

Using Achievement Goals and Interest to Predict Learning in Physical Education

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Abstract:

On the basis of an integrated theoretical approach to achievement motivation, the authors designed this study to investigate the potential influence of mastery goal, performance-approach and avoidance-approach goals, individual interest, and situational interest on students' learning in a physical education softball unit. The authors collected and analyzed data from 6th graders ($N = 177$), using correlation and multiple regression analyses. The results revealed that the mastery goal was a significant predictor for the recognition of situational interest, although individual interest directly contributed to acquisition of knowledge and skill. The findings suggest a need for researchers to adopt an integrated theoretical framework to explore the complicated connection between achievement motivation and learning in physical education.

Key words: knowledge and skill acquisition, motivation, physical activity level

Article:

Physical education is a subject matter domain in which students are expected to learn knowledge and skills in sports and physical activities (Allison, Pissanos, Turner, & Law, 2000). Given that physical education is education about movement, education through movement, and education in movement (Arnold, 1979), learning in physical education individuals often accomplish by mastering a physical movement through physical training. This movement-based learning is an important goal in K-12 physical education (National Association for Sport and Physical Education [NASPE], 2004). During this specific learning process, motivation serves as a primary force that leads students to achieve the learning goal (Solmon, 2003).

Researchers of motivation in physical education have generated many informative findings. A number of theoretical frameworks have guided researchers in developing motivational constructs. Of the many useful motivational constructs, achievement goals and interest have been identified as important motivators contained in the teaching and learning of physical education (Chen & Ennis, 2004). The impact of achievement goals and interest on learning has been recognized.

Achievement Goals

Since the pioneer work by Duda and Nicholls (1992) comparing student mastery- and performance-goal orientations in sports and academics, researchers have adopted the achievement-goal theory as a major theoretical framework for studying motivation in physical education. Similar to the definition widely adopted in education research, goals in physical education are conceptualized as underlying purposes that students may adapt to guide her learning behavior (Chen, 2001). To date, researchers have physical education primarily used Duda's (2001) dual-goal orientation construct (mastery and performance) to describe the two distinctive achievement goals. Students with a high mastery-goal orientation are often found to be concerned with completing tasks and developing competence in the content domain they are studying, whereas students with a performance-goal orientation usually are concerned with demonstrating competence in comparison with their peers.

In general, researchers (Treasure & Roberts, 1994; Walling & Duda, 1995; Xiang, Lee, & Shen, 2001) have shown that physical education students with a high mastery-goal orientation are likely to perceive success and failure in learning as associated with effort to select more challenging learning tasks, and to enjoy the learning experiences. Students with a high performance-goal orientation, conversely, tend to avoid difficult learning tasks and to attribute success or failure to genetic ability. They are more likely to become motivated when they believe their performance is superior rather than inferior to their peers'.

Mastery and performance goals are not mutually exclusive. In fact, it is possible for students to have high levels of both mastery and performance goals or low levels of each. On the basis of this assumed continuum, Standage and Treasure (2002) developed four goal-orientation profiles (a) high mastery and high performance, (b) high mastery and low performance, (c) low mastery and high performance, and (d) low mastery and low performance. They further compared students' situational motivation and regulation strategies adopted in physical education. Standage and Treasure found that students with high mastery goals demonstrated higher motivation than did those students with low mastery goals, irrespective of their level of performance goals. Students with low mastery goals reported a high tendency to rely on external regulation strategies in learning. The authors found that mastery goals may be the decisive factor for increased motivation regardless of the role of performance goals.

In addition, researchers have reported grade-related changes in achievement goals in physical education settings. Xiang and Lee (2002) for example, found that students in the upper grade levels tended to be inclined more toward a performance-goal orientation than did students in the lower grade levels. They suggested that physical educators need to consider their students' age when attempting to motivate them to learn. However, Xiang and Lee found no gender differences in goal orientations in physical education settings. Treasure and Roberts (1994), who investigated students' disposition toward mastery- and performance-achievement goal orientations in a British adolescent population, also found no significant gender difference associated with the dispositional goal orientation.

Although most of the studies in physical education have reported that the mastery-goal orientation is predictive of intrinsic motivation, the motivational effects of the dual-goal construct on learning remain to be seen. Some researchers (e.g., Berlant & Weiss, 1997; Chen & Shen, 2004; Solmon & Boone, 1993) have found that achievement goals may have very limited direct impact on learning in physical education. For example, in the Berlant and Weiss study, the association of achievement-goal orientations with students' visual recognition and recall of correct tennis forehand groundstroke skill was weak. Students learning badminton (Solmon & Boone), multigame units (Chen & Shen), and fitness (Xiang, McBride, & Bruene, 2006) have produced consistent results.

There has been significant development in achievement-goal theory in recent years. Researchers have identified performance-approach and performance-avoidance goals as branches of performance goals (Elliot & Church, 1997). Individuals with performance-approach goals focus on seeking favorable judgments of competence relative to others. Individuals with performance-avoidance goals focus on avoiding unfavorable judgments of competence. Researchers (e.g., Midgley, Kaplan, & Middleton, 2001) believe that a better understanding of achievement goals with performance-approach, performance-avoidance, and mastery-goal structure can help further explore the motivational function of achievement goals on learning. On the basis of emerging evidence in classroom research, using the trichotomous framework, researchers have demonstrated that this framework may better explain students' motivation and learning than does the dual-goal (mastery and performance) construct (Church, Elliot, & Gable, 2001; Elliot, 1999).

With this development, Xiang et al. (2001) called for more research to examine the tenability of the trichotomous framework in physical education. The content of physical education is characterized by the competitive nature of sports and physical activities. In this setting, students learn through physical training that is often experienced in front of their peers. Although most students enjoy physical activity and sport experiences, they are likely, in this performance-centered environment, to fear the embarrassment that may

derive from doing a task wrong or letting their team down (Hastie & Pickwell, 1996). This context, we believe, creates an opportunity for researchers to examine the trichotomous framework in relation to students' learning in physical education (Chen & Ennis, 2004; Xiang et al., 2001).

Interest

In the interest-based motivation theory, researchers suggest that interest individuals interact with the environment (Hidi, 2000). Interest motivates the learner through increasing attention, cognitive functioning, persistence, and affective involvement. As a motivation construct, interest has been conceptualized as individual interest and situational interest. Individual interest is an individual's relatively enduring predisposition of preference for certain objects, events, and activities (Renninger, 2000). Situational interest is the momentary appealing effect of an activity on an individual in a particular context and at a particular moment (Hidi).

Interest researchers (Krapp, 1999) have found that individual interest is developed over time during a person's constant and consistent interaction with certain activities. Interest is based on increased knowledge, positive emotions, and increased value in these activities. Situational interest, however, is generated by certain stimulus characteristics in an activity (e.g., novelty) and tends to be shared among individuals (Hidi & Anderson, 1992). Its motivation effect is generally short lived (Hidi, 2000). In learning, situational interest results from learners' recognition of appealing features associated with a specific learning task (Mitchell 1993).

Adopting the theoretical framework of interest (Hidi, 2000), Chen (1996) revealed that students' situational interest is dependent on a diverse personal interpretation or meanings in the activities and learning tasks. After further testing the construct, Chen, Durst, and Pangrazi (1999) reported that those physical activities that provide new information, demand high-level attention, encourage exploration, or generate instant enjoyment can generate high situational interest in middle school students. Researchers have demonstrated with more recent data that situational interest is directly associated with physical activity intensity, measured in steps taken in the lessons, whereas individual interest is associated with students' knowledge and skill performance (Shen, Chen, Scrabis, & Tolley, 2003). The researchers suggested, on the basis of those findings, that situational interest may have strong motivation effects on students' engagement in the learning process, but one must to develop the students' individual interest to enhance learning.

Achievement motivation is a complex process involving many factors such as interest and goals that influence behavioral responses (Pintrich, 2003). Although interest research in physical education has provided limited data showing the connection between individual and situational interest and various learning outcomes, the strength of the connection is not as strong as theoretically predicted (Chen & Ennis, 2004; Chen & Shen, 2004; Shen et al., 2003). It stands to reason that a single motivation construct may hardly provide a plausible explanation for students' motivation and learning in an achievement setting as complex as school. We believe that studying motivation processes by tapping into two or more motivation constructs may potentially help us to better understand motivated learning behavior, especially the behavior of K-12 learners (Pintrich).

Research Questions

Adopting the integrated perspective (Pintrich, 2003), we examined the influence of trichotomous achievement goals (mastery, performance approach, and performance avoidance) and interests (individual and situational) on learning in physical education. In addition, because learning in physical education should take place in a physically active manner for students to receive health benefits while learning knowledge and skills (Center for Disease Control and Prevention [CDC], 1996), we also explored whether the motivational constructs could influence students' in-class physical activity. The specific research questions were as follows: (a) To what extents do achievement goals and individual interest influence students' recognition of situational interest? (b) To what extent do achievement goals and interest predict learning achievements? (c) To what extent do achievement goals and interest influence in-class physical activity?

This article is theoretically significant in that we attempt to explore the direct link between the trichotomous achievement-goal framework, interest, and measurable learning achievements in physical education. This effort

may help extend our understanding about the effects of different motivation constructs on learning. The information will facilitate physical educators to design appropriate motivational strategies to enhance students' learning in physical education.

Method

Participants

Participants in this study ($N = 202$) were sixth graders (99 girls and 103 boys, age range = 11-13 years, $M = 11.9$ years) selected from three middle schools in the Baltimore and Washington metropolitan areas. All three schools used a 90-min block, 3 day (A-, B-, C-day) rotating schedule. Students had a physical education class on every 3rd day. Among the 202 students, 25 were unable to complete all the measures because of absences and other reasons. The final sample consisted of 177 students. We received parental consent forms and student assent forms before data collection.

Content

We chose a softball unit offered in all three schools as the learning content for two reasons. First, softball is a physical activity that involves both cognitive and physical tasks in order to achieve the learning goals. Second, softball is one of the popular activities offered in middle school physical education curriculum in this area. The study of softball is likely to have broad implications for teaching and learning in middle school physical education.

The softball unit was 4 weeks long (seven lessons) in all three schools. The class size ranged from 27-32 students. The teacher taught the unit as a new content to all the sixth graders. Major learning tasks in the unit centered on concepts (e.g., basic rules, tactical concepts, and strategy concepts) and basic skills (e.g., throwing, catching, bunting, and hitting). Students learned the concepts and skills through skill practices in groups and modified (simplified) games. The teachers used both direct and problem-solving instructional methods in teaching.

Variables and Measures

Achievement goals. We used a 12-item achievement-goal questionnaire adapted from Elliot and Church (1997) to assess students' adoption of mastery, performance-approach, and performance-avoidance achievement goals in the softball unit. Sample items of mastery goal we used included, "It is important for me to understand the content as thoroughly as possible in my softball class." and "I want to learn as much as possible in my softball class." Sample items of performance-approach goals we used included, "It is important for me to do better than other students in my softball class," and "It is my goal to outperform my peers in my softball class." Sample items of performance-avoidance goals we used included, "My goal is to avoid performing poorly in my softball class," and "I worry about the possibility of doing badly in my softball class." We collected responses on a 7-point Likert-type scale ranging from *not at all true* (1) to *very true of me* (7).

We conducted an exploratory factor analysis, with the theoretical dimensions specified in the extraction, to test the construct validity of trichotomous goal model in this study. The exploratory factor analysis with varimax rotation on scores from the achievement-goal questionnaire yielded three factors with eigenvalues exceeding 1.0 that were identical to Elliot and Church's (1997) original construct structure. The three-factor solution accounted for 62.5% of the total variance in the achievement goal data. We deleted one item ("My fear of performing poorly is often what motivates me in the softball unit") because of its cross-loadings on Factors 2 and 3. In summary, Factor 1 accounted for 23.3% of the variance and comprised the four mastery goal items (eigenvalue = 2.09). Factor 2 accounted for 73.1% of the total variance and consisted of the four performance-approach goal items (eigenvalue = 2.08). The third factor accounted for 16.20% of the variance and comprised the three performance-avoidance goal items (eigenvalue = 1.46). We constructed the mastery, performance-approach, and performance-avoidance goal measures accordingly, by averaging the scores of all the items in each dimension. The internal consistency coefficients (Cronbach α) in the three measures ranged from .70-.83. Thus, the results from the factor analysis provided validation support for the trichotomous goal model.

Individual interest. We measured individual interest in softball by using the physical activity interest survey (Chen & Dust, 2002). The creators defined the survey instrument to rate students' individual interest in various physical activities; a 7-point Likert-type scale (7 = *highest interest*, 1 = *lowest interest*) is used in the instrument. We examined individual interest in softball by asking students to rate softball along with the other 17 activities in the curriculum on a 7-point Likert-type scale (7 = *highest interest*, 1 = *lowest interest*). At the beginning of the questionnaire, we asked the students to identify an activity (at school or home) that they were most interested in, write it down in a designated place on the questionnaire, rate it 7, and use it as a reference activity against which the 17 physical activities were compared. This criterion item provided a point of reference against which students judged their interest in softball. According to Tobias (1994), this measurement context can minimize the possibility that individual students exercise their own interpretation of the ratings, thus better maintaining the internal validity of the measure. In physical education, other researchers have widely used this method to assess students' individual interest in a physical activity (e.g., Chen & Shen, 2004; Shen & Chen, 2006).

Situational interest. We measured situational interest by using the 24-item situational interest scale (Chen et al., 1999) that contains a total interest subscale and five source dimensions. We guided students to rate on a 5-point scale (5 = *strongly agree*, 1 = *strongly disagree*) in terms of specific learning tasks they were experiencing.

Chen et al. (1999), established the construct validity of the situational interest scale by using a factor analytical approach with exploratory and confirmatory factor loadings ranging from .50-.90. The reliability coefficient was .95 for the total interest subscale. In this study, we used the sum score of the four total interest items (20 points) to represent the direct measure of situational interest. Those items included "What we were learning today looked fun to me," "It was fun for me to try what we were learning," "What we were learning was interesting for me to do," and "What we were learning attracted me to participate." The internal consistency reliability coefficient (Cronbach's α) was .87 for the total interest data.

Learning achievements. In this study, we operationalized learning achievements as the degree to which students' knowledge and skill in softball changed as a result of instruction. We measured knowledge of softball by using a 14-item multiple-choice test. We framed all items in this test on content from the physical education curriculum for sixth graders. As illustrated below, the purpose of this test is to assess students' cognitive knowledge of softball. Question: "A right-handed pitcher will step with the _____ foot as he or she releases the ball toward home." Possible answers provided were: "(a) right (b) left (correct answer) (c) either." We dichotomously scored the items in the multiple-choice test as correct (1 point) or incorrect (0 point). The maximum score of this test was 14 points.

In examining the content validity of the knowledge test, we asked four experienced physical education teachers (with 10-15 years experience of teaching softball), who did not participate in this study, to rate the content representativeness of each question (1 = *not representative at all*, 6 = *representative very much*) and the language appropriateness for the sixth graders (1 = *not appropriate at all*, 6 = *appropriate very much*). The range of ratings for each item was from 4-6. The mean scores for the content representativeness and language appropriateness were 5.0 and 5.8, respectively, suggesting acceptable content validity.

We examined the reliability of the knowledge test, using Cronbach's internal consistency approach. The internal consistency reliability coefficients (Cronbach α) were .71 and .73 for the pre- and postknowledge test, indicating an acceptable level of reliability for the measure.

We assessed students' softball skill by using the participating teachers' evaluation of students' basic skills, including throwing, catching, and hitting in softball, on a 7-point rubric in terms of the county's physical education curriculum guide. To ensure grading consistency among different teachers, the first author established inter-rater agreement by randomly assessing 30% of the participants during the pretest in each school. Inter-rater agreement between the author and the teachers ranged from 85%-95% within each skill, with

overall agreement (summed average of the three skills) above 90% in all the schools, indicating that the reliability of the ratings were acceptable.

In-class physical activity. We measured the physical activity level in class by using a Yamax SW-200 Digi-walker pedometer (Tokyo, Japan) that recorded total steps taken during a physical education lesson. To keep the accuracy of the measure, we checked all Digi-walker pedometers, using a walking test and a manual shake test (Vincent & Sidman, 2003), before distributing them to the participants.

Data Collection and Analysis

We collected all the data during regular physical education classes in the three schools. We administered achievement goals, individual interest survey, and pretest of knowledge and skill before the softball unit. We collected situational interest data and Digi-Walker data in three lessons during the unit in which the teachers taught major concepts repeatedly, and the development of basic softball skills was the lesson focus. In the last lesson of the unit, we administered the posttest of knowledge and skill.

For subsequent analyses, we aggregated and averaged the scores of situational interest and steps from the three lessons. We used the residual gain scores in knowledge and overall skill for each student to represent learning achievement in the softball unit in order to avoid the influence of pretest on the result (i.e., ceiling effect). We computed the residual gain scores by using a linear regression model in which the pretest was the predictor and the posttest was the criterion.

We conducted Pearson product—moment correlation analysis to examine the overall relationships among achievement goals, interests, steps, and knowledge and skill gains. We used multiple regression analyses to examine the tenability of achievement goals and individual interest in predicting situational interest, and the influence of achievement goals, individual and situational interests on knowledge and skill gains and steps. Because part of our rationale for the study was to expand previous literature to include the trichotomous model of goal orientations in physical education, we used a simultaneous approach to investigate the relative contributions of all predictors in the regression analyses.

Results

Before collapsing the data from the three schools into one data set for the analyses, we conducted a preliminary multivariate analyses of variance (MANOVA) to determine whether students' responses differed simply because they were in different schools. The MANOVA revealed that no significant overall differences among schools in all measures existed, suggesting that it was acceptable to merge the data from the three schools in the subsequent analyses.

Descriptive Statistics and Correlation Analysis

We show descriptive statistics in Table 1. Overall, the students had strong mastery and performance-avoidance goals, whereas their performance-approach goal was relatively low. The students had moderate individual interest in softball and relatively low scores in their preknowledge test and preskill evaluation before the unit started. After 4 weeks of instruction in the softball unit, they got higher scores in the postknowledge test and postskill evaluation. The improvement of scores in knowledge and skill tests suggested that learning did occur in the unit. A high-level rating on situational interest occurred, indicating that the students recognized that the softball lessons were situationally interesting. On average, students took 1,895 steps in each lesson of the unit.

We conducted a MANOVA to determine whether the boys and girls differed in the measures. As shown in Table 1, the boys did better in pretest of knowledge, $F(1, 175) = 5.27, p < .05$ and skill $F(1, 175) = 13.64, p < .01$, and took more steps, $F(1, 175) = 12.09, p < .01$ than did the girls, but the girls had higher situational interest, $F(1, 175) = 7.39, p < .01$. There were no significant differences in achievement goals and individual interest in softball between boys and girls.

TABLE 1. Descriptive Statistics for Achievement Goals, Knowledge, Skills, Interests, and Steps

Variable	Maximum	Boys		Girls		Total	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Mastery goal	7	5.45	1.38	5.63	1.27	5.54	1.33
Performance-approach goal	7	4.11	1.80	3.82	1.66	3.97	1.73
Performance-avoidance goal	7	5.22	1.50	5.46	1.27	5.34	1.39
Individual interest	7	4.32	1.94	4.27	1.95	4.30	1.94
Preknowledge	14	9.33 _a	2.52	8.46 _b	2.50	8.89	2.54
Preskill	7	4.23 _a	1.38	3.45 _b	1.42	3.84	1.45
Situational interest	20	14.33 _a	3.46	15.78 _b	3.61	15.06	3.60
Steps	—	-2.077 _a	776	1.716 _b	594	1.895	712
Postknowledge	14	10.56	2.55	10.06	2.23	10.31	2.40
Postskill	7	5.21 _a	1.34	4.85 _b	1.44	5.03	1.22

Note. *N* = 177. Subscript letters that differ in each row denote significant group means difference between the boys (*N* = 88) and girls (*N* = 89), $\alpha = .05$.

We conducted correlation analyses to examine the overall interrelations among the variables separately for boys and girls. We show the correlation coefficients in Table 2. We found that preknowledge test, preskill evaluation, and individual interest in softball were correlated with each other. We correlated mastery goals with situational interest and knowledge gain. We correlated individual interest in softball with situational interest, knowledge gain, and skill gain. We did not find that situational interest, as a temporary motivator during learning, correlated with knowledge and skill gains. We correlated mastery goals with performance-approach and performance-avoidance goals. Inconsistent with the findings in classroom research (McGregor & Elliot, 2002), we found a moderate correlation between mastery goals and performance-avoidance goals. To our surprise, we did not find predicted correlations between performance-based (approach and avoidance) goals and knowledge and skill gains. We did find that performance-avoidance goals correlated with steps taken in the class. The correlation pattern for boys and girls was identical to the overall result, indicating the interrelations among the variables were not gender specific.

TABLE 2. Correlation Coefficients Between Preknowledge, Preskill, Achievement Goals, Individual Interest, Situational Interest, Learning Achievements, and Steps

	1	2	3	4	5	6	7	8	9	10
1. Preknowledge	—	.45**	.07	-.07	-.01	.52**	.09	-.00	.03	-.01
2. Preskill		—	.10	.06	.07	.32*	.04	.10	.00	.09
3. Mastery goal			—	.19*	.52**	.15	.40**	.28**	.13	.00
4. Performance-approach goal				—	.25**	.00	.03	-.07	.06	.14
5. Performance-avoidance goal					—	.07	.30**	-.00	.14	.25**
6. Individual interest						—	.21*	.41**	.28**	-.14
7. Situational interest							—	.07	-.00	-.05
8. Knowledge gain								—	.33**	-.13
9. Skill gain									—	.08
10. Steps										—

Note. (*N* = 177).
* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

Multiple Regression Analysis

With the assumption that students' disposition conceptualization may be manifested in cognizance of situational interest (Alexander, 1997) we conducted a multiple regression analysis to investigate the influence of achievement goals and individual interest on situational interest. As shown in Table 1 we found that mastery goals, performance-avoidance goals, and individual interest in softball were valid predictors for situational interest, whereas the contribution of performance-approach goals was not significant. The model predicted 27% of the variance in situational interest in class.

To investigate the influence of different motivators on learning achievements and in-class physical activity, we conducted the last three regression analyses with knowledge gain, skill gain, and steps as dependent variables and achievement goals, individual interest, and situational interest as predictors. Because it is assumed that different motivators may interact to influence learning (Lee, 2002), we followed secondary regression analyses

to include interactions between achievement goals and individual interest as predictors in addition to the on predictors.

The analysis for knowledge gain resulted in two positive predictors: individual interest and mastery goals. However, as shown in Table 3, performance-approach goals, performance-avoidance goals, and situational interest did not predict knowledge gain significantly. In the analysis, the model accounted for 23% of the total variance. No significant interaction effects were evident.

TABLE 3. Multiple Regression Results

Dependent variable	Predictors	Estimated coefficients	Estimated SE	<i>t</i>
Situational interest	Mastery goal	0.274	0.078	3.51**
	Performance-approach	-0.041	0.052	-0.78
	Performance-avoidance	0.156	0.075	2.09*
	Individual-interest	0.251	0.122	2.05*
Knowledge gain	Mastery goal	0.147	0.067	2.19*
	Performance-approach	-0.025	0.030	-0.81
	Performance-avoidance	-0.056	0.044	-1.26
	Individual-interest	0.138	0.048	2.87**
	Situational interest	-0.029	0.045	-0.65
Skill gain	Mastery goal	0.242	0.171	1.42
	Performance-approach	-0.055	0.111	-0.50
	Performance-avoidance	0.248	0.161	1.54
	Individual interest	0.650	0.283	2.30*
	Situational interest	-0.286	0.162	-1.76
Steps	Mastery goal	-17.015	16.589	-1.03
	Performance-approach	12.998	10.743	1.21
	Performance-avoidance	44.844	15.595	2.88**
	Individual interest	-49.605	27.473	-1.81
	Situational interest	-14.000	15.725	-0.89

Note. *N* = 177. *SE* = standard error.
p* < .05, two-tailed. *p* < .01, two-tailed.

Individual interest was the only significant predictor in the analysis for skill gain. The model accounted only for 11% of the variance. The small variance change suggested that beside motivational variables, other important factors we did not measure, such as instructional elect from the teachers, should have had strong influence on skill acquisition. We did not find the interactive effects of achievement goals and individual interest on skill gain.

The analysis for in-class physical activity (step) yielded only one predictor: performance-avoidance goal. In the analysis, the model accounted for 12% of the variance in steps taken in class. It seemed that the students with high performance-avoidance were likely to be more active and took more steps during each class. We also did not find interactive effects of achievement goals and individual interest on steps.

Discussion

We designed this study to examine the joint influence of achievement goals and interest on learning achievements and in-class physical activity in a physical education softball unit. We conducted correlational

and multiple regression analyses for the research purpose. In our results, we found that achievement goals and interest are likely to play independent roles in motivating middle school students learning in physical education.

Impact of Achievement Goals and Individual Interest on Situational Interest

Research in education has supported the notion that achievement goals are associated with learning. Researchers have suggested that mastery goals are related to positive and adaptive motivational patterns (McGregor & Elliot, 2002). Students with high mastery goals often report a high likelihood of enjoying learning experiences. The result of this study supports that notion. The moderate correlation between mastery goals and situational interest and the significant coefficient in the regression analysis suggest that mastery goals had a strong influence on the recognition of situational interest in class. The students with high mastery goals in the softball unit were more likely to recognize the interest of learning tasks than were their counterparts with lower mastery goals. With that finding, we confirm that mastery goals are likely to be associated with students' affective involvement in physical education (Parish & Treasure, 2003).

We did not expect the weak but significant correlation between performance-avoidance goals and situational interest in the study. The significant coefficients in the regression analysis support the finding that the performance-avoidance goal was also a positive predictor of students' situational interest. It was likely that students might have enjoyed the learning experiences but at the same time wanted to avoid performing poorly in such a visible and public context. The students' relatively high score in performance-avoidance goal and the moderate correlation between mastery goals and performance-avoidance goals ($r = .52$) seemed to support our postulation.

In physical education, students' individual interest in an activity may strengthen their recognition of situational interest in class (Chen & Darst, 2002). In this study, we expected that the students' individual interest in softball was associated with situational interest. The correlation analysis revealed a weak but significant correlation between individual interest and situational interest. Furthermore, the regression analysis indicated that individual interest in softball was a positive indicator of situational interest. The findings are congruent with Chen and Darst's (2001) results that students with a high individual interest in an activity are likely to view the activity as more interesting and attractive.

Influence of Achievement Goals on Learning

The correlation between mastery goals and knowledge gain suggests that a mastery goal orientation is related with knowledge acquisition in the softball unit. Furthermore, the results from the regression analyses lend additional support that students' mastery goals are a significant predictor of their knowledge learning. It is likely that students' mastery goals in learning softball might have played a role of enhancing students' cognitive learning. To a certain extent, high mastery goals may result in a better knowledge achievement.

However, we did not find correlations between mastery goals and steps taken in class or between mastery goals and skill gain. The results in the corresponding regression analyses also indicate that mastery goals were not a significant predictor of skill gain and steps. The results support the notion that mastery goal orientation, as a general motivation construct, may have limited influence on students' skill learning and physical engagement in physical education (Chen, 2001).

Researchers have suggested in classroom-based studies that performance-approach goals are likely to have positive associations with learning achievement (Harackiewicz, Barron, Tauer, & Elliot, 2002; Pintrich, 2000). Performance-avoidance goal often has deleterious consequences for performance (McGregor & Elliot, 2002). The results in this study, however, did not support that. As shown in Tables 2 and 3, we did not find performance-approach and avoidance goals associated with knowledge and skill gains.

The inconsistency of our results with those from classroom research support the *motivation specificity* phenomenon (Bong, 2001). As Charness and Schultetus (1999) argued, each domain or subject has a different set of demands that directly determine how best to quantify performance and what types of tasks would be most

representative. The specificity of content domains as an important organizational framework has a significant function on an individual's motivation (Bong). We suspect that compared with classroom-based content, the content-and context-specificity of physical education may influence the effectiveness of the achievement-goal construct on learning.

In school physical education, there are multiple objectives (National Association for Sport and Physical Education [NASPE], 2004). In addition to competence goals such as learning knowledge and skills, physical education is often expected to teach toward goals other than competence, such as enjoyment of physical activity and affective development, and keep students in a high level of physical engagement to receive health benefits (CDC, 1996). Under such circumstances, it is reasonable to assume that students' pursuing those other goals may dramatically attenuate the function of performance goals on learning in physical education. In this study, the students' high situational interest and relatively low performance-approach goal seemed to support this assumption.

We did not expect to find that performance-avoidance goals, usually defined as a negative orientation for learning in classroom research, correlated, to a small extent, with students' steps taken in the classes. The significant coefficient in regression supported the view that performance-avoidance goals were associated with physical engagement. Given the fact that there was a positive correlation between performance-avoidance goals and mastery goals but no connection between performance-avoidance goals and learning achievement measures, we suspected that there was a social goal at work in the softball unit. It is likely that pursuing a social bonding (such as social recognition and acceptance) and avoiding peer rejection might have influenced students to accept performance-avoidance goals in order to work for a socialization need (increased physical engagement and interaction). The results are consistent with Guan, McBride, and Xiang (2006) and seem to indicate that pursuing competence-based goals (e.g., learning knowledge) and pursuing other than competence-based goals (e.g., having fun) can be nested harmoniously within students' motivation in physical education. In terms of the importance of social goals on students' learning and engagement in school (Urda & Maehr, 1995), and physical activity engagement in particular (Antshel & Anderman, 2000), future studies are needed to further determine the nature of the social goal and its impact on student learning in physical education.

Influence of Interest on Learning

In contrast to achievement goals, individual interest in softball had a significant influence on knowledge and skill gains. The contribution of individual interest to the knowledge and skill gain as shown in the regression models suggests that individual interest, as an indicator of motivation specificity (Alexander & Jetton, 2000), had a significant influence on learning in the softball unit. This finding supports the view that the learners' individual interest has an independent role in their cognitive learning (Alan & Guthrie, 1999). As the result of high individual interest in a subject, students' cognitive involvement during learning is more likely to be effortful and planned (Alexander, Spell, Buehl, & Fives, 2004). Worthy of note is that the regression model of individual interest and achievement goals on skill gain accounted only for 11 % of the variance, indicating a weak overall contribution of individual interest and achievement goals. We suspected this result might be associated with the specialty of motor skill learning. Researchers have documented that motor skill and knowledge learning are highly related but also have different characteristics (Schmidt & Wrisberg, 2000). As opposed to cognitive understanding of the movement, motor skill learning in physical activities is significantly dependent on individual differences in strength, coordination, and experience. The findings revealed in this study support the assumption that social—cognitive variables might not impact motor skill learning directly (Schmidt & Wrisberg).

We did not find the association between situational interest and skill and knowledge gains. This lack of association is consistent with Hidi and Anderson's (1992) prediction that situational interest may not directly influence knowledge achievement measures. Its impact on learning might be mediated by students' cognitive involvement and recognition (Harp & Mayer, 1997).

Previous research in physical education (Chen & Shen, 2004; Shen & Chen, 2006) has revealed that students' recognition of situational interest was associated with their physical engagement. High situational interest in the learning task is likely to lead to a high physical engagement regardless of students' skill level. However, we did not observe this connection in this study. We attributed this result to the low demand of physical movements in softball. Successful movement in softball may depend not on physical effort but on tactics of play that demand for high cognitive understanding of the game. Unlike other team sports, physical movement in softball is often in the form of short bursts after a long waiting period. This scenario is especially true for beginning learners, such as the students in this study. It is likely that although learning tasks were situationally interesting, the opportunity for students to actually partake in the activity with high physical engagement was not sufficient.

Conclusion

Overall, the findings in this article suggest achievement goals and interest may be integrated into a holistic framework to explain learning and motivational behavior in physical education. The idea that the integrated approach to achievement motivation can provide us with a relatively comprehensive picture of individuals' motivation is supported. Physical educators need to consider different functions of motivators in relation to learning process and achievement variables for developing effective motivational strategies. In future studies, they need to further explore the impact of different motivation constructs on learning in a variety of physical education settings.

REFERENCES

- Alao, S., & Guthrie, J. T. (1999). Predicting conceptual understanding with cognitive and motivational variables. *The Journal of Educational Research*, 92, 243-253.
- Alexander, P. A. (1997). Mapping the multidimensional nature of domain learning: The interplay of cognitive, Motivational, and strategic forces. In M. L. Maehr & P. R. Pintrich (Eds.). *Advances in motivation and achievement* (Vol. 10, pp. 213-250). Greenwich, CT: JAI Press.
- Alexander, P. A., & Jetton, T. L. (2000). Learning from text: A multidimensional and developmental perspective. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.). *Handbook of reading research* (Vol. 3, pp. 285-310), Mahwah, NJ: Erlbaum.
- Alexander, P. A., Sperl, C. T., Buehl, M. M., & Fives, H. (2004). Modeling domain learning: Profiles from the field of special education. *Journal of Educational Psychology*, 96, 545-557.
- Allison, P. C., Pissanos, B. W., Turner, A. P., & Law, D. R. (2000). Preservice physical educators' epistemologies of skillfulness. *Journal of Teaching in Physical Education*, 19, 141-161.
- Antshel, K. M., & Anderman, E. M. (2000). Social influences on sports participation during adolescence. *Journal of Research and Development in Education*, 33, 85-94.
- Arnold, P. J. (1979). *Meaning in movement: Sport and physical education*. London: Heinemann.
- Berlant, A. R., & Weiss, M. L. (1997). Goal orientation and the modeling process: An individual's focus on form and outcome. *Research Quarterly for Exercise and Sport*, 68, 317-330.
- Bong, M. (2001). Between and within-domain relations of academic motivation among middle and high school students: Self-efficacy, task-value, and achievement goals. *Journal of Educational Psychology*, 93, 23-34.
- Centers for Disease Control and Prevention. (1996). *Physical activity and health: A report of the Surgeon General executive summary*. Atlanta, GA: Author.
- Charness, N. & Schultetus, R. (1999). Knowledge and expertise. In F. Durso, R. Nickerson, R. Schvaneveldt, S. Dumais, D. Lindsay, & M. Chi (Eds.). *Handbook of applied cognition* pp. 57-81). New York; Wiley.
- Chen, A. (1996). Student interest in activities in a secondary physical education curriculum: An analysis of student subjectivity. *Research Quarterly for Exercise and Sport*, 67, 424-432.
- Chen, A. (2001), A theoretical conceptualization for motivation research in physical education: An integrated perspective. *Quest*, 53, 35-58.
- Chen, A., & Darst, P. W. (2001). Situational interest in physical education: A function of learning task design. *Research Quarterly for Exercise and Sport*, 72, 150-164.
- Chen, A., & Darst, P. W. (2002). Individual and situational interest: The role of gender and skill. *Contemporary Educational Psychology*, 27, 250-269.

- Chen, A., Dart, P. W., & Pangrazi, R. P. (1999). What constitutes situational interest? Validating a construct in physical education. *Measurement in Physical Education and Exercise Science*, 3, 157-180.
- Chen, A., & Ennis, C. D. (2004). Searching for optimal motivators; Goals, interests, and learning in physical education [Monograph: Contemporary Issues on Motivation]. *The Journal of Educational Research*, 97(6), 329-338.
- Chen, A., & Shen, B. (2004). A web of achieving in physical education: Goals, interest, outside-school activity and learning. *Learning and Individual Differences*, 14, 169-182.
- Church, M. A., Elliot, A. J., & Gable, S. L. (2001). Perceptions of classroom environment, achievement goals, and achievement outcomes. *Journal of Educational Psychology*, 93, 43-54.
- Duda, J. L. (2001). Achievement goal research in sport: Pushing the boundaries and clarifying some misunderstandings. In G. C. Roberts (Ed.), *Advances in motivation in sport and exercise* (pp. 129-182).
- Duda, J. I., & Nicholls, J. GP. (1992). Dimensions of achievement motivation in schoolwork and sport. *Journal of Educational Psychology*, 84, 290-299.
- Elliot, A. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist*, 34, 149-169.
- 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.
- Guan, J., McBride, R., & Xiang, R. (2006). Reliability and validity evidence for the Social Goal Scale-Physical Education (SGS-PE) in high school settings. *Journal of Teaching in Physical Education*, 24, 58-74
- Haraekiewicz, J. M., Barron, K. E., Tauer, J. M., & Elliot, A. J. (2002). Predicting success in college: A longitudinal study of achievement goals and ability measures predictors of interest and performance from freshman year through graduation. *Journal of Educational Psychology*, 94, 562-575.
- Harp, S., & Mayer, R. E. (1997). The role of interest in learning from scientific text and illustrations: On the distinction between emotional and cognitive interest. *Journal of Educational Psychology*, 89, 92-102.
- Hastie, P. A., & Pickwell, A. (1996). Take your partners: A description of a student social system in a secondary school dance class. *Journal of Teaching in Physical Education*, 15, 171-187.
- Hidi, S. (2000). An interest researcher's perspective: The effects of intrinsic and extrinsic factors on motivation. In C. Sansone & J. M. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation: The search for optimal motivation and performance* (pp. 309-339). San Diego, CA: Academic Press.
- Hidi, S., & Anderson, V. (1992). Situational interest and its impact on reading and expository writing. In K. A. Renninger, S. Hidi, & A. Krapp (Eds.), *The sole of interest in learning and development* (pp. 215-238). Hillsdale, NJ: Erlbaum.
- Krapp, A. (1999). Interest, motivation and learning: An educational-psychological perspective. *European Journal of Psychology of Education*, XIV, 23-40.
- Lee, A. M. (2002). Promoting quality school physical education: Exploring the root of the problem. *Research Quarterly for Exercise and Sport*, 73, 118-125.
- McGregor, H. A., & Elliot, A. J. (2002). Achievement goals as predictors of achievement-relevant processes prior to task engagement. *Journal of Educational Psychology*, 94, 381-395.
- Midgley, C., Kaplan, A., & Middleton, M. (2001). Performance-approach goals: Good for what, for whom, under what circumstances, and at what cost? *Journal of Educational Psychology*, 93, 77-86.
- Mitchell, M. (1993). Situational interest: Its multifaceted structure in the secondary school mathematics classroom. *Journal of Educational Psychology*, 85, 424-436.
- National Association for Sport & Physical Education. (2004). *Moving into the future: National standards for physical education* (2nd ed.). Reston, VA: Author.
- Parish, L. E., & Treasure, D. C. (2003). Physical activity and situational motivation in physical education: Influence of the motivation climate and perceived ability. *Research Quarterly for Exercise and Sport*, 74, 173-182.
- Pintrich, P. R. (2000). Multiple goals, multiple pathways: The role of goal orientation in learning and achievement. *Journal of Educational Psychology*, 92, 544-555.
- Pintrich, P. R. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology*, 95, 667-686.

- Renninger, K. A. (2000). Individual interest and its implications for understanding intrinsic motivation. In C. Sansone & J. M. Harachiewicz (Eds.). *Intrinsic and extrinsic motivation: The search for optimal motivation and performance* (pp. 373-404). San Diego, CA: Academic Press,
- Schmidt, R. A., & Wrisberg, C. A. (2000). *Motor learning and performance*. Champaign, IL: Human Kinetics.
- Shen, B., & Chen, A. (2006). Examining the interrelations among knowledge, interests, and learning strategies. *Journal of Teaching in Physical Education*, 25, 182- 199.
- Shen, B., Chen, A., Scrabis, K. A., & Tolley, H. (2003). Gender and interest-based motivation in learning dance. *Journal of Teaching in Physical Education*, 22, 396-410.
- Solmon, M. A. (2003). Student issues in physical education classes: Attitudes, cognition, and motivation. In S. J. Silverman & C. D. Ennis (Eds.). *Student learning in physical education* (pp. 147-163). Champaign, IL: Human Kinetics.
- Solmon, M. A., & Boone, J. (1993). The impact of student goal orientations in physical education classes. *Research Quarterly for Exercise and Sport*, 64, 418-424.
- Standage, M., & Treasure, D. C. (2002). Relationship among achievement goal orientations and multidimensional situational motivation in physical education. *British Journal of Educational Psychology*, 72, 87-103.
- Tobias, S. (1994). Interest, prior knowledge, and learning. *Review of Educational Research*, 64, 37-54.
- Treasure, D. C. & Roberts, G. C. (1994). Cognitive and affective concomitants of task and ego goal orientation during the middle school years. *Journal of Sport & Exercise Psychology*, 16, 15-28.
- Urduan, T. C., & Maehr, M. L. (1995). Beyond a two-goal theory of motivation and achievement: A case for social goals. *Review of Educational Research*, 65, 213-243.
- Vincent, S. D., & Sidman, C. L. (2003). Determining measurement error in digital pedometers. *Measurement in Physical Education and Exercise Science*, 7, 19-24.
- Walling, D. D., & Duda, J. L. (1995) Goals and their associations with beliefs about success in and perceptions Of the purpose of physical education. *Journal of Teaching in Physical Education*, 14, 140-156.
- Xiang, R. & Lee, A. (2002). Achievement goals, perceived motivational climate, and students' self-reported mastery behaviors. *Research Quarterly for Exercise and Sport*, 73, 58-65.
- 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,
- 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.