

Developing Physically Literacy in K-12 Physical Education Through Achievement Goal Theory

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The goal of physical education is to instill physical literacy within students. As an important motivation framework, achievement goal theory has been widely used to understand and explain students' cognitive, affective, and behavioral outcomes. In this paper, we reviewed studies examining achievement goals and outcomes in K-12 physical education settings. First, we provide a brief review of the historical development of the achievement goal theoretical models (the dichotomous model, the trichotomous model, the 2×2 model, and the 3×2 model). Then, we synthesize consequences, antecedents, and interactive factors of each achievement goal construct as well as the influences of gender, age, and culture on students' achievement goals. Finally, we discuss implications for practice and future research. We hope our review can inform physical educators and researchers and assist the application of achievement goal theory into practice.

Keywords: achievement goal theory, physical education, student learning, educational outcomes

The goal of physical education (PE) is to develop physically literate individuals, who have “the ability to move with competence and confidence in a wide variety of physical activities in multiple environments that benefit the healthy development of the whole person” (SHAPE America, 2014, p. 4). The outcomes of physical literacy include the acquisition of motor skills, movement skill competencies, improved physical fitness, positive attitudes toward physical activity, prosocial behaviors, increased persistence, effort, and intrinsic motivation in physical activity and/or PE. Achieving this goal requires the application of theories across disciplines to practice. Among different theories, achievement goal theory (Ames, 1992b; Ames & Archer, 1988; Dweck, 1986; Elliot, 2005; Maehr, 1989; Nicholls, 1984) has been well recognized in understanding and fostering the development of physical literacy. In this paper, we will examine the development of physical literacy in K-12 PE students through the application of achievement goal theory. In the following sections, we will first review the historical development of achievement goal theory and its theoretical models and constructs, then

synthesize empirical evidence for effects of different goals on student learning outcomes (e.g., motivation, effort, and participation) and factors that influence goal adoption, and finally discuss implications for practice and future research.

The Development of Achievement Goal Theory and Theoretical Models

Achievement goal theory has been a prominent theory to explain people's motivation in achievement settings. In this theory, goals represent the purposes, reasons, and/or aims whereby individuals engage in achievement activities. Different goals and their combinations (i.e., goal profiles) have differential effects on students' cognitive, affective, and behavioral outcomes. Adoption of goals is influenced by various factors such as perceived competence/ability and social agents.

In the achievement goal theory literature, four distinct theoretical models have been recognized: a dichotomous model, a trichotomous model, a 2×2 model, and a 3×2 model. As illustrated in Figure 1, the most obvious difference among the four models is that they have different numbers of achievement goals, and the different numbers are indicative of their titles. One common feature the four models bear is that the categorization of achievement goals is based on how competence is evaluated/referenced. Except for the dichotomous model, the other

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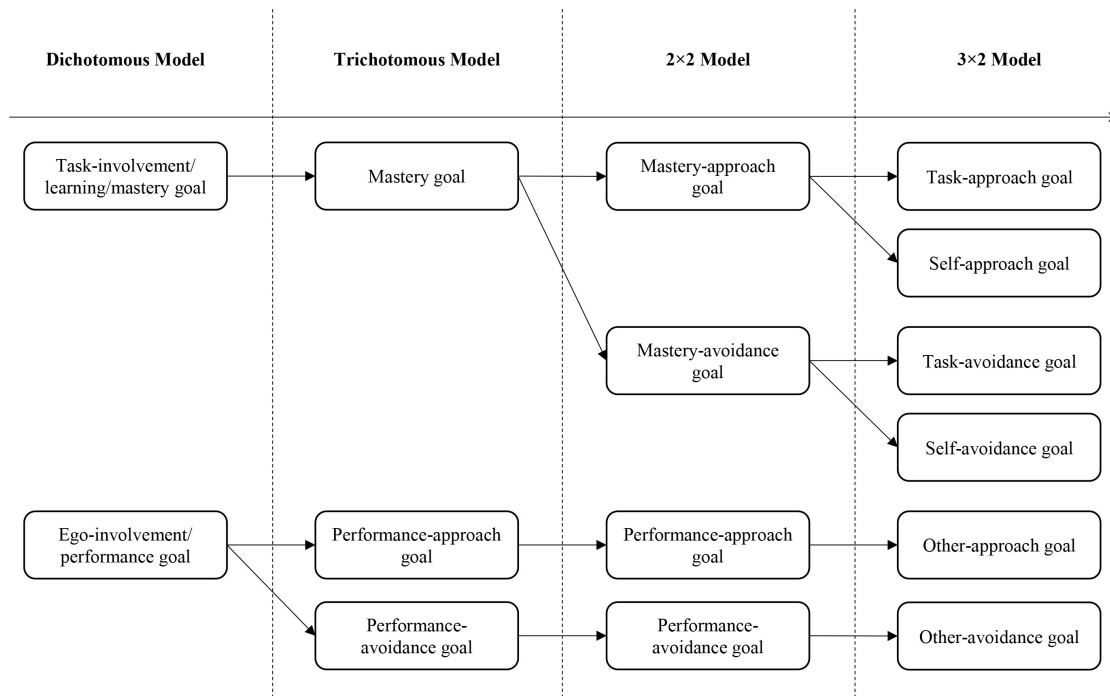


Figure 1 — Development of achievement goal theoretical frameworks and constructs

three models share another common feature, specifically how competence is valanced/directed.

The dichotomous model manifests how the same construct can be labeled differently. Ames (Ames, 1992b; Ames & Archer, 1988) named the two goals mastery and performance, Dweck (Dweck, 1986; Dweck & Leggett, 1988) called them learning and performance, while Nicholls (1984, 1989) used the names task-involvement and ego-involvement. For the dichotomous model, Nicholls' labeling has been referred to the most often in the literature, so it will be used in the remainder of this paper when this model is described. In the literature, many researchers also refer to the two goals as goal orientations because the goals represent a disposition toward desired outcomes (Vandewalle, 1997). For conciseness, we call the two types of goals task and ego. These two goals are distinguished based on whether competence is self-referenced or normative-referenced. Based on self-referenced standards, task goals focus individuals on tasks, acquisition of knowledge and skills, and development of competence. With ego goals, an individual aims to demonstrate superior competence and to be recognized as a better performer than others. In addition, an ego-oriented person may also want to avoid negative judgments of her/his competence if she/he believes ability/intelligence is fixed (e.g., Dweck & Leggett, 1988; Elliott & Dweck, 1988).

In the trichotomous model, valance or direction of competence was introduced (Elliott & Church, 1997; Elliott & Harackiewicz, 1994). In this model, task goal

was labeled mastery goal, and this terminology was continued with the introduction of the trichotomous model. On the other hand, the ego goal was divided into performance-approach and performance-avoidance goals based on how competence was valanced/directed. If competence is directed toward success, performance-approach goals are likely to be endorsed. On the contrary, if competence is directed toward the possibility of not succeeding (i.e., failing), performance-avoidance goals are likely embraced. Performance-approach goals are similar to the ego goals in the dichotomous model, in that individuals compare themselves to others, trying to show superior competence and win public recognitions. Performance-avoidance goals, on the other hand, center on normative incompetence. Individuals with performance-avoidance goals try to avoid being outperformed.

Along the same vein of how competence is valanced for ego goals in the trichotomous model, scholars Elliott (1999) and Pintrich (2000) proposed that mastery goals could also have approach and avoidance properties, hence the introduction of the 2×2 model (Elliott & McGregor, 2001; Elliott & Thrash, 2001), in which mastery goals are separated into mastery-approach and mastery-avoidance goals. The former emphasizes intrapersonal competence by focusing on improvement of self in knowledge and skill acquisition, whereas the latter is based on intrapersonal incompetence and focused on the avoidance of failure in learning.

The most recent 3×2 model still focuses on how competence is referenced and valanced (Elliott,

Murayama, & Pekrun, 2011). Different from the trichotomous and the 2×2 models, competence in the 3×2 model is evaluated based on three standards: task, self, and other. A task-approach goal addresses obtaining task-based competence such as doing a task correctly. Self-approach goals focus on self-based competence defined by intrapersonal standards (e.g., I ran a mile faster in the end of the fall than I did in the beginning of the fall), while other-approach goals are analogous to performance-approach goals. Individuals with task-avoidance goals, self-avoidance goals, and other-avoidance goals seek to avoid looking incompetent in learning outcomes.

Achievement Goal Theory in the PE Setting

Achievement goal theory is important to understand students' achievement motivation and behavior in PE settings (e.g., Agbuga & Xiang, 2008; Guan, Xiang, McBride, & Bruene, 2006; Xiang, Bruene, & McBride, 2004). Looking into the effect of different goals on student learning may inform and help physical educators better design school PE programs and increase their instructional effectiveness. As mentioned earlier, K-12 PE is an important setting to foster physical literacy. Empirical studies, in which achievement goal theory is used as a theoretical framework in K-12 PE settings, will be examined in the remainder of this section.

Selection of Articles and General Findings

Using the keywords "achievement goals," "goal orientation," and "physical education," we searched the major research journals in the field of PE pedagogy for peer-reviewed articles pertaining to the area of student achievement goals. For the articles that appeared as a result of this step, abstract and method sections were read to determine the characteristics of the study such as participants and the study settings. Those involving K-12 students and conducted in school PE settings were retained for review. Those articles that did not meet these criteria were excluded. Overall, a total of 82 articles published in 21 peer-reviewed journals, such as *Journal of Teaching in Physical Education*, *Research Quarterly for Exercise and Sport*, *European Physical Education Review*, and *Journal of Sport and Exercise Psychology*, were included and reviewed.

Among these 82 articles, the researchers employed the dichotomous model in 58% of the studies, the trichotomous model in 16% of the studies, and the 2×2 model in 18% of the studies. The 3×2 model was not found to be used in the K-12 PE setting. This trend reflects that studies based on the more recent achievement goal models are needed. Six (7%) of the 82 articles included in the pool reviewed were review papers or meta-analyses. The majority of the 82 studies were correlational in nature (73%), a few of which were experimental (7%)

and longitudinal (10%). These numbers are not surprising considering challenges of conducting experimental studies in K-12 education settings today (Melnik & Morrison-Beeday, 2012). However, compared with correlational studies, experimental studies are more reflective of cause and effect; clearly there is a need to conduct more experimental studies in the future. The studies reviewed were conducted in 10 different countries, including the U.S., the UK, Greece, Spain, Norway, China, Canada, Turkey, France, and Singapore, with student populations ranging from 81 to 2,645. The study participants were aged between 8 and 18 years, representing males and females.

Different questionnaires were used to assess students' achievement goals. In studies based on the dichotomous model, the Task and Ego Orientations in Sport Questionnaire (Duda, 1989) was the most frequently used instrument (79%). Measures used in trichotomous studies were largely based on the Achievement Goal Questionnaire (42%; Elliot & Church, 1997). For studies using the 2×2 model, measures were modified and adopted from the 2×2 achievement goal scales (Elliot & McGregor, 2001). Assessment using these different instruments across cultures and grade levels derived a consistent result; K-12 PE students scored higher in mastery-oriented goals (task, mastery, mastery-approach) than ego-oriented goals (mastery-avoidance, performance-approach, and performance-avoidance; e.g., Barkoukis, Ntoumanis, & Thøgersen-Ntoumani, 2010; Gao, Lochbaum, & Podlog, 2011; Garn & Sun, 2009; Xiang, Lee, & Shen, 2001; Xiang, Lee, & Solmon, 1997). This result indicates that K-12 PE students are generally more focused on improving their own performance than outperforming others.

Consequences, Antecedents, and Interactive Factors of Achievement Goals

In this section, we focus on the consequences, antecedents, and interactive factors of the achievement goals. Associations between these variables and achievement goals are described according to each achievement goal theoretical model (i.e., dichotomous, trichotomous, and 2×2) employed in the studies reviewed. While the majority of the studies focused on individual goals, some examined the combination of goals (i.e., goal profiles). The individual goals and goal profiles are described in sequence.

Consequences of Achievement Goals. Researchers of achievement goal theory contend that goals aimed at mastering knowledge and developing self-competence lead to favorable consequences. If goals orient people to compete against others or avoid normative failure, consequences can be detrimental. This proposition has been supported by numerous empirical studies.

In research on the dichotomous model, task goals consistently demonstrate a positive association with students' cognitive, affective, and behavioral outcomes, such as high usage of metacognitive strategies (Theodosiou,

Mantis, & Papaioannou, 2008), high degrees of cooperation and satisfaction (Ommundsen, 2001a), self-reported enjoyment (Vlachopoulos, Biddle, Symeon, & Stuart, 1996; Wang & Liu, 2007), intrinsic motivation (Cury, Elliot, Sarrazin, Da Fonseca, & Rufo, 2002; Papaioannou, Tsigilis, Kosmidou, & Milosis, 2007), effort/persistence (Sarrazin, Roberts, Cury, Biddle, & Famose, 2002; Xiang et al., 2004), positive emotions (Ntoumanis & Biddle, 1999), high levels of physical activity participation (Shen, Chen, & Guan, 2007; Tzetzis, Goudas, Kourtessis, & Zisi, 2002), low usage of self-handicapping strategies (Standage, Treasure, Hooper, & Kuczka, 2007), and low frequency of disciplined behavior (Moreno-Murcia, Sicilia, Cervelló, Huéscar, & Dumitru, 2011).

Effects of ego goals, however, are inconclusive. Some studies found ego goals were directly associated with negative consequences such as high level of anxiety (Ommundsen, 2001a), high level of self-handicapping strategies use (Standage et al., 2007), high frequency of self-reported undisciplined behavior (Moreno-Murcia et al., 2011), low level of enjoyment and interest (Escarti & Gutierrez, 2001), lack of motivation (Wang & Liu, 2007), and lack of social involvement (Treasure & Roberts, 1994). Positive outcomes identified include higher levels of perceived ability (Xiang et al., 1997), higher levels of perceived competence (Dunn, 2000; Wang & Liu, 2007), demonstration of mastery behavior (Xiang & Lee, 2002), and better 1-mile running performance (Xiang, McBride, & Bruene, 2006).

In research on the trichotomous model, students who identified with mastery goals also consistently demonstrated positive outcomes. These positive outcomes include high usage of meta-cognitive strategies, help-seeking, effort regulation, high level of intrinsic motivation (Cury, Elliot, et al., 2002), satisfaction (Papaioannou et al., 2007), high degree of motor skill knowledge gain (Shen et al., 2007), effort/persistence (Agbuga & Xiang, 2008), positive attitude and high level of physical activity participation (Halvari, Skjesol, & Bagøien, 2011), and low usage of self-handicapping (Ommundsen, 2006). Performance-approach, on the other hand, showed mixed results. In the studies reviewed, performance-approach goals generated positive outcomes such as high level of perceived competence (Cury, Da Fonseca, Rufo, & Sarrazin, 2002), effort regulation (Ommundsen, 2006), effort/persistence (Agbuga & Xiang, 2008), high degrees of attitude and exertion (Halvari et al., 2011), and less tendency of self-handicapping (Ommundsen, 2006). This type of goal also led to negative consequences such as high level of amotivation (Papaioannou et al., 2007). Performance-avoidance goals were often associated with negative outcomes such as self-handicapping (Ommundsen, 2004, 2006) and amotivation (Papaioannou et al., 2007). In addition, performance-avoidance goals also decreased intrinsic motivation (Halvari et al., 2011), effort regulation (Ommundsen, 2006), and situational interest and physical activity participation (Shen et al., 2007).

In studies using the 2×2 model, mastery-approach goals demonstrated a consistent positive effect while the

other three goals' influences varied. Mastery-approach goals were found to be positively associated with effort/persistence (Guan et al., 2006), enjoyment (Wang, Liu, Chatsarantis, & Lim, 2010), and self-efficacy and physical activity levels (Gao et al., 2011). While occasionally demonstrated positive effects on effort/persistence (Guan et al., 2006), mastery-avoidance goals often had no effects on the measured variables (Gao et al., 2011; Wang et al., 2010). Performance-approach goals had positive influences on effort/persistence (Guan et al., 2006) and also had negative effects on enjoyment (Wang et al., 2010). Performance-avoidance goals, on the other hand, often had no associations with the measured variables (Guan et al., 2006; Wang et al., 2010). Further investigation is needed regarding these inconsistencies.

Goal Profiles. An important characteristic of the dichotomous achievement goal model is that the two types of goal are orthogonal. That is, they are independent of each other (Nicholls, 1989). This was supported by a low, nonsignificant correlation between the task and ego goals across studies based on the dichotomous model (Duda, Fox, Biddle, & Armstrong, 1992; Xiang, McBride, Bruene, & Liu, 2007). This means that task and ego goals are not correlated, the level of perception of one goal does not affect the level of another goal, and students can have multiple goals at the same time (i.e., goal profile). Although the concept of orthogonality becomes less salient with the employment of the subsequently developed theoretical models (Elliot & Church, 1997; Wang et al., 2008), scholars have continued to examine goal profiles to explore the interaction of different goals and their collective influences on students' cognition, affect, and behavior. Using mean-split (Goudas, Biddle, & Fox, 1994; Vlachopoulos et al., 1996), median-split (Standage & Treasure, 2002; Walling & Duda, 1995), or cluster analysis (Solmon, 2006; Xiang et al., 2007), researchers identified different goal profiles. Although these goal profiles vary due to different goal constructs used, they share a commonality; profiles involving task/mastery/mastery-approach goals tend to induce positive outcomes.

Based on the dichotomous model, goal profiles were often represented by four groups: high-task/high-ego, high-task/low-ego, low-task/high-ego, and low-task/low-ego. Researchers found that compared with those with low-task/high-ego and low-task/low-ego goal profiles, students with high-task/high-ego and/or high-task/low-ego goal profiles tended to report higher scores in enjoyment, effort (Vlachopoulos et al., 1996), intrinsic motivation (Standage & Treasure, 2002; Wang, Chatzisarantis, & Spray, 2002), expectancy beliefs, interest, usefulness, intention for future participation (Xiang et al., 2007), and more frequent physical activity participation (Tzetzis et al., 2002).

Using the trichotomous model, Carr (2006) found that the high-mastery/low-performance-approach/low-performance-avoidance group scored significantly lower in introjected regulation than the other three

groups (high-mastery/high-performance-approach/low-performance-avoidance, high-mastery/high-performance-approach/high-performance-avoidance, and low-mastery/low-performance-approach/low-performance-avoidance). When mastery, performance-approach, and performance-avoidance goals were all high, students reported the highest physical activity level out of school. When a low level of mastery goal was accompanied with a high level of performance-approach and performance-avoidance goals, students exhibited the most maladaptive motivation (e.g., external regulation, amotivation) and the lowest extracurricular physical activity participation.

Based on the 2×2 model, Wang et al. (2008) identified three goal profiles in a group of Singapore secondary school students, namely high mastery and avoidance, moderate mastery, and low achievement. The high mastery group scored the highest while the low achievement group scored the lowest in all four goals. Compared with the other two groups, students in the high mastery group showed a higher level of enjoyment, intention to exercise during leisure time, perceived competence, and positive perceptions of PE and PE teachers. Using the 2×2 model and social goal constructs, Garn and Sun (2009) grouped 214 middle school students into three clusters. The first cluster represented the high-goal group in which students scored the highest in all variables, the second cluster the low-goal group where four achievement goals were scored the lowest, and the third cluster the moderate to low group where the students scored low in all four goals. They found that the high-goal group reported a higher level of effort than the other groups in a PACER running test.

Antecedents of Achievement Goals. In some studies, important antecedents to students' achievement goals, such as motivational climates, perceived ability/competence, and social agents, have been identified. Ames (1992a, 1992b) proposed two types of motivational climates: mastery climate (also known as task-involving climate) and performance climate (also known as ego-involving climate). Students who align with the mastery climate focus on their own learning, while those who align with the performance climate emphasize competing against one another. In studies based on the dichotomous model, evidence supports that students tend to endorse task goals in a mastery climate and adopt ego goals in a performance climate (Standage, Duda, & Ntoumanis, 2003; Xiang, Bruene, & Chen, 2005; Xiang, McBride, & Solmon, 2003). In studies using the trichotomous model, a mastery climate was found to be linked to students' adoption of mastery goals, while a performance climate associated with both performance-approach and performance-avoidance goals (Cury, Da Fonséca, et al., 2002; Ommundsen, 2006). Halvari et al. (2011) further revealed that in a performance climate where positive feedback was provided, students had a tendency to adopt performance-approach goals, whereas when negative emotional feeling was communicated, students were likely to endorse performance-avoidance goals. Researchers have rarely

examined antecedents of achievement goals based on the 2×2 model. To our knowledge, only one study by Wang et al. (2010) examined the differential effects of mastery climate and performance climate on a group of Singapore secondary school students' achievement goals. They found that in a mastery climate students were likely to be oriented to mastery-approach and mastery-avoidance goals, while in a performance climate students tended to adopt performance-approach and performance-avoidance goals. Together, these results show that students focus on their own learning and improvement in a mastery climate, while they concentrate on competing against others in a performance climate. Note the number of studies on antecedents based on the trichotomous and the 2×2 models is still limited. Therefore, more effort is needed in this area of inquiry.

Researchers have examined motivational climates in PE utilizing TARGET principles (Epstein, 1988, 1989). TARGET represents Task (learning activities), Authority (providing students autonomy), Reward (incentives), Grouping (working collaboratively or individually), Evaluation (focusing on personal improvement or social comparison), and Timing (quality instructional time). Through manipulating the five components, PE teachers can create mastery or performance climates that in turn influence students' goal adoption (Ames, 1992a, 1992b; Treasure & Roberts, 1995). Interventions based on the TARGET principle have been conducted to promote student task involvement. For example, Weigand and Burton (2002) examined the effect of TARGET on 40 PE students' goal orientations. After a 5-week task-involving instruction, students in the experimental group scored significantly higher in task goals than those in the control group, while the two groups' scores did not differ in ego goals. Similarly, Barkoukis, Tsorbatzoudis, and Grouios (2008) compared the effect of traditional teaching styles and instruction based on TARGET among 374 high school students. After a 7-month intervention, the experimental group scored significantly higher in task goals than the control group, whereas their ego goals were not different. These studies confirmed that mastery climate fosters task goals; however, they only focused on the dichotomous model. Carefully designed experiments to investigate the effect of TARGET on the other achievement goals are still needed. This is critical because learning environments structured by teachers can impact the development of students' physical literacy.

Implicit theories of ability/competence have been used to examine students' differential choices of achievement goals. Researchers (Dweck & Leggett, 1988; Nicholls, 1984) contend that incremental beliefs (ability/competence/intelligence is malleable) lead students to adopt mastery-oriented goals and entity beliefs (ability/competence/intelligence is fixed) to performance oriented goals. Empirical studies based on the dichotomous model evidenced that students' incremental beliefs positively influenced their task goal adoption and entity beliefs positively affected their ego goal adoption (Ommundsen, 2001a, 2001b; Wang & Liu, 2007). Similar results were

found in studies based on the 2×2 model. Incremental beliefs positively predicted mastery-approach and mastery-avoidance goals, and entity beliefs positively predicted performance-approach and performance-avoidance goals (Corrion et al., 2010; Warburton & Spray, 2008, 2013).

Social agents such as parents and peers also play an important role in students' goal adoption. Carr and Weigand (2001) examined the impact of parents, peers, teachers, and sporting heroes on achievement goals among a group of secondary school students in the UK. They found that students' task goal adoption was facilitated by these social agents' emphasis on mastery of knowledge and skills, and ego goal adoption was expedited by these social agents' emphasis on competition against others.

Interactive Factors. Nicholls (1989) proposed that achievement goals would interact with other factors, such as perceived ability/competence and motivational climates, and in turn differentially impacts student outcomes. This proposition, however, has not been fully supported in subsequent research work. For example, Sarrazin et al. (2002) monitored how 500 boys responded to five difficulty levels (very easy, easy, moderate, difficult, and very difficult) of a climbing activity in a French secondary school. They found when task goals were accompanied with a high level of perceived ability, boys tended to invest sustainable effort as the level of difficulty in climbing increased. When ego goals combined with a high level of perceived ability, boys tended to invest effort when the level of difficulty in climbing was very easy to moderate, but when the level of difficulty exceeded a moderate level, they would constantly drop their effort. This tendency was also observed in the boys with task goals and a low level of perceived ability. Boys with ego goals and a low level of perceived ability only put effort when the level of difficulty in climbing was very easy to easy. Once the climbing exceeded an easy level, their effort kept decreasing. Xiang et al. (2004) examined the interaction between achievement goals and motivational climates among 116 elementary school students. They found that when mastery goals were accompanied with a perceived mastery climate, students achieved the highest one-mile run performance.

In studies where the focus has been on other interactive factors, such as perceived ability and situational interest, researchers did not find significant interaction effects. For example, Standage et al. (2007), who examined the interaction between ego goals and perceived ability among 72 elementary school students, did not find a significant contribution of the interaction to self-handicapping. Similarly, Shen et al. (2007) examined whether the interaction between achievement goals and situational interest was predictive of knowledge and skill acquisition and physical activity levels among 177 middle school students in a softball class. In this study however, interaction effects between students' mastery goals and individual interest were not observed.

Influences of Gender, Age, and Culture

Whether girls or boys are likely to adopt mastery or performance goals is inconclusive. In studies based on the dichotomous model, some studies found that boys were more likely to adopt ego goals than girls (e.g., Carr & Weigand, 2001; Standage et al., 2007; Walling & Duda, 1995); others found no significant difference between boys and girls (e.g., Barkoukis et al., 2010; Xiang et al., 1997; Xiang et al., 2006). Using the trichotomous model, Ommundsen (2004) found that Norwegian junior high school boys tended to adopt performance-approach and performance-avoidance goals more than girls, whereas Shen et al. (2007) did not observe differences between girls and boys in a U.S. middle school. This inconclusiveness also extends to studies based on the 2×2 model. For example, Warburton and Spray (2008) measured a group of English primary school students' achievement goals four times in a year. They found boys scored higher in mastery-approach, performance-approach, and performance-avoidance goals than girls at the first time of measurement. At the subsequent three times, boys reported higher scores in all four achievement goals than girls. Guan et al. (2006) and Wang et al. (2008), however, did not find differences in the four goals between boys and girls.

Results of age-related differences in achievement goals are not consistent. Based on the dichotomous model, Xiang and colleagues (Xiang & Lee, 1998, 2002; Xiang et al., 2001) conducted a series of studies in the U.S. in which students' achievement goals across elementary, middle, and high school levels were compared. They found that students in the higher grades reported higher scores in ego goals than those in the lower grades, whereas those in the lower grades reported higher scores in task goals than those in the higher grades. Digelidis and Papaioannou (1999) found similar results in Greece, where senior high school students scored lower in task goals than junior high and elementary school students. In another study conducted in Greece, Theodosiou et al. (2008), however, found elementary school students scored higher in both task and ego goals than junior high and senior high school students. Similarly, in a Greek junior high school, Barkoukis et al. (2010) measured students' achievement goals six times over three years and found that as their grade levels increased, students reported a decline in both task and ego goals.

Based on the trichotomous model, Agbuga and Xiang (2008) compared differences in achievement goals between 8th graders and 11th graders in two Turkish public schools. They found that 8th graders reported significantly higher scores in performance-approach goals than 11th graders, and there was no difference in mastery and performance-avoidance goals across the two grades.

Using the 2×2 model, Guan et al. (2006) did not find differences in achievement goals among a group of U.S. high school students across grades 9–12. Warburton and Spray (2009) observed a group of UK high school students (years 7–9) four times in a year. They found

Year 7 students scored higher in mastery-approach, performance-approach, and performance-avoidance goals at time 1, and their scores in mastery-approach goals decreased over time compared with students in the other grades.

Cross-cultural studies based on achievement goal theory are rare in the field of PE. In one study (Xiang et al., 2001), achievement goals between American and Chinese students were compared across three grade levels (4th, 8th, and 11th). Results showed that the American 4th and 11th graders scored higher in task goals than their Chinese counterparts, while the Chinese 8th graders scored higher than their American counterparts. The researchers attributed the differences to the emphasis the two cultures put on their education systems (i.e., competition is more prevalent in the Chinese education system).

Implications for Practice

Developing physical literacy in students requires physical educators to bridge theory and practice. The achievement goal theory offers a motivational conceptualization of students' purposes and aims. How effective this theory can assist practice relies on how well the goals are presented to students in PE classes. Based on the studies reviewed, mastery-oriented goals (i.e., task goals, mastery goals, and mastery-approach goals) are conducive to student motivation and positive educational/learning outcomes, whereas avoidance goals (i.e., mastery-avoidance goals, performance-avoidance goals) often lead to negative results. Although performance-oriented goals (i.e., ego goals, performance-approach goals, performance-avoidance goals) sometimes bring about positive effects on student learning outcomes, they can be detrimental in the long run. Therefore, we recommend physical educators to focus on promoting mastery-oriented goal adoption and minimize the influence of avoidance goals among students in K-12 PE.

To facilitate students' adoption of mastery-oriented goals, physical educators should consider the following strategies in practice:

1. Provide developmentally appropriate activities so that students feel competent in doing them and gain a sense of success, which can lead to further development of their movement competencies (e.g., Guan et al., 2006; Weigand & Burton, 2002; Xiang et al., 2006).
2. Make activities fun and interesting so that students enjoy taking part in them (e.g., Chen & Ennis, 2004; Xiang et al., 2005; Xiang et al., 2006).
3. Set challenging yet attainable goals to elicit students' best effort (Chen & Ennis, 2004; Ommundsen, 2004).
4. Invite students to make some of their own decisions about what to do and how to do it (Wang & Liu, 2007), so that they feel empowered and willing to take responsibility for their own learning (e.g.,

employing the Spectrum of teaching styles; see Mossston & Ashworth, 2002).

5. Focus students on the learning process and effort instead of product and ability (e.g., Cury, Da Fonseca, et al., 2002; Xiang et al., 1997; Xiang et al., 2006).
6. Provide encouragement specific to student effort and improvement (Xiang, Liu, McBride, & Bruene, 2011).
7. Evaluate students based on their effort and self-improvement instead of comparing them to others (e.g., Xiang & Lee, 1998; Xiang et al., 2011; Xiang et al., 2006).

In addition to the above-mentioned instructional strategies, physical educators can design or reform their programs based on TARGET principles (Epstein, 1988, 1989). As mentioned previously, interventions based on TARGET have facilitated students' task goal orientations. Implementation of TARGET in and out of school has generated positive cognitive, affective, and behavioral outcomes (Braithwaite, Spray, & Warburton, 2011; Cecchini, Fernandez-Rio, & Mendez-Gimenez, 2014; Digelidis, Papaioannou, Laparidis, & Christodoulidis, 2003). Physical educators can also take into account the influence of social agents such as parents, peers, and teachers, to make a more comprehensive positive impact on students.

Directions for Future Research

The achievement goal theoretical framework has developed from the dichotomous, the trichotomous, the 2×2 , to the 3×2 model. The first three models have been widely employed in K-12 PE; the latest 3×2 model has not been examined in the same setting. The findings from a few other studies conducted in collegiate sports (e.g., Lower, Newman, & Pollard, 2016; Masciet, Elliot, & Cury, 2015) indicate that college students were able to distinguish the six goal constructs proposed in the 3×2 model. Results of these studies showed the approach goals (e.g., task-approach goals, self-approach goals) were positively associated with student educational outcomes such as intrinsic motivation and perceived benefits of sport participation, while the other types of goals had no associations with these outcomes. It will be interesting to see whether K-12 PE students can distinguish the six goals proposed in the 3×2 model. Thus, validation studies need to be done first to examine the utility of the 3×2 model. Once this model is proven applicable to K-12 PE settings, we can examine how the six goals interact with other variables (e.g., perceived competence, perceived learning climate) and differentially affect student educational/learning outcomes.

The majority of the studies reviewed in this paper were correlational. Therefore, we encourage researchers to conduct experimental studies to help identify the causal relationships between achievement goals and educational/

learning outcomes. Longitudinal studies have rarely been done, so this certainly can serve as a direction for future research. Cross-cultural studies are also needed to enrich our understanding of the achievement goal theory. We noticed that the associations between achievement goals and other variables (e.g., intrinsic motivation, perceived ability, effort) varied across studies. This might be due to different populations, settings, cultures, and participant characteristics. Although there has been a few of meta-analysis studies on achievement goals (e.g., Lochbaum & Gottardy, 2015; Ntoumanis & Biddle, 1999), these studies did not focus on K-12 PE. Therefore, we expect to see such a meta-analysis in the future.

Another identified finding was the limited number of studies conducted in PE settings in the U.S. Only 16 studies were found to be completed in U.S. K-12 PE settings in the past three decades that met the inclusion criteria for this review paper; this compares to 34 conducted outside the U.S. Therefore, we recommend that PE pedagogy researchers in the U.S. invest more effort in this area. In addition, researchers have paid little attention to students' motor skill and game tactic acquisition in achievement goal studies. Since competence in movement is the focus of developing physically literate individuals (SHAPE America, 2014), we urge scholars to examine the association between achievement goals and student motor performance so as to better inform practice.

Overall, in this paper we reviewed the development of achievement goal theoretical frameworks and constructs, synthesized the associations between achievement goals and student educational/learning outcomes, and discussed implications for practice and future research. We hope this review can help readers comprehend what has been done in the past and envision what needs to be done in the future regarding achievement goal theory. Finally, we acknowledge that our review may not be as conclusive as we first thought it would be. Readers, hereby, are referred to earlier reviews to gain other insights into achievement goal theory research in K-12 PE and other settings (e.g., Chen & Ennis, 2004; Duda & Ntoumanis, 2003; Li & Lee, 2004; Lochbaum & Gottardy, 2015).

References

- Agbuga, B., & Xiang, P. (2008). Achievement goals and their relations to self-reported persistence/effort in secondary physical education: A trichotomous achievement goal framework. *Journal of Teaching in Physical Education*, 27, 179–191. doi:10.1123/jtpe.27.2.179
- Ames, C. (1992a). Achievement goals, motivational climate, and motivational processes. In G. Roberts (Ed.), *Motivation in sport and exercise* (pp. 161–176). Champaign, IL: Human Kinetics.
- Ames, C. (1992b). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, 84, 261–271. doi:10.1037/0022-0663.84.3.261
- Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology*, 80, 260–267. doi:10.1037/0022-0663.80.3.260
- Barkoukis, V., Ntoumanis, N., & Thøgersen-Ntoumani, C. (2010). Developmental changes in achievement motivation and affect in physical education: Growth trajectories and demographic differences. *Psychology of Sport and Exercise*, 11, 83–90. doi:10.1016/j.psychsport.2009.04.008
- Barkoukis, V., Tsorbatzoudis, H., & Grouios, G. (2008). Manipulation of motivational climate in physical education: Effects of a seven-month intervention. *European Physical Education Review*, 14, 367–387. doi:10.1177/1356336X08095671
- Braithwaite, R., Spray, C.M., & Warburton, V.E. (2011). Motivational climate interventions in physical education: A meta-analysis. *Psychology of Sport and Exercise*, 12, 628–638. doi:10.1016/j.psychsport.2011.06.005
- Carr, S. (2006). An examination of multiple goals in children's physical education: Motivational effects of goal profiles and the role of perceived climate in multiple goal development. *Journal of Sports Sciences*, 24, 281–297. doi:10.1080/02640410500131886
- Carr, S., & Weigand, D.A. (2001). Parental, peer, teacher and sporting hero influence on the goal orientations of children in physical education. *European Physical Education Review*, 7, 305–328. doi:10.1177/1356336X010073005
- Cecchini, J.A., Fernandez-Rio, J., & Mendez-Gimenez, A. (2014). Effects of Epstein's TARGET on adolescents' intentions to be physically active and leisure-time physical activity. *Health Education Research*, 29, 485–490. doi:10.1093/her/cyu007
- Chen, A., & Ennis, C.D. (2004). Goals, interests, and learning in physical education. *The Journal of Educational Research*, 97, 329–339. doi:10.3200/JOER.97.6.329-339
- Corrion, K., D'Arripe-Longueville, F., Chalabaev, A., Schiano-Lomoriello, S., Roussel, P., & Cury, F. (2010). Effect of implicit theories on judgement of cheating acceptability in physical education: The mediating role of achievement goals. *Journal of Sports Sciences*, 28, 909–919. doi:10.1080/02640414.2010.484065
- Cury, F., Da Fonseca, F., Rufo, F., & Sarrazin, F. (2002). Perceptions of competence, implicit theory of ability, perception of motivational climate, and achievement goals: A test of the trichotomous conceptualization of endorsement of achievement motivation in the physical education setting. *Perceptual and Motor Skills*, 95, 233–244. doi:10.2466/pms.2002.95.1.233
- Cury, F., Elliot, A., Sarrazin, P., Da Fonseca, D., & Rufo, M. (2002). The trichotomous achievement goal model and intrinsic motivation: A sequential mediational analysis. *Journal of Experimental Social Psychology*, 38, 473–481. doi:10.1016/S0022-1031(02)00017-3
- Digelidis, N., & Papaioannou, A. (1999). Age-group differences in intrinsic motivation, goal orientations and perceptions of athletic competence, physical appearance and motivational climate in Greek physical education. *Scandinavian Journal of Medicine & Science in Sports*, 9, 375–380. doi:10.1111/j.1600-0838.1999.tb00259.x
- Digelidis, N., Papaioannou, A., Laparidis, K., & Christodoulidis, T. (2003). A one-year intervention in 7th grade

- physical education classes aiming to change motivational climate and attitudes towards exercise. *Psychology of Sport and Exercise*, 4, 195–210. doi:10.1016/S1469-0292(02)00002-X
- Duda, J.L. (1989). Goal perspectives, participation and persistence in sport. *International Journal of Sport Psychology*, 20, 42–56.
- Duda, J.L., Fox, K.R., Biddle, S.J.H., & Armstrong, N. (1992). Children's achievement goals and beliefs about success in sport. *The British Journal of Educational Psychology*, 62, 313–323. doi:10.1111/j.2044-8279.1992.tb01025.x
- Duda, J.L., & Ntoumanis, N. (2003). Correlates of achievement goal orientations in physical education. *International Journal of Educational Research*, 39, 415–436. doi:10.1016/j.ijer.2004.06.007
- Dunn, J.C. (2000). Goal orientations, perceptions of the motivational climate, and perceived competence of children with movement difficulties. *Adapted Physical Activity Quarterly*, 17, 1–19. doi:10.1123/apaq.17.1.1
- Dweck, C.S. (1986). Motivational processes affecting learning. *The American Psychologist*, 41, 1040–1048. doi:10.1037/0003-066X.41.10.1040
- Dweck, C.S., & Leggett, E.L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, 95, 256–273. doi:10.1037/0033-295X.95.2.256
- Elliot, A.J. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist*, 34, 169–189. doi:10.1207/s15326985ep3403_3
- Elliot, A.J. (2005). A conceptual history of the achievement goal construct. In A.J. Elliot & C.S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 52–72). New York, NY: Guilford.
- Elliot, A.J., & Church, M.A. (1997). A hierarchical model of approach and avoidance achievement motivation. *Journal of Personality and Social Psychology*, 72, 218–232. doi:10.1037/0022-3514.72.1.218
- Elliot, A.J., & Harackiewicz, J.M. (1994). Goal setting, achievement orientation, and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology*, 66, 968–980. doi:10.1037/0022-3514.66.5.968
- Elliot, A.J., & McGregor, H.A. (2001). A 2x2 achievement goal framework. *Journal of Personality and Social Psychology*, 80, 501–519. doi:10.1037/0022-3514.80.3.501
- Elliot, A.J., Murayama, K., & Pekrun, R. (2011). A 3x2 achievement goal model. *Journal of Educational Psychology*, 103, 632–648. doi:10.1037/a0023952
- Elliot, A.J., & Thrash, T.M. (2001). Achievement goals and the hierarchical model of achievement motivation. *Educational Psychology Review*, 13, 139–156. doi:10.1023/A:1009057102306
- Elliott, E.S., & Dweck, C.S. (1988). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology*, 54, 5–12. doi:10.1037/0022-3514.54.1.5
- Epstein, J.L. (1988). Effective schools or effective students? Dealing with diversity. In R. Haskins & B. MacBae (Eds.), *Policies for America's public schools: Teacher, equity and indicators* (pp. 89–126). Norwood, NJ: Ablex.
- Epstein, J.L. (1989). Family structures and student motivation: A developmental perspective. In C. Ames & R. Ames (Eds.), *Research on motivation in education* (Vol. 3, pp. 259–295). New York, NY: Academic Press.
- Escarti, A., & Gutierrez, M. (2001). Influence of the motivational climate in physical education on the intention to practice physical activity or sport. *European Journal of Sport Science*, 1, 1–12. doi:10.1080/17461390100071406
- Gao, Z., Lochbaum, M., & Podlog, L. (2011). Self-efficacy as a mediator of children's achievement motivation and in-class physical activity. *Perceptual and Motor Skills*, 113, 969–981. doi:10.2466/06.11.25.PMS.113.6.969-981
- Garn, A., & Sun, H. (2009). Approach-avoidance motivational profiles in early adolescents to the PACER fitness test. *Journal of Teaching in Physical Education*, 28, 400–421. doi:10.1123/jtpe.28.4.400
- Goudas, M., Biddle, S., & Fox, K. (1994). Achievement goal orientations and intrinsic motivation in physical fitness testing with children. *Pediatric Exercise Science*, 6, 159–167. doi:10.1123/pes.6.2.159
- Guan, J., Xiang, P., McBride, R., & Bruene, A. (2006). Achievement goals, social goals, and students' reported persistence and effort in high school physical education. *Journal of Teaching in Physical Education*, 25, 58–74. doi:10.1123/jtpe.25.1.58
- Halvari, H., Skjesol, K., & Bagøien, T.E. (2011). Motivational climates, achievement goals, and physical education outcomes: A longitudinal test of achievement goal theory. *Scandinavian Journal of Educational Research*, 55, 79–104. doi:10.1080/00313831.2011.539855
- Li, W., & Lee, A. (2004). A review of conceptions of ability and related motivational constructs in achievement motivation. *Quest*, 56, 439–461. doi:10.1080/00336297.2004.10491836
- Lochbaum, M., & Gottardy, J. (2015). A meta-analytic review of the approach-avoidance achievement goals and performance relationships in the sport psychology literature. *Journal of Sport and Health Science*, 4, 164–173. doi:10.1016/j.jshs.2013.12.004
- Lower, L.M., Newman, T.J., & Pollard, W.S. (2016). Examination of the 3x2 achievement goal model in recreational sport: Associations with perceived benefits of sport participation. *International Journal of Sport Management, Recreation & Tourism*, 26, 44–53.
- Maehr, M.L. (1989). Thoughts about motivation. In C. Ames & R. Ames (Eds.), *Research on motivation in education* (Vol. 3, pp. 299–315). New York, NY: Academic.
- Mascaret, N., Elliot, A.J., & Cury, F. (2015). Extending the 3x2 achievement goal model to the sport domain: The 3x2 Achievement Goal Questionnaire for Sport. *Psychology of Sport and Exercise*, 17, 7–14. doi:10.1016/j.psychsport.2014.11.001
- Melnik, B.M., & Morrison-Beeday, D. (2012). *Intervention research: Designing, conducting, analyzing, and funding*. New York, NY: Springer.
- Moreno-Murcia, J.A., Sicilia, A., Cervelló, E., Huéscar, E., & Dumitru, D.C. (2011). The relationship between goal orientations, motivational climate and self-reported discipline in physical education. *Journal of Sports, Science, and Medicine*, 10, 119–129.

- Mosston, M., & Ashworth, S. (2002). *Teaching physical education* (5th ed.). San Francisco, CA: Benjamin Cummings.
- Nicholls, J.G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review*, 91, 328–346. doi:10.1037/0033-295X.91.3.328
- Nicholls, J.G. (1989). *The competitive ethos and democratic education*. Cambridge, MA: Harvard University Press.
- Ntoumanis, N., & Biddle, S.J.H. (1999). Affect and achievement goals in physical activity: A meta-analysis. *Scandinavian Journal of Medicine & Science in Sports*, 9, 315–332. doi:10.1111/j.1600-0838.1999.tb00253.x
- Ommundsen, Y. (2001a). Pupils' affective responses in physical education classes: The association of implicit theories of the nature of ability and achievement goals. *European Physical Education Review*, 7, 219–242. doi:10.1177/1356336X010073001
- Ommundsen, Y. (2001b). Self-handicapping strategies in physical education classes: The influence of implicit theories of the nature of ability and achievement goal orientations. *Psychology of Sport and Exercise*, 2, 139–156. doi:10.1016/S1469-0292(00)00019-4
- Ommundsen, Y. (2004). Self-handicapping related to task and performance-approach and avoidance goals in physical education. *Journal of Applied Sport Psychology*, 16, 183–197. doi:10.1080/10413200490437660
- Ommundsen, Y. (2006). Pupils' self-regulation in physical education: The role of motivational climates and differential achievement goals. *European Physical Education Review*, 12, 289–315. doi:10.1177/1356336X060069275
- Papaioannou, A.G., Tsigilis, N., Kosmidou, E., & Milosis, D. (2007). Measuring perceived motivational climate in physical education. *Journal of Teaching in Physical Education*, 26, 236–259. doi:10.1123/jtpe.26.3.236
- Pintrich, P.R. (2000). An achievement goal theory perspective on issues in motivation terminology, theory, and research. *Contemporary Educational Psychology*, 25, 92–104. doi:10.1006/ceps.1999.1017
- Sarrazin, P., Roberts, G., Cury, F., Biddle, S., & Famose, J-P. (2002). Exerted effort and performance in climbing among boys: The influence of achievement goals, perceived ability, and task difficulty. *Research Quarterly for Exercise and Sport*, 73, 425–436. doi:10.1080/02701367.2002.10609042
- America, S.H.A.P.E. (2014). *National standards & grade-level outcomes for K-12 physical education*. Champaign, IL: Human Kinetics.
- Shen, B., Chen, A., & Guan, J. (2007). Using achievement goals and interest to predict learning in physical education. *Journal of Experimental Education*, 75, 89–108. doi:10.3200/JEXE.75.2.89-108
- Solomon, M.A. (2006). Goal theory in physical education classes: Examining goal profiles to understand achievement motivation. *International Journal of Sport and Exercise Psychology*, 4, 325–346.
- Standage, M., Duda, J.L., & Ntoumanis, N. (2003). A model of contextual motivation in physical education: Using constructs from self-determination and achievement goal theories to predict physical activity intentions. *Journal of Educational Psychology*, 95, 97–110. doi:10.1037/0022-0663.95.1.97
- Standage, M., & Treasure, D.C. (2002). Relationship among achievement goal orientations and multidimensional situational motivation in physical education. *The British Journal of Educational Psychology*, 72, 87–103. doi:10.1348/000709902158784
- Standage, M., Treasure, D.C., Hooper, K., & Kuczka, K. (2007). Self-handicapping in school physical education: The influence of the motivational climate. *The British Journal of Educational Psychology*, 77, 81–99. doi:10.1348/000709906X103636
- Theodosiou, A., Mantis, K., & Papaioannou, A. (2008). Student self-reports of metacognitive activity in physical education classes. Age-group differences and the effect of goal orientations and perceived motivational climate. *Educational Research Review*, 3, 353–364.
- Treasure, D.C., & Roberts, G.C. (1994). Cognitive and affective concomitants of task and ego goal orientations during the middle school years. *Journal of Sport & Exercise Psychology*, 16, 15–28. doi:10.1123/jsep.16.1.15
- Treasure, D.C., & Roberts, G.C. (1995). Applications of achievement goal theory to physical education: Implications for enhancing motivation. *Quest*, 47, 475–489. doi:10.1080/00336297.1995.10484170
- Tzetzis, G., Goudas, M., Kourteissis, T., & Zisi, V. (2002). The relation of goal orientations to physical activity in physical education. *European Physical Education Review*, 8, 177–188. doi:10.1177/1356336X020082004
- Vandewalle, D. (1997). Development and validation of a work domain goal orientation instrument. *Educational and Psychological Measurement*, 57, 995–1015. doi:10.1177/0013164497057006009
- Vlachopoulos, S., Biddle, S., Symeon, V., & Stuart, B. (1996). Achievement goal orientations and intrinsic motivation in a track and field event in school physical education. *European Physical Education Review*, 2, 158–164. doi:10.1177/1356336X9600200207
- Walling, M.D., & Duda, J.L. (1995). Goals and their associations with beliefs about success in and perceptions of the purposes of physical education. *Journal of Teaching in Physical Education*, 14, 140–156. doi:10.1123/jtpe.14.2.140
- Wang, C.K., Lim, B.S.C., Aplin, N.G., Chia, Y.H.M., McNeill, M., & Tan, W.K.C. (2008). Students' attitudes and perceived purposes of physical education in Singapore: Perspectives from a 2x2 achievement goal framework. *European Physical Education Review*, 14, 51–70. doi:10.1177/1356336X07085709
- Wang, J.C.K., Chatzisarantis, N.L.D., & Spray, C.M. (2002). Achievement goal profiles in school physical education: Differences in self-determination, sport ability beliefs, and physical activity. *The British Journal of Educational Psychology*, 72, 433–445. doi:10.1348/000709902320634401
- Wang, J.C.K., & Liu, W.C. (2007). Promoting enjoyment in girls' physical education: The impact of goals, beliefs, and self-determination. *European Physical Education Review*, 13, 145–164. doi:10.1177/1356336X07076875

- Wang, J.C.K., Liu, W.C., Chatisarantis, N.L.D., & Lim, C.B.S. (2010). Influence of perceived motivational climate on achievement goals in physical education: A structural equation mixture modeling analysis. *Journal of Sport & Exercise Psychology*, 32, 324–338. doi:10.1123/jsep.32.3.324
- Warburton, V., & Spray, C. (2008). Motivation in physical education across the primary—secondary school transition. *European Physical Education Review*, 14, 157–178. doi:10.1177/1356336X08090704
- Warburton, V., & Spray, C. (2013). Antecedents of approach-avoidance achievement goal adoption: An analysis of two physical education activities. *European Physical Education Review*, 19, 215–231. doi:10.1177/1356336X13486055
- Warburton, V.E., & Spray, C.M. (2009). Antecedents of approach-avoidance achievement goal adoption in physical education: A longitudinal perspective. *Journal of Teaching in Physical Education*, 28, 214–232. doi:10.1123/jtpe.28.2.214
- Weigand, D., & Burton, S. (2002). Manipulating achievement motivation in physical education by manipulating the motivational climate. *European Journal of Sport Science*, 2, 1–14. doi:10.1080/17461390200072102
- Xiang, P., Bruene, A., & Chen, A. (2005). Interactive impact of intrinsic motivators and extrinsic rewards on behavior and motivation outcomes. *Journal of Teaching in Physical Education*, 24, 179–197. doi:10.1123/jtpe.24.2.179
- Xiang, P., Bruene, A., & McBride, R.E. (2004). Using achievement goal theory to assess an elementary physical education running program. *The Journal of School Health*, 74, 220–225. doi:10.1111/j.1746-1561.2004.tb07936.x
- Xiang, P., & Lee, A. (1998). The development of self-perceptions of ability and achievement goals and their relations in physical education. *Research Quarterly for Exercise and Sport*, 69, 231–241. doi:10.1080/02701367.1998.10607690
- Xiang, P., & Lee, A. (2002). Achievement goals, perceived motivational climate, and students' self-reported mastery behaviors. *Research Quarterly for Exercise and Sport*, 73, 58–65. doi:10.1080/02701367.2002.10608992
- Xiang, P., Lee, A., & Shen, J. (2001). Conceptions of ability and achievement goals in physical education: Comparisons of American and Chinese students. *Contemporary Educational Psychology*, 26, 348–365. doi:10.1006/ceps.2000.1061
- Xiang, P., Lee, A.M., & Solmon, M.A. (1997). Achievement goals and their correlates among American and Chinese students in physical education: A cross-cultural analysis. *Journal of Cross-Cultural Psychology*, 28, 645–660. doi:10.1177/0022022197286001
- Xiang, P., Liu, Y., McBride, R.E., & Bruene, A. (2011). Longitudinal goal patterns and their effects on students' motivation in running programs. *Journal of Experimental Education*, 79, 295–317. doi:10.1080/00220973.2010.486809
- Xiang, P., McBride, R.E., & Bruene, A. (2006). Fourth-grade students' motivational changes in an elementary physical education running program. *Research Quarterly for Exercise and Sport*, 77, 195–207. doi:10.1080/02701367.2006.10599354
- Xiang, P., McBride, R.E., Bruene, A., & Liu, Y. (2007). Achievement goal orientation patterns and fifth graders' motivation in physical education running programs. *Pediatric Exercise Science*, 19, 179–191. doi:10.1123/pes.19.2.179
- Xiang, P., McBride, R.E., & Solmon, M.A. (2003). Motivational climates in ten teachers' elementary physical education classes: An achievement goal theory approach. *The Elementary School Journal*, 104, 71–91. doi:10.1086/499743

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