Relationship between motivation and learning in physical education and after-school physical activity

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Abstract:

Purpose: A primary goal of physical education is to develop physically literate individuals with the knowledge, skills, and confidence necessary for a physically active lifestyle. Guided by the expectancy-value and interest motivation theories, the purpose of this study was to identify the relationship between students' motivation and health-related fitness knowledge developed in physical education and their after-school physical activity participation. **Method:** Third-, 4th-, and 5th-grade students ($N = 293$) from 6 elementary schools in a large metropolitan school district in the United States provided data on expectancy beliefs and perceived task values, situational interest, health-related fitness knowledge, and after-school physical activity. Data were analyzed using descriptive statistics and a simultaneous multiple regression model. **Results:** It was found that expectancy beliefs ($\beta = .20$, $t = 2.16$, $p = .03$) and perceived exploration demand ($\beta = .25$, $t = 2.58$, $p = .01$), a source for situational interest, were positively related to after-school physical activity. The 2 variables, however, accounted for only 11.2% of the variances for children's after-school physical activity participation. **Conclusion:** This study demonstrates that students' active exploration and expectancy beliefs for success in physical education have limited influence on leisure-time physical activity participation.

Keywords: elementary school | expectancy belief | situational interest | task value

Article:

A primary goal of physical education is to develop physically literate individuals with the knowledge, skills, and confidence necessary to enjoy a lifetime of healthful physical activity (SHAPE America – Society of Health and Physical Educators, 2014). Recently, as physical inactivity has become a prevalent threat to the health of U.S. children (Koplan, Liverman, & Kraak, 2005), the goal of physical education has changed dramatically with an expectation to help children develop active lifestyles. Specifically, physical education programs are expected to

align with public health needs to promote health-enhancing physical activities in and outside of school (Sallis et al., 2012). To accomplish this goal, it seems imperative to identify the connection between students' motivation and learning in physical education and their after-school physical activity behavior. Understanding such a connection may help physical educators plan quality physical education lessons that will positively impact students' after-school physical activity participation.

Several studies seem to support that students' motivation nurtured in physical education could directly and/or indirectly influence their leisure-time voluntary physical activity participation. For example, Cox, Smith, and Williams (2008) revealed that middle school students' leisure-time physical activity was predicted by their motivation-related experiences in physical education, such as self-determined motivation, perceptions of competence, and enjoyment. Hagger, Chatzisarantis, Barkoukis, and Wang (2005) reported that high school students' motivation in physical education predicted their motivation, intentions, and behavior in a leisure-time physical activity context. Using a multitheory approach integrating the self-determination theory and theory of planned behavior, Shen, McCaughtry, and Martin (2008) hypothesized a transcontextual model to examine the influence of urban middle school students' (M_{age} = 12.4 years) perceived autonomy and competence in physical education on their physical activity intentions and behaviors during leisure time. The results suggested that perceived autonomy and competence in physical education function collectively for enhancing physically active intentions and behaviors during leisure time. Furthermore, Wallhead, Hagger, and Smith (2010) recently conducted an educational experiment by teaching students (9- to 16-year-olds) a 12-week sport education season in physical education. They found that the students enhanced autonomous motivation, which transferred to leisure-time and facilitated physical activity participation during lunch recess. More recently, Yli-Piipari and colleagues (Yli-Piipari, Leskinen, Jaakkola, & Liukkonen, 2012) confirmed that students' self-determination in physical education in sixth grade predicted their physical activity in seventh grade. However, self-determination and achievement goal orientations in sixth grade did not impact their longitudinal development in physical activity levels in junior high school (Yli-Piipari et al., 2012). These findings are mostly derived from three theoretical perspectives (i.e., self-determination theory, the theory of planned behavior, and achievement goal theory), which are dispositional factors for physical activity participation. Nevertheless, previous research has identified a multitude of physical activity correlates including the factors mentioned (Wallhead & Buckworth, 2004; Welk, 1999). It is known that students' engagement and learning in a physical education class are influenced and sometimes determined by both dispositional and situational motivational factors (S. Chen, Chen, & Zhu, 2012). These motivational factors as well as the competence gained through various learning experiences (e.g., fitness knowledge) may collectively predict students' after-school physical activity participation.

One effective way is to examine the combined influences of motivational sources from both personal disposition and context-elicited factors in physical education on voluntary after-school physical activity. Of all, students' expectancy-value disposition (Eccles & Wigfield, 1995) and context-elicited situational interest (Hidi & Anderson, 1992) are theorized to be potentially important motivation factors in a learning setting (Pintrich, Marx, & Boyle, 1993). A recent meta-analysis in physical education has revealed that expectancy value and situational interest are the most prevalent motivational sources for K–12 learners (S. Chen et al., 2012). Ding, Sun,

and Chen (2013) further indicated that the situational interest components are strongly associated with physical engagement (i.e., caloric expenditure), while the expectancy-value components are associated with knowledge and skill-learning outcomes in middle school physical education. Situational interest can also result in increased topic interest, which influences learners' positive affective responses and subsequently leads to increased persistence in learning behaviors and increased achievement (Ainley, Hidi, & Berndorff, 2002).

Learning is a multidimensional process that involves the interplay of multiple sources of motivation (e.g., interest, values, goals, beliefs) and cognitive variables (e.g., prior knowledge, strategy use; Pintrich et al., 1993). Empirical findings from educational psychology research identified that along with motivation (e.g., expectancy, interest), learners' prior knowledge also plays a distinctively important role in facilitating learning (Alao & Guthrie, 1999; Tobias, 1994). However, this interrelation remains largely unexplored in physical education research. Further research is needed to examine the predictive role of learners' knowledge (e.g., knowledge about health-related fitness) and motivation in promoting their moderate-to-vigorous physical activity, an important indicator of "physically literate persons" (SHAPE America, 2014).

Taken together, expectancy belief and task values complemented with situational interest may exert significant impact on learners' motivation in physical education with a far-reaching effect on their behavior both in and out of class (e.g., physical activity after school). In addition, students' knowledge learned from physical education (e.g., fitness knowledge) may further enable them to make wise decisions for physical activity participation. As such, the purpose of this particular study was to identify the impact of expectancy value, situational interest, and fitness knowledge in physical education on physical activity participation during after-school hours.

The Expectancy-Value Theory

The expectancy-value theory conceptualizes learners' dispositional motivation to be competence-based and value-based. The theory consists of two major components: *expectancy belief* and *task values* (Eccles & Wigfield, 1995). Expectancy belief refers to a learner's subjective judgment of their likelihood to succeed in an upcoming task, while task values are defined as the learner's perceived reasons for engaging in the task (Eccles & Wigfield, 1995). There are four identified values inherent in learning tasks that are experienced in schooling: *attainment value, intrinsic value, utility value*, and *cost* (Eccles & Wigfield, 1995). The attainment value is learners' perceived importance of attaining success in learning a particular task or a content area. The intrinsic value refers to perceived enjoyment in learning the content. The utility value is the perceived usefulness of the content to be learned. Cost, on the other hand, refers to the expense (such as effort and time) or negative consequence of engaging in a task. Higher cost perceptions resulting from physical discomfort, boredom, irrelevant curricula, and perceived incompetence are often associated with lower task values and a negative perception of physical education (Zhu & Chen, 2013).

The expectancy-value theory appeared to be tenable and applicable in physical education (Xiang, McBride, Guan, & Solmon, 2003). Expectancy belief and task values are found to be antecedents of several process and outcome variables in elementary school physical education. For example,

Xiang, McBride, and Bruene (2004) studied fourth graders' expectancy-value motivation and its relation to the participants' 1-mile (1,609.34 meters) run performance as well as their intention for future participation in running. It was found that the intrinsic value and attainment value positively predicted intention for future running, while expectancy belief predicted performance. In a recent study, S. Chen, Chen, Sun, and Zhu (2013) reported that attainment value positively predicted elementary students' fitness knowledge only when the learning environment was characterized by light-to-moderate physical activity. Furthermore, S. Chen and Chen (2012) revealed that ninth-grade students with stronger expectancy belief and higher perceptions of intrinsic value tended to be more physically active in class and that perceived cost was negatively associated with after-school physical activity. This study alerted physical education professionals to take students' in-class negative perceptions and experiences seriously due to their negative consequences on after-school physical activity participation. Failing to address these cost-related issues (e.g., grading students based on physical ability rather than effort; S. Chen & Chen, 2012) would potentially undermine students' intentions and behaviors in regular physical activity in the long run.

Prior research points out that expectancy-value constructs tend to exert significant motivational functions under different circumstances where distinct motivation outcomes are expected. There is a need to understand the impact of expectancy-value motivation on not only in-class learning experiences, but also desired physical activity behavior change during after-school hours. What remains unclear in the existing research literature is whether expectancy-value constructs are associated with students' after-school physical activity behavior as well as the magnitude of these associations.

The Interest Theory

Other than expectancy for success and perceived task values, young children are often motivated by interest. Different from expectancy- or value-based motivation that relies on mental dispositions, interest-based motivation is largely driven and influenced by the context or environment (Hidi & Anderson, 1992). For example, physical activities used in physical education as learning tasks can create various person–activity interactive contexts with situation-based attraction or interest to students. The situational interest often has an immediate motivational impact on the learner. Situational interest is defined as the appealing effect of a learning task on the learner (Hidi & Anderson, 1992). Previous classroom-based research has shown that students with a high level of situational interest can demonstrate a high level of cognitive engagement, increased motivation to learn, and enhanced achievement (Alexander, 2006; Hidi & Anderson, 1992).

Previous research on elementary school children has identified five sources from which situational interest is derived: *novelty, challenge, attention demand, exploration*, and *instant enjoyment* (Sun, Chen, Ennis, Martin, & Shen, 2008). Specifically, (a) novelty refers to information deficiency between information known and unknown, (b) challenge is defined as the level of difficulty relative to one's ability, (c) attention demand is the concentrated cognition and mental energy required in learning an activity, (d) exploration is conceptualized as the learning aspects that drive the learner to explore and discover, and (e) instant enjoyment refers to the

characteristics that lead the learner to an instant positive feeling of being satisfied (Sun et al., 2008).

This five-source framework has been empirically tested and verified in physical education in elementary (Sun et al., 2008) and middle schools (A. Chen, Darst, & Pangrazi, 1999). Findings from these studies have shown that situational interest has efficacy in positively predicting students' in-class physical engagement (i.e., number of steps) and learning strategies and achievement (i.e., knowledge gain; Shen & Chen, 2006). However, empirical evidence (Shen, Chen, Tolley, & Scrabis, 2003; Zhu et al., 2009) corroborates that situational interest is often short-lived and may only have little to marginal direct impact on learning outcomes. The influence of perceived situational interest in physical education on voluntary physical activity during after-school hours remains unknown. Theoretical articulation on the possible effect of situational interest on after-school activity behavior change is plausible (A. Chen & Hancock, 2006), but empirical research that supports this association is not available to our knowledge. It seems conceivable and necessary that researchers explore the appealing power of situational interest to children and take advantage of its instant motivational impact to understand its role in targeting children's physical activity behavior during after-school hours.

Fitness Knowledge and Physical Activity

Health-related physical fitness refers to our body's ability to function efficiently and effectively and is an important indicator of health (Corbin, Welk, Corbin, & Welk, 2010). Although physical fitness is determined by both genetic and behavioral determinants, it appears that the behavioral determinants are critical in the development of fitness in children (Corbin et al., 2010). For children to develop and sustain the behavior that contributes to fitness development, it is necessary to educate them about the health benefits of fitness and the scientific way to develop and sustain physical fitness safely and effectively. This education process requires unique experiences of engaging children in physical tasks that enhance their understanding of fitness both in and out of physical education classes (Ennis, 2011). As Ennis (2011) suggested, this education process would be most effective for children to learn fitness knowledge and, perhaps, to change their behavior if it was based on the social constructivist learning theories that view the learners to be active agents who control their own learning destiny (Moje et al., 2004). Further, the level of understanding about health and physical activity may dictate students' physical activity participation and healthful living behaviors. Studies revealed that elementary school children demonstrated insufficient knowledge about health and physical activity (Brusseau, Kulinna, & Cothran, 2011; Keating et al., 2009). Observational studies (Heinrich, Maddock, & Bauman, 2011; Nelson, Lytle, & Pasch, 2009; Rimal, 2001) have verified the positive association between health-related knowledge (i.e., energy balance knowledge, exercise knowledge) and physical activity or exercise behavior. However, it remains unclear whether or not and to what extent fitness knowledge influences fitness-enhancing physical activities during after-school hours, and hence, this warrants further research evidence.

The Research Question and Hypothesis

The review of existing research literature has not provided evidence with certainty about the extent to which expectancy-value and interest motivation and fitness knowledge developed in

physical education are associated with students' after-school physical activity. To further understand this important association, this study was designed to answer the following research question: To what extent is elementary school students' after-school physical activity behavior related to expectancy value, interest motivation, and the fitness knowledge experienced in physical education classes? It was hypothesized that expectancy-value motivation, situational interest, and health-related fitness knowledge would positively predict school physical activity behavior.

Method

Participants

The participants were 293 third- (n = 91), fourth- (n = 113), and fifth-grade students (n = 89) from six elementary schools in a large metropolitan school district in an Eastern state of the United States. The mean age of participants was 9.47 years old (SD = 0.92), and both genders were evenly represented across the sample (boys = 146, 50%; girls = 147, 50%). The sample was ethnically diverse with 23% African American, 12% Asian, 29% Caucasian, 20% Hispanic, and 16% Other. The institutional review board approved the protocols of this study, and parental consent and participants' assent were received before data collection.

Variables and Instruments

Expectancy-Value Constructs. The Expectancy-Value Questionnaire (EVQ; Eccles & Wigfield, 1995) modified for elementary physical education was used to measure expectancy-value motivation. Expectancy belief was measured using five items on a 5-point Likert-type scale. An example is, “How well do you think you are in learning concepts in [physical education]?” (1 = *very poorly*, 5 = *very well*). Each of the four task values was measured using two items also on a 5-point Likert scale. For example, an item for the intrinsic value was, “How much do you like your [physical education] classes?” (1 = *don't like it at all*, 5 = *like it very much*). The EVQ has been validated previously using confirmatory factor analyses and has demonstrated satisfactory evidence for content and construct validity and internal reliability (Zhu, Sun, Chen, & Ennis, 2012).

Situational Interest. Situational interest motivation was measured using the Situational Interest Scale (SIS), which was previously validated in elementary school physical education (Sun et al., 2008). The SIS consists of fifteen 4-point Likert-type items that measure five sources of situational interest (i.e., novelty, challenge, attention demand, exploration, and instant enjoyment) and total interest. When responding to the SIS, participants were asked to think about the past 2 weeks of physical education classes and then appraise situational interest as delimited in the five sources. For example, an item that measures “attention demand” states: “My PE classes demanded me to pay_____.” The answer choices include (a) high attention, (b) some attention, (c) a little attention, and (d) no attention. Previous validation studies have shown sufficient evidence indicating sound construct validity and internal consistency reliability for the SIS (A. Chen et al., 1999; Sun et al., 2008).

Health-Related Fitness Knowledge. Health-related fitness knowledge learned in physical education was determined using a pre- and post-knowledge test procedure on a standardized written test. The questions in the test were grade-specific and aligned with the fitness content of physical education. The number of questions in each test ranged from 10 to 13 in a multiple-choice format. Each question had only one correct answer, and the percentage-correct score was computed to assess the level of knowledge mastery. The knowledge gain score was obtained by subtracting the pretest knowledge score from the posttest knowledge score. The test was validated using the known-group method. All questions for different grade levels had a difficulty index value of 50% (with a 10% range of variation) and a discrimination index value greater than 40%. An item for the fourth-grade test was constructed as follows:

> *You can control your heartbeat when exercising by adjusting exercise*_____.
> frequency intensity (correct answer) duration

After-school physical activity. The shortened Three-Day Physical Activity Recall (3DPAR) was used to measure after-school physical activity (Weston, Petosa, & Pate, 1997). While the original 3DPAR asks participants to recall 3 full days of activities, we shortened the instrument to measure physical activities during after-school hours only. The shortened 3DPAR instrument provided a grid divided into 15-min segments where participants recalled their activities that occurred from 3 p.m. to 10 p.m. The recalled activities were classified into seven categories: sport, fitness, other physical activity, academic/homework, rest, entertainment, and socialization. For each 15-min segment, the main activity that occupied the majority of the duration in the 15-min period was entered. The original 3DPAR instrument demonstrated acceptable concurrent validity and test–retest reliability in adolescents (Weston et al., 1997), and similar evidence has been shown in younger children (Trost, Ward, McGraw, & Pate, 1999). We believe the modification made in the present study (i.e., shorter duration of recall) enabled young children to recall and report their physical activity in a valid and reliable manner.

Procedures

Data collection took place in regular physical education classes. The data were collected by graduate and undergraduate students in kinesiology who received 3-day training on data collection techniques for this study. The participants were measured on the fitness knowledge test at the beginning and the end of a school semester, respectively. The questions and answer choices were read aloud, one by one, to the students, and then they circled their answers on the scannable test sheet. Students' questions about the testing procedures were addressed prior to the test. The EVQ and SIS were sequentially administered in the middle of the semester between the pre- and post-knowledge tests. Items in the instruments were read aloud to the participants to ensure full understanding. Lastly, the students were instructed on how to document and recall their after-school activity. They recalled their activity type and time on two regular weekdays and one weekend day. For all the measurements, the participants were instructed to respond independently and were assured that the responses would not be used for any purposes other than the study. Questions were encouraged and then addressed immediately by the data collectors. Data were organized and reduced according to specifications of the instruments for analysis. Specifically, students' responses to the eleven 5-point Likert items of the EVQ and the fifteen 4-point Likert-type items of the SIS were summed up and then averaged by the dimensions of the

constructs. After-school activity data were recoded into minutes of sports, fitness, and other physical activities, and the coded minutes were averaged across the 3 days to represent the overall after-school physical activity.

Data Analysis

First, descriptive analysis was conducted for the entire sample. Second, to determine the role that motivation and knowledge played in after-school physical activity, simultaneous multiple regression analyses were used with after-school physical activity time as the dependent variable and situational interest (i.e., novelty, challenge, attention demand, exploration, and instant enjoyment), expectancy-value constructs (i.e., expectancy belief, attainment value, intrinsic value), and fitness knowledge as the predictors.

Table 1. Descriptive Results of the Variables

	Overall				
Variables	**N**	**M**	**SD**	**Skewness**	**Kurtosis**
Total ASPA	293	73.72	71.91	0.98	0.46
Sports	293	38.24	55.38	1.45	1.28
Fitness	293	28.57	44.10	2.69	11.10
Other PA	293	6.91	22.36	5.04	29.35
Academics	293	88.11	60.64	0.97	0.83
Resting	293	104.39	56.04	0.63	0.50
Entertainment	293	116.47	82.98	0.74	0.13
Socializing	293	37.32	49.60	2.44	8.48
Attention Demand	255	3.51	0.52	− 1.13	1.59
Challenge	251	2.74	0.68	− 0.45	− 0.10
Exploration	262	2.92	0.63	− 0.36	− 0.29
Instant Enjoyment	263	3.53	0.54	− 1.12	1.24
Novelty	254	3.12	0.64	− 0.65	0.10
Total Interest	261	3.52	0.61	− 1.48	2.17
Expectancy Belief	254	4.13	0.75	− 1.14	1.33
Attainment Value	259	4.32	0.81	− 1.45	2.15
Intrinsic value	263	4.54	0.75	− 1.90	3.57
Utility Value	268	4.33	0.77	− 1.52	2.60
Knowledge	289	.60	.18	− 0.46	.04

Note. ASPA = after-school physical activity; PA = physical activity; *M* = mean; *SD* = standard deviation.

Results

Table 1 illustrates the descriptive results of the motivation and activity variables. Descriptive analysis revealed that on average, the students spent about 74 min per day on sport, fitness, and other physical activities during their after-school time (3 p.m.–10 p.m.). Correlation coefficients are presented in Table 2, and the interpretation of the coefficients followed Zhu's (2012) absolute criteria (i.e., no correlation, $r = 0–.19$; low correlation, $r = .20–.39$; moderate correlation, $r = .40–.59$; moderately high correlation, $r = .60–.79$; high correlation, $r \geq .80$).

Situational interest and expectancy-value motivation constructs demonstrated low to moderately high positive correlation coefficients to each other (*r* ranged from .22 to .77). Of all, expectancy belief did not correlate with challenge (*r* = .07) and exploration (*r* = .12). Exploration, expectancy belief, and intrinsic value had a 0 to low-positive correlation with after-school physical activity (*r* ranged from .17 to .19). Attention demand (*r* = .20) and utility value (*r* = .17) had 0 to low -positive correlations with fitness knowledge.

Table 2. The Correlation Coefficients Between Variables

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Physical activity	1	—	—	—	—	—	—	—	—	—	—
2. Attention	.03	1	—	—	—	—	—	—	—	—	—
3. Challenge	.01	.35	1	—	—	—	—	—	—	—	—
4. Exploration	.18	.56	.42	1	—	—	—	—	—	—	—
5. Total interest	.08	.60	.24	.39	1	—	—	—	—	—	—
6. Instant enjoyment	.04	.59	.17	.34	.77	1	—	—	—	—	—
7. Novelty	.14	.42	.27	.45	.60	.47	1	—	—	—	—
8. Expectancy belief	.19	.30	.07	.12	.42	.42	.28	1	—	—	—
9. Attainment value	.09	.34	.17	.29	.31	.28	.22	.33	1	—	—
10. Intrinsic value	.17	.45	.16	.27	.62	.60	.35	.49	.42	1	—
11. Utility value	.11	.42	.31	.37	.39	.27	.28	.48	.49	.52	1
12. Knowledge	− .05	.20	.11	.08	.06	.09	.05	.06	.07	.09	.17

Note. Zhu's (2012) absolute criteria were adopted for interpreting the magnitude of correlation coefficients: no correlation, *r* = 0–.19; low correlation, *r* = .20–.39; moderate correlation, *r* = .40–.59; moderately high correlation, *r* = .60–.79; high correlation, *r* ≥ .80.

Table 3. Multiple Regression Results

	DV: After-School Physical Activity Time (in minutes)				
Predictors	**b**	**SE**	**β**	**t**	**p**
Intercept	17.23	50.16		0.34	.73
Knowledge	− 20.61	33.35	− .05	− 0.62	.54
Attention Demand	− 18.01	15.85	− .13	− 1.14	.26
Challenge	− 5.88	8.88	− .06	− 0.66	.51
Exploration	28.33	11.00	.25	2.58	.01
Total Interest	− 7.88	17.34	− .06	− 0.46	.65
Instant Enjoyment	− 20.33	18.13	− .14	− 1.12	.26
Novelty	9.95	10.78	.09	0.92	.36
Expectancy Beliefs	18.77	8.70	.20	2.16	.03
Attainment Value	− 0.88	8.32	− .01	− 0.11	.92
Intrinsic Value	20.90	11.06	.21	1.89	.06
Utility Value	− 6.85	10.94	− .07	− 0.63	.53

Note. DV = dependent variable.

Lastly, the simultaneous multiple regression analysis demonstrated, as reported in Table 3, that exploration demand (β = .25, *t* = 2.58, *p* = .01) perceived in the physical education classes and students' expectancy beliefs (β = .20, *t* = 2.16, *p* = .03) were the only two significant predictors

for after-school physical activity time. In total, the variables accounted for only 11.2% of the variance in after-school physical activities.

Discussion

This study examined the extent to which elementary school students' after-school physical activity behavior was positively related to expectancy value, interest motivation, and fitness knowledge in physical education. The students demonstrated relatively high levels of motivation. The research hypothesis was partially confirmed in that only expectancy beliefs and exploration intention were positively related to after-school physical activity levels. The findings are discussed in the next section.

Motivation in Physical Education and After-School Physical Activity

The high mean levels for the two motivation measures resonate with S. Chen et al.'s (2012) conclusion that students are motivated in physical education. The results indicate that the young students were mostly motivated by interest-based factors such as intrinsic value and total interest, the two similar constructs from expectancy-value theory and interest theory. This finding illustrates that young children in elementary schools tend to be intuitive learners who are attracted and mesmerized by enjoyable appealing effects in activities or learning experiences.

Despite the high motivation, only two constructs (i.e., expectancy beliefs and exploration intention) demonstrated a statistically significant prediction to students' after-school physical activity participation. Although it has been reported that expectancy belief in physical education can predict performance in physical activity domains (e.g., S. Chen & Chen, 2012; Ding et al., 2013; Xiang et al., 2004), little is known about the relationship between expectancy belief in physical education and after-school physical activity behavior. The data from this study clearly indicated a positive association between expectancy belief in physical education and after-school physical activity, which illustrates that expectancy belief in physical education is an important source of motivation for voluntary physical activity behavior during leisure time. According to Eccles and Wigfield (1995), expectancy belief is learners' expectancies for success. It is among the strongest predictors of achievement and performance across domains (Eccles & Wigfield, 1995; Gao, Lee, & Harrison, 2008). Expectancy belief is often developed through nurturing positive perception of control and competence (Schunk & Zimmerman, 2006). In addition, previous research has shown that perceived competence (Wallhead & Buckworth, 2004) and perceived control (Ennis et al., 1999) were among the strongest correlates of youth physical activity behavior. The expectancy belief derived from and nurtured with perceived competence and control in physical education tends to be internalized and then would be carried over to function during after-school hours. The point of view is plausible because previous research has shown that motivation, when nurtured in class, could be transferred to motivation for activities in leisure time and can exert individuals' intention, effort, and persistence in related behavior (Cox et al., 2008; Yli-Piipari et al., 2012). Hence, students' expectancy belief nurtured in physical education may be positively extended to the development of competence and control in the physical activity context outside of physical education. The increased levels of competence (e.g., skills) and control, in turn, would further enhance students' expectancy beliefs and physical activity level.

Children in physical education are often motivated by opportunities to explore. As a dimension of situational interest, exploration intention in a given situation motivates them to become persistent in solving a problem, understanding a movement skill, and continuing a performance. In this study, exploration intention was the only component of situational interest in physical education included in the regression as a statistically significant predictor for after-school physical activity. This finding suggests that when physical education classes provide ample opportunities for young children to actively explore or discover physical activity tasks, motivation energy derived from such explorations would be translated to their after-school behavior. On the contrary, if there is little to explore in physical education, they may not connect what was taught in physical education with their lived experiences during after-school time. Ennis (2008) reported that when students engaged in a discovery type of physical activity with many exploration options in physical education, not only did they value the activities, but they started making connections with their daily lives.

Meanwhile, this study did not identify any statistically significant association between other motivation variables (i.e., task values and other situational motivation sources) and after-school physical activity. This finding suggests that although the students recognized the values of the learning tasks and perceived the experiences as interesting, the instigated motivation in physical education was temporary in effect or at least had remote relevancy to their physical activity behavior during after-school hours or leisure time. Previous research (Xiang et al., 2004) has identified a positive association between fourth-grade students' task values and intention for future participation in running. However, intention is nonequivalent to behavior; the long-term effect of these motivation constructs on learners' behavior has rarely been explored at the elementary school level. Having studied ninth-grade students, S. Chen and Chen (2012) identified a null association between students' perception of task values and their after-school physical activity level. They also identified that cost (e.g., negative perceptions or experiences) perceived in physical education appeared to have a negative impact on students' afterschool physical activity participation. The finding seems to be aligned with those from other studies that context-elicited motivation (e.g., novelty, attention demand) tend to have only a short-lived effect on learning and behavior (Shen, et al., 2003; Zhu et al., 2009). Recently, in a longitudinal study, Yli-Piipari, Jaakkola, Liukkonen, and Nurmi (2013) identified that an increase physical activity is related to increases in both task values and expectancy values over time. Therefore, despite the short-lived effect of many context-elicited motivators, it is believed that sustained instructional efforts aimed at promoting students' motivation are important to optimize these motivational effects toward physical activity promotion.

Health-Related Fitness Knowledge and After-School Physical Activity

It is also important to note that the students had a low–to-moderate performance on the health-related fitness knowledge test. This result supports the conclusion that elementary school children have inadequate knowledge of health and physical activity (Brusseau et al., 2011; Zhu et al., 2009), and this indicates an area for potential growth in learning in physical education. The current study results challenge physical educators to prioritize and balance learning goals to foster “physically literate persons” (SHAPE America, 2014). Previous research shows that learning in physical education has been measured with questionable parameters that have been

criticized as not defensible achievement measures such as participation, effort, attitude, and dressing out (Morrow, Jackson, Disch, & Mood, 2011). Many, if not all of these parameters are non-competence-based learning outcomes, which do not lead to tangible changes in knowledge, skills, and behaviors that are necessary for healthful living (S. Chen et al., 2012). To battle this reality, physical education teacher education programs ought to convince future physical educators of the importance of healthful-living knowledge as well as other competence-based learning achievements (S. Chen et al., 2012). Physical educators would be more willing to teach this body of knowledge only when they have internalized that knowledge is inherently associated with the intention and ability to make decisions and solve problems for better performance and well-being (Ennis, 2007).

Voluntary physical activity is determined by multiple factors. Ennis (2007) argued that educators should improve students' health-related knowledge about physical activity to help develop and sustain children's rational voluntary participation in regular physical activities. Elementary school students in this study answered a mere 60% of questions correctly on the knowledge test. The students' insufficient knowledge about health-related fitness is a matter of concern and needs to be addressed with purposeful instruction. Welk (1999) proposed the youth physical activity promotion model, a comprehensive model woven by predisposing factors, enabling factors, and reinforcing factors of physical activity promotion. It is believed that when a well-grounded understanding about fitness knowledge is lacking, students may not be able to use it as an enabling factor for physical activity participation. Additionally, health research has suggested that enhancement of knowledge can lead to increased understanding of a specific behavior and a higher level of self-regulation. Engagement in self-regulation skills and abilities, in turn, will enhance self-management behaviors (Ryan & Deci, 2009). Therefore, physical educators are recommended to teach and strengthen students' health-related knowledge (e.g., fitness knowledge) as an enabling factor for youth physical activity promotion. A strong perception of competence for participating in physical activity is pivotal for the well-being of youth (Wallhead & Buckworth, 2004). A higher-order, relational understanding of healthful-living knowledge appears to be such a type of competence underlying voluntary physical activity participation (S. Chen et al., 2012).

What Does This Article Add?

This study generated new knowledge in motivation and learning research in physical education and physical activity settings. First, the study was guided by the perspectives of the expectancy-value theory and the interest theory, two major motivation theories being applied in physical education (S. Chen et al., 2012). The perspectives took into consideration both students' dispositional motivation and situational motivation and allowed for a thorough examination of learners' motivation. Overall, the results suggest that teachers design tasks that require not only physical engagement, but also higher-order cognitive processes demanding active exploration. In addition, teachers need to provide more successful and controllable experiences for students to enhance their expectancy-related beliefs. These instructional efforts may encourage students to participate in physical activities during after-school hours and therefore lead to a healthy lifestyle. However, the current findings should be interpreted with limitations. First, the motivation and learning variables only accounted for 11% of the variance in children's after-school physical activity. Although this study determined the influential impact of exploration and

expectancy beliefs, other researchers have also identified other motivation constructs that may also facilitate physical activity behavior (Hagger et al., 2005; Wallhead et al., 2010; Welk, 1999). The marginal amount of variance explained by the two motivation variables could also relate to the fact that the motivation instigated during class time tends to stay in the physical education context. After-school physical activity would be mostly driven by the motivation instigated in the specific contexts during after-school hours. Second, the study is also limited in that the fitness knowledge achievement (measured by the pencil-and-paper-based test) was the only achievement variable measured in physical education. Students' other aspects of cognitive learning achievement warrant further research inquiries. Third, the after-school physical activity was measured by the shortened 3DPAR, a self-report measure. Although there is no evidence from the data collected in this study that suggests validity and reliability concerns with the measure, caution should be taken regarding the data objectivity. Objective measures (e.g., accelerometers) would yield more accurate data. Taken together, the findings of this study suggest future research and practice (a) offer interesting learning experiences to develop and maintain young children's motivation, and (b) emphasize deliberate education on healthful-living knowledge that is highly relevant to students' voluntary physical activity participation.

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