Are K-12 learners motivated in physical education? A meta-analysis

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Abstract:

Previous studies devoted to K-12 learner motivation in physical education share a general assumption that students may lack motivation. This meta-analytic study examined published original studies (n = 79) to determine students' motivation level and the association between motivation and outcomes. Original means of motivation measures went converted and aggregated to determine motivation levels. Correlation effect sizes were calculated to determine the association between motivation and outcome measures. The analyses revealed that K-12 students are motivated regardless of the theoretical constructs used in the studies (M > 50). The correlation effect sizes (r = .20-30, p < .05) indicate a weak association between motivation and outcome. The findings suggest a need to involve meaningful learning and pedagogy variables in motivation research.

Keywords: effect size | learning outcome | motivation

Article:

In the past 25 years, a large number of research studies based on competing theories have been conducted on learner motivation in physical education. Despite the theoretical diversity, many studies seem to share a common assumption that learners in physical education are not motivated and that increasing student motivation is an urgent issue. That is, motivation researchers (e.g., Gao, Lee, & Harrison, 2008; Gao & Xiang, 2008) often attribute children/adolescent physical inactivity in physical education to lack of motivation. Evidence supporting this assumption, however, is insufficient In fact, with the exception of Goodlad's report (1984) that most K-12 students in the United States demonstrated strong enthusiasm (87% in elementary schools, 80% in middle and high schools) and high interest (86% elementary, 84% middle, 85% high schools) in physical education, little representative data offer a definitive answer to either support or challenge this assumption. With a large number of motivation studies completed, it is possible to examine the assumption with empirical evidence to further our understanding of learner motivation in physical education. In this meta-analytic study, we synthesized the findings

to determine the extent to which (a) K-12 physical education students are motivated and (b) their motivation is associated with achievement outcomes.

Addressing these questions is important in that the answers may provide evidence to guide the teaching/ learning processes. Although the questions have been the topic for conceptual reviews (e.g., Chen & Ennis, 2004), using a meta-analytic approach can provide an accurate assessment that conceptual reviews may be unable to provide (Rosenthal, 1991). A seminal study comparing meta-analysis with conceptual reviews (Cooper & Rosenthal, 1980) found that traditional conceptual reviews may generate inconsistent conclusions with a margin much larger (73%) than values from the meta-analytic procedures (32%, $p < .05$). To find better answers to the questions, it was necessary to use a meta-analytic procedure. In this study, we focused on overall learner motivation, rather than scrutinizing student motivation within each theory. In addition, we analyzed the link between student motivation and learning outcomes as demonstrated in the research. It is believed that such an analysis will provide evidence for a better understanding of learner motivation in physical education (Chen & Ennis, 2004, 2009).

We aimed to address these questions in physical education, a process that uses physical activity for students to acquire knowledge and skills for optimal development and well being (Wuest & Bucher, 2006). Unlike athletics, which assists the physically talented few to excel in sports, physical education affords all students opportunities to acquire knowledge and skills associated with human movement and healthful living. In addition, physical education differs from nonstructured physical activity opportunities (e.g., recess) in that it is achievement oriented. Recess, on the other hand, rarely provides a planned achievement setting, although it often centers on physical activities.

An Overview of Motivation Theories

Pintrich and Schunk (2002) conceptualized motivation as "the process whereby goal-directed activity is instigated and sustained" (p. 5), acknowledging that motivation involves giving behavior energy and direction. In this study, we focused on dominant theories that have guided numerous motivation research studies in physical education. Achievement goal theory (Dweck & Leggett, 1988; Nicholls, 1984) explores and explains potential reasons a learner may have for achievement. Expectancy-value theory (Eccles, 1983) proposes that learner motivation is based on competence-based expectations for success and recognizing values in specific learning tasks. Interest theory (Hidi, 1990) defines motivation as an entity based on personal preferences and/or situational cues that energize the learner-task interaction. Self-determination theory (Deci & Ryan, 1985) provides an explanation of the incremental development of motivation as regulated through external sources to meet the the learner's internal needs. Self-efficacy theory (Bandura, 1997) considers a learner's efficacious beliefs when the learner undertakes specific tasks.

Achievement Goal Theory. Achievement goals are conceptualized as achievement behaviors that guide the way a learner approaches, engages in, and responds to achievement tasks (Dweck & Leggett, 1988). Researchers (e.g., Nicholls, 1984) have framed learner goals into two basic orientations, namely ego/performance and task/mastery. Motivation based on the task/mastery goal orients the learner to adopt task-centered learning behavior, such as assessing success on self-referenced improvements and mastery. A learner with a task/mastery goal orientation

attributes failures to insufficient effort Motivation based on ego/ performance goal centers on a normative concept of success. Learners with an ego/ performance goal tend to be motivated when they perceive an opportunity to outperform others. They tend to attribute failure to lack of ability rather than effort. Researchers (e.g., Elliott & Harackiewicz, 1996) extended the theory beyond this dichotomous framework by further identifying an approach-avoidance structure within each goal orientation (the 2 x 2 framework). A mastery-avoidance goal, for example, motivates the learner to avoid being unable to improve, whereas a performance-avoidance goal motivates the learner to avoid displaying normative incompetence (e.g., avoid competing against more competent opponents).

In addition to studying goals as mental dispositions, researchers have been studying the effect of goal structured environment on goal orientations. Researchers in physical education have revealed that in contrast to a performance-involving climate, a mastery-involving climate promotes satisfaction gained from learning experiences (Treasure, 1997) and enhances perceived learning outcomes and performance (Mitchell, 1996; Papaioannou, 1998; Solmon, 1996; Xiang & Lee, 1998). It was also found that a learning environment created for a particular type of goal orientation can strengthen the corresponding goal orientation in the learner (Todorovich & Curtner-Smith, 2003).

Expectancy-Value Theory. The expectancy-value theory posits that achievement motivation relies on the learner's competence-based expectancy beliefs about success and the perceived value of the task (Eccles, 1983). Expectancy beliefs refer to the learner's judgment of how successfully he or she will perform in learning a task. Task value is the worth that a task may have for current and future life (Wigfield & Eccles, 2002). Research in the classroom and physical education support a four-component conceptualization of value consisting of attainment value, intrinsic value or interest, utility value, and cost (Eccles, 1983; Eccles & Wigfield, 1995). Attainment value refers to the personal importance attached to doing well in a class. Intrinsic or interest value is the extent to which a task attracts the learner and provides enjoyable task-learner interactive experiences. Utility value refers to the perceived usefulness of a task for current and future life. Cost is the negative consequence of engaging in a task, such as high effort demanded in its pursuit (Eccles & Wigfield, 1995). Expectancy beliefs and task values jointly contribute to achievement (Eccles & Wigfield, 1995; Wigfield et al., 1997). In physical education, the task values were found to predict students' persistence and effort in a running program, and expectancy beliefs were found to be positively correlated to students' running performance (Xiang, McBride, & Bruene, 2006). Perceived cost that impacts students' engagement and learning in physical education may include physical discomfort, boredom, and perceived incompetence (Chen & Uu, 2009; Xiang et al., 2006).

Interest Theory. Interest, as a motivator, is a psychological state characterized by a high attention level, intensive effort, and prolonged engagement in an activity accompanied by feelings of pleasure and a sense of achievement (Hidi, 2000). In research, interest is conceptualized as individual and situational interest (Hidi, 1990). Individual interest refers to an individual's psychological disposition that guides personal preferences for activities/action. Situational interest refers to the appealing effect of an activity or object that triggers attention and engagement from an individual at the moment of person-activity interaction.

In comparison to individual interest, situational interest is more educationally relevant because it can be created and controlled by educators. Hidi and Andersen (1992) argued that curricula that create situational interest have great potential to motivate students to learn. In physical education, Chen and colleagues revealed the multidimensional nature of situational interest (Chen, Darst, & Pangrazi, 1999) and found Uiat the cognitive demand of a physical activity determines the level of situational interest (Chen & Darst, 2001). Studies examining the relationship between interest and learning suggest that individual interest correlates with knowledge and skill gain, whereas situational interest correlates with student physical activity levels in physical education classes (Chen & Darst, 2002; Chen, Ennis, Martin, & Sun, 2006; Shen, Chen, &Tolley, 2003).

Self-Determination Theory. Self-determination theory is based on the notion that individuals need to be motivated both intrinsically and extrinsically (Deci & Ryan, 1985). Intrinsic motivation refers to people's drive to undertake an activity because it is interesting or enjoyable, while extrinsic motivation is the drive to engage in an activity in order to be rewarded. The theory further postulates that motivation is a process through which particular psychological needs for competence, autonomy, and relatedness are fulfilled (Deci & Ryan, 1985).

Extrinsic motivation consists of four self-regulation processes. In *external regulation*, motivation solely relies on the possibility to attain a reward (e.g., praises from the teacher, good grades) or avoid a punishment (e.g., blame from the teacher, body weight gain). In *introjected regulation*, motivation is characterized by a strong sense of self-worth or guilt (e.g., a feeling of pride, or a sense of not letting someone else down). In *identified regulation*, motivation is based on a sense of identity associated with the desired behavior (e.g., learners as junior scientists, physical education students as NBA players). In *integrated regulation*, motivation is based on the individual's holistic understanding of the behavior's significance to self, the self-worth of a task, and an identified sense of self with the activity (e.g., "It is important to me").

Self-Efficacy Theory. Self-efficacy refers to "judgments of the likelihood one can organize and execute given action courses required to deal with prospective situations" (Bandura, 1980, p. 263). Self-efficacy motivation is a function of efficacious information received by the individual. Efficacious information comes from several sources (Bandura, 1997). Individuals rely on previous performance when approaching a task, because it affects efficacy expectation and current performance. Vicarious experience (watching others perform a task) is another source that can enhance the observer's motivation for undertaking the same or a similar task. Verbal persuasion from significant others (e.g., a teacher) may bring encouragement to an individual to work toward success. Physiological state, as another efficacious information source, may also mediate an individual's efficacy expectations and the physical effort put into a task (Chase, 1998).

Conceptualization of Learning for the Study

Learning in physical education can be defined as a relatively permanent change in behavior resulting from experience of physical movement coupled with cognitive understanding of the movement (Rink, 2001). The goal of physical education is to foster "physically educated individuals who have the knowledge, skills, and confidence to enjoy a lifetime of healthful

physical activity" (National Association for Sport and Physical Education [NASPE], 2004, p. ll). The NASPE (2004) standards define six areas in which learning should take place and be assessed in order to determine achievement Chen and Ennis (2004, 2009) categorized the six areas of learning as competence-based and noncompetence-based in order to determine the relationships among the standards and learning outcomes. Competence-based outcomes refer to the learning processes and achievements that relate to the development of learners' physical and cognitive competencies (e.g., motor skill development, cognitive knowledge gain, and behavioral change). Noncompetence-based learning outcomes include but are not limited to the affects, attitudes, and/or dispositions for participation and behaviors.

Given the purpose of this study, we adopted a meta-analytic approach that enabled us to examine available empirical evidence across theoretical boundaries to answer the research questions. The approach allowed us to summarize data reported in published studies to arrive at a conclusion. We chose this approach because most of studies on learner motivation involve quantitative measures of motivation. We acknowledge a common limitation of the approach: that the evidence used in the analysis only represents those in the published, quantitative studies. Apparently, other types of evidence exist in unpublished work and in forms other than quantified measures such as qualitative studies. It is not our intention, therefore, to claim the findings from our analysis are completely conclusive. Nevertheless, we believe that this study is helpful in informing both researchers and practitioners for future research and motivation strategy development.

Method

First, we conducted a comprehensive literature search to identify and acquire published research articles on K-1 2 student motivation in physical education. Second, as required for a meta-analysis, we established a set of criteria for article selection. Third, we developed a coding system to code variables found in the articles that met the selection criteria. Fourth, we transformed and reduced various motivation measures for analysis. Lastly, we calculated descriptive statistics and effect sizes to determine motivation levels and the strength of motivation-outcome association. We carefully read all relevant articles to gain a full conceptual understanding of the original studies.

Article Search

Our literature search was based on the criteria that the study must (a) focus on achievement motivation relevant to physical education (not athletics, recess, or afterschool programs) and (b) have been published between January 1985 and December 2009 to reflect recent motivation research. Procedurally, we first searched indexed databases, including ERIC, PsycINFO, and PubMed using different combinations of the keywords "motivation" and "physical education." In addition, we located published review articles - for example, Bryan & Solmon (2007), Chen and Ennis (2004), Duda (1996), and Treasure and Robert (1995) - to cross-reference the articles in the bibliographies. In all, we acquired a total of 222 articles.

All identified articles were subjected to screening for inclusion based on four criteria. First, the study must have included motivation variables nested within one of the five motivation theories.

We included only five theories because they are the most articulated theories with mature constructs that have been used to measure student achievement motivation. Second, the study should have been conducted in elementary and/ or secondary schools where physical education was offered for all learners. Third, in order to maintain consistency with the purpose of this study, a study must have included physical education students as participants. We excluded studies using teachers, school athletes, and children in after-school program as participants. Fourth, given the nature of the research questions, the data collected should have been quantitative or suitable for quantitative transformation or coding in our analyses. Based on these criteria, 79 of the original 222 research articles were included.

Data Organization

Descriptive information (e.g., publication year, journal, school level, sample size, research design, study location, and type of motivation theories) was coded into a database. We entered the reported mean for each motivation measure in each study to represent learners' motivation levels. We did not enter standard deviation, as it represented the variability of a measure rather than the collective variability across the studies in which we were interested.

Table 1. Number of correlation coefficients in different outcomes

Variable	*n* of *r*	Variable	*n* of *r*
Noncompetence-based outcome		Competence-based outcome	
Pride	2	Knowledge	24
Hope	2	Skill	7
Value	8	Strategy	4
Positive emotions	2	Cooperative learning	14
Effort	13	Knowledge and skill composite	2
Cardiovascular capacity	9	Performance	13
Satisfaction	4	Improvement	14
Enjoyment	6	Fitness enhancement	3
Belongingness	35		
Physical activity engagement	32		
Physical activity intention	48		
Participation status	15		
Mental concentration	7		
Flow experience	8		
MVPA level	8		
Self-esteem	3		
Subtotal	202	Subtotal	81

Note. MVPA = moderate-to-vigorous physical activity; *n* of *r* = the number of correlation scores for the association between a motivation variable and each outcome variable.

Also entered into the database were the correlation coefficients that linked motivation and achievement outcome measures. A total of 283 correlation coefficients were reported in 29 of the 79 studies. We first distinguished competence-based outcomes from noncompetence-based outcomes (Chen & Ennis, 2004, 2009). Then we coded specific outcomes into either of the two categories. For example, fitness enhancement was coded as a competence outcome because it indicated growth in knowledge and skills that learners needed to develop personal fitness. In other words, it implies learning (Rink, 2001). In contrast, cardiovascular capacity, a component of health-related fitness, reflects an individual's state of physiological being. It is a result of

competence development (e.g., running longer distance), but it is not a competence-based outcome. Thus, cardiovascular capacity was coded as a non-competence-based outcome. The coding procedure resulted in 16 non-competence-based outcome variables (e.g., enjoyment, physical engagement, flow experience, self-esteem, and belongingness) and 8 competence-based outcome variables (e.g., knowledge gain, skill acquisition, and tactic mastery). See Table 1 for a summary.

Data Transformation. The included studies used various measurement scales. Although the 5-point Likert-type scale was most popular, others, such as 7- or 10-point scales, were often used as well. To assess the motivation level measured on different scales, the scores must be transformed to a uniform scale. For transformation, we converted raw scores from different scales into a 100-point scale. For example, in several studies the Self-Regulation Questionnaire (Ryan & Connell, 1989) was used with a 7-point scale, ranging from 1 = strongly disagree to 7 = strongly agree, to measure the dimensions of intrinsic motivation, integrated regulation, identified regulation, introjected regulation and external regulation. To transform the original means into percentage scores, we divided a mean score from a dimension by 7 and multiplied the result by 100%. The transformed score became a relative score on a scale of 100. Similarly, for a mean score from a 5-point scale, we divided it by 5 and multiplied by 100 to generate a relative score that corresponded to the same 100-point scale. Thus both transformed scores were on the same scale and became comparable to each other. The transformation procedures were administered to all the original means to produce transformed scores for statistical analyses.

The 100-point scale facilitates judgments about the relative strength of the motivation (e.g., 90 indicates a stronger motivation than 55). This approach has been widely adopted in traditional measurement theories for comparing students' grades (Baumgartner, Jackson, Mahar, & Rowe, 2007; Safrit & Wood, 1995). The approach has been acknowledged in educational research as a basic technique for creating comparable scaling for comparison (Gall, Borg, & Gall, 1996).

Data Summation. We computed a mean of the transformed scores to represent learners' overall motivation level. In addition, we computed means for the motivation theories that were used in the original studies. These computations were important because they allowed us to generate descriptive statistics (Hunter & Schmidt, 2004) for motivation levels within and across the theories. It should be noted that the purpose of the summation was not to compare the theories themselves or to compare adaptive or maladaptive behavior outcomes based on the theories. The purpose was to gauge the level of motivation displayed by K-12 students.

Data Analyses

Descriptive statistics including mean, frequency, median, and percentile were calculated to summarize the scope of the motivation studies. To answer the first question about learner motivation levels, we used the calculated means as a holistic indicator of learners' motivation in physical education. To answer the second research question, about the relation between motivation and achievement outcomes, we used the correlation coefficients (r) reported in the original studies to calculate the correlation effect size. The effect size provides "a statistical standardization of the study findings such that the resulting numerical values are interpretable

in a consistent fashion across all the variables and measures involved" (Lipsey & Wilson, 2001, p. 4).

Statistically, the correlation coefficient itself can be used as the statistic of effect size ($\bar{r}$, Hunter & Schmidt, 2004; Lipsey & Wilson, 2001; Rosenthal, 1991), as it refers to the standardized slope of the regression of one variable on the other. However, the discrepancies in sample size across these studies are so large (from 42 to 2,993) that the impact on comparisons of correlation effect size should be taken into account. Following the recommendations by Hunter and Schmidt (2004), we conducted adjustments using the following formula to adjust sampling error:

$$\bar{r} = \frac{\sum[N_i r_i]}{\sum N_i} \quad (1)$$

In Formula I, r_i s the correlation coefficient in the study i, and N_i is the sample size of the study i (Hunter & Schmidt, 2004). As Rosenthal (1991) reiterated forcefully, it is necessary to determine "the accuracy or reliability of the estimated effect size" by testing "the null hypothesis of no relationship between variables X and Y" (p. 14). Rosenthal provided 13 formulas to test 13 different types of effect size. We adopted the equation that Rosenthal recommended for the correlation effect size (Rosenthal, 1991, p. 15) to test the null hypothesis (H_0) that there is no relationship between observed motivation and outcome measures in these studies:

$$t = \frac{r}{\sqrt{1-r^2}} \times \sqrt{df} \quad (2),$$

where t refers to a t test, r is the correlation coefficient, and df is the degrees of freedom.

Results

Characteristics of the Studies and Motivation Levels

The 79 articles included in the analysis were published in journals of kinesiology (n = 29, 37%), educational psychology (n = 18, 23%), physical education (n= 14, 18%), psychology (w=9, 11%), education (n= 6, 7%), and other (n = 3, 4%). As seen in Figure 1, studies on achievement motivation increased exponentially since 2000. Most of the studies were conducted in Europe (n= 43, 54%) and the United States (n= 31, 39%). Fewer studies (n=7, 9%) were conducted in elementary schools than in secondary schools (n= 68, 86%). Four studies (5%) were conducted in both elementary and secondary schools. Sample sizes varied dramatically in these studies, ranging from 42 to 2,993 students, with 331 as the median. Most studies were descriptive in design (n= 65, 82%). The appendix shows descriptive information of the included studies.

There are 30 studies (38%) on the achievement goal theory, 21 (26%) on the self-determination theory, 7 (9%) on the interest motivation theory, 2 (3%) on the expectancy-value theory, and 2 (3%) on the self-efficacy theory. Integrated theoretical frameworks were used in17 studies (21%). Among them, the expectancy-value theory was studied with others in five studies, and the achievement goal theory was studied with others in 16, 11 of which were with the self-determination theory.

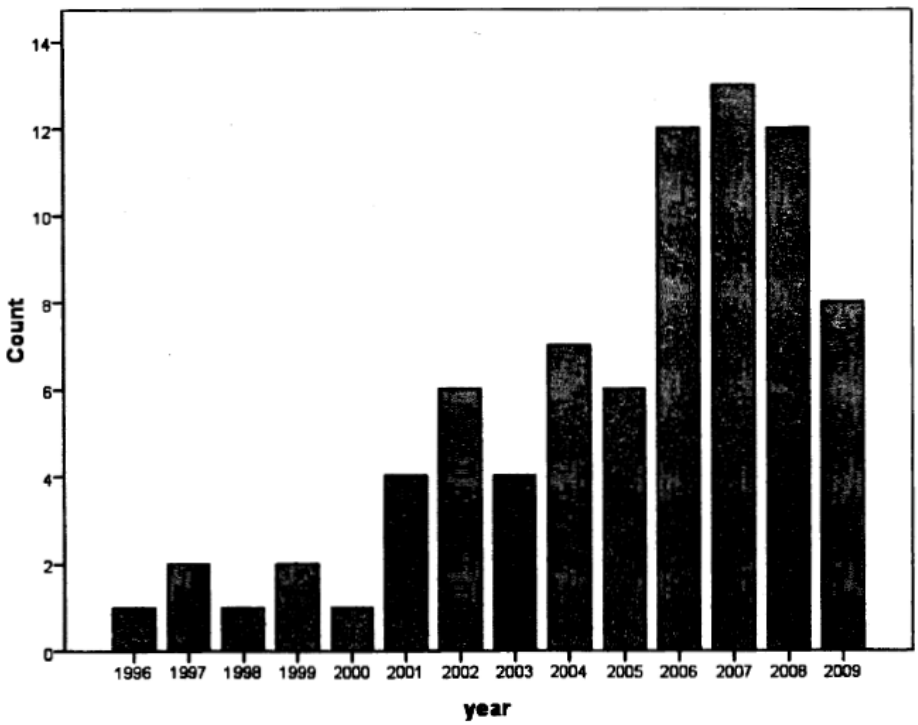

Figure 1. Motivation research publications in physical education by year; column height illustrates the number of publications by year (1996-2009) pertaining to motivation research in physical education.

The means, as shown in Table 2, ranged from 40.69 (self-efficacy level) to 80.19 (*SD*= 1.63, expectancy-belief). With the exception of the self-efficacy measure, the means for all motivation measures surpass the neutral point of 50 on the 100-point scale with a composite mean of 65.47. The mean for the task/ mastery orientation is 78.48 (*SD* = 6.52) and the mean for the performance-avoidance goal orientation is 58.19 (*SD* = 10.49). These means represent the construct- and theory-specific central tendency summarized from all studies using the same theoretical framework. All but one demonstrated motivation levels higher than the mid-point of 50 on the 100-point scale, indicating that K-1 2 learners in general are motivated regardless of the theoretical constructs.

A total of 161 means from motivation measures were aggregated at the school level. There were 17 means from elementary schools, 130 from secondary schools, and 14 from those using both elementary and secondary schools. The data from elementary schools rendered the highest mean (M= 73.30, *SD* = 11.17), followed by the mean from mixed school studies (M= 68.37, *SD* = 11.40) and then secondary schools (M= 64.55, SD = 12.17). These data suggest that, in general, regardless of motivation constructs used to measure motivation, elementary school students demonstrated higher motivation than their secondary school counterparts. We did not conduct inferential statistical analyses to determine the confidence interval of this claim due to the extremely unbalanced group sizes. However, this finding is consistent with data from longitudinal studies (e.g., Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002) showing a decline of motivation by school levels.

Table 2. Descriptive information of motivation variables

Variables	N	*M*	*SD*
Achievement goal theory			
Task/mastery orientation	36	78.48	6.52
Ego/performance orientation	36	57.06	6.07
Mastery avoidance orientation	3	60.34	1.59
Performance avoidance orientation	10	58.19	10.49
Mastery climate	23	74.36	7.98
Performance climate	23	53.48	12.83
Performance avoidance climate	1	53.40	
Subtotal	132	65.42	13.34
Self-determination theory			
Intrinsic motivation	22	71.35	7.84
Identified regulation	19	69.68	9.92
Introjected regulation	18	56.68	9.58
External regulation	20	52.28	7.79
Perceived competence	14	69.08	6.63
Perceived autonomy	14	58.49	7.59
Perceived relatedness	12	68.69	7.14
Self-determination index	3	65.81	6.24
Subtotal	122	63.78	10.82
Interest theory			
Individual interest	8	59.05	10.79
Situational interest	8	66.93	10.26
Subtotal	16	62.99	10.96
Self-efficacy theory			
Self-efficacy strength	2	71.08	14.03
Self-efficacy level	1	40.69	
Subtotal	3	60.95	20.16
Expectancy-value theory			
Expectancy-belief	4	80.19	1.63
Utility	7	76.41	6.78
Enjoyment	6	77.73	6.48
Attainment	6	75.89	5.67
Subtotal	23	77.28	5.67
Grand total/mean	296	65.49	12.28

Note. M = mean; *SD*= standard deviation.

Motivation and Outcome Relations

Of the 79 articles, 29 (37%) also examined the relationship between motivation and outcome measures. As listed in Table 1, the 29 studies generated a total of 283 correlation coefficients linking various motivation measures to both competence-based (n = 81, 29%) and/or noncompetence-based outcomes (n =202, 71%). The number of correlation coefficients reported in each article ranges from 2 to 35 with a median of 21. As shown in Table 3, the correlation effect sizes are r = .30 and r = .20 for non-competence-based and competence-based outcomes, respectively. The total effect size is r = .27. The computed *rs* indicate a low magnitude in correlation effect size between motivation and outcome measures, suggesting a weak link between the two variables as observed in the studies. The t tests resulted in t values of 4.67 (df = 20l, p <.0), 1.88 (df = 80, p < .05), and 4.71 (df = 282, p < .01) for *rs* between motivation and non-competence, competence, and total outcome measures, respectively. The

results indicate that the H_0 should be rejected and the low correlation effect size is statistically accurate and reliable (Rosenthal, 1991).

Table 3. Correlation effect size

	Non. (*n/r*)	Comp. (*n/r*)	Total (*n/r*)
Self-determination theory	103/.32	40/.19	143/.28
Achievement goal theory	60/.25	21/.15	81/.23
Interest	8/.02	16/.25	24/.18
Expectancy-belief theory	28/.39	4/.30	32/.37
Self-efficacy	3/.28	0/n/a	3/.28
Grand effect size	202/.30	81/.20	283/.27

Note. Non. = noncompetence; Comp. = competence; *n* = the number of correlation scores for each motivation theory; *r* = the correlation effect size for the correlation scores within each motivation theory.

Discussion

The purpose of our meta-analytical study was to determine the extent to which (a) K-12 physical education students were motivated and (b) the motivation was associated with learning outcomes. Based on the selection criteria implemented, we identified 79 published studies. Although we extended our search to 1985, all included articles were published after 1996, and most were published after 2000. We only selected studies published in English language journals. However, most studies had been conducted in European countries as well as the United States. This limits the possibility of generalizing the findings to other areas of the world. The reader is forewarned not to generalize the results to non-English-speaking contexts.

On a Tilted Scale: Global Versus Domain/Task Specificity

Our analyses indicate that all five major theoretical perspectives were represented in the empirical research on learner motivation in physical education. However, representation of theoretical frameworks differed drastically across studies. Studies guided by the achievement goal and self-determination theories out-numbered those using the expectancy-value and interest theories. We do not treat this difference as an indication of importance. The theoretical perspectives are equally important in terms of helping us better understand students' motivation in physical education. The difference does, we believe, reflect the level of research focus on the motivation specificity in terms of domain and task.

Pintrich and Schunk (2002) summarized that the achievement goal orientation theory and the self-determination theory are viable in explaining motivation behaviors at a global level. The goal orientation theory, for example, is broad enough to represent a pattern of beliefs about achievement or reasons to pursue overall achievement in schooling (Urdan, 1997). Mastery and performance goals (and their variations), as a superordinate motivation system, provide individuals with a "broader interpretative frame" (Maehr, 2001, p. 183) that unifies explanations of achievement-related cognition, affect, and behavior across content domains and tasks. In other words, a learner with an ego/performance goal orientation will adopt the normative approach to define success in all content areas. Similarly, self-determination theory is global and perceived as a universal construct across motivation levels (Vallerand, 1997). Other constructs - including

self-efficacy, interests, and expectancy-values - are thought to operate at a domain- and/or task-specific level (Schiefele, 2009; Schunk & Pajares, 2001; Wigfield, Tonks, & Klauda, 2009). Domain/ task-specific motivation constructs are viewed as having a more immediate and direct impact on learning achievement and achievement behavior, as observed by Wigfield et al. (2009) and Schiefele (2009) in cases of expectancy-value and interest theories, respectively.

Although the global and domain-specific distinction is relevant to research, it can become blurred due to the transferability of the constructs between the levels in each study (Bandura, Caprara, Barbaranelli, Gerbino, & Pastorelli, 2003). A consensus of psychologists (see a collection edited by Wigfield & Eccles, 2002) holds that global-level motivators may affect the function of the domain- and/or task-level motivators. What is unclear is the specific functional relation between them. We found in the collection of studies that motivation research in physical education has begun an attempt to integrate different theories (e.g., Barkoukis, Ntoumanis, & Nikitaras, 2007; Papaioannou, Milosis, Kosmidou, & Tsigilis, 2007; Shen et al., 2007; Standage, Duda, & Ntoumanis, 2003). However, none of the studies were guided by a conceptualization that could determine the immediate and direct function of these motivation variables. Apparently, future research with this conceptualization is needed to help us further measure the meaningful impact of motivation on learning in physical education.

Motivation as a Function of Theory and Development

A significant finding from the study is that K-1 2 physical education students are motivated. The grand mean of motivation is 65.49 on the 100-point scale. All but one mean was above the 50-point mark on the standardized 100-point scale. This finding is consistent with Goodlad's observation (1984) that physical education is an attractive school subject for K-12 students.

Motivation level varies by theoretical construct. For example, motivation levels based on the expectancy-value theory are higher than those of the achievement goal, self-determination, and interest theories. If the means in Table 2 can be considered indicative of the motivation magnitude in the constructs, we can speculate that expectancy beliefs and perceived task values are stronger motivators than the others. In addition to the discrepancy at the theoretical level, the means are likely to vary in terms of specific subdimensions or components within a theoretical construct. For example, the task/mastery orientation, mastery climate, and identified regulation are stronger motivators than the ego/performance orientation, performance climate, and external regulation, respectively.

The findings provide valuable information that physical educators can use to maximize learner motivation. This may be illustrated by computing Cohen 's (1992) d, $(M_1 - M_2)/SD_{pooled}$, using the means and standard deviations within a theory and using das a conceptual indicator about the importance of a component For example, situational interest's higher mean over individual interest's mean produced a d of .73; the mean of the expectancy-belief over the attainment intrinsic interest and utility values' means resulted in (d values of .76, .38, and .56, respectively. These results suggest that situational interest and expectancy beliefs may be focused on as primary motivators in physical education. Providing situationally interesting tasks leads to an immediate motivation impact stronger than attempting to incorporate individual interest in the

current learning task; and nurturing a belief in success will strengthen learner motivation better than lecturing about the value of the task.

The research literature seems to support an affirmative association between motivation decline and children's developmental process, suggesting that learner motivation decreases when children become older and move from elementary to secondary schools. This conclusion has been supported by individual studies in physical education, and it is often adopted as a consensus. Researchers have been led to the belief that physical activity decrease in secondary school students is due to the developmentally induced decrease in motivation. In our analysis, although the data did show that the mean for secondary school students ($M = 64.55$, $SD = 12.17$) is lower than that for elementary school students ($M = 73.30$, $SD = 11.17$), it is still above the midpoint score of 50 on the standardized 100-point scale by a large margin. Because disproportionally more studies were conducted in secondary schools than those in elementary schools, we were unable to conduct inferential statistical analysis to determine statistical significance in the discrepancy between the means. Considering all the evidence, we believe that claiming motivation declines in physical education as children advance from elementary to middle and high schools may be premature. Longitudinal studies are needed to help clarify the issue of motivation change as associated with development.

Motivation and Outcomes

The importance of motivation is its function in facilitating and enhancing learning achievement Despite conceptual differences among the behavioral, cognitive, and constructivist learning theories, learning achievement by definition signifies acquired changes learners make over time in skill, knowledge, behavior, affect, belief, attitude, and other traits. One important way to document learning achievement in schooling is by using controlled experiments (American Educational Research Association, 2007; U.S. Department of Education, 2003). Rarely, however, did the studies we reviewed use the experimental or quasiexperimental comparative (control) design. Therefore, the outcome measures can hardly represent learning achievement Many can only be conceptualized as students' approximate aptitudes at the time of measurement. With this understanding, we do not claim that the correlation coefficients indicate a relation between motivation and learning achievement, nor do we claim a cause-effect relation in our interpretation. Rather we regard the relation as one linking motivation to a performance outcome learners are expected to accomplish in physical education.

Our analysis of reported correlation coefficients shows that most outcomes measured in these studies are not competence based (see Tables 1 and 3). The correlation effect sizes, confirmed by the *t* test results, are low (ranging from .02 to .39). The low effect size for the relation between motivation and competence-based outcome ($r < .20$) poses a great concern for motivation research. It suggests that motivation in physical education contributes little to the outcomes we expect students to accomplish. Arguably, the low effect sizes suggest that motivation research in physical education may not have helped to clarify the learning achievement issue to the extent it should have. As Chen and Ennis (2009) suggested, it is difficult for motivation researchers to understand learner motivation in physical education without knowing its contribution to learning.

A strong focus on learning achievement is needed in future motivation research. We believe this is an area that researchers need to strengthen in the immediate future. In so doing, researchers need to take into account the following two factors in research design. The first is that studies need to be conducted in achievement settings where the direction component of the motivation can be ascertained. Second, we now know that most students are motivated in physical education, but it is well documented that some students are not, especially in difficult school environments (Ennis, Cothran, & Davidson, 1997). Motivation studies need to focus on "academically unmotivated" learners and their needs (Hidi & Harachiewicz, 2000) in order to help them become motivated to learn.

Implication and Conclusion

It is certain that a single motivation theory may hardly be able to inform us about learner motivation needs and the relation to learning outcomes in physical education (Chen & Ennis, 2004; Shen, Chen, & Guan, 2007). The results from this meta-analytic study reiterate the importance of using a comprehensive, multidimensional theoretical approach to the examination of motivation and learning achievement in physical education (Chen & Ennis, 2004; Hidi & Harachiewicz, 2000; Pintrich, 2003). In addition, the fluctuation of motivation levels across the different motivation theories appears to suggest that motivation function from different sources (e.g., perceived competence-based, situation based) may be subject to individual dispositions, situational or contextual influences, and/or interaction of both. Becoming aware of motivation sources allows researchers and practitioners to determine the best motivation approach for students in a particular learning environment to enhance learning.

The results from this study suggest that some theoretical perspectives have received more research attention than others. More research was conducted using achievement goal and self-determination theories than others. However, as shown in Table 3, studies from these two perspectives were less likely than others to focus on the relation between motivation and learning achievement. We hope that future research on learner achievement motivation will place a strong emphasis on exploring the impact on learning in physical education.

Because only a small number of the studies included outcome measures, it seems to suggest that motivation was studied primarily as a psychological issue rather than as a learning or curriculum issue. It is evident that most studies examined learner motivation as a mental disposition isolated from the learning context. Although *perceived* climate or environment (student self-reported experiences) was reported in some studies, *actual* pedagogical variables (systematically documented instructional events) were seldom measured. The absence of the actual pedagogical data in motivation studies will not allow a meaningful comparison between the perceived and actual learning contexts. Consequently, the attempt to identify pedagogical factors critical to enhancing motivation and achievement may become speculative due to the lack of empirical evidence.

The meta-analytic study revealed that K-12 physical education learners are generally motivated, but the reported link between motivation and learning outcomes is weak. This finding challenges researchers to move motivation research beyond studying the motivation variables in isolation by including meaningful curriculum and instruction variables. The findings also encourage physical

educators to move beyond developing stand-alone motivation strategies by integrating the strategies in the curriculum and learning tasks to enhance learning achievement.

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Appendix: Characteristics of the included articles and reference of cited articles

Author(s) & Year	Journal	Vol.	Pages	*N*	Theory	School
*Barkoukis, Ntoumanis, & Nikitaras (2007)	*British Journal of Educational Psychology*	77	683–702	679	AGT & SDT	S
Boiche et al. (2008)	*Journal of Educational Psychology*	100	688–701	210	SDT	S
Bortoli et al. (2008)	*Perceptual and Motor Skills*	106	207–214	1681	AGT	S
Camacho et al. (2008)	*Perceptual and Motor Skills*	106	473–494	983	AGT	S
Carr (2006)	*Journal of Sports Sciences*	24	281–297	193	AGT & SDT	S
Cervelló et al. (2004)	*Perceptual and Motor Skills*	99	271–293	100	AGT	S
Cervelló et al. (2006)	*Perceptual and Motor Skills*	102	87–92	1103	AGT	S
*Chen & Darst (2001)	*Research Quarterly for Exercise and Sport*	72	150–164	242	IBMT	S
*Chen & Darst (2002)	*Contemporary Educational Psychology*	27	250–269	191	IBMT	S
Chen, Darst, & Pangrazi (2001)	*British Journal of Educational Psychology*	71	383–400	472	IBMT	S
Chen & Shen (2004)	*Learning and Individual Differences*	14	169–182	98	AGT	S
Cox, Smith, & Williams (2008)	*Journal of Adolescent Health*	43	506–513	344	SDT	S
Cury et al. (2002)	*Perceptual and Motor Skills*	95	233–244	682	AGT	S
Digelidis et al. (2003)	*Psychology of Sport and Exercise*	4	195–210	782	AGT	S
Flores, Salguero, & Marquez (2008)	*Teaching and Teacher Education: An International Journal of Research and Studies*	24	1441–1449	2993	AGT	S
Gao (2009)	*Journal of Applied Sport Psychology*	21	S102–S115	2993	EBTV	S
Gao, Lodewyk, & Zhang (2008)	*Journal of Teaching in Physical Education*	28	3–20	252	EBTV & SET	S
Guan et al. (2006)	*Journal of Teaching in Physical Education*	25	58–74	544	AGT	S
Hagger, Chatzisarantis, & Culverhouse (2003)	*Journal of Educational Psychology*	95	785–795	295	SDT	S
Harrison et al. (1999)	*Journal of Teaching in Physical Education*	19	34–57	182	SET	S
Hein & Hagger (2007)	*Journal of Sports Sciences*	25	149–159	634	AGT & SDT	S
Jaakkola & Liukkonen (2006)	*International Journal of Sport and Exercise Psychology*	4	302–324	461	AGT & SDT	S
Lim & Wang (2009)	*Psychology of Sport and Exercise*	10	52–60	701	SDT	S
Morgan et al. (2005)	*Physical Education & Sport Pedagogy*	10	83–105	388	AGT	S
Morgan et al. (2006)	*International Journal of Sport Psychology*	37	299–316	253	AGT	S
Mouratidis et al. (2008)	*Journal of Sport & Exercise Psychology*	30	240–268	228	SDT	S
Mouratidis et al. (2009)	*Psychology of Sport and Exercise*	10	336–343	319	AGT	E
Ntoumanis (2001)	*British Journal of Educational Psychology*	71	225–242	428	SDT	S
Ntoumanis (2005)	*Journal of Educational Psychology*	97	444–453	460	SDT	S
Ntoumanis (2009)	*Journal of Educational Psychology*	101	717–728	394	SDT	S
Ntoumanis (2004)	*Journal of Sport & Exercise Psychology*	26	197–214	390	SDT	S
Ommundsen (2001)	*Psychology of Sport and Exercise*	2	139–156	118	AGT	S
Ommundsen (2001)	*Learning Environments Research*	4	139–158	343	AGT	S
Ommunclsen & Kvalo (2007)	*Scandinavian Journal of Educational Research*	51	385–413	194	AGT & SDT	S
Papaioannou (1997)	*Perceptual and Motor Skills*	85	419–430	1393	AGT, EBTV, IBMT	S
Papaioannou (1998)	*Journal of Teaching in Physical Education*	17	421–441	674	SDT	Mixed
*Papaioannou et al. (2007)	*Journal of Applied Sport Psychology*	19	38–66	580	AGT & SDT	S
Papaioannou & Siskos (2008)	*Psychological Reports*	103	745–763	572	AGT	S
Prusak et al. (2004)	*Journal of Teaching in Physical Education*	23	19–29	42	SDT	S
Shapiro & Ulrich (2002)	*Adapted Physical Activity Quarterly*	19	318–333	60	EBTV	E
Shen & Chen (2006)	*Journal of Teaching in Physical Education*	25	182–199	80	IBMT	S
Shen & Chen (2007)	*Journal of Teaching in Physical Education*	26	145–160	177	IBMT	S

Author(s) & Year	Journal	Vol.	Pages	*N*	Theory	School
*Shen, Chen, & Guan (2007)	*The Journal of Experimental Education*	75	89–108	177	AGT & IBMT	S
*Shen et al. (2003)	*Journal of Teaching in Physical Education*	22	396–409	57	IBMT	S
Shen, McCaughtry, & Martin (2008)	*Research Quarterly for Exercise and Sport*	79	333–343	273	AGT, EBTV, SDT	S
Shen, McCaughtry, & Martin (2008)	*Contemporary Educational Psychology*	33	841–858	837	SDT	S
Shen, McCaughtry, Martin, & Dillion (2006)	*Research Quarterly for Exercise and Sport*	77	498–506	240	IBMT	S
Shen, McCaughtry, Martin, & Fahlman (2009)	*Research Quarterly for Exercise and Sport*	80	44–53	331	SDT	S
Sit & Lindner (2007)	*International Journal of Sport Psychology*	38	283–303	1214	AGT	S
*Solmon (1996)	*Journal of Educational Psychology*	88	731–738	109	AGT	S
Solmon (2006)	*International Journal of Sport and Exercise Psychology*	4	325–346	278	AGT	S
Spray (2000)	*Perceptual and Motor Skills*	90	1207–1215	239	AGT	S
Sproule et al. (2007)	*Personality and Individual Differences*	43	1037–1049	802	AGT	S
*Standage, Duda, & Ntoumanis (2003)	*Journal of Educational Psychology*	95	97–110	328	AGT & SDT	S
Standage, Duda, & Ntoumanis (2005)	*British Journal of Educational Psychology*	75	411–433	950	SDT	S
Standage, Duda, & Ntoumanis (2006)	*Research Quarterly for Exercise and Sport*	77	100–110	394	SDT	S
Standage & Gillison (2007)	*Psychology of Sport and Exercise*	8	704–721	371	SDT	S
Standage & Treasure (2002)	*British Journal of Educational Psychology*	72	87–103	318	AGT & SDT	S
Standage et al. (2007)	*British Journal of Educational Psychology*	77	81–99	123	AGT	S
Taylor & Ntoumanis (2007)	*Journal of Educational Psychology*	99	747–760	787	SDT	S
Tessier, Sarrazin, & Ntoumanis (2008)	*European Journal of Psychology of Education*	23	239–253	96	SDT	S
Theodosiou & Papaioannou (2006)	*Psychology of Sport and Exercise*	7	361–379	338	AGT	S
*Treasure (1997)	*Journal of Sport & Exercise Psychology*	19	278–290	233	AGT	E
Trouilloud et al. (2006)	*Journal of Educational Psychology*	98	75–86	421	SDT	S
Ulrich-French & Fox (2009)	*Journal of Sport & Exercise Psychology*	31	358–379	386	SDT	S
Viciana et al. (2007)	*Perceptual and Motor Skills*	105	67–82	95	AGT	S
Vincent-Morin, & Lafont (2005)	*Journal of Teaching in Physical Education*	24	226–242	64	SET	S
Wallhead, & Ntoumanis (2004)	*Journal of Teaching in Physical Education*	23	4–18	51	AGT	S
Wang, Biddle, & Elliot (2007)	*Psychology of Sport and Exercise*	8	147–168	647	AGT & SDT	S
Wang et al. (2002)	*British Journal of Educational Psychology*	72	433–445	824	AGT & SDT	S
Warburton & Spray (2009)	*Journal of Teaching in Physical Education*	28	214–232	511	AGT	E
Ward et al. (2008)	*Journal of Teaching in Physical Education*	27	385–398	118	SDT	S
Wright, Li, & Ding (2007)	*Perceptual and Motor Skills*	105	386–390	782	AGT	S
Xiang, Bruene, & McBride (2004)	*Journal of School Health*	74	220–225	116	AGT	E
Xiang. Chen, & Bruene (2005)	*Journal of Teaching in Physical Education*	24	179–197	168	AGT & EBTV	E
Xiang & Lee (2002)	*Research Quarterly for Exercise and Sport*	73	58–65	308	AGT	Mixed
Xiang, Lee, & Shen (2001)	*Contemporary Educational Psychology*	26	348–365	87	AGT	Mixed
*Xiang, McBride, & Bruene (2004)	*The Elementary School Journal*	104	253–266	119	AGT & EBTV	E
Zahariadis, Tsorbatzoudis, & Grouios (2005)	*Perceptual and Motor Skills*	101	43–54	452	SDT	E

Note. AGT = achievement goal theory; SOT = self-determination theory; IBMT = interest-based motivation theory; EBTV = expectancy-value theory; SET = self-efficacy theory; E = elementary school; S = secondary school; Mixed = both elementary and secondary schools.

* Articles also cited in the text.