

RESEARCH ARTICLE

Elementary Physical Education: Cost is Personal and Social

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Abstract

Background

Although expectancy-value models of motivation have been applied to understanding children's physical activity in a variety of contexts, the construct of cost has received relatively less attention. In the present study, perceived cost for engaging in mandatory physical education (P.E.) classes is explored. In particular, we examine different dimensions to cost as well as how cost may be related to children's competence beliefs and values, perceived autonomy-support, and P.E. engagement.

Methods

Two hundred fifty-eight fifth-graders were surveyed in their P.E. classes. Children responded to items assessing cost, competence beliefs, intrinsic value, and attainment value for P.E., as well as perceived autonomy-support of the P.E. teacher.

Results

Two distinct types of cost were identified through factor analysis: personal discomfort cost and social cost. Personal discomfort cost was negatively related to competence beliefs and values, engagement in P.E., and perceived autonomy-support.

Conclusions

Perceived cost appears to be a useful way to understand why some children may be less engaged in P.E. classes. P.E. teachers may be able to mitigate cost by engaging in tactics that are autonomy-supportive in nature, such as providing children with choices and rationales for activities.

Keywords: Motivation; Autonomy; Physical activity; Physical education; Expectancy-Value Theory; Cost

1 BACKGROUND

In the United States, physical education (P.E.) classes are an integral part of the elementary school experience. P.E. classes can serve as a way to improve physical activity as well as instill habits related to desirable health outcomes outside the classroom. P.E. teachers play a critical role in shaping children's motivation to be physically active.

Expectancy-value models of motivation have been successfully utilized to explain motivation to engage in physical activity (e.g., Eccles & Harold, 1991; Xiang, McBride, Guan, & Solomon, 2003). In this framework, individuals' expectancies, or expectations for success, and task values impact both the tasks they choose to engage in as well as the quality of that engagement. There are four types of task values: attainment, utility, and intrinsic value, and cost (Wigfield & Eccles, 2000). In the context of P.E. class, expectancies might be understood in terms of children's beliefs about how well they can perform various skills, such as run a mile or play kickball. Attainment value would be the child's sense of the importance of P.E. class, utility value how useful she considers what she is learning in P.E., and intrinsic value the enjoyment of P.E. activities. Cost, on the other hand, would be what is negatively experienced by engaging in P.E. For example, participating in P.E. might entail physical cost, such as becoming sweaty or fatigued, and/or psychological cost, such as potential embarrassment for failing to perform at a desired level.

Many studies employing an expectancy-value paradigm have omitted

cost when exploring task values. However, a number of studies have demonstrated that cost is important to consider. For example, Watkinson, Dwyer, and Nielsen (2005) found that children offered cost-related reasons for avoiding certain activities at recess. Similarly, Xiang, McBride, and Bruene (2006) reported that children cited cost as reasons for disliking a running program in school physical education classes. Outside of an expectancy-value paradigm, researchers have studied similar constructs such as barriers to exercising (e.g., Tergerson & King, 2002).

Chiang, Byrd, and Molin (2011) used an expectancy-value paradigm to investigate 3rd to 5th grade children's reasons for engaging in exercise. Factor analysis results indicated that, for this age group, all items assessing competence beliefs (or expectancies), perceived importance, and interest loaded onto a single factor while items assessing cost loaded onto a second factor. In other words, cost is an empirically distinct component of value. Furthermore, girls reported an increase in cost from 4th to 5th grade, whereas boys reported a decrease in cost for this same time period.

In the present study, an expectancy-value paradigm is applied to understanding children's motivation to engage in P.E. classes. Unlike the broad umbrella of exercise or physical activity, which can be optional for many children outside of school, P.E. is a mandatory part of the school experience. The component of cost was specifically examined in terms of motivation to participate in P.E.

2 METHODS

2.1 Participants

Participants in this study were 5th grade children and their Physical Education (P.E.) teachers. Children were drawn from five elementary schools in a single school district in western North Carolina. A total of 258 children participated in the study. Children ranged in age from 10 to 12 ($M = 10.68$, $SD = .56$). Approximately half of the children were male. About 54% of the children reported being White, 28% Black, 1% Asian, 4% Native American, and 7% reported being more than one race. The remaining children did not report race.

Each elementary school had a single P.E. teacher. Teachers ranged in age from 27 to 57. Four teachers were male and one female. Four teachers were White and one Black. Total years of experience as a P.E. teacher ranged from 3 to 27 years.

2.2 Instruments

The child questionnaire was comprised of two main sections: The first section is based on an expectancy-value theory of motivation, and the second draws from a self-determination paradigm.

2.2.1 Beliefs, values, and cost from expectancy-value theory. In this questionnaire, one item each assessed competence beliefs, intrinsic value, and attainment value for P.E. An additional eight items assessed children's cost for engaging in P.E. These items, developed for the purposes of this study, were written to reflect different types of cost (e.g., getting sweaty and uncomfortable; being disliked for doing something really well). Children responded to each item using a Likert-type scale from 1

to 5, with higher numbers indicating greater agreement with each item. Previous work investigating cost has utilized open-ended items, for instance asking respondents what they disliked about P.E. (e.g., Chen & Chen, 2012; Gråstén, 2016.).

2.2.2 Perceived autonomy-support from self-determination theory. The three items in this section assessed the perceived autonomy-support of the P.E. teacher. These items were modeled from the *Sport Climate Questionnaire (SCQ)*. Children responded to each item using a Likert-type scale from 1 to 5, with higher numbers indicating greater perceived autonomy-support.

A self-determination paradigm of motivation posits that motivation can be broadly characterized as either more autonomous or more controlled in nature. Generally speaking, more autonomous regulation is associated with desirable outcomes such as persistence (Vallerand & Bissonnette, 1992), effort expenditure, enjoyment of school (Ryan & Connell, 1989), and higher levels of conceptual learning (Grolnick & Ryan, 1987). With regard to teaching styles, it has been proposed that certain tactics promote autonomy whereas others are perceived as controlling. Specifically, allowing students to have choice and providing rationales for lessons promote autonomy (Niemic & Ryan, 2009). In contrast, controlling tactics pressure students to engage by, for example, offering rewards, promoting competition, or emphasizing deadlines (Ryan & Deci, 2000).

While it is possible to directly assess teachers' autonomy orientations by administering them questionnaires (e.g., Deci, Schwartz, Sheinman, & Ryan, 1981),

another avenue focuses on student perceptions of the teacher's level of autonomy-support. Research in this area has indicated that student perceptions are in fact related to teachers' self-reported autonomy orientations (Deci et al., 1981). Furthermore, perceptions of the teacher and classroom climate as being more autonomy-supportive as opposed to controlling has been linked to student outcomes such as perceived competence, motivation, and self-esteem (Ryan & Grolnick, 1986). In the P.E. context specifically, studies have demonstrated that P.E. teachers' motivational orientations are related to student outcomes (e.g., Wadsworth, Robinson, Rudisill, & Gell, 2013), and that student perceptions of P.E. teachers' autonomy-support are related to student motivation (Hagger et al., 2009; Standage, Duda, & Ntoumanis, 2006). Furthermore, cross-cultural comparisons have indicated that the relationship between P.E. teacher and student motivation exists across different countries (Hagger et al., 2009).

2.3 Procedure

Children were surveyed during their P.E. classes in a single administration that lasted approximately 15-20 minutes. At three of the schools, children completed questionnaires on paper. At the two remaining schools, children completed questionnaires on computers using an online data collection tool (surveymonkey.com), at the request of the school administration for children to utilize the school computer labs. The computer and paper questionnaires were identical in content.

2.4 Data Analysis

An exploratory factor analysis (EFA) was first performed to examine the dimensionality of the items created to assess cost in this study. Based on the results of the EFA, composite scores were computed for each dimension of cost. Correlations were computed to investigate the relationships among the variables of interest, and analyses of variance (ANOVAs) were performed to examine differences by school and by gender.

3 RESULTS

At each of the five elementary schools, P.E. teachers reported that children met for P.E. class one day each week, from 40 to 50 minutes.

3.1 Children's cost of engaging in P.E.

An exploratory factor analysis (EFA) was performed to examine the dimensionality of the eight items to assess cost. Factors were extracted with principal axis factors and rotated using a Promax rotation. The main consideration in analyzing the factor structure was an identifiable factor structure with clear loadings (i.e., simple structure; Tabachnick & Fidell, 2007).

Results indicated that a two-factor solution fit the model and that five of the original eight items should be retained. The factor structure was as follows:

1. **Factor 1:** Physical and emotional discomfort associated with engaging in P.E. activities
 - a. Do you worry about getting sweaty and uncomfortable?
 - b. Do you worry about not being good at the activity?

2. **Factor 2:** Concern with social approval and competition

- a. Do you worry about being disliked if you do something really well?
- b. Do you worry about what other students will think of you if you really like the activity?
- c. Do you worry about other kids being too competitive?

All item loadings were .40 or above, and no items cross-loaded onto the two factors. The factors had a correlation of .56. Based on the items, Factor 1 was named *personal discomfort cost* and Factor 2 *social cost*.

For each participant, the items in each factor were averaged to create a composite score for that factor. Along a scale of 1 to 5, with 5 indicating higher cost, across the five schools, average *personal discomfort cost* was 1.91 ($SD = .88$), and average *social cost* was 1.76 ($SD = .78$).

To examine whether perceived cost differed by school, a one-way analysis of variance (ANOVA) was performed for each type of cost. Results indicated no differences in personal discomfort cost, $F(4, 251) = 0.44$, $p = .77$, and marginal differences in social cost, $F(4, 251) = 2.01$, $p = .09$. Follow-up tests were conducted using the Dunnett procedure, as Levene's test for the equality of error variances was significant. Results indicated differences between School 2 and School 5, with School 5's students reporting

higher average social cost. Table 1 displays average cost by school.

3.2 Beliefs and values

The three items assessing competence beliefs, intrinsic value, and attainment value for P.E. were averaged to create a single score for each participant. Combining these items into a single value has been standard practice in similar studies, given evidence that these types of items tend to load onto a single factor when factor analyzed (see Chiang *et al.*, 2011). Across all schools, average beliefs and values was 4.46 ($SD = .61$). Correlations were computed between each type of cost and beliefs and values. Results indicated that beliefs and values correlated negatively with personal discomfort cost, $r = -.34$, $p < .001$, but was unrelated to social cost. Furthermore, the two types of cost were positively associated, $r = .32$, $p < .001$.

A one-way ANOVA was performed to examine differences in beliefs and values by school. Results indicated differences by school, $F(4, 252) = 2.68$, $p < .05$. As Levene's test for the equality of error variances was significant, follow-up tests were performed using the Dunnett procedure. Results indicated that School 3 and School 5 had significant differences in the levels of beliefs and values, with School 3's students reporting lower average beliefs and values. Table 1 displays average beliefs and values by school.

Table 1: Average Reported Cost and Beliefs/Values by School

School	<i>n</i>	Cost (Discomfort) <i>M (SD)</i>	Cost (Social) <i>M (SD)</i>	Beliefs and Values <i>M (SD)</i>
1	59	1.86 (.82)	1.69 (.76)	4.50 (.58)
2	54	1.82 (.76)	1.60 (.57)	4.56 (.51)
3	41	2.01 (.88)	1.81 (.76)	4.19 (.85)
4	41	1.88 (.86)	1.68 (.73)	4.51 (.60)
5	61	1.98 (1.04)	1.98 (.95)	4.50 (.61)

3.3 Gender differences in cost and beliefs and values

Three ANOVAs were performed to examine whether there were gender differences in each type of cost and beliefs and values by school.

With regard to personal discomfort cost, the overall model was not significant, $F(13, 242) = 1.49, p = .122$, though the gender*school interaction was marginally significant, $F(7, 242) = 1.92, p = .07$. Girls reported higher average personal discomfort cost in three schools, Schools 1, 2, and 4. In School 5, boys reported higher average personal discomfort cost.

With regard to social cost, the overall model indicated differences, $F(13, 242) = 1.75, p = .05$, with a marginally significant gender*school interaction, $F(7, 242) = 1.70, p = .11$. At Schools 1 and 2, girls reported

higher average social cost. At the remaining schools, Schools 3, 4, and 5, boys reported higher average social cost. Table 2 displays average cost by gender by school.

With regard to beliefs and values, the overall model was significant, $F(13, 243) = 2.47, p < .01$. The main effect of gender was significant, $F(2, 243) = 3.02, p = .05$, as was the gender*school interaction, $F(7, 243) = 2.14, p < .05$. Across all schools, boys reported higher beliefs and values ($M = 4.54, SD = .56$) compared to girls ($M = 4.37, SD = .66$). With regard to the gender*school interaction, boys reported higher beliefs and values at Schools 1, 3, and 5, with the largest discrepancy seen at School 3. Girls reported higher average beliefs and values at School 2. At School 4, boys and girls reported very similar levels of beliefs/values.

Table 2: Average Reported Cost and Beliefs/Values by Gender by School

School	Cost (Discomfort)		Cost (Social)		Beliefs and Values	
	Boys <i>M (SD)</i>	Girls <i>M (SD)</i>	Boys <i>M (SD)</i>	Girls <i>M (SD)</i>	Boys <i>M (SD)</i>	Girls <i>M (SD)</i>
1	1.52 (.59)	2.29 (.87)	1.56 (.74)	1.85 (.76)	4.68 (.49)	4.28 (.62)
2	1.76 (.64)	1.88 (.86)	1.43 (.51)	1.72 (.59)	4.49 (.57)	4.67 (.36)
3	1.98 (.92)	2.00 (.83)	1.96 (.87)	1.61 (.57)	4.46 (.62)	3.82 (1.01)
4	1.85 (.90)	2.00 (.87)	1.78 (.80)	1.56 (.66)	4.48 (.69)	4.52 (.56)
5	2.16 (1.19)	1.93 (.91)	2.19 (1.08)	1.71 (.82)	4.56 (.44)	4.44 (.47)

3.4 Perceived autonomy-support of P.E. teachers

The three items assessing student perceived autonomy-support of the P.E. teacher were averaged to create a composite score for each child. Across the five schools, average perceived autonomy-support was 4.40 ($SD = .66$). Table 3 displays average perceived autonomy-support by school.

Correlations were computed between perceived autonomy support and both types of cost as well as beliefs and values. Results indicated perceived autonomy support was positively associated with beliefs and values, $r = .52$, $p < .001$, and negatively associated with personal discomfort cost, $r = -.20$, $p < .01$.

One way ANOVAs were performed to examine whether perceived autonomy-support varied due to gender or a gender*school interaction. Results indicated no effect of gender or a gender*school interaction. Another ANOVA was performed to examine differences in perceived autonomy-support due to school. Results indicated differences, $F(4, 250) = 8.67$, $p < .001$. As Levene's test for the equality of error variances was significant, follow-up tests were conducted using the Dunnett procedure. Results indicated differences between School 3 and 5, with School 3's students reporting lower average perceived autonomy-support.

Table 3: Average Perceived Autonomy-Support by School

School	<i>n</i>	Autonomy-Support
1	59	4.47 (.60)
2	53	4.51 (.53)
3	41	3.88 (.86)
4	41	4.54 (.56)
5	61	4.51 (.57)

3.5 Levels of engagement, beliefs and values, and cost

Children rated their level of activity in P.E. by responding to a single Likert-type scale ranging from 1 (*not at all active*) to 5 (*extremely active*). P.E. teachers also rated each student using a similar scale. Although neither is a perfect measure of the child's activity level, these ratings provide some information on the child's engagement in P.E. activities.

To investigate the relationship between activity level and beliefs and values, personal discomfort cost, and social cost, correlations were computed between these variables and children's self-ratings as well as P.E. teacher ratings.

Children's self-ratings correlated positively with beliefs and values, $r = .50$, $p < .001$, and negatively with personal discomfort cost, $r = -.19$, $p < .01$. P.E. teachers' ratings correlated positively with beliefs and values, $r = .18$, $p < .01$, and negatively with personal discomfort cost, $r = -.20$, $p < .01$. Neither child self-ratings nor teacher ratings were related to social cost.

Additional correlations were computed to examine gender differences in the relationships between ratings and student beliefs and cost. In terms of child self-ratings, both boys' ratings ($r = .56$, $p < .001$) and girls' ratings ($r = .46$, $p < .001$) were related positively to their beliefs and values. In terms of teacher ratings, however, results indicated a positive correlation between teacher ratings and boys' beliefs and values, $r = .26$, $p < .01$, and a negative relationship between teacher ratings and boys' personal discomfort cost, $r = -.26$, $p < .01$. However, there were no

relationships between teacher ratings and girls' beliefs/values or cost.

4 DISCUSSION

The primary purpose of this study was to examine children's perceptions of the cost of engaging in P.E. class. Generally speaking, cost is what might be negatively experienced if one engages in an activity. Higher levels of perceived cost, then, may deter an individual from participation.

We explored various types of cost in this study. Results suggest there are two distinct dimensions to cost. Namely, fifth-graders distinguish between cost that is related to personal discomfort vs. cost that is socially situated. Personal discomfort cost can be either physical or psychological in nature. Social cost, on the other hand, refers to the perceptions and pressures of others. Children who reported higher levels of one type of cost (i.e., associated with discomfort) were also likely to report higher levels of the other type of cost (i.e., associated with social approval and competition). This suggests that children with one reason to avoid engaging in P.E. may be apt to find other reasons as well.

In the present sample, children across schools reported similar levels of cost associated with personal discomfort. This is unsurprising given that the P.E. curriculum was standard across the elementary schools in this district, and therefore requirements and expectations were similar for all the 5th graders. Across the schools, however, there were marginal differences in children's concern with social approval and competition. Although these differences were small, they suggest that class climate may

contribute to social approval and competition being more or less salient.

In expectancy-value models of motivation, higher levels of competence beliefs, intrinsic value, and attainment value are generally associated with positive outcomes. Namely, children who believe themselves capable and regard activities as enjoyable and important are more likely to engage in positive ways. In the present study, children with higher levels of competence beliefs and values for engaging in P.E. also reported lower levels of personal discomfort cost. However, competence beliefs and values were not related to social cost. Altogether, these findings suggest that a more positive outlook on P.E. can translate into children focusing less on potential discomfort. At the same time, cultivating this positive outlook may have no bearing on perceived social costs.

In this study, we also investigated the construct of perceived autonomy-support, which draws from self-determination theory. Positive outcomes are associated with higher levels of autonomy-support. Here, children who viewed their P.E. teacher as more autonomy-supportive also reported higher levels of beliefs and values and lower levels of personal discomfort cost. Social cost, on the other hand, was unrelated to perceived autonomy-support. Teachers may be able to shape children's motivation to engage in P.E. by teaching in ways that are perceived as autonomy-supportive rather than controlling. At the same time, levels of perceived autonomy-support may be unrelated to children's concerns about social approval and competition, as these may be more a function

of peer relationships than teacher relationships.

At the outset of this study, it was expected that girls would consistently report higher levels of cost and lower levels of beliefs and values compared to boys. However, results revealed effects by school. At certain schools, girls reported higher social cost than boys, whereas at other schools, boys reported higher social cost. In terms of beliefs and values, there were also effects by school. At all schools but one, boys reported higher beliefs and values compared to girls. At the single school in which girls reported higher average beliefs and values, there was a female rather than male P.E. teacher. Although comparing male vs. female P.E. teachers was beyond the scope of this study, it is possible that girls may particularly benefit from having a female P.E. teacher.

Finally, to examine whether actual engagement in P.E. varied as a function of children's perceived costs and beliefs and values, both children and P.E. teachers rated the child's level of participation in P.E. With regard to the child's self-ratings, results indicated that children who rated themselves as more competent and with greater values also rated themselves as more active in P.E. By contrast, children reporting greater levels of personal discomfort cost rated themselves as less active in P.E. As for teacher ratings, an interesting finding emerged: Teacher ratings of engagement were positively related to reported beliefs and values and negatively related to personal discomfort cost for boys but not girls. This somewhat puzzling finding suggests that teachers might be particularly aware of boys' activity level and failure to participate compared to that of girls.

5 Limitations

One potential limitation in this study was the use of self-reports. Children may have been sensitive to social desirability and responded to items to present themselves more positively or to please others. In addition, to assess participation in P.E., we had children and P.E. teachers rate the child's activity level. Using more objective tools such as pedometers, heart-rate monitors, or accelerometers may have yielded more accurate results (e.g., Sylvia, Bernstein, Hubbard, Keating, & Anderson, 2014).

Another possible limitation is that additional dimensions of cost may exist beyond the ones identified in the present study. We used a total of eight items to explore types of cost. Given additional items, it is possible that other types of cost may have emerged. Finally, it is worth noting that the types of cost identified here may not apply to all children throughout the K-12 years of schooling. Fifth-graders, who are typically aged ten to twelve, are at a unique developmental time period in terms of puberty. Children of this age show substantial variation in their progress through puberty, both in timing and tempo. It is possible that children may perceive costs differently prior to or following the completion of puberty.

6 Conclusions

As a staple part of the elementary school experience, P.E. classes serve multiple functions such as teaching specific skills and communicating information and value for healthy living habits. Given that children may vary on their level of engagement in P.E., it is important to identify reasons for lack of engagement. As a

construct, cost has been under-researched and often omitted from studies utilizing an expectancy-value paradigm (e.g., Chiang *et al.*, 2011; Flake, Barron, Hulleman, McCoach, & Welsh, 2015). The present study provides evidence that there are distinct types of cost, and that cost is related to other variables such as competence beliefs and values of success, as well as perceptions of the teacher's level of autonomy-support. Altogether, the present study can offer multiple avenues for supporting motivation to engage in P.E.

Given the evidence that personal discomfort cost and social cost are distinct, P.E. teachers potentially have multiple avenues for intervention. In other words, when children fail to engage, teachers can attempt to mitigate one type of cost and if unsuccessful, teachers can address another type of cost. For example, if children balk at engaging in a fun run in the hot sun, the teacher might hold the run inside an air-conditioned gym. If children still fail to engage, the teacher could investigate whether children are hyper-focused on competition and out-performing one another.

At the same time, social costs can be deterrents to engagement. Although some children respond favorably to competition, others express worry over peer comparisons. Some children may be concerned about being unable to perform as well as their peers. Other children can be fearful of being disliked or ridiculed for performing exceptionally well. Focusing on personal improvement over relative comparison may be helpful for these children.

Children who have higher levels of competence beliefs and values also report

lower levels of personal discomfort cost. Although direction of causality was beyond the scope of this study, this inverse relationship suggests three potential avenues for lowering children's perceived cost: (1) P.E. teachers can help build children's competence beliefs in P.E. by scaffolding skills and circling back to skills with an emphasis on improvement over time. (2) Teachers can raise intrinsic value of P.E. by, for instance, devising activities that are fun and emphasize life-long learning (e.g., Felton, Saunders, Ward, Dishman, Dowda, & Pate, 2005). (3) By explicitly communicating the importance of various P.E. activities, teachers can raise attainment value for not only P.E. but healthy habits in general.

Finally, P.E. teachers can help shape children's motivation to engage in P.E. by being autonomy-supportive. Some possible tactics include giving children choices as well as providing rationales for activities,

especially for less desirable or enjoyable activities. Teachers can also give children the opportunity to ask questions and set their own goals. Although individual children will vary in their motivation to engage in P.E., teachers might embrace a global orientation towards strategies that promote autonomy and mitigate cost.

Human Subjects Approval Statement

This study was approved by the University of North Carolina at Asheville's Institutional Review Board.

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