and colleagues (1993) found that math attitudes (i.e., subjective task values) had a strong direct effect on self-efficacy and performance in addition to the effect of self-efficacy on performance. In addition, consistent with the tenets of expectancy-value theory, Marzillier and Eastman (1984) suggested that an individual's perceived values of the task would regulate his or her behavior as powerful as self-efficacy, and independently of self-efficacy.

AN INTEGRATIVE FRAMEWORK

Conceptual similarities make it possible to integrate the expectancy-value model and self-efficacy theory. Few studies, however, have been conducted to include all the constructs of the expectancy-value model and self-efficacy theory within an integrative framework. Furthermore, the mediating effect of self-efficacy on other constructs remains largely unexplored in the context of physical education. Integrating these two theoretical frameworks may, accordingly, offer important insights into the constructs that mediate students' motivation and achievement behaviors. A prospective research design allows the researchers to follow the participants and measures or observes the behavior of the participants. In this 2-week prospective study, structural equation modeling (SEM) was used to analyze the study data. Many studies exploring the relations between the expectancy-value model or self-efficacy theory constructs and achievement behaviors have used multiple regression analyses. However, SEM can be used as a more powerful alternative. Advantages of SEM compared to multiple regression analyses include: (a) the desirability of testing models overall rather than coefficients individually; (b) the ability to test models with multiple dependent variables; (c) the ability to model mediating variables; and (d) the ability to model error terms (Kline, 2005). Furthermore, previous studies have primarily been cross-sectional design. Prospective analyses, which allow a chronological

ordering of variables, can give us increased confidence that the expectancy-value model and self-efficacy theory constructs influence students' in-class activity levels in physical education.

Therefore, a prospective research design (e.g., use of psychosocial constructs to predict future behavior) that examines simultaneously the effects of the predictors (e.g., path analysis over multiple regression analyses) was selected for use in this study to accurately identify temporal predictive strength in this study (Carron, Hausenblas, & Estabrooks, 2003; Kline, 2005).

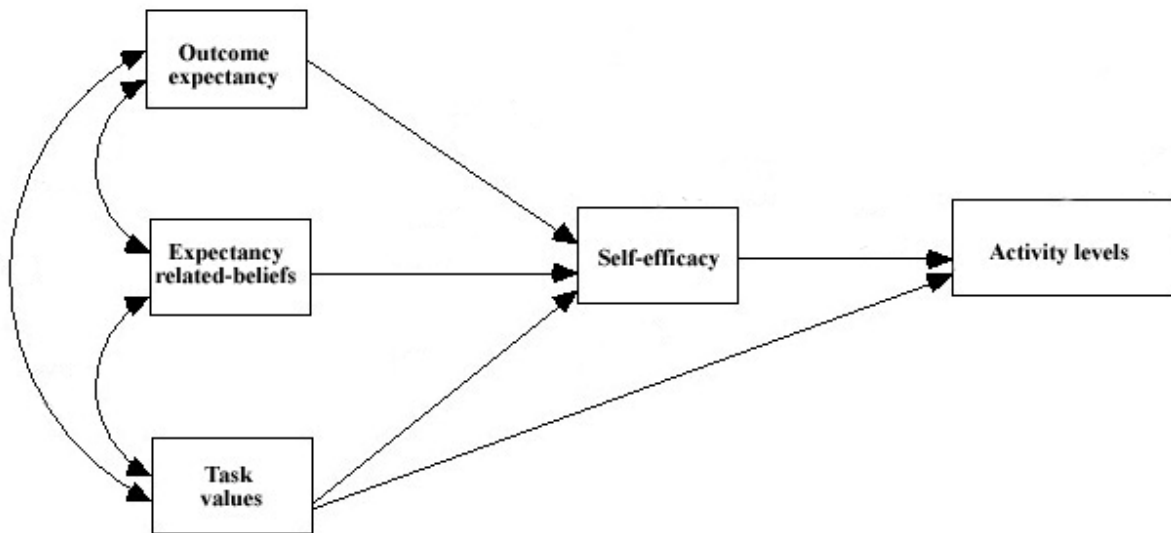


Figure1. The hypothesized model

In sum, this study used prospective data to examine the mediating role of self-efficacy on motivational beliefs and future in-class activity levels in middle school physical education within an integrative model. In the hypothesized model, the mediating role of self-efficacy on other constructs (i.e., expectancy-related beliefs, subjective task values, and outcome expectancy) was examined (See Figure 1). Based on the theoretical frameworks of the expectancy-value model and self-efficacy theory and empirical studies, the following hypotheses were proposed. First, it was hypothesized that self-efficacy would be the strongest predictor of students' in-class activity levels followed by subjective task values. Second, expectancy-related beliefs, outcome

expectancy, and subjective task values would significantly predict self-efficacy. Third, self-efficacy would mediate the relations between expectancy-related beliefs, outcome expectancy, and in-class activity levels.

METHODS

Participants and Setting

Given that students' motivation to participate in physical education and sport programs actually declines over the school years, and this decline is greater for the adolescents than young children, the middle school years are considered a critical period in the development of children's knowledge, attitudes, beliefs, and behaviors (Fredricks & Eccles, 2002; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002; Malina, 1996; Rowland, 1999; Thomas, Lee, & Thomas, 2003). The motivational beliefs and behaviors operating during this period impact adolescents far beyond the middle school years and well into adulthood. Therefore, this study focused narrowly on the middle school students. The participants were 225 6th - 8th graders enrolled in one public school in the Southern region of the United States. Included in this study were nine classes, with three classes from each grade, and including 75 six graders, 75 seventh graders, and 75 eighth graders respectively. The participants of the same grade had a 60-minute physical education class taught by three physical education teachers at the same block on every other day. All the teachers had more than 10 years teaching experiences and they taught each class of each grade by rotating classes every three weeks during the time of data collection.

When students arrived in the gym, the physical education teachers took attendance. Then the students participated in warm-up, activities, and games. The instructional contents consisted of a variety of movement and sport skills, including soccer, capture the flag, jogging/walking, and physical fitness. A typical class included introducing skills to be learned, organizing students

for practice during the middle of the class, and providing closure to the lesson at the end of the class. To avoid the confounding effect of the learning content on the variables used in this study, students' motivational beliefs and in-class activity levels were measured in the fitness activity classes during the period of data collection.

Research Design

This study used a prospective design. All self-report measures used in the hypothesized model (See Figure 1) were measured at Time 1. The data were collected during regular physical education classes. The average time required to complete the survey was about ten minutes. The physical education teachers and the researcher managed students seating in the gym and the researcher administered the survey by explaining how to respond to the questions. Students were encouraged to answer truthfully and they were assured that their responses were anonymous and were not affect their physical education grades. The researcher clearly stated that there were no right or wrong answers, and the teachers would not have access to their responses. In addition, the researcher monitored and helped students by answering any questions they had. The in-class activity levels measures used in the models were measured during a 2-week follow-up (Time 2).

Specifically, at time 1, the 225 middle school students (112 boys, 113 girls) completed the measures of demographic variables, expectancy-related beliefs, self-efficacy, outcome expectancy, and subjective task values. Two weeks after the Time 1 assessment, students' in-class activity levels were measured using accelerometers (Actical activity monitors) for one regular physical education class. The accelerometers were locked to the corresponding waistbands before each class. The accelerometers along with waistbands were then distributed to students while the teachers were taking roll. Each student was assigned an identification number which matched the number on his or her waistband at the first time. The researcher and the

research assistants helped students attach the waistbands and made sure the waistbands were put in the right location.

Univariate outliers were detected by transforming the data to z-scores. Following a recommendation of Stevens (1992), when the sample size is relatively large (e.g., $n > 100$), any z value greater than + 4.00 or less than - 4.00 indicates an unlikely value and this extreme value should be considered an outlier. If the researcher determines that the extreme value was correctly entered and that the subject is simply different from the rest of the sample, then it is appropriate to drop the case from the analysis (Mertler & Vannatta, 2005). In the present study, three outliers and 15 students with missing data were identified and excluded from the study. Therefore, the final sample size comprised 207 students (M age = 12.4, $SD = \pm .99$, age range = 10 - 14; 103 boys, 104 girls). The participants had the following self-report ethnic breakdown: White-American ($n = 177$), African-American ($n = 21$), Hispanic American ($n = 5$), Asian American ($n = 3$), and undeclared ($n = 1$). Permission to conduct this study was obtained from the University Institutional Review Board and consent to participate in the study was obtained from all participants prior to the start of the study.

Measures

The variables included in the hypothesized model were expectancy-related beliefs, self-efficacy, outcome expectancy, and subjective task values assessed at Time 1, and in-class activity levels assessed at Time 2.

Preliminary Work. Prior to conducting this study, pilot work was done with 194 middle school students in the May of 2006 (see Appendix D). Standardized self-report questionnaires were used to assess students' expectancy-related beliefs, subjective task values, outcome expectancy, and self-efficacy. The first two measures were from questionnaires developed and

used by Xiang and her colleagues among elementary and middle school students (Xiang et al., 2004a; Xiang, McBride, Guan, & Solmon, 2003). The instruments have demonstrated acceptable validity and internal consistency ($\alpha = .74 - .83$) in physical education settings. The measure of outcome expectancy was from a recent study conducted with middle school students by Goudas and Dermtizaki (2004). The scale has acceptable validity and internal consistency ($\alpha = .81$) in the 2004 study. To assess the self-efficacy construct, six items were adapted from a previous study (Rodgers & Brawley, 1996) and Bandura's (2006) *Guide for Constructing Self-efficacy Scales*. A panel of five knowledgeable professionals (two sports psychologist and three sport pedagogy faculty) agreed with the acceptability of the content validity of this measure prior to the pilot work. In the pilot study, the measures were tested for internal consistency. Cronbach's alpha coefficients for the four measures were .86, .87, .85, and .84, respectively. Therefore, it was concluded that these measures were appropriate for the target population in this study.

Demographic Variables. Self-report information on sex, race, grade, age, height, and weight was obtained from the questionnaires to characterize the sample.

Expectancy-related Beliefs. The students were asked to rate their general ability in physical education using a 5-point scale. They were asked: (a) How good are you at activities and games in physical education? (1 = very bad, 5 = very good); (b) Compared to other students, how good at physical education are you? (1 = one of the worst, 5 = one of the best); and (c) Compared to other school subjects, how good at physical education are you? (1 = a lot worse in this activity, 5 = a lot better in physical education). The students were asked two questions to assess expectancies for success in physical education on a 5-point scale: (a) How good would you be at learning something new in physical education this year? (1 = very bad, 5 = very good); and (b) How well will you learn activities and games in physical education this year? (1 = not at

all well, 5 = very well). The average score of these five items was used as measure of students' expectancy-related beliefs.

Subjective Task Values. In this study, subjective task values consisted of importance, interest, and usefulness. Two questions were used to assess importance using a 5-point scale. The students were first asked, "For me, being good at the activities in physical education class is....." (1 = not very important, 5 = very important), and "Compared to your school subjects, how important is it to you to be good at activities in physical education?" (1 = not very important, 5 = very important). Two questions were also used to assess interest, again using a 5-point scale: "In general, I find learning new activities in physical education is..." (1 = "way" boring, 5 = "way" fun), and "How much do you like activities in physical education?" (1 = don't like it at all, 5 = like it very much). Two questions were again posed to assess usefulness. One question asked, "Some things that you learn in school help you do things better outside of class. We call this being useful. For example, learning about plants might help you grow a garden. In general, how useful is what you learn in physical education?" (1 = not useful at all, 5 = very useful). The second question asked, "Compared to your other school subjects, how useful is what you learn in physical education?" (1 = not useful at all, 5 = very useful). The average score of these six items was used as an overall indication of students' subjective task values toward physical education.

Self-efficacy. Participants responded to six items on a 5-point Likert-type scale anchored from 1 (strongly disagree) to 5 (strongly agree), with the stem "With regard to this week's physical education class, I have confidence in..." Two sample answers were "my ability to do well in physical education class" and "my ability to learn skills in physical education class." The

mean of these six items was taken to give an overall indication of the magnitude of a student's efficacy beliefs for physical education class.

Outcome Expectancy. To measure outcome likelihood, students rated the likelihood of occurrence of ten different possible outcomes of participating in physical education class using a 7-point Likert-type scale (1 = very unlikely, 7 = very likely). To measure outcome values, students rated each of the outcomes in terms of its value for them on 7-point Likert-type scale (1 = very unimportant, 7 = very important). Sample outcomes included knowing how to exercise after finishing school, developing a nice body, developing physical conditioning, learning how to exercise to improve health, and learning to cooperate. The product of likelihood and value was calculated for each of the outcomes, and the mean of these 10 outcomes was then used as an overall indication of outcome expectancy.

In-class Activity Levels. To measure students' in-class activity levels, Actical activity monitors were utilized (Mini-Mitter Co., Inc., Bend, OR) for one regularly scheduled physical education class. Actical activity monitors were selected for this study because they have advantages over other monitors (i.e., compact size, child proof, waterproof) and they are the newest and the smallest uniaxial accelerometer (28 x 27 x 10 mm, 17 grams with a watch battery) that can record movement in all directions. In this study, the Actical devices were worn at the students' hip, and could record physical activity counts for up to approximately 12 days using 15-second epochs or 45 days using 1-minute epochs. The sampling frequency for the Actical devices is 32 Hz, and sensitivity is 0.01 grams. The devices collect motions in the frequency range of 0.5-3.0 Hz. Actical devices are programmed and downloaded by connecting the monitor to a serial port computer interface using Actical Readers. Once data has been downloaded to corresponding software, data files can be exported into a Microsoft Excel format

(Microsoft Corporation, Redmond, WA). The devices are the ideal physical activity monitor for use with children. Most recently, researchers have demonstrated acceptable validity and reliability of Actical activity monitors when used with children (McIver, Pfeiffer, Almeida, Dowda, & Pate, 2004; Puyau, Adolph, Vohra, & Butte, 2002; Puyau, Adolph, Vohra, Zakeri & Butte, 2004).

Given the duration (short-period) of the physical education class and the aims of this study, activity counts were measured in 15-second epochs to better capture the activity patterns of children, and in-class activity levels were quantified as average activity count per minute (average count/min) for the moderate to vigorous intensity activities. Average activity levels were calculated by averaging the mean activity counts accumulated during moderate and vigorous intensity activities and dividing by the duration of the physical education class (i.e., 60 minutes).

Data Analyses

Data were analyzed in three steps. First, Cronbach's coefficient alphas were computed to ensure the internal consistency of the self-report measures. Second, descriptive statistics and Pearson product-moment correlations were calculated to describe the sample and evaluate simple correlations. Additionally, a series of path analyses were employed to test the mediating effects of self-efficacy within the hypothesized model. Prior to the path analysis, the measured variables in the model were examined for their normality.

According to Baron and Kenny (1986), a variable functions as a mediator when the following three criteria are met: (a) the independent variable significantly affects the presumed mediator; (b) the mediator significantly predicts the dependent variable; (c) when the above two effects are controlled, "a previously significant relationship between the independent and the

dependent (outcome) variable is no longer significant, with the strongest demonstration of mediation occurring when path c is zero” (p. 1176). Based on the third criterion, the indirect effect of the independent variable on the dependent variable via the mediator needs to be calculated to confirm the predictive strength of the mediator (Figure 2).

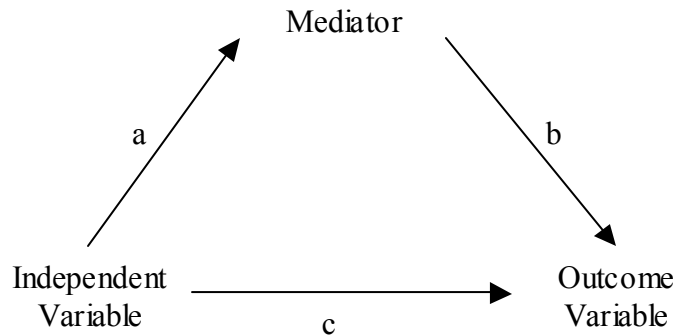


Figure 2. Mediator criteria (Baron & Kenny, 1986)

Specifically, a path analysis (over identified models) was conducted using Amos 5.0 (Arbuckle, 2003) to test if the hypothesized model fit the data, and examine if the first two mediator criteria were met. With a good fit, one additional path analysis was performed to identify the direct effects of the independent variables (i.e., expectancy-related beliefs, subjective task values, and outcome expectancy) on the dependent variable (in-class activity levels). Finally, another path analysis was conducted using the just identified models (equal numbers of parameters and observations) to test the third mediator criterion. Path analysis is an advanced technique to simultaneously test for mediator and outcome effects. It belongs to the structural equation modeling family tree and reflects the structural model of the hybrid model (i.e., path and measurement models). In this study, a single observed measure (e.g., average score) was used for each variable. Considering the research conceptualization and purpose, the size of the

research sample, and the way data were treated, path analysis reflects an appropriate statistical technique to analyze the data in this study (Kline, 2005).

Maximum likelihood estimation was used to evaluate the fit of the integrative models to the empirical data. Acceptable model fit was assessed using multiple indices. The overall fit of the model to the data was examined via the chi-square test (χ^2). A nonsignificant χ^2 indicates the model to be an acceptable fit to the data (Tabachnick & Fidell, 2001). Root mean square error of approximation (RMSEA) represents closeness of fit, and values approximating .06 and zero demonstrate close and exact fit of the model (Hu & Bentler, 1999). The 90% confidence interval (CI) around the RMSEA point estimate should also contain .06 or zero to indicate close or exact fit, respectively. The comparative fit index (CFI), the Tucker-Lewis index (TLI), and the normed fit index (NFI) test the proportionate improvement in fit by comparing the hypothesized model (over identified model) with the just identified model. Minimally acceptable fit was based on CFI and TLI and NFI values of .90; values approximating .95 indicated good fit (Hu & Bentler, 1999).

RESULTS

Descriptive Analyses

Internal consistency of the self-report measures is listed in Table 1. As shown, Cronbach's alpha coefficients for the measures exceeded .70, representing acceptable internal consistency. Table 1 also shows that the descriptive statistics for the whole sample and the bivariate correlations among the variables. In general, students displayed high expectancy beliefs and incentives toward physical education, as all mean scores of these variables were above the midpoint of the measures (i.e., 3 for expectancy-related beliefs, subjective task values, and self-efficacy; 25 for outcome expectancy). Additionally, students exhibited large variability on in-

class activity levels as the average activity counts ranging from 1949 counts/min to 7863 counts/min. Correlation analyses revealed that all the variables were significantly and positively related to one another ($r = .29 - .63, p < .01$ for all). The moderate-to-high relationships between the mediator and the independent variables reinforce the importance to report indirect effects of the independent variables on in-class activity levels via the mediator in the third mediator criterion (just identified model). In this way, the unique contribution of each independent variable can be estimated (Baron & Kenny, 1986).

Table 1. Descriptive statistics, internal reliabilities, and correlations among variables

Variable	1	2	3	4	5
1. Expectancy-related beliefs	.82				
2. Self-efficacy	.63*	.86			
3. Outcome expectancy	.47*	.63*	.83		
4. Task values	.51*	.48*	.51*	.85	
5. Activity levels	.36*	.46*	.29*	.36*	-
<i>M</i>	3.99	4.08	34.00	3.58	3781
<i>SD</i>	.58	.66	11.28	.79	926
<i>Max.</i>	5.00	5.00	49.00	5.00	7863
<i>Min.</i>	1.80	2.17	4.00	1.50	1949

Cronbach alpha coefficients are provided along the diagonal. *M* = mean; *SD* = standard deviation. * $p < .01$.

The Mediating Role of Self-efficacy on In-class Activity Levels

The hypothesized model demonstrated a good fit to the data, $\chi^2(2, N = 207) = .592, p = .55, CFI = 1, TLI = 1, NFI = .997, RMSEA = .00$ (90%CI: .00 - .118). Figure 3 shows the path diagram and standardized path coefficients of the over identified model for the hypothesized

model. Path significance was based on the critical ratio (CR), which is the parameter estimate divided by an estimate of the standard error. When the CR was larger than 1.96 for a regression weight, that path was significant at the .05 level. All path coefficients were statistically significant at $p < .05$ except the path from subjective task values (STV) to self-efficacy (SE). In other words, subjective task values failed to predict self-efficacy in this study. Expectancy-related beliefs (ERB) and outcome expectancy (OE) had the similar direct effect on self-efficacy ($\beta_{ERB-SE} = .41$, $\beta_{OE-SE} = .40$, respectively). Self-efficacy had the highest significant direct effect on in-class activity levels ($\beta_{SE-activity} = .37$) followed by subjective task values ($\beta_{STV-activity} = .17$).

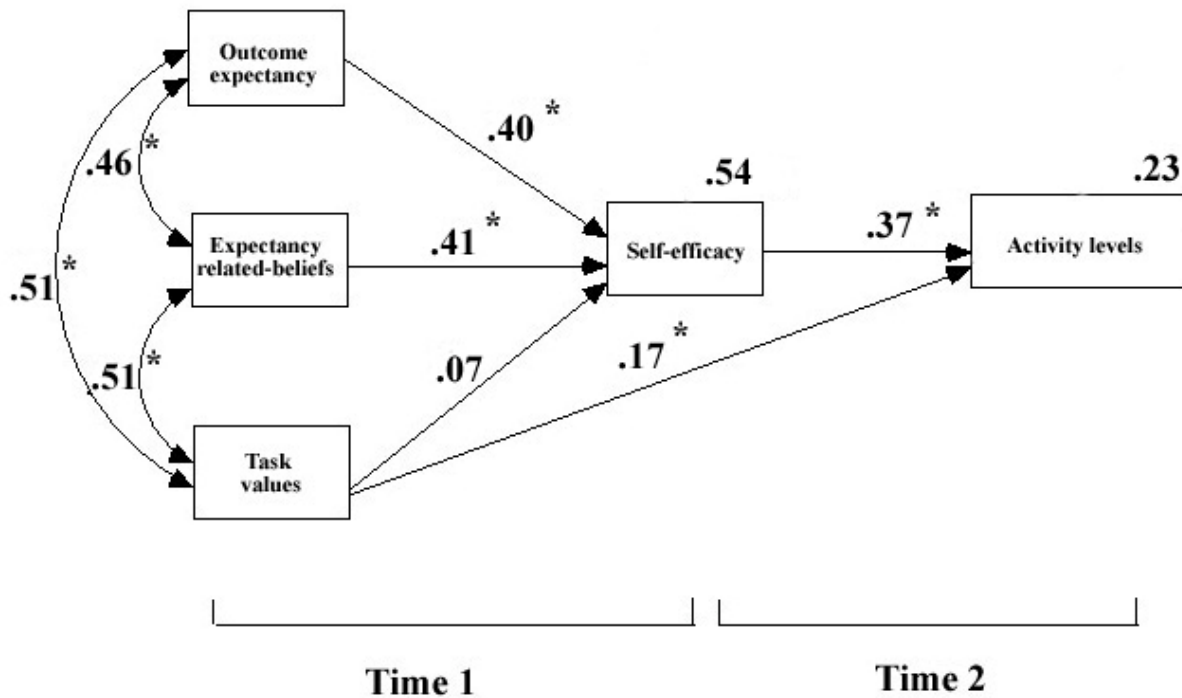


Figure 3. The hypothesized (over identified) model

* $< .05$; The coefficients on the straight lines are the standardized regression weights; the coefficients on two-headed arrows are the covariance between the pairs of independent variables; the coefficients right above the rectangles of mediate and dependent variables are squared multiple correlations.

The overall variance (squared multiple correlations) in self-efficacy and in-class activity levels explained by the model was 54% and 23%, respectively. For the second path analysis,

expectancy-related beliefs had the highest significant direct effect on in-class activity levels ($\beta_{ERB \cdot activity} = .22$) followed by subjective task values ($\beta_{STV \cdot activity} = .20$) and outcome expectancy ($\beta_{OE \cdot activity} = .11$).

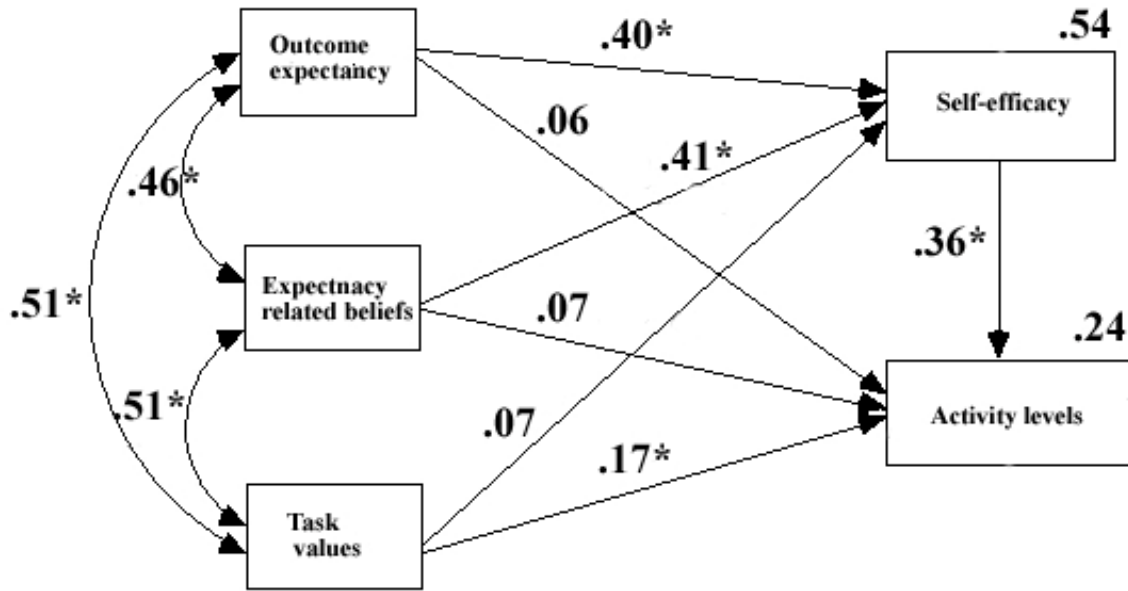


Figure 4. The just identified model

When the unique contribution of self-efficacy to in-class activity levels was controlled (just identified model, See Figure 4), subjective task values still had a significant direct effect on in-class activity levels ($\beta_{STV \cdot activity} = .17$), whereas the direct effects of expectancy-related beliefs and outcome expectancy on in-class activity levels were not significant ($\beta_{ERB \cdot activity} = .07$, $\beta_{OE \cdot activity} = .06$). These small effects of independent variables were not close to zero and thus full mediation was not supported (Baron & Kenny, 1986). In addition, in the over identified model, the indirect effects of expectancy-related beliefs and outcome expectancy on in-class activity levels via self-efficacy were small and significant ($\beta_{ERB \cdot SE \cdot activity} = .15$; $\beta_{OE \cdot SE \cdot activity} = .15$). Based on the results, the mediating role of self-efficacy on in-class activity levels has been partially

supported within the hypothesized model. The mediation effect of self-efficacy on relationship between two independent variables (expectancy-related beliefs and outcome expectancy) and in-class activity levels was partially supported. However, self-efficacy failed to serve as the mediating role for subjective task values.

DISCUSSION

An understanding of the cognitive processes that lead to the increase of in-class activity levels in physical education could be used to design and implement effective instructional strategies for school children. To achieve a greater understanding of the motivational processes leading to the increase of in-class activity levels, this study used prospective data to test an integrative model with middle school students. Specifically, this study examined the mediating role of self-efficacy in future in-class activity levels over a 2-week period. Prior to the main analyses, support was provided for the internal consistency and validity of the measures used in this study.

The hypothesized model had a good fit to the data. Based on the findings of the study, most of the research hypotheses of the hypothesized model were supported. In particular, self-efficacy was the most important predictor of students' in-class activity levels followed by subjective task values. Second, expectancy-related beliefs and outcome expectancy predicted self-efficacy. Additionally, expectancy-related beliefs and outcome expectancy indirectly affected students' in-class activity levels via self-efficacy.

The overall variance of students' in-class activity levels (23%) explained by the hypothesized model was higher than the amount of variance (6%) in 7-day moderate and vigorous physical activity (objective data measured by accelerometers) accounted for by the similar psychological constructs in the analysis of Trost and associates (2002) among middle

school students. It is possible that, in the latter study that did not require participation, other significant factors such as school environment and social supports (i.e., family support, and peer influence) would have significant effects on future physical activity beyond the effect of personal psychological factors. While in contexts where one has little chance for withdrawal, such as the physical education class, these external effects are attenuated to some degree, thus the psychological factors played a larger role in predicting in-class activity levels. On the other hand, the relatively small amount of variance in this study suggests that the psychological constructs alone are not enough to explain achievement behaviors in school settings. Other factors affecting in-class activity levels might include learning contents offered, instructional strategies, teachers' attitudes and behaviors, and individual physical attributes (i.e., weight and height).

As expected, relations within the hypothesized model indicated that self-efficacy exerted the largest direct effect on in-class activity levels. Middle school students with higher self-efficacy were significantly more likely to be physically active in physical education than those with lower levels of self-efficacy. Consistent with findings from numerous other studies, self-efficacy is one of the strongest predictors of the adoption of and adherence to physical activity (Gao, 2008; McAuley, 1985, 1992; McAuley & Mihalko, 1998; Moritz et al., 2000; Rovniak et al., 2002). In addition, self-efficacy partially mediated the relationships between two independent variables (outcome expectancy and expectancy-related beliefs) and in-class activity levels. Among middle school students, outcome expectancy and expectancy-related beliefs have small to moderate impact on in-class activity levels, because higher OE and ERB led to higher level of self-efficacy. Self-efficacy, in turn, exerted a larger effect on in-class activity levels. Thus our study extends previous research by suggesting a mediating effect of self-efficacy within the hypothesized model.

Although researchers suggested that self-efficacy was stronger in predicting achievement outcomes than global or contextual expectancy beliefs (Hu et al., 2005; Moritz et al., 2000), this study indicated that expectancy-related beliefs directly impacted self-efficacy. This finding provides empirical support for the postulation of the potential top-down impact of beliefs at higher levels (i.e., expectancy-related beliefs) in the hierarchy on beliefs at the next lower level (i.e., self-efficacy) (Vallerand, 2001). In addition, expectancy-related beliefs exerted a small indirect effect on in-class activity levels via self-efficacy. However, self-efficacy only partially mediated this relationship. The reason for this partial mediation may relate to the ways students were asked to judge their ability when measuring expectancy-related beliefs and self-efficacy in the current study. For the expectancy-related beliefs measure, the students were asked to rate their own ability and were then asked to compare their ability to others. The self-efficacy measures, however, did not ask comparison items. Instead, the questions were goal-referent and tended to capture students' beliefs about the specific activity. It is possible that this difference might attenuate the full mediation effect of self-efficacy on expectancy-related beliefs.

In line with the research hypotheses, outcome expectancy had a small indirect effect on in-class activity levels via self-efficacy, and failed to exert a significant direct effect on in-class activity levels. Although Bandura (1997) posits that self-efficacy is causally prior to outcome expectancy as the outcomes individuals anticipate depend largely on their judgments of how well they would be able to perform in given situations, our finding is consistent with the opposing position that, self-efficacy is dependent on perceptions of outcomes envisioned by action (Eastman & Marzillier, 1984; Williams et al., 2005). In addition, the finding provides empirical support for the previous research that has shown small association between outcome expectancy and physical activity behavior (Pate, Trost, Felton, Ward, Dowda, & Saunder, 1997; Rovniak et

al., 2002; Sallis, Hovell, Hofstetter, & Barrington, 1992). It also strengthens the argument that outcome expectancy accounts for little variance in physical activity behavior after self-efficacy is considered (Bandura, 1986, 1997; Dziewaltowski, 1989; Dziewaltowski et al., 1990; Rovniak et al., 2002). Nevertheless, partial mediation effect of self-efficacy was observed in this study. The coefficient associated with the effect of outcome expectancy on in-class activity levels was small and close to zero and would likely to be full mediation effect in a larger sample.

Not surprising, subjective task values exerted a moderate direct effect on in-class activity levels. According to expectancy-value model and recent empirical studies, subjective task values can predict both individuals' task choice and engagement in sport and physical education (Eccles & Harold, 1991; Cox & Whaley, 2004; Xiang et al., 2004a, 2004b, 2006). The present findings support the predictive utility of subjective task values in middle school physical education, but subjective task values did not significantly predict self-efficacy, and thus failed to support the research hypothesis. Although Wigfield and Eccles (1992) posited that subjective task values might impact the effectiveness of efficacy training, few studies have been conducted to investigate which of these constructs (self-efficacy and subjective task values) take causal precedence. Most current views would hold that self-efficacy develops first for young children because of the kinds of evaluative feedback students receive about their performance (Wigfield & Eccles, 1992). As children grow up and become aware of their competence at specific activity, they may adjust their perceive values toward different activities so that these constructs are in synchrony with each other. Alternatively, once children value an activity, it is likely that they will spend more time trying to master the activity, which would increase their self-efficacy toward the activity. Therefore, these alternative causal relations should be tested using longitudinal research in the future.

CHAPTER 3: MIDDLE SCHOOL STUDENTS' MOTIVATION TOWARD PHYSICAL EDUCATION: A LONGITUDINAL STUDY

This study investigated middle school students' motivation toward physical education using a longitudinal design over the course of one school year. Expectancy-value model of achievement choice (Eccles et al., 1983) and self-efficacy theory (Bandura, 1986, 1997) served as the theoretical frameworks for the study. In sport and physical education, these two theoretical frameworks have proven fruitful in explaining students' motivation and achievement behaviors (Chase, 2001; Cox & Whaley, 2004; Xiang et al., 2003, 2004a, 2004b, 2005, 2006). These two perspectives, however, have been examined separately in past work. Eccles and Wigfield (2002) called for theoretical integration of motivation in the field to provide a comprehensive and complete picture of the multiple facets of motivation constructs and their relations with achievement-related cognitive, affective, and behavioral patterns. Therefore, this study explores the relationships between the motivational variables from these two perspectives over time, and examined the mean level changes of these variables, in an effort to facilitate our understanding of students' motivation toward physical education in middle school settings.

EXPECTANCY-VALUE MODEL OF ACHIEVEMENT CHOICE

The work of Eccles and Wigfield and their colleagues (Eccles et al., 1983; Wigfield & Eccles, 1992, 1994; Wigfield, Eccles, & Rodriguez, 1998) suggests that whether or not students wish to be engaged in an activity, the amount of effort they are willing to expend on the activity, and their persistence in the activity can be explained by their beliefs about how well they will perform the activity (i.e., expectancy-related beliefs) and the degree to which they value the activity (i.e., subjective task values). Expectancy-related beliefs consist of both beliefs about ability and expectancies for success, whereas importance, interest, and usefulness comprise important aspects of subjective task values.

Within this theory, expectancy-related beliefs and subjective task values are assumed to be positively related to each other (Eccles et al., 1983; Eccles, Wigfield, & Shiefele, 1998). That is, individuals tend to attach more value to activities in which they do well and believe they are competent. Recent empirical research in physical education concerning the relationship between these two constructs support this postulation (Xiang et al., 2003, 2004b). Researchers focusing on the expectancy-value model of achievement choice demonstrated that students' expectancy-related beliefs and subjective task values are associated with their actual and anticipate task choice, achievement performance, effort, and engagement in sports and physical education (Eccles & Harold, 1991; Cox & Whaley, 2004; Xiang et al., 2004a, 2005, 2006).

SELF-EFFICACY THEORY

Self-efficacy theory includes self-efficacy and outcome expectancy as major constructs (Bandura, 1997). Self-efficacy refers to beliefs about one's capabilities to learn or perform behaviors at designated levels (Bandura, 1986, 1997). To date, many studies have suggested that self-efficacy is a major determinant of activity choice, willingness to expend effort, performance and persistence in sport and physical activity (Feltz, 1982, 1984, 1988, 1992; Feltz & Magyar, 2006; Feltz & Mugno, 1983; McAuley, 1985, 1992; Moritz et al., 2000).

Outcome expectancy, on the other side, refers to a person's beliefs concerning the likely outcomes of a behavior (Bandura, 1997). In sport and physical activity, research has shown small to moderate associations between outcome expectancy and intentions among young adults (Bryan & Rocheleau, 2002; Dzewaltowski, 1989; Dzewaltowski et al., 1990; Trost et al., 2002). Although it was evident that the positive relationship between self-efficacy and outcome expectancy is promising (Corcoran & Rutledge, 1989; Kirsch, 1982; Williams et al., 2005), Bandura (1997) argued that the relationship between self-efficacy and outcome expectancy

depends on how tightly contingencies between actions and outcomes are structured in a given domain of functioning. Apparently, the relationship between these two constructs in middle school physical education needs further investigation.

GRADE DIFFERENCES

Unlike the age-related changes in academic domains, researchers have documented contradictory findings for grade differences in expectancy beliefs (i.e., expectancy-related beliefs, and self-efficacy) in physical education. The majority of research has reported that children's expectancy beliefs decline across school years in physical education (Chase, 2001; Lee, Carter, & Xiang, 1995; Lee, Hall, & Carter, 1983; Lee, Nelson, & Nelson, 1988; Lirgg, 1991; Xiang et al., 2003, 2004b; Xiang, Lee, & Williamson, 2001), whereas some have found no significant differences over time (Xiang et al., 2005, 2006; Xiang & Lee, 1998). For example, in their cross-sectional and short-term longitudinal studies, Xiang and her colleagues (Xiang et al., 2003, 2004b) have indicated that a decline in children's expectancy beliefs toward physical education began to take place in the transition from primary to intermediate grades.

Nevertheless, in the research with fourth graders in a running program, they did not find any significant changes in expectancy beliefs across the school year (Xiang et al., 2005, 2006). This lack of congruence warrants future research, particularly considering that middle school students are less studied by researchers in the field of physical education.

In considering the age-related differences in children's subjective task values, two kinds of changes have been studied: changes in the levels of children's valuing of different activities and changes in the structure of the component of children's subjective task values. In general, research evidence has reported that older children's overall ratings of subjective task values for physical education decline compared to the mean levels of younger children's (Xiang et al.,

2003, 2004b). With respect to the change of each component (interest, importance, and utility), research has also shown that these components declined over time (Xiang et al., 2005, 2006). Although relatively fewer work has been done on the three components, this study focused only on the overall subjective task values.

GENDER DIFFERENCES

The empirical evidence concerning the emergence of gender differences is mixed, with some showing significant differences while others reporting no differences. Over the years, researchers have reported gender differences in children's expectancy beliefs, but these differences vary by activities or tasks (Lee, 1997). Generally, research findings have consistently shown that boys were more likely to hold higher ability beliefs and expectancies for success in most traditional sport activities and physical education (Eccles, Wigfield, Harold, & Blumenfeld, 1993; Eccles & Harold, 1991; Harter, 1982; Jacobs, et al., 2002; Wigfield et al., 1997; Xiang et al., 2003, 2004a, 2006). Some research evidence, on the other side, has suggested that gender differences may be a result of perceived gender appropriateness of the activities or tasks (Clifton & Gill, 1994; Lee, Fredenburg, Belcher, & Cleveland, 1999; Lirgg, 1991; Sanguinetti, Lee, & Nelson, 1985; Solmon, Lee, Belcher, Harrison, & Wells, 2003). That is, when an individual is participating in activities deemed as gender appropriate, his or her expectancy beliefs would increase. For example, males are likely to feel more competent and perform better on masculine-typed tasks (e.g., football and basketball), while females tend to feel more competent and perform better on feminine-typed tasks (e.g., dance and gymnastics). Hence, when sport and physical education contribute to the construction of a particularly dominant form of masculinity, males tend to feel more competent than girls and vice versa.

The research evidence has also provided conflicting results concerning the effect of gender on subjective task values. Many studies examining gender differences showed that boys like sport more and place higher importance on participating in sport and physical education than do girls (Eccles & Harold, 1991; Eccles et al., 1993; Fredricks & Eccles, 2002; Jacobs et al., 2002; Lee et al., 1999; Wigfield & Eccles, 1992). Some recent studies, however, reported that elementary school boys and girls did not differ in subjective task values toward physical education and a running program (Xiang et al., 2003, 2004a, 2006). Again, gender appropriateness perspective may account for the lack of these differences. In other words, boys and girls tend to value activities that they perceive as appropriate for their gender. In the Xiang et al. studies (Xiang et al., 2003, 2004a, 2006), running and physical education were not stereotyped as masculine or feminine and, as a result, students may have felt that these activities were appropriate for both genders.

In both of the theoretical perspectives being discussed, there was little research on grade and gender differences on students' outcome expectancy. Indeed, most of studies examining outcome expectancy have targeted older populations, young to middle-aged adults, and rural youth, and none of them has addressed developmental and gender differences thus far. Therefore, the first purpose of this study was to investigate the patterns of relationships among variables drawn from the expectancy-value model and self-efficacy theory over the course of one school year. Second, this study examined the age-related changes and gender differences of the study variables to further our understanding of student motivation in middle school physical education. Specifically, the following questions were addressed: (a) what are the relationships among expectancy-related beliefs, subjective task values, self-efficacy, outcome expectancy, and students' intention for future participation in physical education? (b) what is the relative strength

of self-efficacy, subjective task values, outcome expectancy as predictors of students' intention for future participation in physical education? (c) are there any mean level changes in expectancy-related beliefs, subjective task values, self-efficacy, and outcome expectancy toward physical education over one school year? (d) are there any gender differences in the mean levels of the study variables?

METHODS

Participants and Settings

The participants in this study were 206 middle school children from the same participating school. Data were collected in the spring of 2006 when these students were in sixth and seventh graders and the same time the following year when they were in seventh and eighth graders. Therefore, the sample in this study provided information on students across grades 6 - 8. Cohort 1 (six-grade students in Year 1 and seven-grade students in Year 2) included 54 boys and 51 girls, and Cohort 2 (seven-grade students in Year 1 and eight students in Year 2) included 52 boys and 42 girls, with seven missing data for gender for Cohort 2. Students were from middle and upper middle class families. The ethnic distribution of the students was as follows: 83 % Caucasian, 9.2 % African American, 1.9 % Hispanic, and 2.4 % Asian American. The other 3.4 % did not provide ethnic information. Participation was voluntary, and institutional, parental, and child permission was obtained prior to the study. Permission was also obtained from the school district, the school administration, and the teachers.

Sample attrition rates between the two data collection periods were 14.29 % for Cohort 1 and 22.77 % for Cohort 2. Attribution in the sample was due primarily to students' absences during the data collection periods and students moving away from the participating school. To assess if sample attrition influenced the results, the mean scores of each measure were compared

with the larger sample. There were no significant differences on the measures, indicating that attrition did not affect the results reported in this study.

When students arrived in the gym, the physical education teachers took attendance. Then the students participated in warm-up, activities, and games. It is important to note that, in this study, students were divided into two or more groups based on their sex after the warm-up. The curriculum activities included capture the flag, soccer, football, basketball, fitness stations, walking/jogging, and dance. During both periods of the data collection, all the students took the fitness class in the gym. Specifically, the physical education teachers set up eight stations prior to the arrival of the students. The teachers took five minutes to explain all stations and demonstrated the different activities in each station. Three to four students participated within each station for one minute, and they had 15 seconds to put their equipment away and move to the next station and start again. The students were required to work on each station three times in the class.

Variables and Measures

All the self-report measures of students' motivational beliefs (expectancy-related beliefs, subjective task values, self-efficacy, and outcome expectancy) were the same as those in the study one. Additionally, one questionnaire item was used to ask students to rate their intention for future participation in physical education. Students' block number, grade, and their date of birth were used to track their responses across the school year.

Intention for Future Participation in Physical Education. This measure was from questionnaires developed and used by Xiang et al. (2003, 2004a). The students were asked to respond to a single question on a 5-point scale, "When you get to high school, you will have a choice whether you want to take physical education. How much would you want to take it?" (1 =

not at all, 5 = very much). This self-report measure provided evidence for the reliability and validity with elementary and secondary school students in physical education setting (Xiang et al., 2003, 2004b).

Data Collection

This study used a replication design. All the self-report measures were measured in the spring semester of 2006 (Time 1), and were measured again in the spring semester of 2007 (Time 2). The identical data collection procedure was used across the school year. The questionnaire items were handed out to the students during their regular physical education classes, and the students were encouraged to answer truthfully and ask questions if they had difficulty understanding instructions or questionnaire items. The researcher monitored and helped students by answering any questions they have. Each data collection session lasted about 15 minutes.

Data Analyses

The data were analyzed in four steps. First, Cronbach's coefficient alphas were computed to ensure the internal consistency of the self-report measures. Second, descriptive analyses and Pearson product-moment correlations were calculated to identify significant relationships among expectancy-related beliefs, subjective task values, self-efficacy, outcome expectancy, and intention for future participation in physical education over time across cohort. Third, a series of stepwise multiple regressions were performed to assess the relative contributions of self-efficacy, subjective task values, outcome expectancy to students' intention for future participation in physical education across cohort by year. Finally, a multivariate analysis of variance (MANOVA) with repeated measures examined mean level changes in students' expectancy-

related beliefs, subjective task values, self-efficacy, and outcome expectancy toward physical education, with year (Year 1 and Year 2) as within-subject factor and cohort (Cohort 1 and Cohort 2) and gender (boys and girls) as between-subject factors. Follow-up univariate tests were conducted when the MANOVA yielded main effects for year. Independent t tests were used to determine which individual means differed significantly from each other when significant interaction occurred between year and cohort. A Bonferroni adjustment was made to the alpha level to accommodate for multiple comparisons.

RESULTS

Descriptive Statistical and Correlations

As shown in Table 3, the Cronbach's alpha coefficients of all the self-report variables exceeded the acceptable criterion of .70, suggesting that these self-report measures demonstrated acceptable internal consistency. Means and standard deviations of students' expectancy-related beliefs, subjective task values, self-efficacy, and outcome expectancy toward physical education are included in Table 2. In general, students displayed moderate to high expectancy-related beliefs/self-efficacy and subjective task values and outcome expectancy toward physical education. They also reported relatively moderate intention for future participation in physical education, as all the mean scores of these variables were above the midpoint of the scale (i.e., 25 for outcome expectancy, and 3 for the other variables).

The patterns of correlation among the study variables were relatively stable as students moved through grades six to seven and grades seven to eight. The correlations, presented in Table 3, revealed that all the self-report measures were very significantly and positively related to one another ($r_s = .27 - .67, p_s < .01$ for all), with the exception of the significant relation

between outcome expectancy and intention ($r = .22, p < .05$) for the six grade students at Year 1. Among them, expectancy-related beliefs were moderately related to subjective task values,

Table 2. Descriptive statistics for each variable across cohort

Measure	Cohort 1 (n = 105)				Cohort 2 (n = 101)			
	Six grade		Seven grade		Seven grade		Eight grade	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Expectancies	4.09	.61	3.70	.58	4.05	.65	3.77	.64
Task values	3.70	.73	3.43	.70	3.57	.66	3.21	.74
Self-efficacy	4.13	.61	3.72	.64	3.99	.68	3.85	.55
Outcome Expectancy	36.75	10.17	29.31	11.33	34.06	10.46	29.08	10.42
Intention	3.86	1.17	3.43	.83	3.81	1.02	3.54	.85

M = mean; *SD* = Standard deviation; Expectancies = Expectancy-related beliefs; Intention = Intention for future participation in physical education.

suggesting students who had positive ability beliefs in the activities and games in physical education were more likely to see it as an important, interest, and useful activity. In addition, there was a positive relationship between self-efficacy and outcome expectancy, and these two constructs were significantly associated with expectancy-related beliefs and subjective task values, respectively.

How Students' Motivation Predict Intention for Future Participation in Physical Education?

Due to the exploratory nature of this study, stepwise multiple regression analyses were conducted to investigate the predictive utility of these motivational beliefs. There was evidence that self-efficacy is superior over expectancy-related beliefs in predicting achievement-

Table 3. Correlations and internal reliability among variables across cohort

Measure	1	2	3	4	5	α	1	2	3	4	5	α
	Cohort 1					Six grade					Seven grade	
1.Expectancies	-					.78	-					.81
2.Task values	.43**	-				.77	.57**	-				.80
3.Self-efficacy	.64**	.58**	-			.73	.51**	.58**	-			.79
4.Outcome expectancy	.53**	.48**	.58**	-		.79	.66**	.51**	.67**	-		.78
5. Intention	.30**	.46**	.46**	.22*	-	.82	.30**	.45**	.45**	.39**	-	.85
	Cohort 2					Seven grade					Eight grade	
1.Expectancies	-					.79	-					.78
2.Task values	.40**	-				.81	.57**	-				.78
3.Self-efficacy	.67**	.54**	-			.75	.59**	.46**	-			.76
4.Outcome expectancy	.51**	.42**	.66**	-		.81	.50**	.47**	.64**	-		.78
5. Intention	.48**	.46**	.49**	.28**	-	.82	.27**	.43**	.48**	.37*	-	.82

α = Cronbach's alpha coefficient; * $p < .01$; ** $p < .001$.

Table 4. Results of multiple regressions on students' intention for future participation in physical education by grade

Predictor	β	R ² (cum.)	<i>t</i> value
<i>Cohort 1</i>			
Sixth grade			
Task values	.30	.2170	2.77**
Self-efficacy	.28	.2697	2.59*
Seventh grade			
Task values	.28	.1965	2.65**
Self-efficacy	.28	.2481	2.54*
<i>Cohort 2</i>			
Seventh grade			
Self-efficacy	.33	.2228	2.94**
Task values	.27	.2752	2.42*
Eighth grade			
Self-efficacy	.36	.2298	3.61**
Task values	.26	.2836	2.63*

β values are standardized regression coefficients from the final stage of the regression analysis; R² values are cumulative, with each incremental step adding to the variance explained. * $p < .05$. ** $p < .01$.

related outcomes (Hu et al., 2005; Moritz et al. 2002). To avoid unwanted multicollinearity among highly correlated variables, self-efficacy was put into the model rather than expectancy-related beliefs. That is, this study used self-efficacy and subjective task values and outcome expectancy to predict students' intention for future participation in physical education. The results of multiple regressions, as shown in Table 4, indicated that the sequence of the significant

predictors varied as a function of cohort. For sixth graders in Cohort 1, subjective task values ($p < .01$) and self-efficacy ($p < .05$) were significantly positive predictors of students' intention for future participation in physical education, and accounted for 26.97% of the variance. When students proceeded into the seven grades, subjective task values ($p < .01$) and self-efficacy ($p < .05$) still emerged as predictors explaining 24.81% of the variance. For the seven graders in Cohort 2, self-efficacy ($p < .01$) and subjective task values ($p < .05$) were the significant predictors and explained 27.52% of the variance. When they entered the eight grades, self-efficacy ($p < .01$) and subjective task values ($p < .05$) were again the predictors, accounting for 28.36% of the variance.

Mean Level Changes in the Variables Across Time

Prior to the MANOVA analysis, the assumption of multivariate normality and the homogeneity of variance-covariance matrices were examined. The values of skewness ranged from to $-.96$ to $.29$, and the values of kurtosis ranged from $-.92$ to 2.44 , suggesting that the variables were approximately normally distributed. The Box's M test revealed that the assumption of homogeneity of variance-co-variance matrices was not met ($F = 1.26, p = .04$). However, it should be noted that Tabachinick and Fidell (2001) argued that the Box's M test is too strict, with the large sample sized usually necessary for multivariate applications of analysis of variance (p. 80). Given that the variables were approximately normally distributed and a relatively large sample size was involved in this study, the level for significance for the subsequent analyses was set at an alpha level of $.01$ to address the violation of this assumption (Chen & Zhu, 2001; Tabachinick & Fidell, 2001),.

Results of the MANOVA analysis, as reported in Table 5, indicated no significant effects of the interaction between year, cohort, and gender, the interaction between cohort and gender,

and the interaction between year and gender. The results, however, yielded significant effect for the interaction between year and cohort and this is shown in Figure 5. Additionally, the main effect of year was statistically significant, but cohort and gender failed to exert main effects. Cohen's η^2 was computed to assess the effect size of the significant differences. The values ranged from medium ($\eta^2 = .08$) to large ($\eta^2 = .25$), suggesting that the effects of year and cohort are practically meaningful.

Table 5. Results of multivariate analysis of variance: Effects of cohort, gender, and year on the variables

Source	Wilks' Λ	F	Hypothesis df	Error df	p	η^2
Between-subject factor						
Gender \times Cohort	.98	.78	4	161	.54	.02
Gender	.96	1.77	4	161	.14	.04
Cohort	.95	2.31	4	161	.06	.05
Within-subject factor						
Year \times Gender \times Cohort	.93	2.89	4	161	.02	.07
Year \times Gender	.95	1.92	4	161	.11	.05
Year \times Cohort	.92	3.62	4	161	.01	.08
Year	.75	13.27	4	161	.00	.25

Expectancy-related Beliefs. There was a significant main effect for year, $F(1,164) = 26.38, p < .01$. Specifically, the mean levels of students' ability beliefs and expectancies for success decreased consistently over the school year. No other significant main effects or interaction effects were found on this variable.

Subjective Task Values. A significant main effect for year was evident, $F(1,164) = 22.38, p < .01$. There was a decline in the mean levels of subjective task values from Year 1 to Year 2 across the two cohorts. That is, as students aged, they were less likely to value physical education over time.

Self-efficacy. A significant effect emerged for the interaction between year and cohort, $F(1,164) = 7.17, p < .01$. There was a decline in students' self-efficacy in Cohort 1 from Year 1 to Year 2, $t(91) = 5.12, p < .01$, but no such decline occurred for students in Cohort 2. In other words, the entering middle school students tended to have higher self-efficacy than when they proceeded into seventh grade, the middle grade in a three-grade school.

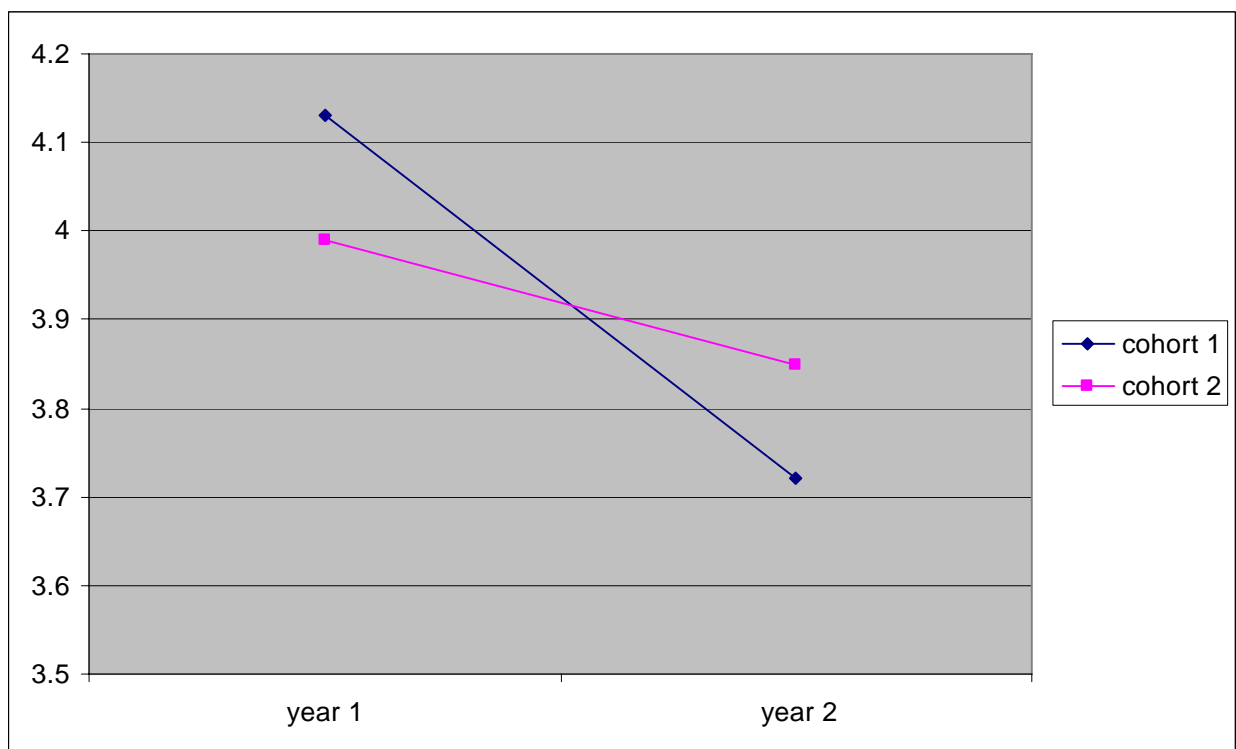


Figure 5. Interaction effect between year and cohort

Outcome Expectancy. There was a significant main effect for year, $F(1,164) = 41.71, p < .01$. In particular, students reported significantly lower scores in outcome expectancy toward physical education in Year 1 than Year 2.

DISCUSSION

The present study was an initial attempt to draw on expectancy-value model and self-efficacy theory to identify the relationships among expectancy-related beliefs, subjective task values, self-efficacy, outcome expectancy, and intention for future participation in physical education. This study also explored the mean level changes of the study variables over one school year to further our understanding of the development of students' motivation in middle school physical education. Prior to the main analyses, support was provided for the internal consistency of the measures used in this study.

In line with the previous studies concerning the positive relationship between expectancy-related beliefs and subjective task values in the physical education context (Xiang et al., 2003, 2004b, 2005, 2006), data from this study revealed significant relationships between these two variables for both cohorts over time. This positive link indicated that, students who scored higher on expectancy-related beliefs regarding physical education tended to see it as more useful, important, and interesting. These results provided empirical support for the theoretical link between expectancy-related beliefs and subjective task values proposed by the expectancy-value model (Eccles et al., 1983).

Although Bandura (1997) argued that there is no single relationship between self-efficacy and outcome expectancy, the present data indicated that self-efficacy was moderately and positively related to outcome expectancy within the self-efficacy theory. The positive relationship suggests that either individuals who are more efficacious tend to envision positive rather than negative outcomes or increases in expected positive outcomes make individuals more likely to perceive they are able to perform the behavior than the expectations of negative

outcomes. These findings support the statement proposed by other researchers (Gao, 2008; Gao, Xiang, Lee, & Harrison, in press; Kirsch, 1982; Williams et al., 2005).

Self-efficacy was significantly related to expectancy-related beliefs. This result provides support for the conceptual similarities between these two constructs. In addition, outcome expectancy had a positive correlation with expectancy-related beliefs, which might also attribute to their conceptual similarities. In fact, expectancies for success (one component of expectancy-related beliefs) and outcome expectancy are similar in that both involve the anticipated outcome of engaging in a task. However, expectancy-related beliefs represent the assignment of a probability of a “successful” outcome while outcome expectancy focuses on the anticipated outcome of the motivated behavior (Wigfield & Eccles, 2000).

In the academic domains, the positive relationship between self-efficacy and subjective task values is compatible with Eccles and her associates’ reports that expectancy-related beliefs are positively associated with subjective task values (Eccles et al., 1998). The finding of this study provides empirical evidence for this relationship in the physical education context. Likewise, outcome expectancy was positively associated with subjective task values in this study. According to Wigfield (1994), subjective task values and outcome values (one component of outcome expectancy) are defined as incentives to engage in different tasks. Although these two constructs are conceptually different, they seem to have a reciprocal relation (e.g., perceived task values may have an effect on outcome motivation; Bandura, 1997).

Recent studies have proposed that intention is one of the most important predictor of physical activity participation (Hagger, Chatzisarantis, & Biddle, 2002; Symons Downs & Hausenblas, 2005). An individual is more likely to participate in physical activity when he or she possesses stronger intention for future participation. In this study, the relative strength of self-

efficacy, subjective task values, and outcome expectancy as predictors of students' intention for future participation in physical education varied by cohort. For students in Cohort 1, subjective task values were the more significantly positive predictor of intention, followed by self-efficacy. In contrast, for students in Cohort 2, self-efficacy exerted more influence in predicting intention than subjective task values. The findings suggest that, overall, subjective task values and self-efficacy are important determinants for students' intention or task choices in physical education. Researchers suggest that these two beliefs influence students' achievement outcomes such as activity choice, effort, and engagement in classrooms (Eccles et al., 1998; Meece, Wigfield, & Eccles, 1990; Wigfield & Eccles, 2002) and physical activity/education (Chase, 2001; Feltz & Magyar, 2006; Gao, 2008; Lee, 1997; Xiang et al., 2003, 2004b, 2006). The data indicate that if the students were more likely to be efficacious in activities in physical education and view physical education as more important, interesting, and useful, they would have stronger intention for future participation. As a result, teachers might help students successfully complete the task to reinforce their competence, and focus on learning activities the students perceive as important, interesting, and useful.

The overall variance in intention explained by subjective task values and self-efficacy (25-28%) was higher than the variance explained by the expectancy-value model variables among elementary school students (e.g., 7% - 23%; Xiang et al., 2003). Apparently, integrating the expectancy-value model and self-efficacy theory in this longitudinal study facilitates a more complete understanding of student motivation and achievement-related cognitions (e.g., intention) in physical education. This study echoes Xiang and colleagues' advocacy of using multiple theoretical perspectives to study students' motivation and achievement outcomes, as motivation represents "a complex process in which multiple factors interact to impact students'

achievement-related cognition, affect, and behavior” (Xiang et al., 2006). The reason for the different sequences of predictable variables for both cohorts, however, remains unknown. Future study is needed to identify and investigate the potential causes for this difference. Qualitative methodologies, such as structured interviews and focus-group interviews with the students, might provide helpful information to unearth the potential underlying reasons.

Interestingly, outcome expectancy failed to serve as a significant predictor of intention for both cohorts over time. This is unexpected, as outcome expectancy was posited to be associated with intention in sport and physical activity among young adults. The plausible reason might be that, outcome expectancy is a better predictor of achievement behaviors in adults, especially older adults. Older adults may value the positive outcomes of physical activity more than children and adolescents, and therefore the expectations of outcomes may be more likely to motivate older adults to be physically active. In this study, middle school students had been introduced to the benefits of physical activity, but they tended to focus more on values of the task or activity rather than the outcomes of performing the task or activity. An important implication for teaching practice is a need to increase students’ awareness of the benefits of physical education (e.g., health promotion, decrease stress, and self-esteem enhancement) during the course of middle school years. Suggested instructional practices and strategies might include: (a) providing lectures to broaden students’ knowledge base concerning the relations between physical activity and physiological changes from lifespan perspectives; (b) utilizing fitness testing kits to test students’ physical fitness regularly and providing timely feedback to promote physically active lifestyle; (c) helping students experience positive outcomes of physical education by creating favorable outcome expectancy (i.e, feel competence) among students.

Similar to the majority of studies in the classroom (Eccles et al., 1993; Fredricks & Eccles, 2002; Jacobs et al., 2002; Wigfield et al., 1997), the present data yielded a decline in the mean levels of expectancy-related beliefs over time for both cohorts among middle school students. In a recent longitudinal research, Xiang et al. (2004b) observed that students' expectancy-related beliefs decreased from primary to intermediate grades among elementary school students. This study also revealed a decrease over time in students' subjective task values and outcome expectancy for both cohorts. That is, students tended to devalue physical education and were less likely to see and value the outcomes of participating in physical education as they became older. This is discouraging in terms of the teaching practices. As known, the importance of subjective task values and outcome expectancy to students' achievement outcomes for school children and youth has been well documented (Eccles et al., 1998; Rovniak et al., 2002; Sallis et al., 1992; Trost et al., 2002; Xiang et al., 2004b, 2006). It can be speculated that, if students devalue physical education and the benefits of physical education as they grow up, they will be less motivated to take physical education and participate in out-of-school physical activity programs regularly.

Taken together, students' expectancy-related beliefs and subjective task values become less positive as they get older, at least for the middle school students in this study. Wigfield and Eccles (2000) proposed two explanations for this consistent decline. First, teen-aged students become much better at understanding and interpreting the evaluative feedback they receive and engage in more social comparison with their peers. As a result, they become more accurate and realistic in their self-assessment, and therefore their expectancy beliefs become relatively more negative. Meanwhile, they tend to devalue the achievement tasks so that their beliefs and perceived values are in synchrony. A second explanation is that, for the adolescence, evaluations

are more salient and competitions between students are more likely, thus lowering students' motivational beliefs (Stipek, 1996; Wigfield, Eccles, & Pintrich, 1996). Hence, these data uphold previous research in academic domains. With the decline of outcome expectancy among this population, the findings reflect a natural extension of empirical and theoretical trend among middle school students.

In addition, another important finding was that the mean levels of self-efficacy decreased over time only for the students in Cohort 1. Sixth graders in their first year of middle school, when proceeding to the seventh graders, felt less efficacious and competent in physical education. Although prior studies have suggested that self-efficacy generally decrease over the middle school years (Chase, 2001; Feltz, 2006; Moritz et al., 2000; Pajares, 1996; Pajares & Valiante, 1999), seventh graders' self-efficacy did not decrease significantly. For this cohort, concerns were focused on the steady decline of expectancy-related beliefs, subjective task values, and outcome expectancy over the school year, while self-efficacy remained relatively stable. It is unknown whether this finding is specific to the study sample or whether seventh graders' self-efficacy remained stable after the transition year. We believe this is an area that merits continued scrutiny, especially in a long-term longitudinal study that would trace a cohort of students as they progress from late elementary school to early high school.

It is particularly interesting to determine whether gender differences in the study variables would be congruent with the prevalent views that boys showed higher motivation in sport and physical education. No gender differences were found on each of the individual variables in this study. That is, boys and girls did not differ on the mean scores of expectancy-related beliefs, subjective task values, self-efficacy, and outcome expectancy over the course of a school year. Our results mirror those of Xiang et al.'s findings (2004b, 2006) obtained from a

sample of elementary school students and extend these findings to the middle school level. This phenomenon begs explanations that could account for the lack of differences. Insights may be available from the work of researchers as regards gender stereotypic beliefs (e.g., Lee et al., 1999; Lirgg, 1991, Solmon et al., 2003). The perspectives of perceived gender appropriateness might be used to explain those studies reporting no gender differences. For instance, there were no gender differences on student motivation in a running program for fourth graders (Xiang et al., 2004b, 2006) or selected sport skills (Chase, 2001), because students viewed running and the types of activity as gender neutral activity. It is possible that students considered fitness activity as appropriate for both genders in this study.

Another plausible explanation is that boys and girls use a different metric when providing beliefs judgments (Nodding, 1996). Apparently, what seems evident is that interpreting differences in boys' and girls' mean levels of motivation instruments as gender differences in motivation may offer an incomplete explanation of the phenomenon at work. If researchers are to continue to explore gender differences in motivation in physical education, they will need to address this issue with assessments and interpretations that accurately reflect the nature of that phenomenon.

The present study supports both conceptual and empirical work utilizing expectancy-value model and self-efficacy theory in explaining student motivation in sports and physical activity. However, there are limitations in the study that warrant consideration. First, only one self-report outcome variable (i.e., intention) was examined in reference to students' motivational beliefs. To gain a more complete picture of the predictive utility of the motivational beliefs to achievement behaviors, other student outcomes, such as objective physical activity levels, fitness testing scores, behavioral observations, and teacher-reported effort/persistence, should be

studied. Second, peer influence plays a larger role than the influence from teachers and parents among the middle school students (Payne & Isaacs, 2005). Therefore, it is critical to examine the role of peers, as well as the influences of parents and teachers on students' achievement motivation in physical education. Additionally, it has been found that students' motivation changed dramatically during the transition from the elementary school to middle school or from middle school to high school (Fredricks & Eccles, 2002; Jacobs et al., 2002). Future research also needs to examine fifth graders and ninth graders in relation to their motivational beliefs in the longitudinal study. Lastly, students' past experiences with physical education exert a strong influence on their achievement motivation and behaviors. It is also important to examine students' motivation and intention in combination with prior experiences with physical education.

In summary, the findings of this study provide empirical evidence for the importance of integrating expectancy-value model and self-efficacy theory in understanding student motivation in middle school physical education. The study also revealed an overall decrease in motivation among middle school students in physical education over the school year. They might also have implications for the delivery of the out-of-school physical activity programs among the target students.

CHAPTER 4: THE EFFECTS OF LEARNING CONTENT ON MIDDLE SCHOOL STUDENTS' MOTIVATION AND PHYSICAL ACTIVITY LEVELS

The expectancy-value model of achievement choice and self-efficacy theory can be integrated to facilitate our understanding of students' motivational beliefs toward physical education. Within this integrated theoretical framework, three factors are considered important to motivation: self-efficacy (Bandura, 1997), subjective task values (Wigfield & Eccles, 2000), and outcome expectancy (Bandura, 1997; Goudas & Dermizaki, 2004).

Issues related to motivational beliefs and learning content offered can combine to influence research on student learning in a significant way. Bong (2001a) posited that students form motivational beliefs that are specific to a particular content area and context. Recent review papers also document that learning content has been documented to influence students' attitudes and motivation in physical education (Chen, 2001; Chen & Darst, 2001; Lee, 1997). For example, the enjoyment and perceived usefulness of the curricular activities emerge as important components of students' positive motivation (Lee, 1997). Most motivation research, however, has focused primarily on individuals' psychological dispositions rather than on the learner-content interactions, and consequently has overlooked the potential effect of learning content on motivation. Therefore, empirical studies are recommended to examine the relation between the learning content in physical education and students' motivation towards physical education (Chen, 2001; Chen & Darst, 2001).

The learning content in physical education curriculum may also influence students' physical activity levels in physical education (Fairclough & Stratton, 2006). Regardless of the postulation suggesting that invasion games (i.e., soccer, basketball, and hockey) usually promote relatively high levels of activity, previous studies have yielded various findings as researchers utilized different instruments and a variety of learning contents. In their studies with heart rate

monitors, Kulinna and colleagues (2003) reported that moderate to vigorous physical activity (MVPA) was greatest during hula-hoop, volleyball, fitness, and soccer. Macfarlane and Kwong (2003) also found that students were most active during ball games and free play in comparison to athletics and gymnastics. However, students' MVPA has varied within similar types of physical education activities using systematic observation instrument. For example, Simons-Morton and associates (1993) observed that most MVPA was attained during walking/jogging, football, and dodge ball. Few studies have assessed the effects of the learning content on physical activity levels using an accurate objective instrument such as the accelerometer. The uniqueness of this study, therefore, was to use accelerometers (i.e., Actical activity monitors) to measure students' in-class activity levels in the examination of the impact of two different learning contents on their motivational beliefs and in-class activity levels.

While multi-activity units (a package of multiple sports and physical activities) dominated physical education classes for decades, today's students are becoming more aware of the importance of healthy lifestyles, and are more interested in content related to fitness and health. In this sense, physical educators and curriculum developers should continue to modify their programs to match students' constantly changing needs and interests (Ennis, 2003). Currently there is a call for shifting the emphasis from learning sport skills to enhancing health-related fitness in physical education through refocusing the learning content offered. Accordingly, health-related fitness stations and soccer were chosen as learning content in this study. More specifically, the fitness stations represented a health-related fitness education curriculum, whereas soccer represented traditional multi-activity curriculum in physical education. In the present study, four weeks were allocated for fitness stations and soccer units, respectively. The soccer unit consisted of playing games in the class, while the fitness stations

unit integrated physical fitness testing and focused on cardiovascular endurance, muscular strength and endurance, and flexibility, three health-related physical fitness components.

GRADE AND GENDER DIFFERENCES IN PHYSICAL ACTIVITY LEVELS

There is considerable work on the effects of grade and gender on student motivation, and it was addressed in detail in Study 2. Hence, only the influence of grade and gender on students' in-class activity levels was illustrated in the introduction.

Previous research (e.g., Kulinna et al., 2003; Stratton, 1997; Vincent & Pangrazi, 2002) has confirmed that students differ in their in-class activity levels in physical education classes across grades and age groups. In general, students' physical activity levels decline dramatically with increases in age and grade level during adolescence (USDHHS, 1996). Several recent empirical studies uphold this notion. Specifically, Stratton (1997) found that students' MVPA increased from nine to ten years of age, peaked at 11 to 12 years of age, and then decreased in later school years. Klausen and colleagues (1986) also found that students' heart rates were lower in older children (age 12 to 13) than in younger children (age 10 to 11). Kulinna et al. (2003) further indicated that elementary school children displayed the highest heart rates, followed by high school students and middle school students. It is clear that more research is needed before a reasonable conclusion can be reached as to whether and why middle school students decrease in their MVPA in physical education class.

In addition, emerging evidence has shown the potential gender differences in students' MVPA in physical education class. Contradictory findings have been reported regarding this difference. For example, McKenzie, Marshall, Sallis, and Conway (2000), using the System for Observing Fitness Instruction Time instrument (SOFIT), found that boys were more active than girls overall and during skill drills, game play, and free play. Pedometer researchers (Hannon

&Ratliffe, 2005; Michaud, Cauderay, Narring, & Schutz, 2002; Rowlands, Eston, & Ingledeu, 1999; Vincent & Pangrazi, 2002) also reported that, regardless of the type of activity, boys were consistently more active than girls. Research, using accelerometer instruments, further supported this pattern of differences between boys and girls from grade 1 - 12 across all physical education classes (Lemura, Andreacci, Carlonas, Klebez, & Chelland, 2000; Trost et al., 2002). However, the picture is not clear concerning the gender effect because researchers utilized different types and models of physical activity monitors or behavioral observation systems. For instance, Kulinna et al. (2003) failed to find gender differences on 3 - 12 graders' heart rates in physical education class. Sarkin, McKenzi, and Sallis (1997), using accelerometers (Caltrac), also found no significant gender effect on fifth graders' MVPA in physical education class. The incongruence makes it difficult to make conclusions regarding whether boys and girls have different in-class activity levels and, hence, it deserves special attention.

In summary, the primary aim of this study was to examine the effects of two types of learning content on students' motivational beliefs (self-efficacy, subjective task values, and outcome expectancy) and in-class activity levels in middle school physical education. Specifically, two types of learning content (health-related fitness and soccer) were compared to determine which one is more likely to enhance students' motivation and in-class activity levels. The secondary aim of this study was to investigate the potential effects of grade and gender on the study variables. Based on the literature reviewed, it was hypothesized that students would exhibit higher levels of motivational beliefs in the fitness stations but would have higher physical activity levels in the soccer unit. Second, it was hypothesized that younger students would exhibit higher levels of motivational beliefs and in-class activity levels than older students.

Lastly, it was hypothesized that when compared to girls, boys would display higher levels of motivational beliefs and physical active levels.

METHODS

Participants and Setting

The 225 participants were sixth through eighth graders (112 boys, 113 girls) enrolled in a suburban public school in the Southern region of the United States. Three classes of 75 students each came from each grade. Students were from families of middle and upper class. The ethnic composition of the sample was 86.7 % Caucasian, 9.8 % African American, 2.2 % Hispanic, and 1.3 % Asian American. The participants in each class had a 60-minute physical education class taught by three physical education teachers on alternate days. The teachers shared the responsibility for the teaching assignments in the three classes of each grade. Informed parental consent forms and child assent forms were obtained in accordance with the University Institutional Review Board and school district requirements.

Sample attrition rates between the two data collection periods were 29.33 % for sixth graders, 18.67 % for seventh graders, and 34.67 % for eighth grader. The high attribution rates were due primarily to the rigid requirement of having complete data on multiple types of measures, including surveys and physical activity monitors. A one way analysis of variance was conducted with the students in the fitness unit to determine whether students who had completed data differed significantly from those students who had missing data on any of the measured variables. There were no significant differences on the measures including age, gender, race, self-report measures, and objective activity measures, indicating that attrition did not affect the results reported in this study.

The physical education curriculum in this school consisted of a variety of activities,

including capture the flag, soccer, football, basketball, fitness stations, walking/jogging, and dance. For the soccer unit, the students played games under teachers' supervision following the warm-up activities. For the fitness stations unit, the physical education teachers set up eight stations prior to the arrival of the students. The stations included fitness activities such as push-ups, jump rope (individual ropes), crunches (with stability ball), squat (with balance cushion), bench steps, curl-ups, aerobics (square run), and front/ lateral/triceps extensions. The teachers took five minutes to explain all of the stations and demonstrated the different activities in each station. Three to four students participated within each station for one minute, and they had 15 seconds to put their equipments away and move to the next station and start again. The students were required to work on each station three times in the class.

Research Design

A replication design was used in this study, and data were collected during regularly scheduled physical education classes. A schedule was coordinated with the teachers for the data collection so as not to interrupt instructional time. Students first completed the survey regarding their motivational beliefs about the fitness activities. The average time required to complete the survey was ten minutes. Then one day was scheduled to assess students' in-class activity levels using accelerometers when students were participating in the fitness station activities. The same procedures were used for the survey items and activity levels in the soccer unit. Additionally, the physical education teachers were told that any data collection days should represent typical instructional days and should be viewed for normal physical education classes.

In order to make the data collection go smoothly, two undergraduate student assistants were recruited to assist on days when the middle school students wore the accelerometers. The accelerometers were locked to the corresponding waistbands before each class. The

accelerometers along with waistbands were then distributed to the students during roll call. On the first day of data collection, each student was assigned an identification number that matched the number on his or her waistband. The student assistants and the researcher helped students wear the waistbands and made sure the waistbands were put in the right location. Also, the time for practice during class sessions was monitored and standardized. In the later classes, the students were told to wear the same waistbands with accelerometers.

Instrumentation

Demographic information was included in the survey about students' age, grade, gender, and race. Standardized self-report questionnaires were used to assess students' self-efficacy (Bandura, 2006), subjective task values (Xiang et al., 2003), and outcome expectancy (Goudas & Dermtizaki, 2004). These self-report measures were similar to those in Study 1. However, the stems of the survey items were rephrased by using the specific content class (i.e., soccer, and fitness) instead of general physical education class. For instance, the self-efficacy items were prefaced by using "With regard to the fitness class, I have confidence in..." Students' block number, grade, and their date of birth were used to track their subjective responses and objective measures.

In-class Activity Levels. To measure students' in-class activity levels, Actical activity monitors were utilized (Mini-Mitter Co., Inc., Bend, OR) for one soccer class and the fitness class, respectively. Given a relative short-period of time for the physical education class and the purpose of this study, activity counts were measured in 15-second epochs, and in-class activity levels were quantified as average activity count per minute (average count/min) for the moderate to vigorous intensity activities.

Data Analyses

First, descriptive analyses and Pearson product-moment correlations were calculated to describe the sample characteristics. Second, a MANOVA with repeated measures was performed to examine mean level changes in motivational beliefs and in-class activity levels, with learning content as the within-subject factor, and grade and gender as between-subjects factors. Third, follow-up univariate tests were conducted if follow-up univariate tests were conducted if MANOVA yielded main effects for learning content and grade, and interaction effect between content and grade. A Bonferroni adjustment was made to the alpha level to accommodate for pairwise comparisons.

RESULTS

Descriptive Statistics

Overall, average scores of the measurements fell within a reasonable range, and all the self-report scales demonstrated acceptable internal consistency (See Table 6 and Table 7 for descriptive statistics). Specifically, the students exhibited moderate levels of motivational beliefs, as the mean scores of the motivational variables were above the midpoint (i.e., 3 for self-efficacy and subjective task values; 25 for outcome expectancy) for both the soccer and fitness classes. However, the students showed large variability in their in-class activity levels ($SD = 641 - 924$), ranging from 1949 counts/min to 6756 counts/min for the fitness class and from 2101 counts/min to 7417 counts/min for the soccer class. These results indicated that some middle school students were physically active whereas others were relatively inactive in physical education class. In regard to the correlations between each study variable across the learning content, students' motivational beliefs toward fitness were significantly and positively related to their motivation toward soccer (i.e., .27 for self-efficacy, .44 for subjective task values, and .53

Table 6. Descriptive statistics for each variable

Variable	Six grade (n = 53)				Seven grade (n = 61)				Eight grade (n = 49)				Total Sample			
	Fitness		Soccer		Fitness		Soccer		Fitness		Soccer		Fitness		Soccer	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Self-efficacy	4.07	.82	4.03	.71	4.07	.63	3.78	.65	3.99	.74	3.85	.58	4.05	.71	3.89	.65
Task Values	3.89	.66	3.59	.81	3.39	.89	3.56	.69	3.29	.81	3.12	.75	3.52	.84	3.44	.77
Outcome Expectancy	35.48	10.23	34.68	11.31	34.60	11.34	29.98	11.29	31.54	12.97	28.6	11.06	33.97	11.63	31.09	11.45
Activity levels	3832	856	4224	681	3542	775	3912	924	3771	727	3985	641	3705	794	4035	778

M = mean; *SD* = Standard deviation; Activity levels= in-class activity levels.

Table 7. Correlations among variables

Variable	1	2	3	4	5	6	7	8
1. Self-efficacy (fitness)	.85							
2. Task Values (fitness)	.48**	.85						
3. Outcome Expectancy (fitness)	.66**	.58**	.84					
4. Activity Levels (fitness)	.48**	.39**	.32**	-				
5. Self-efficacy (soccer)	.27**	.30**	.41**	.24**	.86			
6. Task Values (soccer)	.30**	.44**	.44**	.23**	.61**	.82		
7. Outcome Expectancy (soccer)	.47**	.42**	.53**	.26**	.61**	.56**	.80	
8. Activity Levels (soccer)	.10	.23**	.11	.45**	.12	.21*	.18*	-

Cronbach alpha coefficients are provided along the diagonal. * $p < .05$. ** $p < .01$.

for outcome expectancy). Additionally, students' in-class activity levels in the fitness class were also positively associated with their activity levels in the soccer class ($r = .45$).

Mean Level Changes in the Variables Across Time

Prior to the MANOVA analysis, the assumption of multivariate normality and the homogeneity of variance-covariance matrices were examined. The values of skewness ranged from to $-.61$ to $.85$, suggesting that the variables were approximately normally distributed. The Box's M test, however, revealed that the assumption of homogeneity of variance-co-variance matrices was not met ($F = 1.44$, $p = .00$). To address the violation of this assumption (Chen & Zhu, 2001; Tabachinick & Fidell, 2001), the alpha level for significance for the subsequent analyses was set at $.01$.

Results of the MANOVA analysis, presented in Table 8, indicated that there were no significant effects for the interaction between content, grade, and gender, interaction between grade and gender, and interaction between content and gender. The interaction effect between

content and grade, however, was statistically significant. In terms of the main effects, gender was not significant, but the main effects from content and grade were significant. Cohen's η^2 was computed to assess the effect size of the significant differences. The values ranged from medium ($\eta^2 = .07$) to large ($\eta^2 = .22$), suggesting that the content and grade effects and the interaction effect between content and grade are practically meaningful.

Table 8. Results of multivariate analysis of variance: Effects of learning content, grade, and gender on students' motivational variables and activity levels

Source	Wilks' Λ	<i>F</i>	Hypothesis df	Error df	<i>p</i>	η^2
Between-subject factor						
Gender \times Grade	.95	1.10	8	308	.36	.03
Gender	.97	1.09	4	154	.36	.03
Grade	.86	2.95	8	308	.003	.07
Within-subject factor						
Content \times Gender \times Grade	.92	1.76	8	308	.09	.04
Content \times Gender	.93	2.78	4	154	.03	.06
Content \times Grade	.85	3.20	8	308	.002	.08
Content	.78	10.59	4	154	.00	.22

Self-efficacy. The follow-up test for self-efficacy yielded a significant main effect for content, $F(1,157) = 6.46, p = .01$, indicating that students reported higher self-efficacy in fitness than in soccer. Students' beliefs about their ability to perform soccer or fitness activities did not differ across grade and gender (See Table 6).

Subjective Task Values. The follow-up test yielded that the main effect for grade was also significant, $F(2,157) = 7.31, p < .01$. Compared to the older students (eighth graders), the younger students (sixth graders) reported higher mean levels of subjective task values. However, seventh graders did not differ significantly from sixth graders or eight graders. In addition, a significant interaction effect between content and grade was also found, $F(2,157) = 5.71, p < .01$. Specifically, sixth graders reported higher perceived values toward the fitness class than toward soccer. When further examining the differences by learning content, sixth graders reported higher values toward fitness than both seventh and eighth graders ($p < .01$). For the soccer class, sixth and seventh graders displayed higher values than eighth graders did ($p < .01$). This interaction is shown in Figure 6.

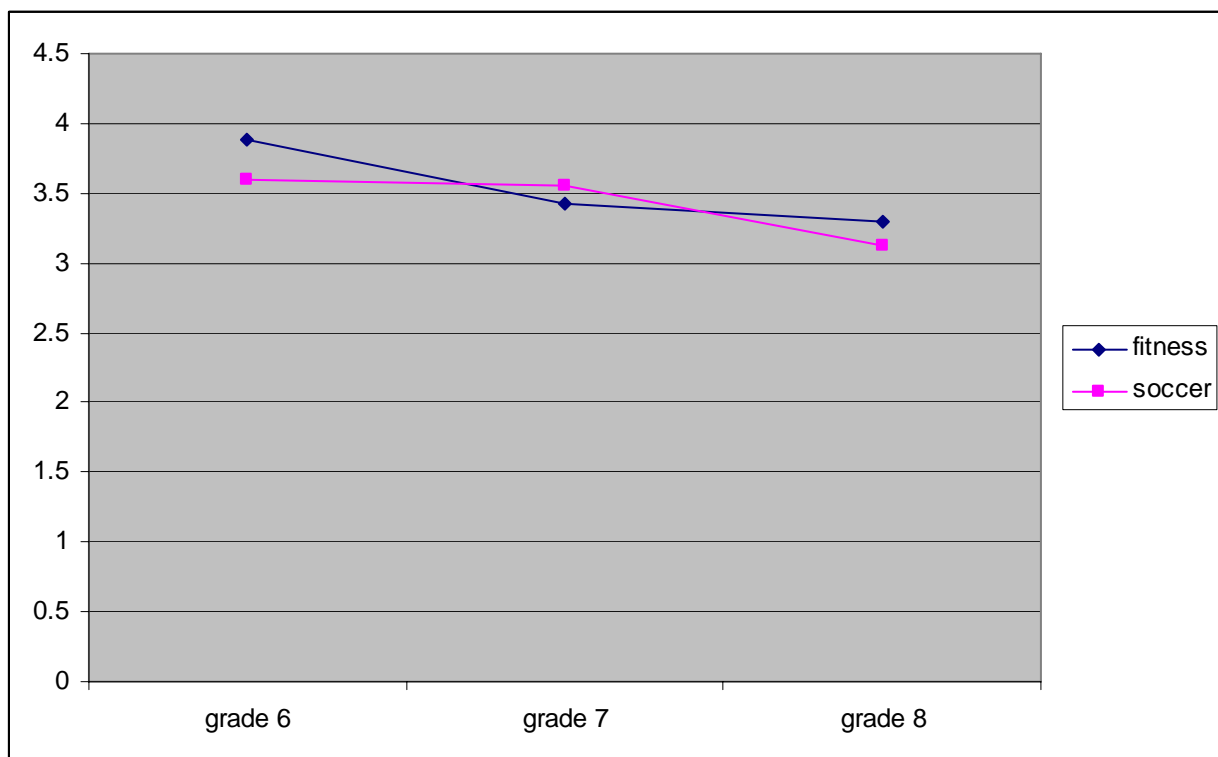


Figure 6. Grade differences of subjective task values by content

Outcome Expectancy. The follow-up test for outcome expectancy yielded main effect only for content, $F(1, 157) = 9.14, p < .01$. In this study, students' reported higher levels of outcome expectancy toward the fitness class than they did toward the soccer class. That is, students were more likely to see the likelihood of the outcome of the fitness class, and considered fitness outcomes more valuable than the outcomes of the soccer class.

In-class Activity Levels. The follow-up test indicated that the main effect for content was significant, $F(1, 157) = 20.41, p < .01$. Students were more physically active in the soccer class than they were in the fitness class. No other significant effects were found with this variable.

DISCUSSION

This study focused on middle school students and investigated the impact of two types of learning content (i.e., soccer, and fitness) on their motivational beliefs and in-class activity levels in physical education classes. The study also examined the potential grade and gender effects for the study variables. According to the descriptive analyses, the target students showed moderate levels of motivational beliefs toward physical education, but exhibited large variability in light of their MVPA in the physical education classes. Each of these motivational beliefs (self-efficacy, task values, and outcome expectancy) was positively associated across the learning content. In addition, students who were more active in the soccer class tended to be more physically active in the fitness class as well.

The significant main effect for learning content found in the study offer interesting insights into the study of children's motivation in physical education. Specifically, students reported higher self-efficacy and outcome expectancies in fitness classes than they did in soccer. This result supports the argument that students are becoming more aware of the health benefits

of physical activity and are more motivated to become involved in fitness activities. It is also possible that students in today's school are more familiar with the fitness activities because the overall enrollment in fitness/conditioning activities has increased about three times in twelve years in the United States (National Center for Educational Statistics [NCES], 1998). In addition, the tasks in the fitness stations were relatively easy to master and this could account for higher efficacy scores. In contrast, there were many different kinds of soccer skills (e.g., dribbling, shooting, and passing) to master and game strategies and rules to learn. This might be the major difference in students' self-efficacy scores for the different content areas. At the same time, a focus on health promotion and developing health-related active lifestyles during the past decade could influence the way children value fitness activities, and result in more positive views toward participation in the fitness activities. Soccer, a performance-oriented sport, is played less as children age because of its highly competitive nature and team play format. The study findings are congruent with existing theory and research demonstrating that specific learning content can indeed function as an important moderator for school age children's and adolescents' motivation (Bong, 2001a; Marsh & Yueng, 1996; Simpson, Licht, Wagner, & Stader, 1996).

Sixth graders in this study displayed higher perceived subjective task values toward fitness than they did toward soccer. These students were more interested in fitness and viewed fitness activities as more useful in their lives. The same was not true for the seventh and eighth graders. A possible reason may be that sixth graders have not had as much opportunity to participate in soccer activities and this lack of positive experience could result in lower values when compared to fitness activities that are routinely a focus in the upper elementary school. Collectively, most of the results support the first hypothesis. Hence, whereas the content specificity of motivation found in this study is consistent with previous research in academic

domains (Bong, 2001a, 2001b), the findings also reflect an apparently important extension of previous research to middle school physical education.

Students in the soccer class exhibited significant higher in-class activity levels than they did in the fitness stations class. This result also provides strong empirical support for the first research hypothesis, and upholds the notion that invasion games promote high activity levels. One obvious reason of this finding is that in the fitness stations class students had 15 second breaks for transitions between the stations after working on each station for one minute. This organizational plan was necessary but resulted in a decrease in activity intensity during the class. Meanwhile, for the soccer class, students spent the majority of time running in an effort to move the balls into scoring position. There was no skill practice during the periods of the data collection, so instructional time and waiting time were minimized. Consequently, students' activity intensity levels were high during the data collection time.

One of the objectives of this study was to investigate whether students' motivation and MVPA differ by grade and gender levels. It was found that sixth graders in the first year of middle school reported significantly higher perceived task values toward fitness than seventh and eighth graders did. Meanwhile, sixth and seventh graders exhibited higher perceived values toward soccer than eighth graders did. This evidence confirms past research indicating that younger students have higher subjective task values during middle school years (Fredrick & Eccles, 2002; Jacob et al., 2002).

Inconsistent with the research hypothesis, students' in-class activity levels did not decline from sixth graders through eighth graders. Regardless of the learning content, the middle school students exhibited similar in-class activity levels across all three grades in the physical education class. In the Kulinna et al.'s study (2003), elementary school children exhibited higher heart rates

than middle school children. The decrease of MVPA during middle school and the lower heart rates may reflect lower motivation for participation in physical education or a change in how physical education class is delivered (Stratton, 1997). Few studies have been conducted to examine the grade differences in activity levels within middle school students and the present findings provide new empirical evidence pertaining to activity levels for physical education in three middle school graders. Future research should include late elementary school students (i.e., fifth graders) or early high school students (i.e., ninth graders) to examine whether there are significant differences during the transition years.

Consistent with the Study 2 findings, no gender differences emerged on motivational beliefs for the two content areas. Another major finding of this study was that gender did not contribute to the observed differences in students' in-class activity levels. Recent research indicated that boys were more active than girls in a soccer unit when controlling for teacher effect (Hannon & Ratliffe, 2005). The baseline data of Middle School Physical Activity and Nutrition (M-SPAN) also showed that boys were significantly more active in physical education than girls were, particularly during skill drills, games, and free play. Reviews of prior studies using both self-report and objective measures revealed that boys were from 15% to 25 % more physically active than were girls (McKenzie, 2003; McKenzie et al., 2000). The results of this study are contradictory with the previous research but there are two possible explanations for the difference. Although Lauriola and colleagues (2004) posited that soccer is considered a male dominant sport in Europe, Hannon and Ratliffe (2005) indicated that soccer was most liked and preferred by high school White girls in the United States. It is possible that, in addition to fitness, soccer is also viewed as a gender neutral sport in this country and, hence, both activities are appropriate for boys and girls. Second, several researchers have argued that in coeducational

physical education classes girls might have low activity levels because of the unpleasant experiences and lack of opportunity attributable to male dominance (Carroll & Loumidis, 2001; Niglgas, 1998). In this study, the physical education class was coeducational but the students were separated by gender for practice and game play. This strategy might have helped girls accumulate more physical activity. The finding is in line with previous qualitative studies (Cockburn, 2000; Osborne, Bauer, & Sutliff, 2002; Taylor et al., 1999) suggesting that separating boys and girls facilitates girls' enjoyment in physical education and in-class activity levels.

In summary, the results of this study suggest that invasion games (i.e., soccer) promote higher levels of physical activity than fitness activities, whereas students were more motivated to participate in the fitness class. These findings provide strong empirical support for the content specificity of students' motivation and in-class activity levels in physical education class. However, there are limitations in the study that warrant consideration. Because this is the first examination of learning content in relation to motivation, situational motivation might provide more accurate information than dispositional motivation since dispositional motivation refers to the tendency to experience particular motives across time and situations. It is important to examine situational motivation such as intrinsic motivation and situational interest in addition to self-efficacy. Also, the instructional styles used by the teachers in this study might have a confounding effect on students' motivation and in-class activity levels. The soccer game play was organized in a traditional way with an emphasis on competition and winning. The fitness unit used student-centered stations and deemphasized competition. Future research should use a systematic observation instrument to determine differences in the teaching styles. Despite these limitations, the results of this study have clear implications for researchers and practitioners who

want to implement interventions in physical education. Particularly when the objective is to promote students' physical activity levels in school and after school programs, practitioners should consider the learning outcome goals when selecting the curriculum content.

CHAPTER 5: GENERAL DISCUSSION

Over the last twenty years it has become evident that school children do not engage in sufficient levels of physical activity (CDC, 2007). Physical inactivity and sedentary lifestyles lead to dramatic increases in the prevalence of obesity and diabetes among this population and can cause health problems in their future. School physical education programs have the potential to increase physical activity levels for all children and therefore, can play a critical role in promoting public health (McKenzie, 2003; Sallis & McKenzie, 1991; Wallhead & Buckworth, 2004). However, current research documents low student motivation for active participation and low levels of physical activity in physical education. The purpose of this dissertation was to integrate the expectancy-value model of achievement choice and self-efficacy theory to better understand school children's motivational beliefs and physical activity levels and intention for future participation, with the goal of encouraging children to be more physically active and adopt healthy lifestyles. To address this aim, three quantitative studies were conducted. Study 1 used prospective data to examine the mediating role of self-efficacy on students' expectancy-related beliefs, subjective task values, outcome expectancy, and their in-class activity levels in middle school physical education. Study 2 investigated students' motivation toward physical education using a longitudinal design over the course of one school year, and the impact of grade and gender on motivation as well. Study 3 examined the effects of different learning content on students' motivational beliefs (self-efficacy, subjective task values, and outcome expectancy) and their in-class activity levels in physical education. The findings of this dissertation provided robust empirical evidence on the motivation theoretical integration and the factors that influence students' motivation and physical activity levels.

The results of Study 1 help to test the hypothesized model integrating the expectancy-value model and self-efficacy theory among middle school students in physical education. The results are promising, and support most of the research hypotheses for the integrated theoretical model. In particular, students' self-efficacy beliefs exerted the largest direct effect on their in-class activity levels over a 2-week period, followed by subjective task values. Likewise, outcome expectancy and expectancy-related beliefs have a small to moderate impact on in-class activity levels, as these beliefs exhibited direct effects on self-efficacy, and self-efficacy, in turn, exerted a large effect on in-class activity levels. The overall strengths of this study include integration of theoretical frameworks using self-efficacy as a mediating variable and the use of path analysis and objective data of in-class activity levels. The findings shed new lights on theoretical integration and extend previous research supporting the mediating role of self-efficacy in physical education. For example, expectancy-related beliefs directly affected self-efficacy and indirectly affected activity levels via self-efficacy.

Study 2 drew on the expectancy-value model and self-efficacy theory to investigate the patterns of relationships among the motivational variables and students' intention for future participation over the course of a school year. This study also examined the age-related changes and gender differences in the study variables. The results highlight that the patterns of correlation among the study variables were significantly positive as students moved through grades six to seven and seven to eight. In light of the relative strength of motivational beliefs as predictors of students' intention for future participation in physical education, self-efficacy and subjective task values emerged as significant predictors across cohorts. This yearlong longitudinal study yielded a consistent decline in the mean levels of expectancy-related beliefs, subjective task values, and outcome expectancy over time, whereas the mean levels of self-efficacy decreased over time

only for the students in Cohort 1. This is an area that merits continued investigation. There were no gender differences for any of the variables in this study. The perspectives of perceived gender appropriateness and different instructional styles clearly provide reasonable explanations for this phenomenon and document the need for future study.

The findings in the first two studies might have significant implications for teaching practice in physical education. First, as the results have shown, students are more likely to be physically active and take physical education in future years when they believe they can accomplish the tasks/activities required in class. Self-efficacy also mediated the relationships between expectancy-related beliefs and outcome expectancy and activity levels. Thus, it is important for future interventions to include strategies that will raise students' perceived ability (i.e., expectancy-related beliefs) particularly self-efficacy. With higher levels of self-efficacy, favorable increases of activity levels and intention for future participation are likely. To achieve this, however, educators need to adapt learning to individuals' ability levels and allow them to achieve a sense of success and establish and maintain positive ability perceptions; provide accurate and timely feedback; and use role models to provide vicarious experiences.

The results also suggested that students' perceived interest, importance, and usefulness toward physical education directly influenced their activity levels and intention for future participation in physical education. Considering that one of the important goals is to foster students' interest in physical education, it is crucial for physical educators to present learning activities in interesting, novel, and meaningful ways. This will encourage students from a large variety of skill levels and backgrounds to be actively engaged in the activities in physical education classes. Physical educators should also emphasize the usefulness or importance of physical education.

Additionally, students' outcome expectancy toward physical education exerted an indirect effect on their in-class activity levels via self-efficacy. Increasing awareness of the benefits of an activity (i.e., soccer, capturing the flags) at the beginning of the unit may be more effective for children, especially when the outcomes of the activity are highly valued. For example, teachers can address the likely outcomes and possible benefits of the activity (e.g., learning team work, decreasing stress, and enhancing self-esteem) to children. To help students strengthen such beliefs, teachers can help students experience positive outcomes of this activity to value the likely outcomes (e.g., feeling competence, and developing relationships).

The overall variance in students' intention for future participation in physical education and in-class activity levels explained by the motivational beliefs (23 - 28%) was relatively small. This suggests that other psychological factors (i.e., situational motivation) and non-psychological factors might be utilized to explain students' achievement-related behavior and cognition in school settings. Other variables might include students' intrinsic motivation, situational interest, stress, learning contents offered, teachers' attitudes and instructional styles, and individual physical attributes (i.e., weight and height). Future research, accordingly, is needed to consider a wide range of variables, and to apply appropriate interventions to increase students' in-class activity levels in physical education.

Study 2 also revealed an overall decrease in motivation among middle school students in physical education over the school year. It is important that teachers devise strategies to reinforce students' motivation as they age. Continued research is needed to identify and investigate the reasons for the decline in student motivation toward physical education, to include elementary and high school students in longitudinal designs, and to examine student motivation in a free-choice program among school students who are both motivated and unmotivated towards out-of-

school physical activity. Additionally, by concentrating on overall gender differences most of the studies ignore the more significant within-group differences among boys and girls in the context of physical education. In this sense, it is important to examine within-group individual differences as well as between-group gender differences.

In Study 3, two types of learning content (health-related fitness and soccer) were compared to determine which one has a more positive influence on students' motivation and in-class activity levels. The results suggest that, when compared to soccer, students reported higher self-efficacy and outcome expectancy beliefs toward fitness, and sixth graders displayed higher perceived subjective task values toward fitness than soccer. These findings strengthen the argument that today's students are becoming more motivated to become fit and healthy. On the other hand, students exhibited significant higher in-class activity levels in the soccer class than they did in the fitness stations class. This result is of particular significance and upholds the notion that invasion games promote relatively high physical activity levels in physical education class. In summary, the findings of Study 3 provide strong empirical support for the content specificity of students' motivation and in-class activity levels in physical education class.

Investigating the connections between learning content and motivation and activity levels is important for physical educators to fully understand issues associated with student motivation in achievement settings and to design motivating curricula for students. By focusing on the impact of different types of learning content on students' motivation and in-class activity levels, physical education teachers and researchers can better understand the link between student motivation, physical activity levels, and curriculum design. In this way, physical education teachers and curriculum developers can design and implement a learning environment that is

interesting and meaningful to students, and thus enhance students' moderate to vigorous physical activity in physical education through enjoyable and motivating lessons.

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APPENDIX A: EXTENDED REVIEW OF LITERATURE

UNDERSTANDING STUDENTS' MOTIVATION IN SPORT AND PHYSICAL EDUCATION: FROM THE EXPECTANCY-VALUE MODEL AND SELF-EFFICACY THEORY PERSPECTIVES

It was evident that school children do not engage in sufficient levels of physical activity (CDC, 2006). This leads to dramatic increase in the prevalence of obesity and diabetes among this population and causes health problems in their future. Physical education and other school sport programs have the potential to increase physical activity levels for all children and therefore, can play a critical role in promoting public health (McKenzie, 2003; Sallis & McKenzie, 1991; Wallhead & Buckworth, 2004). However, current research documents low student motivation for active participation in physical education and sport programs. Further research is required to gain a better understanding of children's motivational processes and achievement behaviors, with the goal of encouraging children to be more physically active and adopt a healthy lifestyle.

As a key facilitator of achievement behavior, motivation can be defined as the energization, direction, and regulation of behavior (Roberts, 2001). Understanding children's motivational beliefs is crucial to physical educators/coaches and considered key to the promotion of regular physical activity. Given that children's motivation to participate in physical education and sport programs actually declines over the school years, and this decline is greater in girls than boys (Thomas, Lee, & Thomas, 2003), developmental and gender/racial differences should be taken into account when addressing children's motivation. In addition, it is necessary to explore children's motivation and achievement under both sport and physical education contexts because the two settings differ with respect to scope, purpose, and the nature of achievement.

It is postulated that expectancy beliefs directly influence decisions individuals make about whether or not they will choose to participate in a task or continue to engage in a task following failure. However, this influence is only observed when adequate incentives for behaviors are presented (Bandura, 1986; Pintrich & Schunk, 1996). Accordingly, when investigating children's motivation, it is important to examine both expectancy beliefs and related incentives (i.e., task values, outcome values). Currently, a variety of motivational theories that include some type of expectancy beliefs and related incentives have been applied to explain motivated behaviors (e.g., choice, persistence, and performance) in sport and educational contexts (Bandura, 1986, 1997; Eccles et al., 1983; Harter, 1981; Weiner, 1985). This review will focus on the expectancy-value model and self-efficacy theory, two theoretical frameworks that have been used extensively to explain motivational patterns in the contexts of sport and physical education.

The aims of this paper, therefore, are threefold. The first aim is to review the literatures relevant to individuals' expectancy beliefs and incentives from expectancy-value and self-efficacy perspectives. The goals of this phase are to clarify conceptual similarities and differences, address measurement issues, and shed light on ways to promote engagement in sport and physical education programs. The second aim is to identify developmental and gender/racial differences in this literature. The third aim is to identify contextual influences on students' motivation and achievement, and to provide respective implications for physical educators and coaches.

EXPECTANCY-VALUE MODEL AND SELF-EFFICACY THEORY

Among contemporary motivational theories, the expectancy-value model of achievement choice proposed by Eccles and her colleagues (Eccles et al., 1983) and Bandura's self-efficacy

theory (1986, 1997) have been examined and applied in sport and physical education. The expectancy-value model explores students' cognition and focuses on the role of expectancy-related beliefs and their perceived values for achievement tasks, whereas Bandura's self-efficacy theory includes self-efficacy and outcome expectancy as major constructs.

Expectancy-value Model of Achievement Choice

The expectancy-value model of achievement choice includes a variety of achievement-related influences that impact individuals' expectancies and values (Wigfield, 1994). Eccles and her colleagues (Eccles & Harold, 1991; Eccles, Wigfield, Harold, & Blumenfeld, 1993; Fredricks & Eccles, 2002, 2004, 2005) have conducted many studies concerning children's expectancy and value beliefs in reference to many settings including sports, while Xiang (Xiang, McBride, & Guan, 2004b; Xiang, McBride, Guan, & Solmon, 2003) has been the most prominent researcher applying expectancy-value model in the physical education context. According to this model, students' achievement performance, the amount of effort exerted, persistence, and choice of achievement tasks are influenced by their expectancy-related beliefs and the values they attach to achievement tasks (Eccles et al., 1983).

Eccles and Wigfield (Eccles et al., 1983; Eccles & Wigfield, 1995) proposed that expectancy-related beliefs consist of both beliefs about ability and expectancies for success. Beliefs about ability are defined as individuals' evaluations of their competence in different achievement tasks. Expectancies for success refer to individuals' beliefs about how well they will do on an upcoming task and are closely related to their beliefs about ability. Research focusing on students' expectancy-related beliefs about different tasks in sport and physical education demonstrates that this construct plays a crucial role in students' motivation and

influence their achievement behaviors such as effort/persistence and performance (Cox & Whaley, 2004; Xiang, Chen, & Bruene, 2005).

In the Eccles et al. model (1983), task values are defined as incentives for engaging in different activities, and are described as a multidimensional construct made up of four separate components: attainment value (importance), intrinsic value (interest), utility value (usefulness), and cost. The importance factor concerns the personal importance of doing well on a task in terms of salient aspects of one's self-schema and core personal values (e.g., achievement needs and competence needs). Interest refers to the enjoyment an individual gets from engaging in the activity or the subjective interest the individual has for the task. Some researchers consider this component similar to the construct of personal interest (Pintrich, Ryan, & Patrick, 1998). Usefulness refers to how a task fits into an individual's current or future goals. Cost refers to how the decision to engage in one activity (e.g., playing soccer) limits access to other activities (e.g., doing schoolwork), assessment of how much effort will be taken to accomplish the activity, and its emotional cost. Each of these components is proposed to have its own unique relationship with achievement behaviors. However, most of empirical work has only focused on the first three components of the value construct. In sport and physical education, task values might be a critical dimension affecting positive achievement behaviors. For example, Cox and Whaley (2004) reported that high school student athletes' interest and usefulness were positively associated with their effort/persistence in basketball. Xiang and her associates (Xiang, McBride, & Bruene, 2004a; Xiang et al., 2003, 2004b) found that elementary school children's intention for future participation in physical education or running was positively related to their task values for physical education or running.

Within the expectancy-value model of achievement choice, expectancy-related beliefs and task values are assumed to be positively related to each other (Eccles et al., 1983; Eccles, Wigfield, & Schiefele, 1998). That is, individuals tend to attach more value to activities in which they do well and believe they are competent. Recent empirical research in physical education concerning the relationship between these two constructs support this postulation (Xiang et al., 2003, 2004b). When further investigating how different components of task values are related to expectancy-related beliefs, researchers have found that the more intrinsic aspects of task values (interest and importance) relate more closely to individuals' expectancy-related beliefs in sport and physical education (Cox & Whaley, 2004; Xiang et al., 2005; Xiang, McBride, & Bruene, 2006).

Similar to the predictive utility of these two constructs in academic domains (Eccles et al., 1983; Schunk, 1991; Stipek & Mac Iver, 1989), empirical studies indicate that individuals' expectancy-related beliefs predict their achievement performance and the amount of effort exerted, whereas task values predict both individuals' actual and anticipated task choice, and engagement in sport activities and physical education (Eccles & Harold, 1991; Cox & Whaley, 2004; Xiang et al., 2004a, 2005, 2006). Specifically, expectancy-related beliefs and interest were predictors of effort/persistence for White athletes (Cox & Whaley, 2004). Task values and/or expectancy-related beliefs emerged as predictors of children's intention for future participation in physical education (Xiang et al., 2003, 2004b).

Several researchers have incorporated the expectancy-value model with other motivational theories, and the results have been conflicting. For instance, when Xiang and her colleagues combined achievement goal theory with this model, fourth graders' expectancy-related beliefs and/or importance made significant contributions to the prediction of their one-

mile running performance, while interest and importance were predictors for intention to future participation in running (Xiang et al., 2004a, 2005, 2006). On the contrary, Chen, Martin, Ennis, and Sun (2006) recently combined situational interest and this model in elementary physical education, finding that none of the constructs of this model (i.e., expectancy beliefs, and task values) predicted learning outcomes (i.e., knowledge test about cardiovascular fitness) and average in-class physical activity. Apparently, due to this incongruence in the available empirical studies, more research is needed when combining the expectancy-value model with other contemporary motivational theories.

Self-efficacy Theory

The second related theory that has examined the role of an individual's expectancy beliefs and incentives is self-efficacy theory (Bandura, 1986, 1997). This theory proposes that an individual's achievement behavior can be explained and predicted by self-efficacy and outcome expectancy. Self-efficacy is beliefs about one's capabilities to learn or perform behaviors at designated levels, while outcome expectancy refers to a person's beliefs concerning the likely consequences of a behavior. Feltz (1992, 2006) and McAuley (1985, 1992) have been the leading theorists and researchers regarding the application of this theory in sport and exercise settings. Relatively few studies have addressed children's self-efficacy and outcome expectancy in physical education (Chase, 1998, 2001; Goudas & Dermizaki, 2004; Zakrajsek & Carnes, 1999), and the specific research questions have varied.

Within this theory, self-efficacy is described as a specific kind of expectancy beliefs. As a product of a complex process of self-persuasion, self-efficacy relies on cognitive processing of diverse sources of efficacy information including mastery experiences (e.g., past performance), vicarious experiences (e.g., modeling), verbal persuasion (e.g., pep talk), and somatic and

emotional states (e.g., anxiety) (Bandura, 1997). In essence, individuals who feel efficacious are more likely to perform at a higher level, try new behaviors, expend more effort on those behaviors, and persevere longer when they encounter challenges. To date, many studies have suggested that self-efficacy is a major determinant of activity choice, willingness to expend effort, performance and persistence in sport and physical education (Feltz & Mugno, 1983; McAuley, 1985; Moritz, Feltz, Fahrback, & Mack, 2000). Particularly, higher self-efficacy would lead to greater persistence and better performance than lower self-efficacy.

Outcome expectancy is defined as incentives in self-efficacy theory (Rodgers & Brawley, 1991). The importance of an outcome and the degree of its influence may have a great deal of variability among individuals, thus it is crucial not to presume that outcomes could always act as incentives for motivated behavior (Maddux, 1995; Poag-DuCharme, 1993; Rodgers & Brawley, 1991, 1996). As a result, Rodgers and Brawley (1991) proposed that outcome expectancy is formed by the interaction of two factors, (a) outcome likelihood, which refers to the probability that a certain action will lead to a certain outcome and (b) outcome values, which refer to the values the individual assigns to the possible outcomes of the behavior. Compared with much attention given to the role of self-efficacy, less attention has been paid to outcome expectancy. In sport and physical activity, research has shown small or no association between outcome expectancy and behavior (Pate et al., 1997; Rovniak, Anderson, Winett, & Stephen, 2002; Sallis, Hovell, Hofstetter, & Barrington, 1992). At least one recent study (Goudas & Dermizaki, 2004) has found that outcome expectancy was moderately related to students' perceived usefulness of physical education and intrinsic motivation toward physical education.

According to Bandura (1997), there is no single relationship between self-efficacy and outcome expectancy, and "it depends on how tightly contingencies between actions and

outcomes are structured, either inherently or socially, in a given domain of functioning (p.23).” However, the positive relationship between self-efficacy and outcome expectancy is promising (Corcoran & Rutledge, 1989; Williams, Anderson, & Winnet, 2005). The positive relationship suggests that either individuals who are more efficacious tend to envision positive rather than negative outcomes or increases in expected positive outcomes make individuals more likely to perceive they are able to perform the behavior than the expectations of negative outcomes.

Research focusing on the ways self-efficacy and outcome expectancy might operate together to impact achievement behaviors has produced mixed findings. Bandura (1986, 1997) has proposed that, when one is predicting behaviors in which outcomes are highly contingent on the quality of performance, outcome expectancy does not explain significant variation beyond that explained by self-efficacy. This is evidenced by studies indicating outcome expectancy accounted for little variance in motivational indices or behavior after self-efficacy was considered (Dzewaltowski, 1989; Dzewaltowski, Noble, & Shaw, 1990; Rovniak et al., 2002). Other research work, however, observed that both self-efficacy and outcome expectancy were independent predictors of behavior in sport and physical activity (Poag-DuCharme, 1993; Rodgers & Gauvin, 1998; Gao, Xiang, Lee, & Harrison, in press). Clearly, the predictive attributes of self-efficacy and outcome expectancy need further investigation.

Recently many studies have been conducted to explore students’ motivational beliefs and their relationships across expectancy-value model and self-efficacy theory in the academic domains (Bong, 2001a, 2001b; Britner & Pajares, 2001, Pajares& Miller, 1994; Pajares, Miller, & Johnson, 1999; Pajares & Valiante, 1999). Among them, self-efficacy and task values were widely examined pertaining to students’ motivation and achievement. Generally, the positive relationship between self-efficacy and task values is compatible with Eccles and her associates’

reports that expectancies are positively associated with task value (Eccles et al., 1998). In terms of the predictive utility of these two constructs to academic performance, Pajares and his colleagues have reported that self-efficacy tends to predict performance, whereas task values do not add significant variance to academic performance when tested together with self-efficacy (Pajares & Miller, 1994; Pajares et al., 1999; Pajares & Valiante, 1999). This is in accordance with the previous research indicating that expectancy beliefs emerge as a better predictor of performance than task values (Wigfield & Eccles, 1992).

CONCEPTUAL SIMILARITIES AND DIFFERENCES

Self-efficacy is similar in several aspects to expectancy-related beliefs. First, both self-efficacy and beliefs about ability are personal views about one's perceived capability. Second, self-efficacy is defined as future-oriented beliefs (long-term or short-term), which shares some characteristics with expectancies for success. Albeit these conceptual similarities, self-efficacy differs from expectancy-related beliefs in that self-efficacy judgments are more situation-specific and in that individuals make use of these judgments in reference to some type of goal (Bandura, 1986, 1989; Pintrich & Schunk, 1996), while expectancy-related beliefs refer to contextual beliefs such as beliefs in one's ability in a sub-domain (e.g., physical, social, academic).

Likewise, there is an important conceptual distinction between expectancies for success and outcome expectancy. These two constructs are similar in that both involve the anticipated outcome of engaging in a task. However expectancy-related beliefs represent the assignment of a probability of a "successful" outcome while outcome expectancy focuses on the anticipated outcome of the motivated behavior. Bandura (1997) argued that expectancy-value theorists historically have focused on outcome expectancy, but Wigfield and Eccles (2000) contend that in their work they measured individuals' own expectancies for success but not outcome expectancy

within self-efficacy theory. Indeed, these researchers considered their expectancy construct more similar to Bandura's self-efficacy construct, whereby outcome expectancy might play the role of providing incentives which may have the same function as task values in the expectancy-value model.

In addition, it is clear that the values an individual places on either the task (task values) or the outcome (outcome values) could affect his or her motivation and behavior. However, these two constructs are conceptually different. Task values are "the incentives or purpose that individuals have for succeeding on a given task" (Wigfield, 1994, p.102). That is, task values concern an individual's perceived beliefs about interest, importance, and utility of a task or domain. In contrast, outcome values refer to how certain outcomes relative to others are more desirable for different individuals. Specifically, a person who values the outcome or finds the outcome more attractive will be more motivated to attain the outcomes. Although Bandura (1997) proposed that the motivating potential of anticipating outcomes is largely determined by the subjective values that an individual places on the task, it is possible that an individual values a task because he or she values the outcome of the task. The reciprocal relationships of these constructs remain less clear.

Taken together, what these two theoretical perspectives have in common are beliefs about one's perceived capability and incentives to participate in certain activities. The research area, in general, has shown promise in explaining students' motivation and achievement in educational contexts. The two perspectives, however, have been examined separately in past sport and physical education research. According to Eccles and Wigfield (2002), there is a need for theoretical integration in the field, particularly with respect to theories that incorporate expectancy beliefs and related incentives. Second, the effect of one construct on another across

these two theories remains largely unexplored. Specifically, it is proposed that contextual beliefs (expectancy-related beliefs) might influence situational beliefs (self-efficacy) (Vallerand, 2001). Researchers also suggested that outcome expectancy might operate to influence self-efficacy. For example, increasing expected positive outcomes of physical activity would increase self-efficacy for physical activity (Maddux, 1999). Additionally, it is possible that incentives might be a nutshell that includes task values and outcome expectancy. Integrating these two theoretical frameworks may, accordingly, offer important insights for understanding students' motivation and achievement behavior.

MEASUREMENT ISSUES

There are measurement differences in assessing expectancy beliefs and their correlated incentives. One crucial difference among measures is the level of specificity of the measurement. Bandura (1997) contended that self-efficacy should be measured specifically within situational level because specific measures of beliefs relate more closely to behavior. The self-efficacy measures typically ask individuals about their confident level for accomplishing the task (e.g., How confident are you in your ability to learn skills well in this activity), while measures of expectancy-related beliefs have tended to be domain rather than task specific (e.g., How well will you learn activities and games in physical education this year), and therefore expectancy-value approach has been somewhat more general than that of research focusing on self-efficacy (Wigfield & Eccles, 2000). No doubt, omnibus measures of self-efficacy could create confounded relationships and ambiguous findings that obfuscate the potential contribution of any expectancy beliefs to the understanding of motivation.

The second critical measurement issue involves the ways individuals are asked to judge their ability. From the expectancy-value perspective, the individuals are asked to rate their own

ability and then compare their ability across different subject areas and to other individuals. Typical examples include “How good at activities and games in physical education are you?” and “How good at physical education are you, compared to other students?” Self-efficacy measures, however, do not ask comparison items. Instead, the questions are goal-referent and tend to capture individuals’ beliefs about the specific tasks or activities (Bandura, 1997; Pajares, 1996). For instance, the individuals may be asked, “How confident are you that you can do weight training workout three times per week for the next four weeks?” Collectively, not only the conceptual definitions for expectancy beliefs vary, but the measures vary across these theories. Future research is called for to investigate more closely how similar and different these measures are.

It is clear that the cost component of task values is often overlooked in the empirical studies testing Eccles et al. model (1983). Cost has to do with negative aspects of engaging in an activity. Without an assessment of the cost associated with a particular activity, task values are essentially incomplete (Cox & Whaley, 2004). Recently, Liu and Chen (2006) utilized open-ended writing and interviews to examine the perceived cost in physical education. Thus, construction of a valid and reliable measure for cost is highly recommended in future research.

Finally, a major concern that has yet to be clearly resolved involves the measurement of outcome expectancy. In sport and physical activity, existing studies examining outcome expectancy combine perceived outcome likelihood and subjective outcome values followed by summing the resulting products (Poag- DuCharme, 1993; Rodgers, 1992; Rodgers, & Brawley, 1991, 1993, 1996). Rodgers and Brawley (1996) provided several reasons to support the use of the weighted measurement. First, there is no reason to expect that the measurement of various outcomes can be predictors of achievement behavior for those who do not value the outcomes.

Second, the weighted measurement can better capture the joint influence of outcome likelihood and outcome values. Finally, the measurement is in accordance with expectancy-value theory (Fishbein & Ajzen, 1975) when individuals are dealing with uncertain outcomes. However, some researchers (Evans, 1991; Gagne & Godin, 2000) have argued that the multiplicative combination of perceived outcome likelihood and outcome values is statistically unsound. Specifically, this calculation is problematic because the variance accounted for in a dependent variable by a multiplicative composite varies depending on the numerical scale used to measure each component variable. Instead, these researchers suggested traditional methods to test for interaction effect of outcome likelihood and outcome values. Clearly, further research is needed to study and sort out the conceptual and methodological concerns regarding outcome expectancy.

DEVELOPMENTAL AND GENDER/RACIAL DIFFERENCES

Research from both of the theoretical perspectives discussed in the paper suggests developmental and gender/racial differences in all constructs except outcome expectancy. Studies examining outcome expectancy have not addressed developmental and gender/racial differences thus far. The next section of this paper synthesizes developmental, gender, and racial differences.

Developmental Differences

Based on the predictive roles of students' expectancy beliefs and task values, a major emphasis in research on motivation has been an assessment of how these constructs change as children develop. Unlike the age-related changes in academic domains, researchers have documented contradictory findings for age differences in expectancy beliefs in sport and physical education. The majority of research has reported that children's expectancy beliefs decline across school years in sport and physical education (Chase, 2001; Fredricks & Eccles, 2002; Jacobs,

Lanza, Osgood, Eccles, Wigfield, 2002; Lee, Carter, Xiang, 1995; Xiang et al., 2003, 2004b), whereas some have found no significant differences over time (Xiang et al., 2005, 2006). For example, in their cross-sectional and short-term longitudinal studies, Xiang and her colleagues (Xiang et al., 2003, 2004b) have indicated that a decline in children's expectancy beliefs toward physical education began to take place in the transition from primary to intermediate grades (e.g., 2nd grade to 5th grade). Nevertheless, in their research with fourth graders in a running program, they did not find any significant changes in expectancy beliefs across the school year (Xiang et al., 2005; Xiang et al., 2006).

When researchers are seeking explanations for these conflicting findings, two recent long-term longitudinal studies from 1st through 12th grade have provided some convincing results (Fredricks & Eccles, 2002; Jacobs et al., 2002). According to these studies, children's expectancy beliefs in sports declined over the course of schooling, and this decline accelerated over time. One explanation is that young children nearly always think they are competent in and will do well on the upcoming tasks. As children grow older, their expectancy beliefs become more accurate and realistic (Fredricks & Eccles, 2002). This decline might also reflect an increase in the competitiveness of the school and athletic contexts as children progress through school.

In considering the age-related differences in children's task values, two kinds of changes have been studied: changes in the levels of children's valuing of different activities and changes in the structure of the component of children's task values. In general, research evidence has reported that older children's overall ratings of task values for sport (Jacobs et al., 2002) and physical education (Xiang et al., 2003, 2004b) decline compared to younger children. By contrast, one cross-sectional study of first, second, and fourth graders found that children's

values on sport increased over time (Wigfield et al., 1990). However, research has shown that each individual component (interest, importance, and utility) declined over time (Xiang et al., 2005, 2006). Interestingly, Wigfield et al. (1997) reported that the perceptions of usefulness and importance of sport decrease while interest in sport remained rather stable over the three-year period assessed in their study. In another long-term longitudinal study, children's ratings of interest decline slightly, while the decline in importance perceptions of sports increased larger over time (Fredricks & Eccles, 2002). One plausible explanation is that as sport has become much more competitive, children tend to lower their perceptions of the importance of sport as a way to protect their self-esteem even though they still enjoy participating in the sport activities. Together, these findings paint a rather gloomy picture of children's changes of task values across school years. It is clear that more research is needed to clarify developmental changes in these components of children's perceived values toward sport and physical education.

Gender and Racial Differences

In addition to the developmental differences, studies have reported gender/racial differences on expectancy beliefs and task values in sport and physical education. The empirical evidence concerning gender differences is, however, mixed. Over the years, researchers have reported gender differences in children's expectancy beliefs, but the differences seem to vary by activities or tasks (Lee, 1997). Generally, research findings have consistently shown that boys are more likely to hold higher ability beliefs and expectancies for success in most traditional sport activities and physical education (Eccles & Harold, 1991; Jacobs et al., 2002; Wigfield et al., 1997; Xiang et al., 2003, 2004a, 2006). Other research has suggests that gender differences may be a result of perceived gender appropriateness of the activities or tasks (Clifton & Gill, 1994; Lee, Fredenburg, Belcher, & Cleveland, 1999; Lirgg, 1991; Solmon, Lee, Belcher,

Harrison, & Wells, 2003). That is, when an individual is participating in activities deemed as gender appropriate, their expectancy beliefs increase. Researchers have proposed that gender-role stereotypes can influence the development of children's competence beliefs, their expectations for success on various task, and their perceptions of value in various activities (Lee et al., 1999). Lee et al. further posited that a main reason for gender-role stereotypes is the need for children to feel socially accepted. For example, boys are expected by others to play masculine-typed tasks (e.g., basketball and football) while girls were expected to participate in feminine-typed tasks (e.g., dance and gymnastics). These socially constructed gender-role stereotypes have pressured both boys and girls to behave in ways that will satisfy the expectations of society. Apparently, when sport and physical education contribute to the construction of a particularly dominant form of masculinity, males tend to feel more competent than girls and vice versa.

The research evidence has also provided conflicting results concerning the influence of gender on task values. Many studies report that boys like sport more and place higher importance on participating in sport than do girls (Eccles & Harold, 1991; Fredricks & Eccles, 2002; Jacobs et al., 2002; Lee et al., 1999). Some recent studies (Xiang et al., 2003, 2004a, 2006), however, found that elementary school boys and girls did not differ in task values toward physical education and a running program. Again, the gender appropriateness perspective may account for the lack of differences in these studies. One way that gender-role stereotypes can affect task values is through their impact on the importance boys and girls attached to various personal characteristics (e.g., masculine characteristics such as physical strength and aggressiveness, and feminine characteristics such as gracefulness and agility). In other words, boys and girls tend to value activities perceived to be appropriate for their gender. Taken together, the research

reviewed indicates that gender differences in children's motivational beliefs (e.g., expectancy beliefs, task values) are found most often in gender-role stereotyped activities.

In comparison to gender differences that have been extensively studied across these theoretical frameworks, racial differences have received much less research attention. In academic domains, research on expectancy beliefs has revealed that minority students (e.g., African-American, and Hispanic American) maintained optimism and positive self-esteem even in the face of achievement failure (Graham, 1994; Lay & Wakstein, 1985). In sport settings, the critical mass of research is primarily focused on African-Americans. While pervasive racial stereotypes exist pertaining to physical superiority in particular activities for African-Americans, recent studies indicate that racial groups display different proclivities toward and perceptions of appropriateness of particular sports and physical activities (Goldsmith, 2003; Harrison, 1999; Harrison, Lee, & Belcher, 1999). Generally speaking, particular sports such as football, basketball and track sprinting are regarded as more appropriate for African-Americans whereas sports such as golf and hockey are deemed more appropriate for the Whites (Harrison & Belcher, 2006). The perceived racial appropriateness of an activity could consequently impact individual's expectancy beliefs and values toward an activity. Cox and Whaley (2004), in a study with high school basketball athletes, found that the African-Americans scored significantly higher than the Whites on expectancy beliefs in relation to playing basketball, with basketball being labeled "Black" sport by African-Americans and the Whites alike (Harrison, 1999).

Research to date on the values minority children have toward school in the more general educational contexts has yielded mixed results, with African-Americans devaluing the importance, attractiveness, and utility of academic success (Graham & Taylor, 2001) and minority students, including African-Americans, valuing education more than the Whites

(Goldsmith, 2004; Stevenson, Chen, & Uttal, 1990). In sport settings, when compared to the White athletes, African-Americans were more interested in basketball, believed basketball was more useful to them, and felt that basketball was more important (Cox & Whaley, 2004). These findings provide the first evidence concerning task values that racial groups place on specific sport. It is possible that, in the African-American culture, sport is valued as an expression of self and a potential way out of economic hardship and racial oppression (Coakley, 2004; Major, 1998), especially considering that basketball is considered as their racial appropriate sport. Racial-role appropriateness may also explain the resistance of African-American students in physical education classes to engage in activities that extend beyond those stereotyped activities for their race. Many physical educators express feelings of exasperation when their African American students, particularly boys, express their desire to engage exclusively in basketball (Harrison & Belcher, 2006). To alleviate the negative impact of racial-role stereotypes, it is important for physical educators to create a learning environment that is engaging, has meaningful content (Ennis et al., 1997), and offer a curriculum that is culturally responsive to the needs of students (Ladson-Billings, 1995).

CONTEXTUAL INFLUENCES

Contemporary motivation research emphasizes the contextual influences on students' motivational orientation (Weiner, 1990). Harrison and Belcher (2006) proposed that there is no demarcation between what might occur in physical education class and the world of sport in the minds of many Americans. In spite of the fact that sport and physical education share a common heritage, they have grown more distinctive with the knowledge explosion and through disciplinary specificity (Lumpkin, 2005). That is, these contexts differ in definition, scope, purpose, and the nature of achievement. Operationally, sports are highly organized and

competitive physical activities governed by rules with the goal of obtaining enjoyment, personal satisfaction, or rewards. In today's world, youth sports involve more than 25 million children a year. Physical education is an educational process through which an individual acquires skills, fitness knowledge, and attitudes that contribute to an optimal development and well-being through physical activity. School physical education programs are the primary avenues for helping children learn the skills and knowledge needed to lead a healthy and physically active lifestyle (Wuest, 2006). In addition, participation in physical education is usually mandatory, whereas participation in sports is primarily a voluntary undertaking.

Extant studies indicate that expectancy beliefs and incentives influence achievement behaviors differently under various contexts. In contexts where one has little chance for withdrawal, such as physical education programs requiring participation, expectancy beliefs are posited to predict performance and persistence while task values are predictors of intentions for future participation (Dishman et al., 2004; Samuel & Gibb, 2004; Xiang et al., 2003, 2004b). However, when one enters a context involving the freedom to withdraw, such as extracurricular sports, expectancy beliefs predict performance (Feltz & Mugno, 1983; McAuley, 1985) and effort/persistence (Cox & Whaley, 2004). Incentives (i.e., task values, outcome expectancy), on the other side, were related to participation or intentions (Gao, Xiang, Lee, & Harrison, 2006; Rodgers & Brawley, 1991, 1996; Rodgers & Gauvin, 1998). Under both contexts, persistence tends to increase as expectancy beliefs develop. Yet, in the context of physical education, expectancy beliefs may not be a good predictor of persistence in part because of teachers' rules and policies about engagement. Therefore, future research needs to investigate various motivational indices such as strategy use and cognitive effort to determine their relations to expectancy beliefs and incentives.

Children's perceived low task values in physical education has resulted in the lack of feelings of interest, enjoyment, and personal meanings and perceptions of significance, challenge, and usefulness (Carlson, 1995; Hopple & Graham, 1995; Sanders & Graham, 1995). Because children are not allowed to drop out, their levels of engagement and quality of learning are affected. By contrast, children usually have the option of dropping out in sport. If they lose interest or do not value a certain activity, they can leave the program. Of course, the distinctions between the contexts should not isolate sport from physical education. Indeed, the experiences of participating in sport programs influence how children feel about physical activity and consequently influence physical education. Some of what we have learned by studying youth sport can also apply to physical education. Further, the fundamental motor skills (e.g., throwing and catching) and movement concepts (e.g., balance) children learn in elementary physical education programs form the foundation for later development of specialized games and sport.

IMPLICATIONS FOR EDUCATIONAL PRACTICE

The research on expectancy beliefs and related incentives provides considerable implications for professional practice in sport and physical education. First, as the research has shown, students are motivated to engage in activities and achieve success when they believe they can accomplish the activities. Physical educators can and should help students maintain relatively accurate but high expectancy beliefs, and help them avoid an illusion of incompetence. To achieve this, teachers/coaches should help students achieve success by keeping tasks at a relatively challenging but reasonable level of difficulty, providing accurate and timely feedback, and using models to provide vicarious experiences.

Second, it is critical that physical educators emphasize the values of sport and physical education. To help students become more personally invested in the activities, teachers/coaches

may make the activities meaningful for them, and positively reinforce task completion. To foster students' interest, it is crucial that teachers/coaches provide students with opportunities to engage in interesting, personally relevant, and challenging activities. This approach will help students from a large variety of skill levels and backgrounds be actively engaged in sport and physical education.

Third, increasing awareness of the benefits of an activity at the beginning of the program may be more effective for children, especially when the outcomes are highly valued. For example, teachers/coaches can address the likely outcomes and possible benefits of running (e.g., health promotion, decrease stress, and self-esteem enhancement) to children. After that, teachers can help students experience positive outcomes to create favorable outcome expectancy (e.g., feel competence, and develop relationships) among students.

Although the gender-role/racial-role stereotypes will be difficult to change in sport and physical education, it is possible that teachers can reduce the influence of these stereotypical views by creating a learning environment that meets the needs of all students and provide learning experiences that are enjoyable, interesting to motivating to genders, as well as Whites and minorities. This strategy might overcome demotivating effects and/or physical discomfort among the different groups. With these efforts to challenge the traditional dominant stereotypical views, all children can be convinced that participating in a broad range of sport and physical activities regularly is important and meaningful.

Finally, due to the contextual influences on motivational beliefs, research findings provide respective implications for sport and physical education. In sport settings, coaches, physical education teachers, and particularly parents might play significant roles to influence children's sense of expectancy, valuing and participation in sport. Training seminars might be

designed to teach adults developmental processes associated with youth sport and learning of sport skills (Rodriguez, Wigfield, Eccles, 2002). Adults can in turn help children learn to focus on skill development rather than winning, so that they feel competent and value sport involvement for a lifetime of sport enjoyment, health and fitness. In physical education, the main emphasis is on the learning environment. Some desirable instructional practices and strategies include: providing interesting and fun activities; providing learning activities that allow students to achieve a sense of success and establish and maintain positive ability perceptions; and promoting high ability perceptions among all students (Xiang et al., 2004a, 2006).

SUMMARY

Current research on expectancy beliefs and incentives focuses on two general beliefs of individuals: believing in the ability to be successful, and valuing the tasks or outcomes. The two general research approaches highlighted in this paper were expectancy-value model and self-efficacy theory. Ample research suggests that expectancy beliefs are more likely to be related to actual achievement or performance, whereas incentives are more related to task choice in physical education and persistence in sport.

There are developmental, gender, and racial differences to consider in children's expectancy beliefs and incentives. In particular, most evidence suggests that younger children are more likely to have relatively higher expectancy beliefs and task values and that these motivational beliefs decline with age. The trends for gender/racial differences are related to gender-role/racial-role stereotypes. Girls tend to have lower expectancy beliefs and task values in most activities in sport and physical education. A lack of research in race limits our ability to fully understand minority children's motivational beliefs. In addition, the influences of the

contexts of sport and physical education on motivational beliefs are apparent and, consequently impact children's achievement behaviors.

Future areas of research include the investigation of the complex relationships among these expectancy beliefs and incentives, as well as the predictive utility of these constructs on motivated behaviors in sport and physical education settings. Second, one of the four components in Eccles et al. model (1983), cost, has rarely been investigated in the studies that test the model in sport and physical education. Future research should continue to explore the impact of cost. Third, future research needs to include outcome expectancy to better understand its relationship with other motivational beliefs and achievement behaviors in physical education. Additionally, it is necessary to further investigate the role of expectancy beliefs and incentives as a function of race. In summary, this line of research provides a better understanding of children's motivation and behavior in sport and physical education, and guidance for increasing the number and engagement levels of children and youth in quality programs.

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APPENDIX B: CONSENT FORMS

CONSENT FORM

Dear Parent:

I am a Ph.D. candidate in Kinesiology at Louisiana State University, and am conducting a project to gather information about children’s motivation and physical activity levels in physical education.

The school principal and physical education teacher have agreed to allow me to work with the children from the LSU Laboratory School. The project is outlined in detail on the back of this page. Essentially, students will spend about 20 minutes completing several surveys designed to assess their motivation toward physical education during their regular PE class in fall and spring semester respectively. Then they will wear three equipments (pedometer, accelerometer, and heart rate monitor) on three regularly scheduled physical education classes.

If you give me permission for you child to participate, your child will be told that participation is voluntary, that he or she can refuse to participate, and can decide to stop being involved in the project at any time without getting in trouble. We will only work with your child if he or she agrees to be involved.

The study will benefit teachers and students by helping us better understand issues associated with student motivation in achievement settings and design motivating curricula for students, and the most accurate measurement for students’ in-class activity levels as well. There are no risks involved in this study, and there is no cost involved. Participation is completely voluntary, and children can withdraw from the study at any time. If you have any questions or concerns about the project, you may call me Monday - Friday from 8:30 am until 4:00 pm at 578-5714 and I will be happy to answer your questions. If you will give me permission for your son or daughter to participate, please sign this letter below and return it to your child's PE teacher. Thank you very much for your help.

Zan Gao
LSU Ph.D. Student
Phone: 578-5714

Approved: _____
Principal

Child’s Name: _____

I will allow my child to participate in the study described above.

Parent’s Signature: _____ Date: _____

1. Study Title: The Effects of Learning Content on Students' Motivation and Physical Activity Levels in Middle School Physical Education
2. Performance Site: LSU laboratory school
3. Investigators: The following investigators are available for questions about this study, M-F, 8:00 a.m. - 4:30 p.m. Zan Gao 578-5714
4. Purpose of the Study: The primary aim of this study is to examine the effects of three types of learning content on students' motivation and in-class activity levels in middle school physical education. As a secondary aim, the most accurate measurement (pedometer, accelerometer, and heart rate monitor) of in-class activity levels will be examined.
5. Subject Inclusion: Middle school students
6. Number of subjects: 300
7. Study Procedures: Students will spend about 20 minutes completing several surveys designed to assess their motivation toward physical education, and wear pedometer, accelerometer, and heart rate monitor on three regularly scheduled physical education classes.
8. Benefits: The study will benefit teachers and students better understand issues associated with student motivation in achievement settings and design motivating curricula for students, and the most accurate measurement for students' in-class activity levels as well.
9. Risks: No known risks. We are simply measuring the effects of different curricula contents designed by teachers on physical activity levels in regular physical education classes. We are not implementing any new fitness activities.
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 the 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. Financial Information: There is no cost to the subjects, nor is there any compensation for participating in the study.
13. Withdraw: Students may withdraw at any time without penalty. They should let the principal investigator, Zan Gao, know immediately that they wish to terminate their involvement with the study.

Parent's Signature: _____

Date: _____

STUDENT ASSENT FORM

I, _____, agree to participate in a study to find ways to help teachers encourage children to be physically active in physical education class. I will fill out some questions about my physical education class on some surveys, and then wear pedometer, accelerometer, and heart rate monitor for three regular physical education classes. I can decide that I do not want to be in the study, or stop being in the study at any time without repercussions.

Child's Signature _____ Age _____ Date _____

Witness _____ Date _____

APPENDIX C: INSTRUMENTATION

EXPECTANCY-VALUE SCALE

Directions: Read each item carefully. Using the scale below, please circle the number that best describes your expectancy-related beliefs and task values toward physical education (P. E.). We are interested in your opinion. There are no right or wrong answers.

1. How good at activities and games in P.E. are you?

(1) very bad; (2) bad; (3) not sure; (4) good; (5) very good.

2. How good at P.E. are you, compared to other students?

(1) one of the worst; (2) one of the bad; (3) not sure; (4) one of the good; (5) one of the best.

3. How good at P.E. are you, compared to other school subjects?

(1) a lot worse in P.E.; (2) a littler worse in P.E.; (3) not sure; (4) a littler better in P.E.; (5) a lot better in P.E.

4. How good would you be at learning something new in P.E. this year?

(1) very bad; (2) bad; (3) not sure; (4) good; (5) very good.

5. How well will you learn activities and games in P.E. this year?

(1) not at all well; (2) not well; (3) not sure; (4) well; (5) very well.

6. For me, being good at activities and games in P.E. is...

(1) not very important; (2) not important; (3) not sure; (4) important; (5) very important.

7. Compared to your other school subjects, how important is it to you to be good at activities and games in P.E.?

(1) not very important; (2) not important; (3) not sure; (4) important; (5) very important.

8. In general, I find learning new activities and games in P.E. is...

(1) "way" boring; (2) "way" a little boring; (3) not sure; (4) "way" a little fun; (5) "way" fun.

9. How much do you like activities and games in P.E.?

(1) don't like it at all; (2) don't like it; (3) not sure; (4) like it; (5) like it very much.

10. Some things that you learn in school help you do things better outside of class. We call this being useful. For example, learning about plants might help you grow a garden. In general, how useful is what you learn in P.E.?

(1) not useful at all; (2) not useful; (3) not sure; (4) useful; (5) very useful.

11. Compared to your other school subjects, how useful is what you learn in P.E.?

(1) not useful at all; (2) not useful; (3) not sure; (4) useful; (5) very useful.

INTENTION FOR FUTURE PARTICIPATION IN PHYSICAL EDUCATION SCALE

When you get to high school, you will have a choice whether you want to take P.E. How much would you want to take it?

(1) not at all; (2) not likely; (3) not sure; (4) likely ; (5) very much.

SELF-EFFICACY SCALE

Rate how confident you are in your ability to successfully accomplish each of the following items.

Check only one circle on each line.

With regard to this week's activities, I have confidence in ...	Strongly Disagree	Disagree	No opinion	Agree	Strongly Agee
1. my ability to doing well in this activity.	SD	D	N	A	SA
2. my ability to learn skills well in this activity.	SD	D	N	A	SA
3. my performance in this activity.	SD	D	N	A	SA
4. my knowledge needed to do well in this activity.	SD	D	N	A	SA
5. my success in this activity if I exert enough effort.	SD	D	N	A	SA
6. my ability to handle the anxiety related to this activity	SD	D	N	A	SA

OUTCOME LIKELIHOOD SCALE

Different students have different views for the likelihood of outcomes of this week's activities. How do you think the likelihood of the following outcomes of these activities apply to you? (Check one circle on each line)

Items	Likelihood of each outcome for you						
	Very unlikely	Unlikely A little	Unlikely A very little	Not sure	Likely A very little	Likely A little	Very likely
1. Learn how to exercise after finishing school.	1	2	3	4	5	6	7
2. Develop a nice body.	1	2	3	4	5	6	7
3. Develop physical condition.	1	2	3	4	5	6	7
4. Learn how to exercise to improve health.	1	2	3	4	5	6	7
5. Relax from other lessons.	1	2	3	4	5	6	7
6. Learn to cooperate.	1	2	3	4	5	6	7
7. Learn various sports.	1	2	3	4	5	6	7
8. Learn motor skills.	1	2	3	4	5	6	7
9. Learn to comply with rules.	1	2	3	4	5	6	7
10. Learn to compete and win.	1	2	3	4	5	6	7

OUTCOME VALUE SCALE

Different students value differently the outcomes of this week's activities. How important to you are the following outcomes for participating in these activities? (Check only one circle on each line)

Items	Value of each outcome for you						
	Not very important	Not important A little	Not important A very little	Not sure	Important A very little	Importa- nt A little	Very importa- nt
1. Learn how to exercise after finishing school.	1	2	3	4	5	6	7
2. Develop a nice body.	1	2	3	4	5	6	7
3. Develop physical condition.	1	2	3	4	5	6	7
4. Learn how to exercise to improve health.	1	2	3	4	5	6	7
5. Relax from other lessons.	1	2	3	4	5	6	7
6. Learn to cooperate.	1	2	3	4	5	6	7
7. Learn various sports.	1	2	3	4	5	6	7
8. Learn motor skills.	1	2	3	4	5	6	7
9. Learn to comply with rules.	1	2	3	4	5	6	7
10. Learn to compete and win.	1	2	3	4	5	6	7

APPENDIX D: PILOT STUDY

UNDERSTANDING STUDENTS' MOTIVATION IN PHYSICAL EDUCATION: INTEGRATION OF EXPECTANCY-VALUE MODEL AND SELF-EFFICACY THEORY

Paper presented at 2007 National Meeting of the American Education Research Association

The rapid rise of obesity among America school children could lead to future health problems such as cardiovascular disease and diabetes (Centers of Disease Control and Prevention [CDC], 1997; U.S. Department of Health & Human Services [USDHHS], 1996, 2001). School physical education programs have the potential to increase physical activity levels for all children and therefore, can play a critical role in promoting public health (Sallis & McKenzie, 1991; Wallhead & Buckworth, 2004). However, research documents poor student motivation for active participation and low levels of engaged time in physical education. Thus understanding children's motivational beliefs is crucial to physical educators and considered key to the promotion of regular physical activity. In addition, given that children's motivation to participate in physical education actually declines over the school years, with the decline greater for girls than for boys (Thomas, Lee, & Thomas, 2003), grade and gender differences should be taken into account when addressing children' motivation in physical education.

As a central construct of motivation, expectancy beliefs represent the key idea that most individuals will not choose to do a task or continue to engage in a task when they expect to fail. It is important to note, however, that the influence of expectancy beliefs is only observed when adequate incentives (i.e., perceived importance, and outcome values) for behaviors are presented (Bandura, 1986; Pintrinch & Schunk, 1996). Therefore, when investigating children's motivation in physical education, researchers must consider both expectancy beliefs and their corresponding incentives. Currently, there are a variety of motivational theories that include expectancy beliefs

and incentives in some form. Among them, the expectancy-value model and self-efficacy theory have frequently been applied to explain how motivation influences achievement outcomes (e.g., choice, persistence, and performance) in sport and educational contexts (Bandura, 1986, 1997; Eccles et al., 1983). Beliefs about one's perceived capability and incentives to participate in certain activities are central components of these two theories and have shown promise in explaining students' motivation and achievement in educational contexts. These two perspectives, however, have been examined separately in past work in physical education. Eccles and Wigfield (2002) have argued that there is a need for theoretical integration in the field, particularly with respect to models that incorporate expectancy beliefs and incentives. Therefore, for a better understanding of students' motivation more research designed to integrate the two theoretical frameworks is needed.

EXPECTANCY-VALUE MODEL OF ACHIEVEMENT CHOICE

The expectancy-value model of achievement choice is proposed by Eccles and Wigfield and their colleagues (Eccles et al., 1983; Wigfield & Eccles, 1992, 1994; Wigfield, Eccles, & Rodriguez, 1998). According to this model, students' achievement performance, the amount of effort exerted, persistence, and choice of achievement tasks are influenced by their expectancy-related beliefs and the values they attach to achievement tasks (Eccles et al., 1983). Xiang has been one of the first investigators to study the application of the expectancy-value model in physical education contexts (Xiang, Chen, & Bruene, 2005; Xiang, McBride, & Bruene, 2004; Xiang, McBride, & Bruene, in press; Xiang, McBride, & Guan, 2004; Xiang, McBride, Guan, & Solmon, 2003).

Expectancy-related Beliefs

In the Eccles et al. model (1983), expectancy-related beliefs consist of both ability beliefs and expectancies for success. Ability beliefs are defined as individuals' evaluations of their competence in different achievement tasks. Expectancies for success refer to individuals' beliefs about how well they will do on an upcoming task and are closely related to their ability beliefs. Research focusing on students' expectancy-related beliefs about different tasks in physical education demonstrates that this construct plays a crucial role in students' motivation and influences their achievement outcomes such as performance in a running program (Xiang et al., 2005; Xiang, McBride, & Bruene, 2004; Xiang et al., in press).

Task Values

According to Eccles et al. (1983), task values are defined as incentives for engaging in different tasks. Attainment value (importance), intrinsic value (interest), and utility value (usefulness) comprise important aspects of task values. Importance concerns the personal importance of doing well on the task in terms of salient aspects of one's self-schema and core personal values (e.g., achievement needs and competence needs). Interest refers to the enjoyment an individual gets from performing the task or the subjective interest the individual has for the task. Some researchers consider this component similar to the construct of personal interest (Pintrich, Ryan, & Patrick, 1998). Usefulness refers to how a task fits into an individual's current or future goals. In physical education, task values might be a critical dimension affecting achievement outcomes. For example, Xiang and her associates (Xiang, McBride, & Bruene, 2004; Xiang, McBride, & Guan, 2004; Xiang et al., 2003) have reported that school children's intention for future participation in physical education or running was predicted by the values they attached to physical education or running.

Within the expectancy-value model of achievement choice, expectancy-related beliefs and task values are assumed to be positively related to each other (Eccles et al., 1983; Eccles, Wigfield, & Shiefele, 1998). That is, individuals tend to attach more value to activities in which they do well and believe they are competent. Recent empirical research in physical education concerning the relationship between these two constructs support this postulation (Xiang, McBride, & Guan, 2004; Xiang et al., 2003). Further, researchers have reported that the more intrinsic aspects of task values (interest and importance) relate more closely to individuals' expectancy-related beliefs in a running program (Xiang et al., 2005; Xiang et al., in press).

Similar to the predictive utility of these two constructs in academic domains (Eccles et al., 1983; Schunk, 1991; Stipek & Mac Iver, 1989), empirical studies in sport and physical education indicate that individuals' expectancy-related beliefs predict their achievement performance and the amount of effort exerted, whereas task values predict both individuals' actual and anticipated task choice, engagement/ persistence, and strategy use (Eccles & Harold, 1991; Cox & Whaley, 2004; Xiang et al., 2005; Xiang, McBride, & Bruene, 2004; Xiang et al., in press). For example, students' expectancy-related beliefs made a significant contribution to the prediction of their one-mile running performance, while interest and importance were contributors for intention to future participate in running (Xiang, McBride, & Bruene, 2004; Xiang et al., 2005; Xiang et al., in press).

SELF-EFFICACY THEORY

Self-efficacy theory comes from social cognitive theory and includes self-efficacy and outcome expectancy as major constructs (Bandura, 1986, 1997). Bandura and other researchers have applied this theory to a variety of domains, including mental health, health behavior, athletic performance, career choices, and academic achievement. This theory proposes that an

individual's achievement behavior can be explained and predicted by self-efficacy and outcome expectancy. While these factors have been studied in a variety of contexts, relatively few studies have addressed children's self-efficacy beliefs and outcome expectations in physical education (Chase, 1998, 2001; Goudas & Dermtizaki, 2004; Zakrajsek & Carnes, 1999).

Self-efficacy

Self-efficacy refers to beliefs about one's capabilities to learn or perform behaviors at designated levels (Bandura, 1986, 1997). Generally, individuals who feel efficacious are more likely to perform better, try new behaviors, use effective strategies, expend more effort on those behaviors, and persevere longer when they encounter challenges. Particularly, higher self-efficacy would lead to greater persistence and better performance than lower self-efficacy. In physical education, children with higher self-efficacy tend to choose to participate in physical education, attribute failure to lack of effort, and have higher future self-efficacy than those with lower self-efficacy (Chase, 2001).

Outcome Expectancy

Outcome expectancy, being defined as incentives within self-efficacy theory, refers to a person's beliefs concerning the likely outcomes of a behavior (Bandura, 1997; Rodgers & Brawley, 1991). As the importance of an outcome and the degree of its influence may have a great deal of variability among individuals, it is crucial not to presume that outcomes could always act as incentives for motivated behavior (Maddux, 1995; Poag-DuCharme, 1993; Rodgers & Brawley, 1991, 1996). As a result, Maddux and his colleagues (1986) modified self-efficacy theory by adding outcome values as a component of this theory. Rodgers and Brawley (1991) further proposed that outcome expectancy is formed by the interaction of two factors, (a) outcome likelihood, which refers to the probability that a certain action will lead to a certain

outcome and (b) outcome values, which refer to the values the individual assigns to the possible outcomes of the behavior. This form of conceptualization is in line with the theoretical foundation which highlighted the importance of incentives in influencing motivated behavior (Bandura, 1986, 1997), and therefore should have considerable value in examining students' motivation and achievement outcomes.

Compared with much attention given to the role of self-efficacy within this theory, less attention has been paid to outcome expectancy. As expectations that an outcome will follow a given behavior, outcome expectancy does not focus on the achievement performance itself, but rather the result from the behavior. For example, taking physical education class three times per week is the behavior, while learning motor skills, learning to cooperate and improving physical conditioning are the outcomes. In terms of the application of this construct in physical education, at least one recent study (Gouda & Dermtizaki, 2004) has found that outcome expectancy was moderately related to students' perceived usefulness of physical education and intrinsic motivation toward physical education.

According to Bandura (1997), there is no single relationship between self-efficacy and outcome expectancy, and "it depends on how tightly contingencies between actions and outcomes are structured, either inherently or socially, in a given domain of functioning (p.23)." However, the positive relationship between self-efficacy and outcome expectancy is promising (Corcoran & Rutledge, 1989; Kirsch, 1982; Williams, Anderson, & Winnet, 2005). This is because the positive relationship suggests that either individuals who are more efficacious tend to value outcomes or increases in valuing outcomes make individuals more likely to perceive they are able to perform the behavior. Research focusing on the ways self-efficacy and outcome expectancy might operate together to impact motivation and achievement outcomes has

produced mixed findings, with some indicating that outcome expectancy accounted for little variance in motivational indices or behavior after self-efficacy was considered (Dzewaltowski, 1989; Dzewaltowski, Noble, & Shaw, 1990; Rovniak, Anderson, Winett, & Stephen, 2002), whereas others suggesting that both constructs were independent predictors of intentions and behavior in sport and physical activity (Dasharnais, Bouillon, & Godin, 1986; Poag-DuCharme, 1993; Rodgers, 1992; Rodgers & Brawley, 1993, 1996; Rodgers & Gauvin, 1998). Yet, thus far few studies have been conducted to investigate these two constructs simultaneously in physical education.

CONCEPTUAL SIMILARITIES/DIFFERENCES

There are conceptual similarities and differences between the expectancy-value model and self-efficacy theory. Self-efficacy, for example, is similar in several ways to expectancy-related beliefs. First, both self-efficacy and ability beliefs are personal views about one's perceived capability. Second, self-efficacy is defined as future-oriented beliefs, which shares some characteristics with expectancies for success. Self-efficacy also differs from expectancy-related beliefs in that self-efficacy judgments are more situation-specific and are made in reference to some type of goal (Bandura, 1986, 1989; Pintrich & Schunk, 1996). In contrast, the expectancy-related beliefs refer to beliefs in one's ability in a sub-domain (e.g., physical, social, academic). Researchers have suggested that situational-specific expectancy beliefs were more accurate in predicting achievement behaviors than global or domain level expectancy beliefs (Hu, McAuley, & Elavsky, 2005; Moritz, Feltz, Fahrbach, & Mack, 2000). It is possible to integrate self-efficacy and other incentives while ignoring the expectancy-related beliefs when exploring students' motivation in physical education.

Likewise, lack of clarification with respect to conceptual issues across theories also results in a debate concerning expectancies for success and outcome expectancy. These two constructs are similar in that both involve the anticipated outcome of engaging in a task. However, expectancies for success represent the assignment of a probability of a successful outcome while outcome expectancy focuses on the anticipated outcome of the motivated behavior. Bandura (1997) argued that expectancy-value theorists historically have focused on outcome expectancy, but Wigfield and Eccles (2000) contend that in their work they measured individuals' own expectancies for success but not outcome expectancy within self-efficacy theory. Indeed, these researchers considered their expectancy construct more similar to Bandura's self-efficacy construct, whereby outcome expectancy might play the role of providing incentives which may have the same function as task values in the expectancy-value model.

In addition, it is clear that the values an individual places on either the task (task values) or the outcome (outcome values) could affect his or her motivation and behavior. However, these two constructs are conceptually different. Task values are "the incentives or purposes that individuals have for succeeding on a given task" (Wigfield, 1994, p.102). That is, task values concern an individual's perceived beliefs about interest, importance, and utility of a task or domain. In contrast, outcome values refer to how certain outcomes relative to others are more desirable for different individuals. Specifically, individuals who value the outcome or find the outcome more attractive are more motivated to attain the outcomes. Although Bandura (1997) proposed that the motivating potential of anticipating outcomes is largely determined by the subjective values that an individual places on the task, it is possible that an individual values a task because he or she values the outcomes of the task. The relationships between these constructs remain less clear.

Conceptual similarities make it possible to integrate the expectancy-value model and self-efficacy theory. Few studies, however, have been conducted to explore the complex relationships of the variables across these theories in physical education. Furthermore, the effects of these motivational beliefs on achievement outcomes remain largely unexplored in the context of physical education. Integrating these two theoretical frameworks may, accordingly, offer important insights into students' motivation and achievement outcomes. The proposed research is an initial attempt to integrate the two frameworks.

In this pilot study, students' self-report strategy use and persistence/effort were utilized as indices of their achievement outcomes and the results are included in this document. Shunk (1995) posited that selection and use of effective learning strategies may be a good motivational index for achievement motivation. Researchers investigating motivational influences on learning strategies in academic domains have shown that students with high expectancy beliefs and task/outcome values are likely to use effective learning strategies (Pintrich & De Groot, 1990; Schunk & Swartz, 1992a, 1992b). Furthermore, students' use of these effective strategies was highly correlated with their achievement and with teachers' ratings of their self-regulation in a class setting (Ruban & Reis, 2006, Ryska & Vestal, 2004). Students' motivational beliefs impacted the use of effective strategies, and strategy use and this sequence, in turn, influenced their achievement behaviors such as performance, task persistence, and effort. Meanwhile, researchers in both classroom and physical education (e.g., Elliot, McGregor, & Gable, 1999; Xiang & Lee, 2002) consider persistence and effort to be important predictors of achievement outcomes. Persistence is defined as a continued investment in learning when obstacles are encountered while effort refers to the overall amount of energy expended in the process of learning (Zimmerman & Risemberg, 1997). As indicated by Roberts (2001), persistence/effort is

not only assumed to reflect motivation and is one of the important indicators of achievement outcomes, but also is among the criteria researchers use to assess motivation in sport and physical education. Finally, an individual's motivational beliefs are theorized to influence the degree of persistence/effort demonstrated in the face of failure or aversive stimuli (Bandura, 1986).

Many studies exploring the relations between expectancy-value model or self-efficacy theory and achievement outcomes have used multiple regression analysis. However, structural equation modeling (SEM) can be used as a more powerful alternative. Advantages of SEM

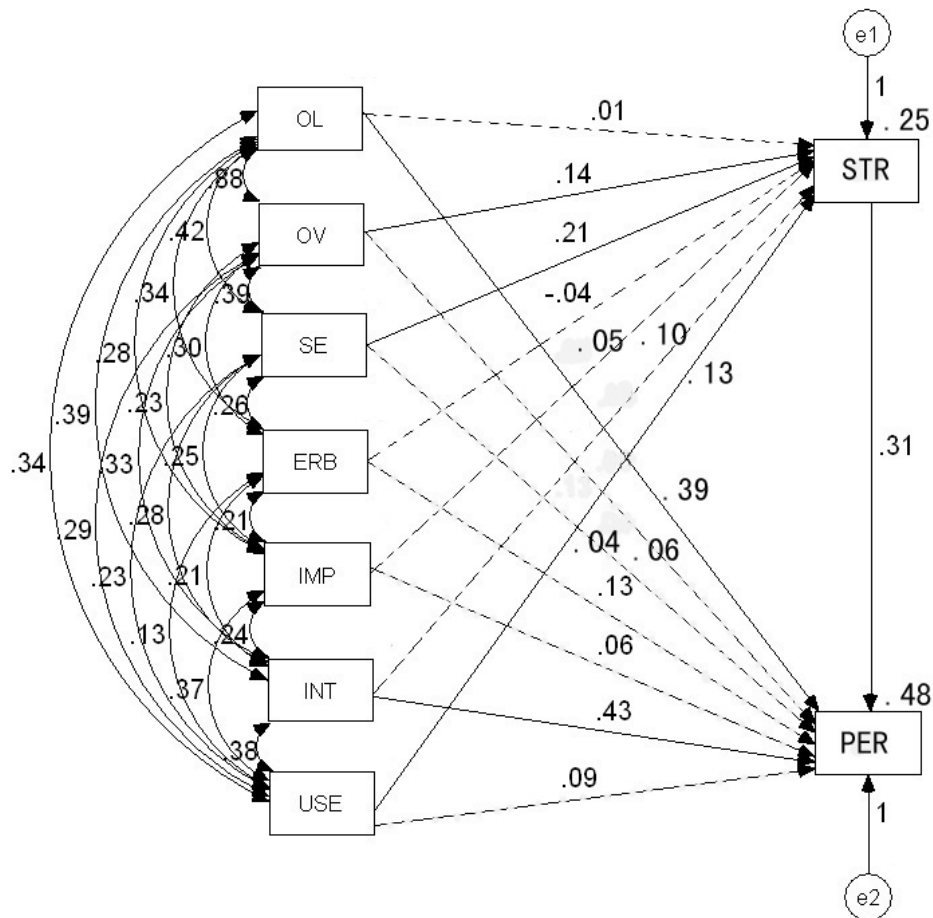


Figure 1. ERB = expectancy-related beliefs; IMP = importance; INT = interest; USE = usefulness; SE = self-efficacy; OL = outcome likelihood; OV = outcome values; STR = strategy

use; PER = persistence/effort. The dotted line = nonsignificant path; the solid line = significant path.

compared to multiple regression include use of confirmatory factor analysis to reduce measurement error by having multiple indicators per latent variable, the desirability of testing models overall rather than coefficients individually, the ability to test models with multiple dependents, the ability to model mediating variables, and the ability to model error terms (Kline, 2005). Consequently, SEM was used to test an integrated model including expectancy-value model or self-efficacy theory in this study.

Based on prior research findings supporting the expectancy-value model and self-efficacy theory with regard to achievement motivation among school children, and on the bivariate correlations noted in this sample, the hypothesized model of predictors of achievement indices among middle school students was developed (See Figure 1). This hypothesized model predicted that (a) all the motivational beliefs (expectancy-related beliefs, task values, self-efficacy, and outcome expectancy) would directly influence students' strategy use in physical education; (b) all the motivational beliefs would directly or indirectly influence students' persistence/effort in physical education; and (c) students' strategy use would directly influence their persistence/effort and mediate the relationships between motivational beliefs and persistence/effort in physical education.

In summary, although numerous studies have been done with expectancy-value theory and self-efficacy theory, the integration of these motivational theories in the field of physical education has not been explored. Therefore, the primary aim of this study was to integrate expectancy-value model and self-efficacy theory to study students' motivation in physical education with the goal of increasing students' engagement in physical education classes and the subsequent adoption of active lifestyles. Specifically, in this pilot study an integrated model

including expectancy-related beliefs, task values, self-efficacy, and outcome expectancy was tested in a sample of middle school students to increase the understanding of how these variables affect the achievement indices (i.e., strategy use, and persistence/effort). The following research questions were used to guide the study: (a) what motivational variables (expectancy-related beliefs, task values, self-efficacy, and outcome expectancy) can be put in an integrated model?; and (b) how do these variables affect students' strategy use and persistence/effort?

METHODS

Participants and Setting

The participants in this study were 194 sixth and seventh graders (105 boys, 94 girls) from a public school in the Southern region of the United States. The majority of the participants came from middle- and upper- socioeconomic background and was Caucasian (86.6%). The school used a 90-minute block, two-day (A-, B- day) rotating schedule. The participants had a physical education class on every second day. Under each block, the participants from different grades had physical education in the same period. The four teachers (one female, three males) were full-time physical education teachers. Informed parental consent forms and child assent forms were obtained in accordance with the University Institutional Review Board and school district requirements.

Instrumentation

A biographic information sheet and seven survey instruments were used in this study. The seven instruments assessed students' expectancy-related beliefs, task values, self-efficacy, outcome expectancy, and self-report indices of achievement outcomes (strategy use and persistence/effort).

Expectancy-related Beliefs. The students were asked to rate their general ability in physical education using a 5 - point scale. They were asked, “How good are you at activities and games in PE?” (1 = *very bad*, 5 = *very good*), “Compared to other students, how good at PE are you?” (1 = *one of the worst*, 5 = *one of the best*), and “Compared to other school subjects, how good at PE are you?” (1 = *a lot worse in this activity*, 5 = *a lot better in PE*). The students were asked two questions to assess expectancies for success in PE on a 5 - point scale: “How good would you be at learning something new in PE this year?” (1 = *very bad*, 5 = *very good*), and “How well will you learn activities and games in PE this year?” (1 = *not at all well*, 5 = *very well*). The measure was from questionnaires developed and used by Xiang and her colleagues (Xiang, McBride, & Guan, 2004; Xiang et al., 2003). They have demonstrated the acceptable validity and reliability in physical education setting for school children.

Task Values. Two questions were used to assess *importance* using a 5 - point scale. The students were first asked, “For me, being good at activities and games in PE is.....” (1 = *not very important*, 5 = *very important*), and “Compared to your other school subjects, how important is it to you to be good at activities and games in PE?” (1 = *not very important*, 5 = *very important*). Two questions were used to assess *interest*, again using a 5-point scale: “In general, I find learning new activities and games in PE is...” (1 = “*way*” *boring*, 5 = “*way*” *fun*), and “How much do you like activities and games in PE?” (1 = *don’t like it at all*, 5 = *like it very much*). Two questions were again posed to assess *usefulness*. One question asked, “Some things that you learn in school help you do things better outside of class. We call this being useful. For example, learning about plants might help you grow a garden. In general, how useful is what you learn in PE?” (1 = *not useful at all*, 5 = *very useful*). The second question asked, “Compared to your other school subjects, how useful is what you learn in PE?” (1 = *not useful at all*, 5 = *very*

useful). The measure was also from questionnaires developed and used by Xiang and her colleagues (Xiang, McBride, & Guan, 2004; Xiang et al., 2003).

Self-efficacy. To assess the self-efficacy construct, six items were adapted from previous study (Rodgers & Brawley, 1996) and Bandura's(2006) *Guide for Constructing Self-efficacy Scales*. All items were rated on 100% confidence scales from “*not confident at all*” to “*completely confident*” (Bandura, 1986). One example was “What is your confidence in your ability to do well in this activity in the PE class today?” The mean of these six items was taken to give an overall indication of the magnitude of a student's efficacy beliefs for the corresponding physical education class.

Outcome Expectancy. This measure was borrowed from a recent study by Goudas and Dermtizaki (2004). To measure outcome likelihood, students rated on the likelihood of occurrence of the ten different possible outcomes of the specific activity in physical education class using a 7 - point Likert - type scale (1 = *very unlikely*, 5 = *very likely*). To measure outcome values, students rated on each of the outcomes in terms of its value for them on 7 - point Likert - type scale (1 = *very unimportant*, 5 = *very important*). To obtain a composite score for outcome expectancy, each outcome likelihood score was multiplied by the respective outcome value score, the produces were summed, and the total score will divided by 10. All the three scales had shown the accepted reliability ($\alpha = .79$ for outcome likelihood, $\alpha = .73$ for outcome values, and $\alpha = .81$ for outcome expectancy) in the previous study.

Strategy Use. A measure of strategy use came from Gano-Overway and Ewing (2004). This 5 - item measure used a 5 - point Likert - type scale (1 = *strongly disagree*, 5 = *strongly agree*), focusing on self-regulatory processes to assess students' self-report use of strategies during practice. Gano-Overway and Ewing (2004) established acceptable validity and internal

reliability for this measure. A sample item from the scale is: “In this PE class, when I am practicing I often practice on my own.”

Persistence/Effort. This 8-item measure came from a recent study by Guan, Xiang, McBride, and Bruene (2006) and included four items each for assessing persistence and effort. Although persistence and effort represent two different constructs theoretically, previous studies revealed that the two could be combined into one single factor (Guan et al., 2006; Xiang & Lee, 2002). In this study, students rated each item on a 7 - point scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The stem for these items was “In this physical education class...” One example of a persistence/effort item is: “When I have a trouble performing some skills, I go back and practice.”

Data Collection

All surveys were administered and collected during regular physical education classes. During the pilot study, the average time required to complete the survey was about thirty minutes. The physical education teachers and the researcher managed students seating in the gym and the researcher administered the survey by explaining how to respond to the questions. Students were encouraged to answer truthfully and assured that their responses are anonymous and were not affect their physical education grades. The researcher clearly stated that there were no right or wrong answers, and the teachers would not have access to their responses. In addition, the researcher monitored and helped students by answering any questions they have.

Data Analyses

Four steps were taken to analyze data. First, structural equation modeling (SEM) analysis using Amos 5.0 (Arbuckle, 2003) was conducted to validate the measurement models. It was accomplished through confirmatory factor analysis (CFA). Second, Cronbach’s coefficient

alphas were computed to ensure the internal consistency of the self-report measures. Third, descriptive statistics and bivariate correlations were calculated to describe the sample and evaluate simple correlations. Finally, SEM was used to fit the hypothesized model through path analysis with latent variables. In this study, the exogenous variables were expectancy-related beliefs, task values, self-efficacy, and outcome expectancy, and the endogenous variables were strategy use and persistence/effort.

In this pilot study, model fit was assessed using multiple indices. The overall fit of the model to the data was examined via the chi-square test (χ^2). A nonsignificant χ^2 indicates the model to be an acceptable fit to the data. Root mean square error of approximation (RMSEA) represents closeness of fit, and values approximating .06 and zero demonstrate close and exact fit of the model (Hu & Bentler, 1999). The 90% confidence interval (CI) around the RMSEA point estimate should also contain .06 or zero to indicate close or exact fit, respectively. The comparative fit index (CFI), the Tucker-Lewis index (TLI) and normed fit index (NFI) test the proportionate improvement in fit by comparing the target model with the baseline model (independence model). Minimally acceptable fit was based on CFI, TLI, and NFI values of .90; values approximating .95 indicated good fit (Hu & Bentler, 1999).

RESULTS

Evaluation of the Measurement Models

The measurement model is that part (possibly all) of a SEM model which deals with the latent variables and their indicators. A pure measurement model is a CFA model in which there is unmeasured covariance between each possible pair of latent variables, there are straight arrows from the latent variables to their respective indicators, there are straight arrows from the error and disturbance terms to their respective variables, but there are no direct effects (straight

arrows) connecting the latent variables. Unmeasured covariance means one almost always draws two-headed covariance arrows connecting all pairs of exogenous variables. The measurement model was evaluated like any other SEM model, using goodness of fit measures.

CFA assumes multivariate normality, thus the initial analysis examined the multivariate normality of the indicators (items) for the latent variables. The data set was imported into Amos 5.0 for construction of the covariance matrix to be used in SEM analysis and a check of the multivariate normality of the data. No problems with non-normality were evident and all the indicators were retained for all the three individual measurement models (expectancy-value model, self-efficacy model, and achievement model). The adequacies of the proposed priori factor structures underlying the measurement models were examined via CFA. Maximum likelihood estimation methods were used, and the latent variables were allowed to correlate freely with one another within each model. The Chi-square (df and *p* value), CFI, TLI, NFI, and RMSEA values obtained in this study indicated acceptable fit between the three measurement models and our data. Accordingly, the valid measurement models led to the evaluation of the hypothesized model. In addition, based on the results of the CFA, scales of expectancy-related beliefs, usefulness, importance, interest, self-efficacy, outcome likelihood, outcome values, strategy use, and persistence/effort were constructed by averaging the items on the scales. For example, five responses were averaged to form a score for expectancy-related beliefs, with a high score indicating high expectancy-related beliefs, and a low score indicating low expectancy-related beliefs. Internal consistency (Cronbach, 1951) for the scales is listed in Table 1. As shown, Cronbach's alpha coefficients for the scales exceeded Nunnally's (1978) criterion of .70, representing acceptable internal consistency.

Descriptive Analyses

Table 1 shows that the descriptive statistics for the whole sample and the bivariate correlations among the variables. In general, students displayed high expectancy beliefs (expectancy-related beliefs and self-efficacy) and task/outcome values toward physical education, as all the mean scores of these variables were above the midpoint (i.e., 3 for expectancy-related beliefs, self-efficacy, and task values; 5 for outcome likelihood and outcome values) of the scale. Also, students reported high levels of perceived strategy use and persistence/effort. In line with the previous studies, correlation analyses revealed that all the self-report measures were significantly positively related to one another (r s = .21 - .76, p s < .01 for all).

Table 1. Descriptive statistics, internal reliabilities, and correlations among variables

Variable	1	2	3	4	5	6	7	8	9
1.Expectancy	0.86								
2.Importance	.37**	0.87							
3.Interest	.41**	.31**	0.86						
4.Usefulness	.21*	.41**	.48**	0.87					
5.SE	.67**	.41**	.53**	.37**	0.84				
6.OL	.52**	.28**	.45**	.33**	.62**	0.85			
7.OV	.45**	.22*	.36**	.28**	.55**	.76**	0.86		
8.Strategy	.30**	.28**	.38**	.38**	.44**	.39**	.41**	0.86	
9.Persistence	.44**	.33**	.56**	.41**	.53**	.61**	.51**	.47**	0.85
<i>M</i>	4.07	3.60	3.99	3.36	4.06	5.73	5.99	3.57	5.17
<i>SD</i>	.62	.94	.83	.97	.64	1.06	1.10	.73	1.35

Notes. Cronbach alpha coefficients are provided along the diagonal. *M* = mean; *SD* = standard deviation. Expectancy = expectancy-related beliefs; SE = self-efficacy; OL = outcome likelihood; OV = outcome values; Strategy = strategy use; Persistence = persistence/effort. * p < .01; ** p < .0001.

Evaluation of the Structural Models

Because the fit statistics from the measurement models indicated that the measures adequately represented each latent variable, the structural model was tested. The baseline model was created by the statistical program and represented a model that does not fit the data (Arbuckle, 1997). Path significance was based on the critical ratio (CR), which is the parameter estimate divided by an estimate of the standard error. When the CR was larger than 1.96 for a regression weight, that path was significant at the .05 level. That is, its estimated path parameter is significant. The hypothesized structural model was tested with all the paths depicted in Figure 1. Six of the hypothesized paths were significant. Fit statistics indicated the fit of the hypothesized model was not good, $\chi^2(2, N = 194) = 16.141, p = .000, TLI = .658$. RMSEA was .191(90%CI: .112 - .283), further rejecting the fit of the hypothesized model. A trimmed model with non-significant paths removed was then tested. There was an improvement in the fit of the trimmed model. This fit was good, $\chi^2(5, N = 194) = 5.282, p = .382, CFI = 1, TLI = .998, NFI = .991$. Furthermore, the trimmed model was more parsimonious with a RMSEA .017 (90%CI: 0 - .103), and explained greater percentages of the variances in strategy use ($R^2 = .276$) and persistence/effort ($R^2 = .502$).

Effects of Motivational Variables on Achievement Indices

The total effects and indirect effects of the motivational variables on indices of achievement outcomes (strategy use, and persistence/effort) are described in the following paragraph. The direct effects are shown in Figure 2. *Indirect effects*, the portion of total effects mediated by strategy use, reflect the process by which motivational variables influence persistence/effort. *Direct effects*, the portion of total effects not explained by strategy use, reflect the independent contributions of the motivational variables.

Self-efficacy, usefulness, and outcome values had moderate direct effects on strategy use ($\beta = .232, \beta = .233, \beta = .215$, respectively, $p s < .05$). However, they did not have significant indirect effects on persistence/effort ($\beta = .047, \beta = .047, \beta = .043$, respectively, ns). Interest and outcome likelihood exerted moderate total and direct effects on persistence/effort ($\beta = .312, \beta = .393$, respectively, $p s < .05$). In addition, strategy use exhibited a moderate total and direct effect on persistence/effort ($\beta = .201, p < .05$), but failed to be a mediator between the motivational variables and persistence/effort. Expectancy-related beliefs and importance did not have statistically significant effects on strategy use and persistence/effort.

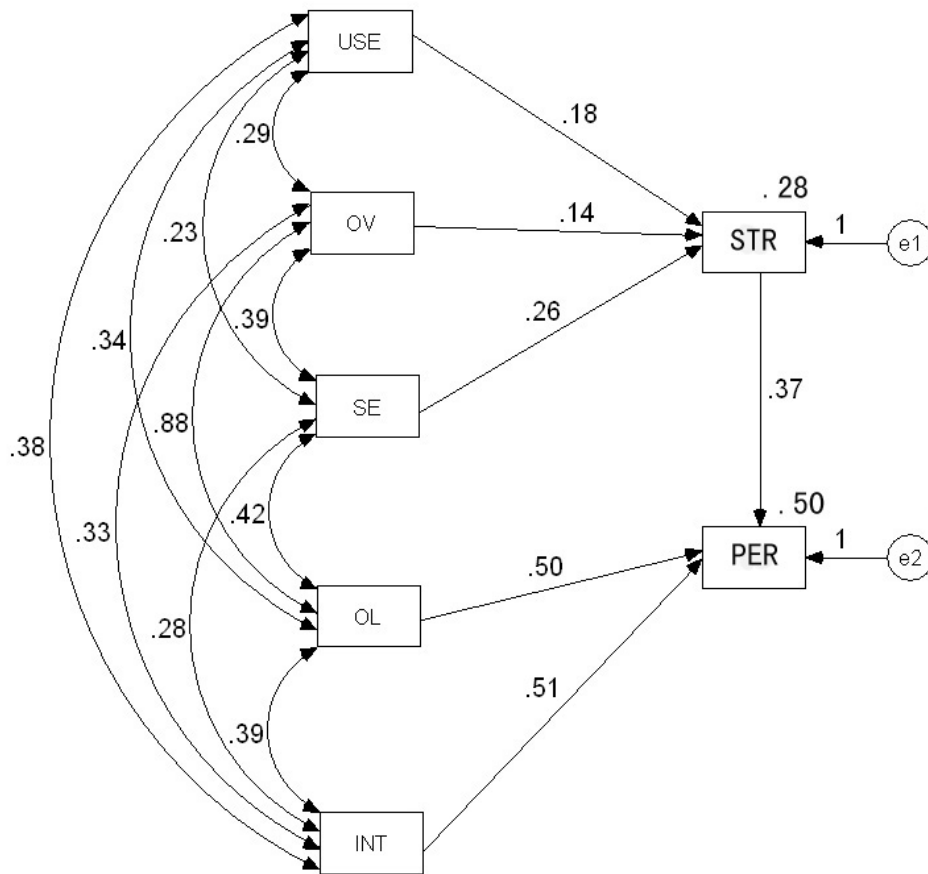


Figure 2. INT = interest; USE = usefulness; SE = self-efficacy; OL = outcome likelihood; OV = outcome values; STR = strategy use; PER = persistence/effort.

DISCUSSION

This pilot study was an initial attempt to use cross-sectional data to test a hypothesized integrated model among middle school students by exploring the direct, indirect, and total effects of expectancy-related beliefs, self-efficacy, importance, interest, usefulness, outcome likelihood, and outcome values in relation to strategy use and persistence/effort. Prior to the main analyses, support was provided for the validity and reliability of the measures used in this study.

Evaluation of the measurement models via CFA supported the existence of factors and validity for all the variables used in this study. Adequate internal consistency was also demonstrated for these measures. This suggests that all the measures could produce valid and reliable scores used for this study.

Correlation analyses revealed significant relationships between expectancy-related beliefs and the three task values (importance, interest, and usefulness). In other words, students who scored higher on expectancy-related beliefs regarding physical education tended to see it as more useful, important, and interesting. Further, consistent with expectancy-value research within academic and physical education settings, students' perceived importance and interest were more significantly correlated with their expectancy-related beliefs than usefulness (Eccles & Wigfield, 1995; Wigfield et al., 1997; Xiang et al., 2005; Xiang, McBride, & Bruene, 2004). This finding provides empirical support to indicate that the more intrinsic aspects of task values relate more closely to expectancy-related beliefs. Likewise, self-efficacy, outcome likelihood, and outcome values were highly or moderately correlated with one another within self-efficacy theory. Individuals who are more efficacious tend to see the likelihood of the outcomes or value the outcomes, and increases in valuing the outcomes or occurrences of the likelihood of outcomes make individuals more likely to perceive they are able to perform/learn the task. Additionally,

self-efficacy was highly related to expectancy-related beliefs. This result provides support for the conceptual similarities between these two constructs representing expectancy beliefs.

Among the two expectancy beliefs across the expectancy-value model and self-efficacy theory, only self-efficacy exerted direct effect on strategy use. Middle school students with higher self-efficacy were significantly more likely to use effective strategies than those with lower levels of self-efficacy. Consistent with this finding, in many previous studies, self-efficacy has been one of the strongest predictors of using effective strategies in the academic domains (Pintrich & De Groot, 1990; Schunk & Swartz, 1992a, 1992b). Lee (1997) also suggested that students with high expectancy beliefs would employ learning strategy to enhance the acquisition and retention of information or skills in physical education class. However, expectancy-related beliefs failed to influence strategy use. This result agrees with prior research findings suggesting that situational-specific expectancy beliefs (i.e., self-efficacy) were stronger in predicting achievement outcomes than global or domain expectancy beliefs (Hu et al., 2005; Moritz et al., 2000).

Both self-efficacy and expectancy-related beliefs had significant zero-order correlations with persistence/effort, but did not exhibit significantly direct or indirect effects on persistence/effort in this study. Extant studies examining the effect of expectancy beliefs on achievement outcomes indicated that, in contexts where one has little chance for withdrawal, such as physical education programs requiring participation, expectancy beliefs are posited to predict persistence/effort and performance (Cox & Whaley, 2004; Dishman et al., 2004; Samuel & Gibb, 2004; Xiang, McBride, & Guan, 2004; Xiang et al., 2003). However, under such context of physical education, expectancy beliefs may not be a good predictor of persistence/effort since students persist, in part, because of teachers' rules and policies about engagement and

participation (Schunk, 1995). Therefore, future research needs to investigate various motivational indices such as self-regulation and cognitive affect to determine their relations to expectancy beliefs.

Not surprisingly, interest exerted the greatest direct/total effects on persistence/effort. This result is in accordance with the recent study with the high school students (Cox & Whaley, 2004). Even though Cox and Whaley (2004) used teacher-reported persistence/effort, interest was the only significant predictor of persistence/effort from the construct of task values in their study. Usefulness, however, had a direct effect on strategy use. In other words, students who perceived physical education as more usefulness were more likely to use effective strategies. Interestingly, students' perceived importance failed to influence neither of the achievement indices. Previous studies have suggested that importance was a significant contributor of students' intention for future participation in physical education or running (Xiang et al., 2003; Xiang et al., 2005; Xiang, McBride, & Bruene, 2004; Xiang, McBride, & Guan, 2004; Xiang et al., in press). It is possible that the achievement indices used in this study were not sensitive to the measures of importance. Another plausible explanation might be that, compared to the academic subjects, physical education is marginalized on a global scale in the U.S. (Stroot & Whipple, 2003). Thus, students' perceptions concerning the importance of physical education would not differ significantly among the middle school students.

As expected, among the incentive variables within the self-efficacy theory, outcome likelihood and outcome values were included in the integrated model to influence the indices of achievement outcomes. Specifically, outcome likelihood exerted a strong direct/total effect on persistence/effort in addition to interest. Outcome values, on the other hand, only had a direct effect on strategy use. This finding provides empirical support for the previous research that has

shown small but significant associations between outcome expectancy and behavior (Pate et al., 1997; Rovniak et al., 2002; Sallis, Hovell, Hofstetter, & Barrington, 1992). It also strengthens the argument that outcome expectancy is an independent predictor in addition to self-efficacy in predicting achievement behaviors in sport and physical activity (Dasharnais et al., 1986; Poag-DuCharme, 1993; Rodgers, 1992; Rodgers & Brawley, 1993, 1996; Rodgers & Gauvin, 1998).

In line with the findings in the academic domains, strategy use exerted a direct effect on persistence/effort. Specifically, students who tend to use effective learning strategies were more likely to report high levels of persistence/effort. However, strategy use was not a significant mediator between motivational beliefs and persistence/effort. This may be due to the lack of direct effects of the predictors (self-efficacy, usefulness, and outcome values) on persistence/effort. Taken together, the results from this study support a growing body of evidence that expectancy beliefs and the corresponding incentives (i.e., task/outcome values) exert an influence on students' achievement outcomes (Cox & Whaley, 2004; Rovniak et al., 2002; Xiang et al., 2003; Xiang et al., in press), and confirm the proposal of the needs to integrate theoretical frameworks in the field (Eccles & Wigfield, 2002). More specifically, considering the priority of self-efficacy over expectancy-related beliefs in predicting achievement outcomes, future research may integrate self-efficacy and other incentive variables (task values, outcome values, and outcome likelihood) to explore students' motivation and achievement in physical education. In fact, self-efficacy and task values have already been utilized as motivational beliefs in the academic domains (Bong, 2001; Britner & Pajares, 2001). Although importance did not have any significant effect on any index of the achievement outcomes in this study, it must be remembered that this construct might exhibit effect on other achievement indices such as task choice or with other samples. In sum, when comparing the

expectancy-value model and self-efficacy theory, it can be concluded that neither theory is better than the other. The suitability of the theories depends primarily on the questions researchers are asking. Nevertheless, an integration of these two theoretical frameworks might provide more insights into the field of physical education.

Implications and Limitations of This Study

The findings in this study might have significant implications for teacher practice in physical education. First, as the results have shown, students are more likely to use effective strategies when they believe they can accomplish the specific task/activity. Physical educators can and should help students maintain relatively accurate but high self-efficacy, and assist them in the avoidance of an illusion of incompetence as well. To achieve this, therefore, educational professionals need to adapt learning to individuals' ability and allow them to achieve a sense of success and establish and maintain positive ability perceptions; provide accurate and timely feedback; and use role models to provide vicarious experiences. Second, outcome likelihood and outcome values exerted direct effect on persistence/effort and strategy use respectively in this study. Increasing awareness of the benefits of an activity (i.e., capturing the flags) at the beginning may be more effective for children, especially when the outcomes of the activity are highly valued by them. For example, teachers can address the likely outcomes and possible benefits of this activity (e.g., learning team work, decreasing stress, and enhancing self-esteem) to children. To help students strengthen such beliefs, teachers can help students experience positive outcomes of this activity to value the likely outcomes (e.g., feeling competence, and developing relationships).

In addition, students' perceived interest in physical education directly influenced their persistence/effort. Considering that one of the important goals is to foster students' interest in

physical education, it is crucial for physical educators to present learning activities in interesting, novel, and meaningful ways, and provide cognitively demanding learning tasks to enhance situational interest for greater student motivation (Chen & Ennis, 2004). This will encourage students from a large variety of skill levels and backgrounds to be actively engaged in the physical activity classes. Also, students' perceived usefulness of physical education had a direct effect on strategy use. This finding implies that physical educators might emphasize the usefulness or utility of physical education throughout the class. To help students become more personally invested in the activities or games in physical education, teachers should make the activities meaningful for them, and positively reinforce task completion. Last, given that students' use of effective learning strategies predicted their self-report persistence/effort, physical educators can help students select appropriate strategies during the learning process, monitor and evaluate their progress, and give them timely feedbacks to facilitate high levels of achievement outcomes.

Strengths of this study include its exploratory nature of integrating two theoretical frameworks and the use of SEM. However, this study has several limitations. First, gender was expected to be related with expectancy beliefs and task/outcome values. Generally, girls tend to have somewhat lower expectancy beliefs and task values in most activities in physical education, and this gender effect is primarily determined by gender-role stereotypes. If there is a gender effect on motivational beliefs and achievement outcomes, boys and girls would report motivation and approach learning activities in different ways. Consequently, future investigation should be conducted examining the moderate effect of gender on students' motivation and achievement in physical education. Second, the participants came from one public school and the sample size was relatively small. Although there was a sufficient number of participants for the subject

versus variable ratio (15:1) recommended when doing regression analyses, it was a little smaller than the 200 subjects generally recommended when doing SEM (Bollen, 1989). In addition, most of the participants were Caucasian and were from middle- and upper- class. Accordingly, the hypothesized model in this study should be retested with a larger and more diverse sample in future research. Third, although the self-report measures of strategy use and persistence/effort were validated as indices of achievement outcomes prior to the main analyses; it would have been desirable to have a more objective measure of students' achievement outcomes in the future.

Overall, the results of this study help to test the hypothesized model integrating expectancy-value model and self-efficacy theory among middle school students in physical education. The hypothesized model suggested that (a) self-efficacy, usefulness, and outcome values directly influence strategy use; (b) Interest and outcome likelihood directly influence persistence/effort; and (c) strategy use directly influence persistence/effort. Six of the hypothesized paths were statistically significant, and the model accounted for 25% of the variance in strategy use, and 48% of the variance in persistence/effort. However, the hypothesized model did not show a good fit to the data. A more parsimonious trimmed model fit the data well, with significant improvement in fit with the deletion of the nonsignificant paths. The trimmed model also accounted for greater percentages of the variances in strategy use and persistence/effort. The findings shed new lights on integrating expectancy-value model and self-efficacy theory and broaden the foundation regarding empirical knowledge base for these theoretical frameworks. For example, self-efficacy was conceptually similar with expectancy-related beliefs but showed stronger predictive utility on achievement outcomes. Therefore we might integrate self-efficacy and other incentive variables to investigate students' motivation in the future. Continued research is needed to test this model with larger samples of school children

who are more diversified in terms of race and socioeconomic status, to consider additional variable that might influence achievement motivation, to develop integrated theoretical models to gain a better understanding of children's motivation and achievement outcomes in physical education, and to apply appropriate interventions to increase the number and engagement levels of school children in quality programs on a daily basis.

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APPENDIX E: RAW DATA
RAW DATA OF STUDY ONE

grade	age	gender	race	activity	erb	tv	se	oe
1	12	1	3	3928.69	4.2	2.67	4.17	35.2
1	12	1	2	5229.37	4.8	4.33	5	49
1	12	2	1	5432.79	5	5	5	49
1	12	1	1	4744.44	4.2	4.5	5	42
1	11	1	1	3278.66	4.2	3.67	3.67	30.1
1	11	2	1	2793.68	3.6	3.67	3.5	23.9
1	11	1	1	3065.84	4.6	3.83	4.17	40.7
1	12	1	1	3635.27	4.2	4	4.67	21.2
1	12	2	1	2558.34	3	3	1	23.5
1	11	1	1	3280.13	5	3.33	5	18.2
1	11	1	1	3592.14	4.8	3.5	4.5	18
1	11	1	2	3083.67	3.8	3.83	3.83	36
1	12	2	1	3071.35	3.6	4.17	4.67	39.1
1	11	1	1	.	.	1.83	3.67	15.3
1	12	2	2	3379.47	4.8	4.67	4	36
1	11	2	1	4543.64	4.2	4.83	4.83	29.3
1	12	2	2	4566.06	4.2	4.83	5	44.8
1	12	2	1	3895.3	4.2	3.5	4.33	26.1
1	11	1	1	3980.15	4.6	4.33	4.67	44.9
1	12	2	1	4189.21	3.4	4.33	5	49
1	12	1	1	2819.48	3.8	3.83	3.67	43.1
1	11	2	1	4863.54	4.8	4.83	5	40.3
1	12	2	1	3536.4	4.2	4	4.33	46.9
1	12	2	1	3671.14	4.2	4.17	4.67	41.9
1	11	2	1	3011.38	3.6	3.5	3	33.3
1	11	2	1	3324.72	3.2	4.17	3.83	35.7
1	11	1	1	3824.94	2.8	3	3.17	17.6
1	12	2	1	3752.35	4.4	4.83	4.5	43.8
1	11	1	1	.	.	.	.	.
1	11	2	1	5558.46	5	5	5	48.3
1	11	2	1	5200.83	4.8	4.67	4.67	48.3
1	11	2	1	2978.6	4	4.33	3.83	40.8
1	11	2	1	4468.38	4.8	4.5	4.83	48.3
1	12	1	1	3330.33	3.4	2.83	3	30.8
1	11	1	1	4389.83	4.4	5	4.83	43.8
1	11	1	1	3862.53	4	4.33	3	32
1	11	2	1	3448.06	3.4	4	4	47.7
1	12	2	1	3481.11	3	3.67	3.5	28.3
1	12	2	2	.	3.6	.	4	.
1	12	2	1	3746.46	4.2	4	3.83	26.2
1	11	2	3	3320.57	3.6	3.83	3.67	43.1
1	12	2	1	4173.62	3.8	3.83	4	37

1	11	2	1	3453.43	3.6	3.5	4	27.8
1	10	2	2	5724.72	3.8	4.17	5	37.1
1	12	1	1	.	4	3.83	4	15.5
1	12	1	1	3203.26	3.6	3.33	3.17	14.2
1	11	2	1	4334.37	4.4	3.33	5	41.4
1	11	2	1	4821.02	3.6	3.17	3.17	29.7
1	11	2	4	5177.69	4.2	4	4.17	39.8
1	11	1	1	5736.02	4.2	4.5	4.83	39
1	12	1	1	4663.42	4.4	3.33	4.33	44.1
1	12	1	.	4292.62	4.6	3.33	3.67	30.7
1	11	1	1	3518.56	3.6	3.5	3.5	24
1	11	1	1	.	.	.	.	.
1	11	2	1	3110.2	3.6	3.17	3.5	18.4
1	11	2	1	3848.93	3.8	3.5	4	40.6
1	11	2	1	5142.65	4.6	4.67	5	43.8
1	11	1	1	.	3.6	4	3.83	37.9
1	12	1	1	.	.	.	.	.
1	12	1	1	.	3.6	.	.	24.2
1	12	1	1	2555.93	4	3.33	3.67	18.4
1	11	2	1	.	.	.	.	.
1	11	2	1	2921.22	3	2.17	3.83	24.8
1	11	1	1	4181.56	4.2	4.67	5	49
1	12	1	1	4933.76	4.4	4.5	4.83	48.3
1	11	1	1	.	3.6	3.17	2.17	.
1	11	1	2	3375.5	4.2	4.33	4	43
1	11	2	1	3829.48	3.8	3	3	18.8
1	12	1	3	2717.05	4	3.17	3.5	14.3
1	11	1	1	3742.74	1.8	2.83	3	12.1
1	12	2	1	2471.76	3.6	3.83	3.5	43.6
1	11	2	1	2717.01	3.8	3.33	3.83	33.3
1	11	2	1	.	.	.	.	.
1	11	2	1	3967.96	3.6	3.67	4	29.8
1	11	2	1	3141.24	4	4.67	4.17	49
2	13	1	1	2490.39	4.2	3.83	4.17	40.4
2	13	2	1	3056.23	4.6	3	3.83	28.3
2	12	2	1	3367.34	4.6	3.5	5	38.6
2	12	1	1	2720.57	3.8	3.67	4	43.8
2	13	2	1	3555.88	3.6	3	4	45.6
2	12	2	1	3409.21	4.4	4.17	4.17	35.7
2	13	1	1	4275.19	5	4.5	5	49
2	13	1	1	3665.25	4	2.33	4.5	42.8
2	13	1	1	4117.5	4.8	4.33	5	49
2	12	1	1	3276.64	4	3.67	5	37.2
2	13	1	1	5385.64	4.6	4.5	4	42
2	12	1	1	3431.37	4	3.33	4.17	32.3
2	13	2	1	3595.91	3.6	3.33	4	42.5

2	12	2	1	4077.87	5	4.83	5	45.7
2	12	2	1	3060.39	4	2.67	3.83	21.5
2	12	1	1	3748.56	4.8	4.33	5	47.6
2	12	2	1	5212.78	4	5	5	45.7
2	12	2	1	3830.2	4.8	4.33	4.83	49
2	12	2	1	3720.21	4.6	4.67	4.33	36.3
2	12	2	1	3194.72	4	3	4	32.4
2	12	1	1	3231.74	4.6	3.17	5	49
2	12	2	1	2631.25	4.6	4.33	4.33	31.7
2	12	2	1	.	.	.	.	.
2	13	2	1	2933.3	3.2	3.83	4	39.5
2	12	2	1	3109.21	5	4	4.5	47.6
2	12	1	2	3672.17	4.2	3.17	3.5	30
2	13	1	2	4079.6	4.8	2.67	4	28.3
2	12	1	1	4541.92	3.4	4	4	30.7
2	13	1	1	4323.4	3.8	3.67	4.5	43.7
2	12	1	1	4579.62	4.2	2.17	5	49
2	13	1	1	4445.68	5	4.67	5	49
2	13	1	1	3580.56	4.2	4.17	4	35.9
2	13	2	1	3022.5	4.4	4.17	3	16
2	12	2	1	.	.	.	.	.
2	12	2	1	2288.67	3.6	2	3	16
2	12	2	1	3409.67	3.6	3.33	3.5	20.4
2	12	1	1	2742.58	1	1.17	1.67	2.5
2	12	1	1	.	3	.	.	35.4
2	12	2	1	3672.62	3.8	3.67	3.83	23.1
2	12	2	1	3003.63	3.6	2.83	3.17	25
2	13	2	1	3267.36	4	3.67	4.17	40
2	12	2	1	3346.21	3.8	3.67	3.33	29.4
2	12	1	2	3162.57	3.8	3	3.67	37
2	12	1	1	4036.91	4.8	5	5	44.8
2	13	1	1	3635.66	4.6	2	3.83	17.4
2	13	1	1	6756.11	5	5	4.17	44.2
2	13	2	1	3249.24	3.8	3.33	3.33	19.2
2	12	2	1	3194.54	4.2	3.5	3.5	18.9
2	13	1	1	3412.67	4	3.83	3.67	26.1
2	12	1	1	2702.29	4	1.83	3.67	30.6
2	12	2	1	3139.79	4	4.67	4.17	49
2	12	1	1	3830.93	4.4	3.17	4	39.8
2	13	1	1	2653.44	2.2	2	3.33	35.2
2	12	1	1	4298.64	3.4	1.5	5	16
2	13	2	1	3141.41	3.8	3.83	4	48.3
2	13	1	1	3859.41	3.6	3	3.67	21.9
2	12	2	4	2918.76	3.8	4.33	4.33	7.3
2	12	1	1	2388.67	3	3	3	4
2	12	1	1	2909.76	4.6	3	4.33	26.2

2	13	2	1	2797.98	4.6	4.17	5	45.5
2	12	1	1	2919.52	4.8	2.5	4.5	39.7
2	12	1	1	3807.03	3	3.17	3.67	35.9
2	12	1	1	3685.84	3.8	3.5	4.33	47.7
2	13	1	1	.	3	2.5	3	.
2	13	2	1	3508.84	4	2.83	4.17	44.3
2	13	1	2	3050.75	4	3.67	4	36
2	12	2	1	3124.64	3.6	3	4.33	44.1
2	12	1	1	4172.07	4.4	2	5	28
2	14	1	2	5370.47	4.4	2.33	3.83	44.2
2	12	2	4	2939.44	3.8	3.5	4	46.4
2	12	2	1	3416	4.2	4.33	4.5	36.2
2	12	2	1	3136.35	3.6	3.5	4	37.5
2	12	2	1	2893.93	3	2.5	3.67	29.8
2	12	2	2	3621.96	4	3.5	4	24.4
2	12	2	1	3483.91	4	3.67	4	46.4
3	14	1	1	2415.98	4.4	4.33	3.5	32.5
3	14	1	1	3561.4	4.6	4.5	3.67	31.8
3	14	2	1	5080.3	4.6	4.5	5	46.4
3	14	2	1	4299.86	4.2	3	4.5	13
3	14	1	1	4291	4.4	3.83	4.67	40.2
3	13	2	1	2833.85	5	3.5	4.33	59.2
3	13	2	1	3205.87	3.6	3	4	22.6
3	13	2	2	3768.6	4.2	4.17	5	47
3	13	1	1	3713.88	4.6	4.5	4.67	25.8
3	13	1	1	3746.54	4.2	3.67	4.5	49
3	13	2	2	5308.58	4.4	3.5	4.67	38.6
3	13	1	2	4637.66	5	4	5	49
3	13	1	1	2902.53	4.2	2	3.83	32
3	13	2	1	3134.83	3.6	4	4	36
3	13	1	1	3948.57	3.4	3.17	4	36.6
3	13	2	1	3393.45	4	4.17	3.83	29.2
3	13	1	3	3922.39	3.6	3.17	3.67	20
3	12	2	1	3782.23	3.4	3.17	3.67	26.3
3	13	2	1	4037.19	4.2	4.5	5	20.4
3	14	1	1	3678.86	4.6	3.33	4.33	28
3	14	1	1	3840.14	4.6	3.33	5	49
3	13	2	1	3353.4	3	3	3.83	46.3
3	14	2	1	3913.94	3.4	3.67	.	.
3	14	1	1	4396.4	5	4.83	5	49
3	14	1	2	4021.63	4.6	4	5	49
3	13	2	1	3579.05	3.8	3.67	5	47.6
3	13	2	1	4719.14	4.8	5	5	49
3	13	1	1	2409.09	3	3.83	3	29.8
3	14	1	1	3247.49	3.2	2.67	3	16.8
3	14	2	1	3359.55	3	3	3	16

3	14	1	1	4371.81	3	3	3	18.4
3	13	1	1	4488.13	3.6	2.33	4	26.2
3	14	1	1	5136.23	5	5	4.83	46.9
3	13	1	1	3857.04	3	2.83	4.67	25.8
3	14	1	1	.	3.8	3	3	.
3	13	1	1	1948.76	2.8	2.33	2.33	7.4
3	14	1	1	2998.83	3.6	2.67	3.83	33.7
3	14	1	1	3002.32	3.4	3	3.83	29.3
3	14	2	1	.	4.4	.	3.67	16
3	14	2	1	3343.71	3.6	2.33	3.67	30.9
3	13	2	1	3705.26	3.6	3.33	3.33	22.7
3	13	1	2	5447.14	4.2	4.5	5	39
3	14	1	1	2860.94	3.6	1.67	4	12.7
3	14	1	1	4298.64	4.8	5	5	49
3	13	1	1	4566.29	3	3	3	16
3	13	1	1	3328.39	3.6	2.67	3.67	24
3	13	1	1	5240.14	3.2	3	3	16
3	13	1	1	4266.63	4.2	2.83	5	49
3	13	1	1	2929.65	3.4	2.83	3	16
3	13	1	1	.	.	.	.	.
3	13	1	3	3634.82	4	3.67	3.5	19.8
3	13	1	1	4542.21	3.8	2.5	3	18.3
3	14	1	2	3612.2	4	3.83	4.33	27.9
3	14	2	1	3280.58	4.2	4	4	34.2
3	14	2	1	.	.	.	.	.
3	14	2	1	3969.34	4.6	3.83	4.5	41.5
3	14	2	1	3282.85	3.6	2.33	4	25
3	14	2	2	3073.48	3.6	3	3	25
3	14	2	1	.	3	3	3	.
3	13	2	1	.	4.2	3.67	.	.
3	14	1	2	3640.65	5	4.67	5	46.9
3	13	2	1	4197.94	3.8	3.5	3.5	19.3
3	14	2	1	3725.8	3.8	2.83	3.17	21.7
3	14	1	1	.	4.2	4	4.5	44.2
3	13	2	1	3638.56	3.4	3	3.17	26.5
3	13	2	1	3621.96	4	3.33	4	36.6
3	13	2	1	3328.61	3.8	3.67	4	27.1
3	13	2	1	3775.47	3.6	2.67	3.33	20.7
3	14	1	1	.	.	.	.	.
3	14	1	1	.	.	.	.	.
3	13	1	1	2924.95	4	1.83	3	16
3	13	2	1	3673.06	3.8	3.17	4	16
3	14	2	1	3768.87	3.2	2.17	4.5	28.6
3	14	2	1	3278.43	2.8	3.33	3.67	32.8
3	14	2	2	3692.12	3.6	3.33	4	47.6

RAW DATA OF STUDY TWO

cohort	gender	grade	erb1	tv1	se1	oe1	erb2	tv2	se2	oe2	intention1	intention2
1	1	6	4.6	4.17	4.5	32.7	.	.	.	.	5	5
1	2	6	4.2	2.33	3.67	37.4	3.6	4.5	4.17	31.9	2	3
1	2	6	4.4	4.5	4.83	45.7	3.6	4.17	3.33	18.4	5	3
1	1	6	3.6	3.33	4	42.4	3.6	3.33	4	41.6	3	4
1	2	6	4.4	2.33	3.83	49	4.2	2.67	3.67	32.2	2	3
1	2	6	4.4	4.17	3.83	40.3	3.6	3.67	4	32.4	5	5
1	1	6	4.8	4.67	4.67	47.7	4.6	2.33	5	49	4	5
1	1	6	3.4	2.33	3.5	36.5	3.8	3.33	4.33	34.1	5	4
1	1	6	5	5	5	49	3.6	3	3	15.8	5	4
1	1	6	4.4	4	4.83	46.3	3.6	3.5	3.17	16	4	5
1	1	6	4.8	4.5	4.67	46.2	5	5	5	47.6	5	5
1	1	6	4	3.33	4.33	32.7	3	3.33	4.17	32.4	5	3
1	2	6	4.2	3.33	4	45.7	3.2	2.33	3	14.4	2	4
1	2	6	3.8	3.67	4.17	38.5	4.4	4.33	3	49	3	4
1	2	6	3.6	2.67	4	35.5	3.8	2.33	2.83	17.1	3	3
1	1	6	5	3.5	5	49	3	3	3	16	1	3
1	2	6	3.6	3.83	4	38	3.6	3.5	3.67	35.5	4	4
1	2	6	4.6	5	5	49	4.2	3.83	4	34	5	4
1	2	6	4.6	3.5	4.5	44	3.6	3.33	3.5	17.2	4	4
1	2	6	.	.	.	.	3.6	2.83	3.5	23.8	.	3
1	1	6	4.6	2.67	5	37.6	3.4	3	4.33	42	4	4
1	2	6	3.8	3.5	3	26.6	3.4	2.83	3	23.9	4	4
1	2	6	4.2	4	4.67	43.8	3.8	3.17	4	23	3	3
1	2	6	2.8	3.17	3.67	34.7	2.8	2.67	3	33.7	2	4
1	2	6	3.8	4	3.5	44.8	4.4	3.5	4.33	38.6	3	.
1	1	6	5	5	5	49	.	.	.	.	5	5
1	2	6	4.2	4.5	4.5	38.7	4.4	3.33	3.83	43.1	5	5
1	2	6	3.6	3.17	3.67	41.3	3.8	3.83	3.83	28.1	3	.
1	.	6	.	.	.	.	.	.	.	.	.	2
1	1	6	3.2	4	3.33	27	3	3	2.83	15.6	3	5
1	1	6	3	3	3	21.5	4.2	1.67	3	49	5	4
1	1	6	4.2	3.17	3.83	30.5	3	3.33	4.17	30.6	5	3
1	1	6	3	3.67	3.67	25.5	2.6	2.67	3.33	17.9	4	3
1	2	6	4	4.67	5	44.4	4.8	4.67	3	49	5	.
1	1	6	4.8	3.5	3.83	.	.	.	.	.	1	5
1	1	6	4.4	4.5	4	3.3	3.8	3.5	3.67	28	3	5
1	1	6	5	4.17	4.67	40.1	4	4.17	4.17	27.9	4	4

1	1	6	3.6	4.17	4.5	37	3.6	3.67	3.67	23.5	3	5
1	1	6	4	2.83	4	33.1	4.6	4.67	5	49	2	5
1	1	6	4.2	4.83	5	45	3.4	4.67	5	49	5	5
1	1	6	4.8	4.17	3.83	38.7	3.4	3.83	4.33	30.8	5	4
1	1	6	3.8	3.5	4.5	42.5	3.8	4.17	4.33	34.6	5	4
1	2	6.	.	.	.	.	4.4	3.17	4	36.	.	4
1	2	6	4.4	3	4.17	37.4	3.6	3.17	3	16	5	3
1	2	6	3.6	3.33	4.5	12.7	3	3	3	16	4	3
1	2	6.	.	.	.	.	3.4	3	3	16.	.	3
1	1	6	1.6	1.33	1.67	1.4	3	3	3	16	1	5
1	1	6	3.8	1.33	3	16	3.8	2.83	4	17	3	4
1	2	6	4	3	4	31.3	3.6	3.17	3.33	17.6	4	3
1	2	6	4.6	3.5	3.33	32.1	3	3	3	16	3	4
1	2	6	4.6	3.17	4.67	41.6	4.2	3.17	4	26.8	5	5
1	2	6	3.6	3.83	3.83	40.5	4	4.17	4	41.8	3	5
1	1	6	3.6	3.83	4.33	46.3	4	3	3.83	24.2	5	5
1	1	6	4.4	4.33	4.33	42.5	5	5	5	47.6	5	5
1	1	6	4.8	3.83	4.5	35.9	3.6	4.5	3	21.7	5	5
1	1	6	5	4.5	4.83	46.2	4.8	4.67	4.83	41.6	4	3
1	2	6.	.	.	.	.	3.2	3.17	3.5	11.6.	.	5
1	2	6	4.6	4.17	4.67	40.5	3	2.67	2.67	9.7	4	5
1	1	6	4.2	3.17	4	32.9	3.6	3.33	3.67	26.4	5	4
1	1	6	2.8	3.33	2.83	13.5	4	3.33	3.5	17.7	2	3
1	1	6	3.4	3.67	4	24.3	3	3	3	18	5	2
1	1	6	4	3.17	5	15.4	3	2.67	3	16	5	4
1	2	6	3.8	4.33	3.83	36	3.6	4	4	19.2	4	5
1	2	6	3.8	3.17	3.67	39.9	3.8	3.5	3.5	37.2	3	5
1	2	6	3.6	4	3.5	35.4	3.8	3.83	3.33	22.8	3	3
1	1	6	4.8	4.17	4.5	43.4	3	3	3.33	21.3	5	3
1	1	6	4.2	4	3.5	40.8	3	3.17	3	16	4	5
1	2	6	4.6	4.5	5	49	4.2	4.83	5	42	5	5
1	1	6	4.4	4	5	36.3	3.4	2.83	3.33	32.8	5.	
1	2	6	3.6	4.33	4.33	47.7.	.	.	.	.	4	4
1	1	6	4.8	3.83	4.17	48.3	4.4	3.17	3	22.9	3.	
1	2	6	3.2	3.17	3.5	33.7.	.	.	.	.	4.	
1.	.	.	.	.	.	.	.	.	.	.	.	4
1	1	6	4.6	4.33	4.33	34.8	3.6	3.17	3.	.	4	4
1	2	6	3.2	4.5	4	45.5	5	4.17	3	45.2	4	4
1	1	6	4.8	4	5	47.7	3.6	3.83	4.17	33.6	5	4

1	1	6	4.4	3.17	3.67	42.5	3	3.17	3.5		4	3
1	1	6	4.6	3	3.33	45.7	3	3	3	16	5	
1	2	6										5
1	1	6	3.4	4.17	3.83	33.1	5	3.67	3.33	30.5	4	4
1	1	6	3.6	4	3.83	37	3.4	4	4	31.8	4	3
1	1	6	4.2	3.33	4	32.1	3	3	3	16	1	4
1	1	6					4.2	4.17	4.5	34		5
1	2	6	4.6	3.5	4.33	32.8	4.8	5	4.5	49	3	5
1	1	6	4.6	4.17	4.67	38.1	3.4	2.83	3.67	32.8	5	4
1	1	6	4.4	3	3.83	23.5	3.2	3.67	4	23.8	1	5
1	1	6	3.4	3.5	4.17	22.6	4.6	5	5	44.2	4	3
1	1	6	3.6	3.17	3	17.6	2.4	1.67	3	16	3	3
1	2	6	4.2	4.17	4	39.6	3.6	3.17	3.83	26	4	4
1	1	6	4.8	4.5	4	47.7	4.2	3.67	4	34	5	5
1	2	6	4.6	3.17	4.33	41.6	3.4	3.33	4	33	5	5
1	1	6	4.4	4.17	5	49	4.4	3.67	5	49	3	3
1	1	6	4.6	3.5	4.17	27.3	3.2	2.5	3	16	5	4
1	2	6	3.8	3.17	3.5	26.2	3.6	4	4.17	43.8	4	4
1	2	6	4.4	5	4.5	46.6	3.2	3.67	4	26.8	5	3
1	2	6	4.2	3.5	4	32.3	3.4	3.5	3.83	37.6	3	3
1	2	6	3.4	2.17	3.5	29	3.4	3	3.83	25.5	1	4
1	2	6	4.2	4.83	4	37.1	4	4	4	30.9	5	3
1	2	6	3.8	3.67	4.33	44.3	4	3.33	4.5	41.1	3	5
1	2	6	3.8	4.17	4.17	42.9	3.6	3.5	3.5	41.4	3	3
1	2	6	3.2	3	4.17	39.2	4	3	4.5	35.1	2	2
1	2	6	3.4	3.5	3.5	22.3	3.4	2.5	2.83	16.1	3	5
1	1	6	4.2	4	5	46.9	4.8	4.5	4.67	41.8	5	4
1	2	6					3.6	2.83	3.83	43.5		5
1	2	6	4.6	4.33	4.83	35.1	3.6	3.67	3.67	15.4	5	3
1	2	6					3.4	3	3.5	19.9		3
1	1	6	4.6	3.5	4.17	36.1	3.2	3.17	3.5	29.5	5	5
2	1	7	4.8	4.83	4.5	45.6	3.2	3.17	3.67	39.8	5	4
2	1	7	4.4	3.67	3.17	20	4	3.83	3.5	25	5	4
2	2	7					3.8	3.17	3.83	29.1		2
2	2	7					2.8	1.83	3.33	17.5		5
2	1	7	4.4	3.83	4.33	39.7	3.6	4.33	4.33	37.8	5	5
2	2	7	4.8	4.67	5	44.3	5	5	5	39.8	5	3
2	2	7	2.8	2.67	3.17	33	3	2.33	3.17	28.1	2	2
2	2	7	4	3.33	4	35.3	4	3.5	4.17	28.3	1	4

2	1	7.	.	.	.	.	4.4	3.5	4.33	34.8.	.	.
2	1	7	4.2	4.17	4.67	48.3.	.	.	.	.	4	3
2	2	7	3.6	2.83	3.5	17.2	3.8	2.83	3.67	29.6	1	2
2	1	7	4.2	4	4.67	44.9	4.8	3.17	3.67	22.7	5	3
2	1	7	4.4	2.67	4	29.6	3.6	3	4	25	4	4
2	2	7	3.2	4	4	25.7	3.4	3.33	3.83	20.1	4	3
2	1	7	3.8	3.83	4.17	42.3	3.2	3.67	3.67	32.6	3	3
2	2	7	3.4	3.67	4.17	27	4.2	3.33	4.17	40.5	3	4
2	1	7	4.4	3.83	4	25.5	3.2	2.67	4	17.2	4	2
2	2	7	4.4	2.83	3	16	3.6	1.67	3	22.3	3	4
2	2	7	4.4	4.5	4.17	43.3	3.4	3.33	3.5	20.7	4	5
2	1	7	5	4.67	5.	.	4.6	3.67	4.17	34	5	5
2	1	7	4.6	3.17	5	41.5	4.6	3.33	5	40.7	5	2
2	2	7	3.8	2.5	3	18.8	3.8	3	4	23.8	1.	.
2	2	7	3.6	3.67	3.5	33.2.	.	.	.	.	3	4
2	1	7	3.6	2.67	3.83	22.3	4.6	3.33	4	24.5	2	5
2	1	7	5	4.67	4.5	39.3	4	3.67	3.5	38.2	5	5
2	2	7.	.	.	.	.	3	3	4	35.	.	3
2	1	7	3.8	3.17	4	44.4	4	2.17	3.33	18.6	3	4
2	1	7.	.	.	.	.	4	4.17	3.67	26.2.	.	3
2	1	7	4.6	4.17	4.33	44.3	3.4	2.83	3.33	22	4	1
2	2	7	3.4	2.5	2.5	26.4	4	1.83	4.17	29.1	1.	.
2	2	7	4.6	4	4.33	44.2.	.	.	.	.	4	4
2	2	7	4	3.17	4.17	35.9	3.6	3.67	4	36.6	4	5
2.	.	.	.	.	.	.	4.6	4	4.83	48.3.	.	5
2	1	7	4	4	4.67	33.2	4.2	3.5	4	26.5	4	2
2	2	7	4	3.17	3.17	27	3.6	3.33	3.33	32.7	3.	.
2.	.	.	.	.	.	.	.	.	.	.	.	5
2	2	7	3.8	3.83	3.67	31.6	2.8	3.17	4	32.5	4	3
2	2	7	3.8	3.5	3.33	28.8	3.4	3.17	4	37.1	3	3
2	2	7	3.8	3.33	4.5	40.6	3.6	3.83	4	37.1	3	3
2	1	7	3.4	4.5	4.33	44.1	4	3.17	4	27	4	2
2	1	7	3.6	2.67	3.5	20	3.4	2.83	4	16.4	3.	.
2	1	7	4.4	3.83	5	32.5.	.	.	.	.	4.	.
2	1	7	5	4.17	4.83	45.3	3.4	2.33	3	16	5	3
2	1	7	4	4.17	4.33	33.8	3.6	2.67	4	28.9	5	5
2	1	7	4.8	4.33	4.33	43.2	4.2	3.67	4.5	45.9	5	2
2	1	7	5	4.67	4.33	46.9	3.4	2.33	3.5	39.9	1	4
2	1	7	4.4	4.33	4.17	45.1	3.8	3.17	4	28.3	4	2

2	1	7	2	2	1	6.8	3.2	2.5	2.67	3.1	2	3
2	1	7	4.2	4.33	4.33	42.3	2	1.5	3	31.9	4	5
2	1	7	3.8	3.17	4	29.9	3.2	3.67	3.33	31.6	5	2
2	2	7	3.4	2.67	3	20.1	4.6	3	4.33	24	2	3
2	2	7	4	3.17	3.67	15.7	4.2	2.67	4.33	41.6	3	5
2	2	7	4	3.5	3.67	38.2	3.4	3.67	3	26	4	5
2	1	7.	.	.	.	.	5	4	4.83	45.3.	.	3
2	1	7	4.4	3.67	4.33	25.3	3	1.67	4	13.6	5	5
2	1	7	5	4.83	5	49	5	5	5	49	5	5
2	1	7	4.2	3.67	3.83	2.1	3.4	2.83	3.83	20.8	5	5
2	1	7.	.	.	.	.	3.8	3.67	4.17	33.7.	.	3
2	1	7	3.2	3.83	2.83	13.9	3	3	3	16	5	2
2	1	7	4.6	3.5	5	49	4.6	3	5	49	4	4
2	1	7	4.8	3	4.5	42.8	2.8	2.67	4	15.6	4	5
2	1	7	5	3	4.67	39.2	3.4	2.83	3.5	16.9	5	4
2	1	7.	.	.	.	.	3.8	3.83	4	40.4.	.	1
2	1	7	4.4	2.17	4.5	35.2	3.4	3.5	3.33	26.2	4	1
2	2	7	3.4	3.5	3.67	15	4.2	1.17	4	41.8	3	4
2	2	7	4.4	3	3.17	40.5	3.2	2.5	3.5	13.8	3	4
2	2	7	4.6	4.17	5	41.7	4.6	4.33	4	49	4	4
2.	.	.	.	.	.	.	3.8	3	4.17	28.1.	.	2
2.	.	.	.	.	.	.	3.6	3.67	3.33	17.	.	5
2.	.	.	.	.	.	.	4.4	3.5	4	44.1.	.	3
2	1	7	4.6	4.33	4.5	24	4.2	3.33.	.	.	5	4
2	1	7	5	3	4	46.9	4.8	3	3	9	5	3
2.	.	.	.	.	.	.	4	3.83	3.83	29.6.	.	3
2	2	7	5	4.33	4.5	45.7	3	3	4	25	4	4
2	2	7	4	3	4	46.2	4.6	3.5	5	39.4	3	4
2	2	7	4.2	4	5	43.8	4.6	3.67	4.67	36.3	4	2
2	2	7	4	3.33	4	42.9	4.2	2.83	4.17	46.5	3	1
2	2	7	3	4	3.17	35.4	4.2	3.5	4	45.7	3	3
2	2	7	3.4	4	3.5	30.8	3.2	3.33	4	30.7	3	4
2.	.	.	.	.	.	.	4	4	4	24.5.	.	5
2	1	7	4.6	3.83	5.	.	4.8	5	5	44.1	5	4
2	2	7	4.4	4.17	4.5	34.2	4	3.67	4.33	27.2	4	5
2	2	7	3.6	3.67	3	32.3	4	3.5	3.67	30.5	5	5
2	1	7	4.6	4.33	4.17	39.1	4.4	4.17	3.67	34.1	5	3
2	2	7	3.6	2.83	3.83	30.1	4.2	3	3	26	3	5
2	2	7	4.2	3.17	4.17	34.1	3	3	3.5	27.2	4	4

2	2	7	3.8	3.33	3.5	28.8	3.8	3.83	3.5	18	4	2
2	2	7	4.6	2.83	3.83	30.7	3.2	2.5	3.33	13.5	3	
2	.	.	.	.	.	.	.	.	.	.	.	5
2	1	7	4.6	3.67	3.67	35.6	4.4	4.5	4	34.6	5	3
2	1	7	4.2	3.33	4.17	46.9	4.6	3.5	3	16	4	3
2	1	7	3.8	3.17	3.17	27.3	3.8	2.83	4.33	16	3	3
2	2	7	3.4	2.67	3.17	25	3.4	2.83	4	21.2	3	4
2	1	7	3.4	3.17	3.67	30.3	3.4	3.33	3.33	30.5	3	3
2	1	7	4.2	2.83	4	39.9	3	2.67	3	32.4	5	5
2	2	7	3.6	4.17	3.5	32	5	5	5	49	4	
2	1	7	4.4	2.83	4.33	44.3	.	.	.	.	4	4
2	1	7	4.6	4.33	4.5	45.3	3.8	3.33	4	26	5	2
2	2	7	3	4	3.83	26.9	2.6	2.33	4	18.5	4	1
2	2	7	2	3.67	3.5	23.7	2.8	2.83	3.17	13.5	3	3
2	1	7	4	3	3.83	29.1	3	3	3	16	4	3
2	1	7	2.6	2.83	3.83	43	3.4	2.67	4	26.8	4	3
2	.	.	.	.	.	.	2.8	2.33	3	20	.	4

erb = expectancy-related beliefs; se = self-efficacy; tv = subjective task values; oe = outcome expectancy; activity = in-class activity levels.

RAW DATA OF STUDY THREE

cohort	gender	activity1	tv1	se1	oe1	activity2	tv2	se2	oe2
1	1	3928.69	2.67	4.17	35.2	4291.8	3.33	4.17	28.5
1	1	5229.37	4.33	5	49	5334.52	4.33	5	36.1
1	2	5432.79	5	5	49	5845.12	5	5	49
1	1	4744.44	4.5	5	42	3119.34	3.83	4.83	47.6
1	1	3278.66	3.67	3.67	30.1	3849.86	3.33	4.33	37.2
1	2	2793.68	3.67	3.5	23.9	4783.28	4.33	3.17	22.5
1	1	3065.84	3.83	4.17	40.7	3924	3.5	3.83	39.9
1	1	3635.27	4	4.67	21.2		3.33	3	41.3
1	2	2558.34	3	1	23.5	3875.39	3.33	5	29.2
1	1	3280.13	3.33	5	18.2	3342.03	1.5	2.33	49
1	1	3592.14	3.5	4.5	18	4361.08	3.17	2.67	35
1	1	3083.67	3.83	3.83	36	4085.66	3.33	4	22.2
1	2	3071.35	4.17	4.67	39.1	2873.66			
1	1		1.83	3.67	15.3		2.83	3.67	25.7
1	2	3379.47	4.67	4	36	5067.75	2.5	4	41.8
1	2	4543.64	4.83	4.83	29.3	4968.63	4.33	4.67	26.3
1	2	4566.06	4.83	5	44.8	4163	2.33	4.33	26.7
1	2	3895.3	3.5	4.33	26.1	4055.45	4.33	4.33	42.1
1	1	3980.15	4.33	4.67	44.9		4.5	4.67	40.9
1	2	4189.21	4.33	5	49	4585.23	3.67	4	32.8
1	1	2819.48	3.83	3.67	43.1	3468.81	3.33	3.83	29.3
1	2	4863.54	4.83	5	40.3	4996.16	3.17	4	33.4
1	2	3536.4	4	4.33	46.9	3839.85	3.83	3.67	33.8
1	2	3671.14	4.17	4.67	41.9	4427.56			
1	2	3011.38	3.5	3	33.3	2907.35	3.17	4.17	29.2
1	2	3324.72	4.17	3.83	35.7	3638.81	3	3.83	40.6
1	1	3824.94	3	3.17	17.6	3807.15			
1	2	3752.35	4.83	4.5	43.8	4160.07	5	5	49
1	1					4320.84	2.67	3.17	15.3
1	2	5558.46	5	5	48.3	4776.37	5	5	47.6
1	2	5200.83	4.67	4.67	48.3	5215.38	5	4.67	45.6
1	2	2978.6	4.33	3.83	40.8	6109.1			
1	2	4468.38	4.5	4.83	48.3	5370.69	4.5	5	46.2
1	1	3330.33	2.83	3	30.8	5560.9	3.67	3.67	21.9
1	1	4389.83	5	4.83	43.8	4264.66	4	3	49
1	1	3862.53	4.33	3	32	3949.53	3.17	3	16
1	2	3448.06	4	4	47.7	4063.33	4.67	4	25
1	2	3481.11	3.67	3.5	28.3	4060.11	2.67	3.17	27.4
1	2			4			3	3	42.7
1	2	3746.46	4	3.83	26.2	3887.49	5	5	49
1	2	3320.57	3.83	3.67	43.1	4215.94	4.33	4.5	32.5
1	2	4173.62	3.83	4	37	4056.45	3	4	28.2

1	2	3453.43	3.5	4	27.8	4145.82	2.83	3.83	32.4
1	2	5724.72	4.17	5	37.1	3478.32			
1	1		3.83	4	15.5	5185.48	3.33	2.83	17.6
1	1	3203.26	3.33	3.17	14.2	4162.96	2.67	3.67	14.6
1	2	4334.37	3.33	5	41.4	3859.29	3	3	44.1
1	2	4821.02	3.17	3.17	29.7	5065.28	2.83	3.5	17.6
1	2	5177.69	4	4.17	39.8	4973.81			
1	1	5736.02	4.5	4.83	39	3970.42	3	3	16
1	1	4663.42	3.33	4.33	44.1	4086.86	4.5	4.83	49
1	1	4292.62	3.33	3.67	30.7	4202.77	3.17	5	47.7
1	1	3518.56	3.5	3.5	24	4540.88			
1	1					3126.12	4.83	5	49
1	2	3110.2	3.17	3.5	18.4	3398.59	3.17	3.33	16.4
1	2	3848.93	3.5	4	40.6	6123.07	3	3.67	19.4
1	2	5142.65	4.67	5	43.8	4119.48	3.33	5	49
1	1		4	3.83	37.9	6099.08	4.33	4	36.2
1	1					4278.65	3.5	4	44.2
1	1				24.2	4540.48	3	3.5	21.1
1	1	2555.93	3.33	3.67	18.4	3158.57	3.5	3.5	26.1
1	2					3362.07	3.17	4	21.6
1	2	2921.22	2.17	3.83	24.8	3437.05	3.17	3.33	29.4
1	1	4181.56	4.67	5	49				
1	1	4933.76	4.5	4.83	48.3	4077.32	4.67	4.67	49
1	1		3.17	2.17		3000.45	2.67	3	16.4
1	1	3375.5	4.33	4	43	4092.73	3.5	4	45
1	2	3829.48	3	3	18.8	4122.63	2.67	4.33	21.1
1	1	2717.05	3.17	3.5	14.3	3322.35	2.67	3.83	30.8
1	1	3742.74	2.83	3	12.1	3785.63	4.5	4.5	
1	2	2471.76	3.83	3.5	43.6	4088.59	3	3.17	19.8
1	2	2717.01	3.33	3.83	33.3	4218.49	4.17	4	48.3
1	2					3458.84	4.17	4	47.7
1	2	3967.96	3.67	4	29.8	4379.36	4.17	4	47.7
1	2	3141.24	4.67	4.17	49	3777.21	4.67	5	45.3
2	1	2490.39	3.83	4.17	40.4	3639.32			
2	2	3056.23	3	3.83	28.3	2100.65	4.5	4.17	31.9
2	2	3367.34	3.5	5	38.6	2384.76	4.17	3.33	18.4
2	1	2720.57	3.67	4	43.8	3656.01	3.33	4	41.6
2	2	3555.88	3	4	45.6	3563.13	2.67	3.67	32.2
2	2	3409.21	4.17	4.17	35.7	3074.71	3.67	4	32.4
2	1	4275.19	4.5	5	49	5070.86	2.33	5	49
2	1	3665.25	2.33	4.5	42.8	3707.77	3.33	4.33	34.1
2	1	4117.5	4.33	5	49	2532.04	3	3	15.8
2	1	3276.64	3.67	5	37.2	3044.06	3.5	3.17	16
2	1	5385.64	4.5	4	42	4821.19	5	5	47.6
2	1	3431.37	3.33	4.17	32.3	3011.12	3.33	4.17	32.4

2	2	3595.91	3.33	4	42.5	2826.47	2.33	3	14.4
2	2	4077.87	4.83	5	45.7	7416.93	4.33	3	49
2	2	3060.39	2.67	3.83	21.5	3088.07	2.33	2.83	17.1
2	1	3748.56	4.33	5	47.6		3	3	16
2	2	5212.78	5	5	45.7	3717.3	3.5	3.67	35.5
2	2	3830.2	4.33	4.83	49	3518.65	3.83	4	34
2	2	3720.21	4.67	4.33	36.3	4082.23	3.33	3.5	17.2
2	2	3194.72	3	4	32.4	3194.58	2.83	3.5	23.8
2	1	3231.74	3.17	5	49		3	4.33	42
2	2	2631.25	4.33	4.33	31.7	2960.23	2.83	3	23.9
2	2					2388	3.17	4	23
2	2	2933.3	3.83	4	39.5	3158.48	2.67	3	33.7
2	2	3109.21	4	4.5	47.6	3526.1	3.5	4.33	38.6
2	1	3672.17	3.17	3.5	30	3892.83	3.5	3.67	28
2	1	4079.6	2.67	4	28.3	3358.46	4.17	4.17	27.9
2	1	4541.92	4	4	30.7	3966.73	3.67	3.67	23.5
2	1	4323.4	3.67	4.5	43.7	4873.54	4.67	5	49
2	1	4579.62	2.17	5	49	4332.47	4.67	5	49
2	1	4445.68	4.67	5	49	10510.5	3.83	4.33	30.8
2	1	3580.56	4.17	4	35.9	4199.43	4.17	4.33	34.6
2	2	3022.5	4.17	3	16	6869.75	3.17	4	36
2	2					4201.01	3.17	3	16
2	2	2288.67	2	3	16	5022.04	3	3	16
2	2	3409.67	3.33	3.5	20.4	4370.06	3	3	16
2	1	2742.58	1.17	1.67	2.5	3172.63	3	3	16
2	1				35.4	4268.97	2.83	4	17
2	2	3672.62	3.67	3.83	23.1		3.17	3.33	17.6
2	2	3003.63	2.83	3.17	25	4343.53	3	3	16
2	2	3267.36	3.67	4.17	40	4469.76	3.17	4	26.8
2	2	3346.21	3.67	3.33	29.4	5117.74	4.17	4	41.8
2	1	3162.57	3	3.67	37	3910.16	3	3.83	24.2
2	1	4036.91	5	5	44.8	4967.34	5	5	47.6
2	1	3635.66	2	3.83	17.4	4118.7	4.5	3	21.7
2	1	6756.11	5	4.17	44.2	3779.81	4.67	4.83	41.6
2	2	3249.24	3.33	3.33	19.2	4333.06	3.17	3.5	11.6
2	2	3194.54	3.5	3.5	18.9	4045.37	2.67	2.67	9.7
2	1	3412.67	3.83	3.67	26.1	3894.68	3.33	3.67	26.4
2	1	2702.29	1.83	3.67	30.6	4716.51	3.33	3.5	17.7
2	2	3139.79	4.67	4.17	49	3948.64	4.17	3	45.2
2	1	3830.93	3.17	4	39.8	3975.21	3.83	4.17	33.6
2	1	2653.44	2	3.33	35.2	3888.58	3.17	3.5	
2	1	4298.64	1.5	5	16	4268.44	3	3	16
2	2	3141.41	3.83	4	48.3	3426.89			
2	1	3859.41	3	3.67	21.9	4139.41	3.67	3.33	30.5
2	2	2918.76	4.33	4.33	7.3		4	4	31.8

2	1	2388.67	3	3	4	3846.47	3	3	16
2	1	2909.76	3	4.33	26.2	3975.23	4.17	4.5	34
2	2	2797.98	4.17	5	45.5	3583.08	5	4.5	49
2	1	2919.52	2.5	4.5	39.7	3638.78	2.83	3.67	32.8
2	1	3807.03	3.17	3.67	35.9	4317.91	3.67	4	23.8
2	1	3685.84	3.5	4.33	47.7	3964.75	5	5	44.2
2	1		2.5	3			1.67	3	16
2	2	3508.84	2.83	4.17	44.3	2911.01	3.17	3.83	26
2	1	3050.75	3.67	4	36	3532.23	3.67	4	34
2	2	3124.64	3	4.33	44.1	2825.61	3.33	4	33
2	1	4172.07	2	5	28	4835.17	3.67	5	49
2	1	5370.47	2.33	3.83	44.2	5669.5	2.5	3	16
2	2	2939.44	3.5	4	46.4	3486.67	4	4.17	43.8
2	2	3416	4.33	4.5	36.2	4028.52	3.67	4	26.8
2	2	3136.35	3.5	4	37.5	3454.32	3.5	3.83	37.6
2	2	2893.93	2.5	3.67	29.8	3201.81	3	3.83	25.5
2	2	3621.96	3.5	4	24.4		4	4	30.9
2	2	3483.91	3.67	4	46.4	3904.95	3.33	4.5	41.1
3	1	2415.98	4.33	3.5	32.5		3.17	3.67	39.8
3	1	3561.4	4.5	3.67	31.8		3.83	3.5	25
3	2	5080.3	4.5	5	46.4	3742.85	3.17	3.83	29.1
3	2	4299.86	3	4.5	13	4224.67	1.83	3.33	17.5
3	1	4291	3.83	4.67	40.2		4.33	4.33	37.8
3	2	2833.85	3.5	4.33	59.2	3203.09	5	5	39.8
3	2	3205.87	3	4	22.6		2.33	3.17	28.1
3	2	3768.6	4.17	5	47	5423.58	3.5	4.17	28.3
3	1	3713.88	4.5	4.67	25.8		3.5	4.33	34.8
3	1	3746.54	3.67	4.5	49	3115.22			
3	2	5308.58	3.5	4.67	38.6	5722.35	2.83	3.67	29.6
3	1	4637.66	4	5	49	4682.95	3.17	3.67	22.7
3	1	2902.53	2	3.83	32	3604.22	3	4	25
3	2	3134.83	4	4	36		3.33	3.83	20.1
3	1	3948.57	3.17	4	36.6	3853.47	3.67	3.67	32.6
3	2	3393.45	4.17	3.83	29.2	4144.99	3.33	4.17	40.5
3	1	3922.39	3.17	3.67	20	3812.87	2.67	4	17.2
3	2	3782.23	3.17	3.67	26.3	3643.43	1.67	3	22.3
3	2	4037.19	4.5	5	20.4		3.33	3.5	20.7
3	1	3678.86	3.33	4.33	28	4290.85	3.67	4.17	34
3	1	3840.14	3.33	5	49		3.33	5	40.7
3	2	3353.4	3	3.83	46.3	3800.74	3	4	23.8
3	2	3913.94	3.67			2512.09			
3	1	4396.4	4.83	5	49	3593.72	3.33	4	24.5
3	1	4021.63	4	5	49	4551.56	3.67	3.5	38.2
3	2	3579.05	3.67	5	47.6	4533.18	3.17	4	37.1
3	2	4719.14	5	5	49	4284.79	3.83	4	37.1

3	1	2409.09	3.83	3	29.8	3046.66	3.17	4	27
3	1	3247.49	2.67	3	16.8	4369.96	2.83	4	16.4
3	2	3359.55	3	3	16	3671.14			
3	1	4371.81	3	3	18.4	3999.95	2.33	3	16
3	1	4488.13	2.33	4	26.2	4665.74	2.67	4	28.9
3	1	5136.23	5	4.83	46.9	5160.99	3.67	4.5	45.9
3	1	3857.04	2.83	4.67	25.8	3794.79	2.33	3.5	39.9
3	1		3	3		3421.65	3.17	4	28.3
3	1	1948.76	2.33	2.33	7.4	3729.44	2.5	2.67	3.1
3	1	2998.83	2.67	3.83	33.7	3712.69	1.5	3	31.9
3	1	3002.32	3	3.83	29.3	3547.44	3.67	3.33	31.6
3	2			3.67	16	4302.7	3	4.33	24
3	2	3343.71	2.33	3.67	30.9	3736.74	2.67	4.33	41.6
3	2	3705.26	3.33	3.33	22.7		3.67	3	26
3	1	5447.14	4.5	5	39		4	4.83	45.3
3	1	2860.94	1.67	4	12.7	2905.6	1.67	4	13.6
3	1	4298.64	5	5	49	4528.04	5	5	49
3	1	4566.29	3	3	16	4590.98	2.83	3.83	20.8
3	1	3328.39	2.67	3.67	24	3502.79	3.67	4.17	33.7
3	1	5240.14	3	3	16	4778.72	3	3	16
3	1	4266.63	2.83	5	49	3156.36	3	5	49
3	1	2929.65	2.83	3	16	2599.91	2.67	4	15.6
3	1						2.83	3.5	16.9
3	1	3634.82	3.67	3.5	19.8	3595.57	3.33		
3	1	4542.21	2.5	3	18.3	4065.66	3	3	9
3	1	3612.2	3.83	4.33	27.9		3.83	3.83	29.6
3	2	3280.58	4	4	34.2	3832.32	3	4	25
3	2					3357.75	3.5	5	39.4
3	2	3969.34	3.83	4.5	41.5	4020.66	3.67	4.67	36.3
3	2	3282.85	2.33	4	25	4377.41	2.83	4.17	46.5
3	2	3073.48	3	3	25	3894.55	3.5	4	45.7
3	2		3	3			3.33	4	30.7
3	2		3.67				4	4	24.5
3	1	3640.65	4.67	5	46.9	4153.8	5	5	44.1
3	2	4197.94	3.5	3.5	19.3	3634.71	3.67	4.33	27.2
3	2	3725.8	2.83	3.17	21.7	4609.58	3.5	3.67	30.5
3	1		4	4.5	44.2		4.17	3.67	34.1
3	2	3638.56	3	3.17	26.5	3758.02	3	3	26
3	2	3621.96	3.33	4	36.6		3	3.5	27.2
3	2	3328.61	3.67	4	27.1	4182.75	3.83	3.5	18
3	2	3775.47	2.67	3.33	20.7	4461.18	2.5	3.33	13.5
3	1								
3	1						4.5	4	34.6
3	1	2924.95	1.83	3	16		3.5	3	16
3	2	3673.06	3.17	4	16	2586.91	2.83	4.33	16

3	2	3768.87	2.17	4.5	28.6	3640.29	2.83	4	21.2
3	2	3278.43	3.33	3.67	32.8	3530.1	3.33	3.33	30.5
3	2	3692.12	3.33	4	47.6	3580.37	2.67	3	32.4

se = self-efficacy; tv = subjective task values; oe = outcome expectancy; activity = in-class activity levels.

VITA

Zan Gao received his Bachelor of Education from Hunan Teachers University and Master of Education from Beijing Sport University. From 1999-2002, Zan worked as a professional journalist and editor in Chinese Sports Daily, and, in the fall of 2002, he was admitted to the doctoral program at The University of Kansas. In 2003, Zan transferred to the physical education pedagogy program at Louisiana State University (LSU) in the Department of Kinesiology. While at LSU, Zan's academic progress is evidenced by his 3.82 G.P.A. His research productivity is substantiated by numerous research projects and publications. As a result of his hard work, he has made ten first author presentations at national conferences, and has coauthored seven others. Most recently, four of his manuscripts were accepted for publication in peer-reviewed journals such as *Research Quarterly for Exercise and Sports* and *Quest*.

Zan has been the recipient of several honors including LSU College of Education Scholarship, LSU Graduate School Enhancement Awards and Travel Awards, LSU Department of Kinesiology Don Franks President's Challenge Fellowship, 2006 Graduate Student Research Award of American Education Research Association (AERA) Special Interest Group - Research on Learning and Instruction in Physical Education, and 2007 American Alliance for Health, Physical Education, Recreation, and Dance Ruth Abernathy Presidential Scholarship Award. He has shown great leadership by involving in the service for the local communities and professional activities. He has been a Local Planning Committee member of National Physical Education Teacher Education Conference in 2003 and reviewer for AERA abstracts and *Journal of Sport and Exercise Psychology*. He served as a member of the Undergraduate Student Committee and Teaching Enhance Committee at LSU, editorial assistant for *Journal of Teaching in Physical Education*, and executive committee member of International Chinese Society for

Physical Activities and Health (ICSPAH). Zan is currently the web manager of ICSPAH.

Recently, Zan accepted an Assistant Professor position at the University of Utah. His career goal is to become an exemplary teacher and researcher in the field.