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Original article

Children's expectancy beliefs and subjective task values through two years of school-based program and associated links to physical education enjoyment and physical activity

Arto Gråstén

Department of Sport Sciences, University of Jyväskylä, Jyväskylä 40014, Finland

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Abstract

Purpose: The present study examined the patterns of children's expectancy beliefs and subjective task values through the Physical Activity as Civil Skill Program and associated links to physical education enjoyment and total physical activity.
Methods: The sample comprised 401 children aged 9–13 years from 3 small towns located in North-East Finland. All children received school-based activities across 2-year program from Grades 5 to 7. The present data were collected using questionnaires across 3 measurement phases during 2012–2014.
Results: The levels of expectancy beliefs and subjective task values indicated to be relatively high and the development was stable through the program, especially in terms of expectancy beliefs, attainment value, and cost. In contrast, interest value and utility value decreased over the particular period of time. Boys believed they are physically more competent when compared to other students and valued physical education classes more important than girls. In addition, the higher the physical activity level the children reported, the higher the physical education enjoyment they perceived.
Conclusion: The current program including actions to increase physical activity through manipulation of psychological and physical school environment modifications indicated to be an effective strategy to prohibit declining levels of children's expectancy beliefs and task values.

Keywords: Exercise motivation; Expectancy beliefs; Expectancy-value theory; Physical activity; Physical education enjoyment; Task values

1. Introduction

Physical inactivity (PA) levels are rising with major implication for general health and well-being of the population worldwide.[1] For instance, less than 40% of school-age children in Australia, Canada, Columbia, Finland, South-Africa, and the US meet the current PA guidelines.[2] Compared to other continents, Asian school-age youth show even lower physical activity levels.[3] A considerable proportion of daily PA for children can be provided through school physical education (PE) to meet the current recommendations at minimal additional cost to the community.[4] However, the objectives of PE[5] are challenging to achieve, if children are not motivated to participate actively in their PE classes.[6] Previous research has consistently shown that PE enjoyment is an essential element underlying exercise motivation for children and youth so as to maintain positive engagement in total PA[7–9] and physically active participation in PE.[10–12] To address this, the Physical Activity as Civil Skill Program 2010–2014 was implemented to prevent long-term effects of inactivity on children's well-being and health using PE as a means to increase their PE motivation and PA.[13] The expectancy-value approach provides a useful framework to envisage the link between children's PE motivation and achievement related behavior, such as PA engagement.[14–16] The present study examined the patterns of children's expectancy beliefs and subjective task values through the particular program, and associated links to PE enjoyment and total PA.

The expectancy–value theory addresses whether or not children desire to participate in an activity and how much effort they are prepared to put into the activity.[17,18] Thus, the theory consists of 2 major components, expectancy beliefs and subjective task values.[19] Precisely, the level of persistence and performance in

Peer review under responsibility of Shanghai University of Sport.
Email address: agrasten@jyu.fi

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the activity is determined by their beliefs about how well they will perform the activity and values they attach to the activity. Beliefs about ability are defined as an individual's beliefs about competence in performing or learning different achievement tasks and probability for success at a specific task. Subjective task values are defined as individuals' incentives for doing different tasks. Eccles et al.[17] have demonstrated that subjective task values are a function of 4 distinct components: attainment value, intrinsic value, utility value, and cost. Attainment value is defined as the importance to do well on a given task, and it incorporates identity issues as tasks are important when individuals view them as central to their own sense of themselves, and allow them to express or confirm important aspects of themselves.[17] Intrinsic value is similar to the self-determination theory's[20] intrinsic motivation, since enjoyment is gained from doing the task. When individuals value an activity intrinsically, they often become deeply engaged in it and can persist at it for a long time.[17,20] Utility value or usefulness refers to how a task fits into an individual's future plans, for instance, taking a PE class to fulfill a need for social interaction.[17] Thus, utility value is similar to the self-determination theory's[20] identified regulation, because doing an activity out of utility value, the activity is a means to an end rather than an end in itself. Utility value is also connected to personal goals and sense of self, and so has also some ties to intrinsic motivation.[20] Cost refers to what the individual has to give up to do a task, as well as the anticipated effort one will need to put into task completion.[17]

Gender differences have been found in terms of expectancy beliefs[15,21–23] and subjective task values, with boys scoring higher than girls.[15,17,21,24,25] In contrast, gender differences in task values have not been observed in some other studies.[22,26] For instance, according to a recent Finnish study, school-age girls were most likely to participate in gymnastics and dance classes, while boys tended to prefer ball games such as soccer, ice or floor ball.[27] In turn, Xiang et al.[22] concluded that girls and boys did not differ in their expectancy beliefs across the running program, because they viewed running as appropriate for both genders. Several researchers suggested that differences may be result of participation in gender appropriate activities, when expectancy beliefs and values increase as a result.[28,29] Therefore, gender differences have been found more regularly in gender preference activities, as girls and boys will often tend to value activities that they perceive as appropriate for their gender.[14]

Previous research has consistently revealed the decreasing pattern in school-related expectancy beliefs over time,[25,30,31] especially when children transfer from elementary to secondary school.[25,32] Considering the development of subjective task values, Eccles et al.[33] and Wigfield's research group[34] showed that children's PE related task values declined across the elementary school years. More recently, Yli-Piipari[25] reported that values in school PE sustained stable across Grades 6–9. In addition, Fredricks and Eccles[35] found that children's intrinsic value and attainment value in school sports decreased across school years from elementary to secondary school. At that age children meet remarkable changes in their lives. These changes include, for example, transitions to another school and transforms in their social and environmental networks. Based on previous findings, the transition from elementary to secondary school seems to be the most important period in regard to the development of expectancy beliefs and values. It is still unclear whether children's perceptions of expectancy beliefs and task values can be increased by promoting PE motivation across regular PE classes. The present study extends previous research by investigating the developmental trajectories of children's expectancy beliefs and subjective task values through 2 years of school-based program.

PE classes have been considered as potential functions to increase children's daily PA, according to the expectancy-value theory related studies.[15,16,22,26,36] For instance, Cox and Whaley[26] found that beliefs just as subjective task values were positively associated with students' effort and persistence in basketball classes. Additionally, the 1-mile run was strongly associated with attainment value in the elementary school running program study.[22] Gråstén et al.[15] found that attainment value was the strongest predictor of Finnish secondary school students' PA in PE classes. Similarly, expectancy beliefs had a positive impact on students' PA in the sample of U.S. Grade 9 students.[16] Yli-Piipari[25] reported that Finnish children aged 11–13 years, who highly valued PE classes, became more physically active across Grades 6–9. However, Pintrich[37] argued in his earlier paper that many expectancy-value models have focused on the role of expectancy beliefs and subjective task values, and their relation to future performance and achievement related choices, but have not examined how these variables might be related to goals. For instance, none of the reviewed publications examined the associations of expectancy beliefs, task values, and PE enjoyment, despite the fact that enjoyment represents a direct and substantial influence on children's PA participation.[38] This reinforces the potential for substantial methodological variation to be introduced in the literature. The current study presents the associations of expectancy beliefs, subjective task values, PE enjoyment, and total PA.

The aim of the current study was to examine the patterns of children's expectancy beliefs and subjective task values through the Physical Activity as Civil Skill Program and associated links to PE enjoyment and total PA. First, the developmental trajectories of expectancy beliefs and subjective task values were analyzed, assuming a stability or increase across the program.[25,30–32] Second, a structural model of expectancy beliefs, subjective task values, PE enjoyment, and PA was tested, expecting that beliefs and values would positively associate to enjoyment and PA.[15,16,22,26,36] The covariance effects of gender and school were also examined.

2. Materials and methods

2.1. Participants

The current sample comprised 401 children (211 girls, 190 boys) aged 9–13 years (11.85 ± 0.50 years, mean ± SD). Participants were recruited from 14 elementary schools of 3 small towns located in Northeast Finland. All students were invited to participate through direct contact with the school principals. The human participants' approval statement was obtained from the Ethics Committee of University of Jyväskylä and

written informed consent to participate in the study was obtained from all children and their parents. Participation in this study was voluntary and no extra credit was awarded for participation. The present data were collected using the whole-school approach through 3 measurement phases in April 2012 (T0, $n = 274$), April 2013 (T1, $n = 205$), and April 2014 (T2, $n = 164$). Children completed the questionnaires under the supervision of the teachers during 45 min classes, typically held in the classroom or gym. The participants were advised to ask for help if confused concerning either the instructions or the clarity of a particular item. To minimize tendency to give socially desirable responses, children were encouraged to answer honestly and were assured that their responses were confidential. Children were told that their involvement was voluntary and they were allowed to terminate their participation at any time. All children did not provide proper longitudinal data or were not willing to participate in the follow-up study. Those who provided complete data at least in one measurement point were included into the subsequent analyses. Therefore, the final data consisted of 401 children.

2.2. School-based program

The European Union funded Physical Activity as Civil Skill Program took place in Northeast Finland in 2010–2014.[13] The program was implemented to prevent long-term effects of inactivity for children's well-being and health. The program adopted the features of the expectancy-value theory[17] and the self-determination theory.[20] Specifically, the central assumption of the current program was that children's PE motivation related expectancy beliefs and subjective task values can be influenced by manipulating the psychological and physical school environment, which required changes in 2 different elements, psychological (e.g., attitudes, competence in PE classes) and physical environment (e.g., facilities, structures, and methods). The program involved teacher training, since teachers' actions play a crucial role in regard to promoting PA in children and youth. Teachers were given supplemental training to increase children's motivation, PE enjoyment, and PAs during the school days. The workshops and psychological modifications had the following main elements: (1) activating teaching practices (students work together within small cooperative group structure, students are responsible for setting up equipment, during class time students dictate the rate of progression through specific practices), (2) competence and expectancy belief support (evaluation emphasizes individual improvement, experiences of learning, and success), (3) improving students' personal skills (students choose practices from a range of offered practices with different skill requirements, more activity and less waiting during PE classes), and (4) positive feedback and encouragement (recognition and feedback is based on the individual progress).

The physical environment modifications consisted of the following actions: (1) extended break (daily extended break of 30 min in addition to the lunch break and regular breaks), (2) access to fitness hall (students were allowed to use fitness facilities during the extended and regular breaks in order to exercise or play games), (3) controlled ballgames (students were responsible for setting up ballgames and refereeing during extended breaks (i.e., 30 min × 5 days × 12 weeks) under the teachers' supervision), and (4) equipment supply (exercise equipment were available to all students during the extended and regular breaks, students were responsible for setting up equipment). All children of the current sample received school-based activities across 2 years of program from Grades 5 to 7 (2012–2014). More detailed information about the program was provided elsewhere.[21]

2.3. Measures

2.3.1. Expectancy beliefs and subjective task values

Self- and Task-Perception Questionnaire (STPQ), originally developed by Eccles et al.,[39] was used to measure expectancy beliefs and subjective task values in the context of PE. The scale was modified following procedures outlined by Xiang and research group[23] and to address the domain-specific questions for Finnish PE classes. The introduction preceding the items was "In the school's physical education classes". Beliefs about ability (e.g., How good in physical education classes are you?) and expectancies for success (e.g., How good would you be in physical education classes learning something new in this semester?) were used as a combination, similar to the one used by Xiang and group,[23] and more recently, Chen and Chen.[16] The attainment value (e.g., Compared with other school subjects, how important is it to you to be good in physical education classes?), intrinsic value (e.g., How much do you like physical education classes?), utility value (e.g., Compared with other school subjects, how useful is what you learn in physical education classes?), and cost (If you had a choice, would you come or rather not come to physical education classes?) dimensions were measured applying the procedures of Chen and Chen.[16] Responses were given on 5-point Likert-scales anchored by *totally disagree* (1) and *totally agree* (5). Gråstén[21] demonstrated acceptable overall model fit (the Tucker–Lewis index (TLI) = 0.96, the comparative fit index (CFI) = 0.97, the standardized root mean square residual (SRMR) = 0.072) and excellent composite reliability for expectancy beliefs (0.92), attainment value (0.97), intrinsic value (0.96), and utility value (0.99) in school PE among the sample of Finnish secondary school students.

2.3.2. PE enjoyment

Physical Education Enjoyment Scale,[40] which adopted the protocol of Sport Enjoyment Scale[41] into PE, was used to assess enjoyment in PE classes. The item stem was: "In my PE class". The subscale consists of 4 items: (1) "I like physical education classes", (2) "Physical education classes are fun", (3) "Physical education classes bring me joy", and (4) "I enjoy physical education classes". The responses were indicated on a 5-point Likert-scale ranging from *strongly disagree* (1) to *strongly agree* (5). Previously, the construct validity (TLI = 1.00, CFI = 1.00, root mean square error of approximation, RMSEA = 0.031) and internal consistency with the composite reliability of 0.93 were strongly supported in a sample of Finnish Grade 7 students.[21]

2.3.3. Self-reported moderate-to-vigorous PA (MVPA)

The Health Behavior in School-aged Children Research Protocol[42] was used to measure children's self-reported MVPA.

The introduction preceding the items was: "In the next two questions physical activity means all activities which raises your heart rates or momentarily get you out of breath for example in doing exercise, playing with your friends, going to school, or in school physical education. Sport also includes for example jogging, intensive walking, roller skating, cycling, dancing, skating, skiing, soccer, basketball, and baseball." The items required students to summarize their time spent in PA each day in the following way: (1) "When you think about your typical week, on how many days are you physically active for a total of at least 60 min per day?" and (2) "Over the past 7 days, on how many days were you physically active for a total of at least 60 min per day?" Both items rated on an 8-point response scale (0–7 days). Prochaska et al.[43] investigated that for a sample of 138 U.S. children with a mean age of 12.1 years, the particular items were reliable (intraclass correlation coefficient, ICC = 0.77) and had moderate correlation ($r = 0.40$) with accelerometer data in a study based on a 5-day data collection period. Recently, Gråstén[21] reported that for a sample of 61 Finnish Grades 5 and 6 children, the items were reliable ($\alpha > 0.90$), and the statistically significant differences between standardized self-reported and accelerometer scores were not found based on the data collected across a 7-day period.

2.4. Statistical analysis

First, normal distribution, outliers, and missing values of the data were examined. No modifications due to normality were required. Neither statistically significant outliers were detected through the covariance matrix based on the Mahalanobis distance test ($p < 0.001$) of standardized values (±3.00).[44] In the case of the whole-school approach, the high percentage of missing values at T2 occurred, because all children were not willing to participate in the longitudinal sequence or changed to other schools. Therefore, the data included 44% of missing values. Little's Missing Completely at Random Test (MCRT) ($\chi^2 = 874.464$, $df = 751$, $p < 0.01$) and frequencies (gender, school) indicated that the missing values did not represent any particular school or group. Hence, the missing values were assumed to be missing at random.[45]

Next, the descriptive statistics, composite reliability, and ICC for each variable were determined. In order to examine the developmental trajectories of expectancy beliefs and subjective task values, the latent growth curve models were implemented. The models were constructed by fixing the loadings of expectancy belief and task value variables across T0 to T2 to T1 on the initial level and to T0, T1, T2 on growth. The intercepts, variances, and residuals of the latent variables (expectancy beliefs, attainment value, interest value, and utility value) and the mean and residuals of the observed variable (Cost) were estimated. Gender (Cov_1) and school (Cov_2) were added into the models as covariates, since children were recruited from 3 cities.

Finally, the associations between expectancy beliefs, subjective task values, PE enjoyment, and total PA at T0 were tested following the procedures of Chen and Chen.[16] The proportion of variance predicted by expectancy beliefs and task values for PE enjoyment and total PA was investigated using squared multiple correlations (R^2). Fig. 1 presents the hypothesized model of

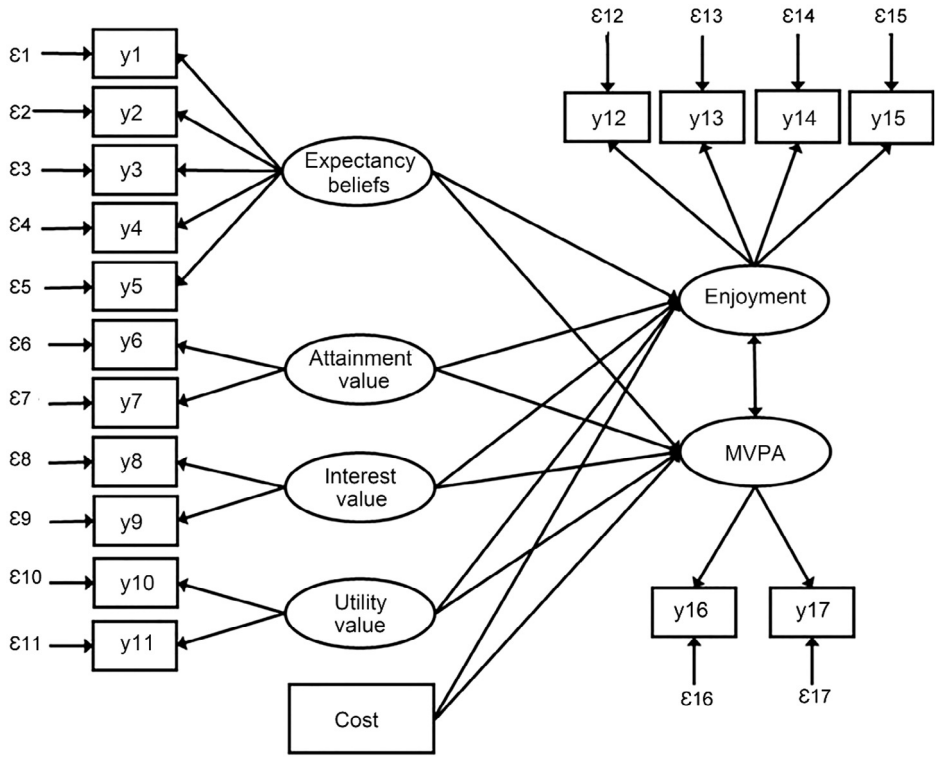

Fig. 1. The hypothesized model of expectancy beliefs, subjective task values, physical education enjoyment, and total physical activity. For the sake of clarity, the links between expectancy beliefs and values are not shown. MVPA = moderate-to-vigorous physical activity.

expectancy beliefs, subjective task values, PE enjoyment, and total PA.

χ^2 test was used as a test of the model's overall goodness-of-fit to the data. A non-significant difference between observed frequency distribution and theoretical distribution had an acceptable fit to the data. To determine the appropriateness of the model SRMR and the RMSEA, the CFI, and the TLI were also examined.[46] A value of 0.05 or less for SRMR indicates the reasonable magnitude of a varying quantity, a value of 0.05 or less for the RMSEA indicates an acceptable fit of the model in the relations to the degrees of freedom.[46] The CFI and TLI indices range from 0 to greater than 1. Fit indices greater than 0.95 are indicative for an excellent model fit. The missing value analysis was performed using SPSS Statistics (Version 22.0; IBM Corp., Armonk, NY, USA) and all subsequent analyses using Mplus Version 7.11 (Mplus user's guide, 6th ed., Los Angeles, CA, USA).

3. Results

3.1. Descriptive statistics

Correlation coefficients, means, SD, composite reliability, and ICC of expectancy beliefs, subjective task values, PE enjoyment, and total PA were examined (Table 1). Descriptive statistics highlighted that the correlations between children's expectancy beliefs and task values ranged from low to moderate across 2 years of program. The associations of expectancies, values, PE enjoyment and total PA showed to be weak at T0. In contrast, the strongest correlations were found between expectancy beliefs and attainment value, expectancy beliefs and interest value, and interest value and utility value at T2. All observed variables were assumed to be reliable, since composite reliability and intraclass correlation were relatively high. The mean scores indicated that the developmental growth of expectancy beliefs and subjective task values was negative and linear.

3.2. Latent growth curve modeling

First, the developmental trajectories of expectancy beliefs and subjective task values were implemented (Table 2). The latent growth curve models revealed an excellent model fit for expectancy beliefs, utility value, and cost. The model fit for attainment value and interest value was also acceptable. The standardized results highlighted that children's expectancy beliefs and attainment value in PE classes were positive, strong, and sustained stable across 2 years of program. The covariance effect of gender on expectancy beliefs and attainment value was found. To analyze the differences between girls and boys, the means were constrained to be equal. Two-group test confirmed the mean difference between girls and boys, with boys scoring higher than girls in expectancy beliefs ($p < 0.001$) and attainment value ($p < 0.001$) at T0, T1, and T2. Interest value and utility value were also high, but decreased across the program. Finally, cost was at the high level and stable through the measurement points. No gender differences were detected regarding interest, utility, or cost dimensions. Neither the differences between schools were revealed at any time point.

Table 1
Correlation coefficients, means (M), standard deviations (SD), composite reliability (CR), and intraclass correlation coefficients (ICC) of the study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	M	SD	CR	ICC
1 EB T0	–																4.01	0.87	0.82	0.65***
2 EB T1	0.57**	–															3.75	1.00	0.92	0.70***
3 EB T2	0.56***	0.66*	–														3.66	0.98	0.93	0.72***
4 AV T0	0.53**	0.38	0.37	–													3.76	1.09	0.83	0.69***
5 AV T1	0.42	0.66	0.63	0.48***	–												3.56	1.12	0.86	0.75***
6 AV T2	0.35*	0.62	0.77***	0.45***	0.67**	–											3.61	1.06	0.84	0.71***
7 IV T0	0.68***	0.48	0.51	0.51*	0.42	0.47	–										4.13	1.10	0.89	0.81***
8 IV T1	0.51	0.73***	0.54	0.33	0.66***	0.53	0.60***	–									3.85	1.19	0.93	0.87***
9 IV T2	0.39	0.57**	0.78**	0.37	0.58	0.76***	0.55	0.65***	–								3.79	1.20	0.96	0.92***
10 UV T0	0.63***	0.37	0.29	0.49**	0.38	0.27	0.69***	0.47*	0.28	–							3.98	0.94	0.83	0.68***
11 UV T1	0.40*	0.65	0.58	0.36	0.70***	0.58	0.48	0.75***	0.60	0.45***	–						3.72	1.04	0.84	0.72***
12 UV T2	0.39	0.62	0.74*	0.33	0.65	0.75***	0.48	0.48***	0.77***	0.32**	0.60***	–					3.62	1.11	0.87	0.77***
13 Cost T0	0.49	0.28	0.30	0.28	0.21	0.22	0.62***	0.39	0.32	0.47***	0.28	0.26	–				4.13	1.11	NA	NA
14 Cost T1	0.29	0.44	0.38	0.10	0.41	0.34	0.38	0.60***	0.42	0.29	0.51***	0.33***	0.48***	–			3.93	1.18	NA	NA
15 Cost T2	0.27	0.42	0.54	0.06	0.38	0.50	0.42	0.42	0.64**	0.08**	0.39	0.52***	0.42*	0.47***	–		3.78	1.21	NA	NA
16 Enjoyment T0	−0.04	NA	NA	−0.06	NA	NA	−0.06	NA	NA	0.01	NA	NA	−0.03	NA	NA	–	4.24	0.87	0.93	0.77***
17 MVPA T0	−0.02	NA	NA	0.00	NA	NA	−0.10	NA	NA	0.01	NA	NA	−0.09	NA	NA	0.32***	5.10	1.77	0.89	0.79***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Abbreviations: AV = attainment value; EB = expectancy beliefs; IV = interest value; MVPA = moderate-to-vigorous physical activity; NA = not available; UV = utility value.

Table 2
Overall model fit and standardized results for the growth curve models of expectancy beliefs and subjective task values.

	χ^2 (*df*)	*p* value	CFI	TLI	RMSEA	SRMR	90%CI	Level	Slope	Cov_1[a]	Cov_2[a]
Expectancy beliefs	3.427 (3)	0.330	1.00	0.99	0.019	0.016	0.00–0.09	5.53***	−2.48	0.16*/0.20	−0.01/0.17
Attainment value	6.651 (3)	0.083	0.96	0.89	0.056	0.021	0.00–0.11	4.86***	−1.00	0.17*/−0.04	−0.14/0.32
Interest value	6.113 (3)	0.106	0.97	0.91	0.051	0.019	0.00–0.11	4.30***	−1.52*	0.08/0.25	−0.01/0.14
Utility value	3.507 (3)	0.320	0.99	0.98	0.021	0.020	0.00–0.09	5.40***	−1.15**	0.11/0.16	−0.09/0.12
Cost	0.924 (3)	0.820	1.00	1.13	0.000	0.014	0.00–0.05	4.72***	−0.89	0.05/−0.00	−0.03/0.18

Notes: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
[a] A value on level/slope.
Abbreviations: CFI = comparative fit index; CI = confidence interval; Cov_1 = gender; Cov_2 = school; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; TLI = Tucker–Lewis index.

Taken together, the levels of expectancy beliefs and subjective task values indicated to be relatively high and the development was stable through the program, especially in terms of expectancy beliefs, attainment value, and cost. Boys believed they are physically more competent when compared to other students and valued PE classes more important than girls.

3.3. Associations of expectancy beliefs, values, enjoyment, and PA

The factor model was implemented in order to analyze the associations of expectancy beliefs, values, PE enjoyment, and total PA (Fig. 1). The hypothesized model revealed a non-acceptable overall fit for the data (χ^2 (139) = 178.310, $p = 0.014$, CFI = 0.99, TLI = 0.98, RMSEA = 0.030, 90%CI: 0.02–0.04, SRMR = 0.030). The next step was to modify the model based on the modification indices. The residuals of the items y1, y2, and y3 were allowed to correlate. The modified model (Fig. 2) revealed an excellent model fit (χ^2 (136) = 136.038, $p = 0.483$, CFI = 1.00, TLI = 1.00, RMSEA = 0.001, 90%CI: 0.00–0.03, SRMR = 0.027). The standardized results showed that interest value negatively related to total PA. No other statistically significant paths were observed from expectancy beliefs or subjective task values to achievement related variables, enjoyment or PA. However, total PA was moderately related to PE enjoyment and the relationships between expectancy beliefs, attainment value, interest value, utility value, and cost ranged from modest ($r = 0.32$, attainment value, cost) to strong ($r = 0.70$, interest value, cost). The covariance effect of gender (Cov_1(y16,

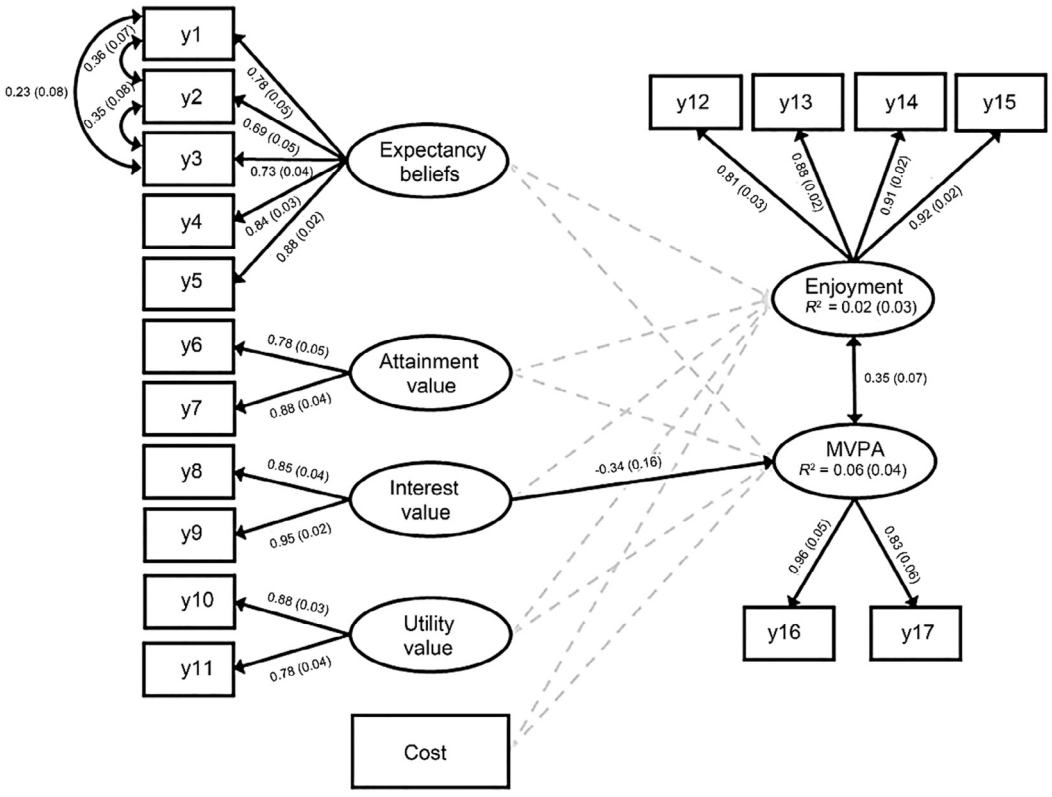

Fig. 2. The standardized results for the model of expectancy beliefs, subjective task values, physical education enjoyment, and total physical activity. All paths are significant at $p < 0.05$ level, standard errors in parentheses. For the sake of clarity, the covariates of gender and school, and the links between expectancy beliefs and values are not shown.

y17) = 0.49, $p < 0.05$) on total PA was found, since boys were more physically active than girls at T0 ($p < 0.001$). Finally, the model showed that the squared multiple correlations for PE enjoyment and total PA were negligible.

4. Discussion

The aim of the current study was to examine the patterns of children's expectancy beliefs and subjective task values through the Physical Activity as Civil Skill Program and associated links to PE enjoyment and total PA. The developmental trajectories of expectancy beliefs and subjective task values were analyzed, assuming a sustainability or increase across the program.[25,30–32] Finally, a structural model of expectancy beliefs, subjective task values, PE enjoyment, and total PA was tested, expecting that beliefs and values would positively associate to enjoyment and PA.[15,16,22,26,36] The covariance effects of gender and school were also examined.

The results highlighted that the levels of expectancy beliefs and subjective task values indicated to be relatively high and the development of expectancy beliefs, attainment value, and cost was stable through the program. In contrast, interest value and utility value decreased over the particular period of time. These findings were not fully in line with the hypothesis, as it was assumed that the scores would sustain at the same level or even increase through the program. However, the findings were encouraging, since several previous studies revealed the decreasing pattern in school-related expectancy beliefs,[25,30,31] intrinsic value and attainment value,[35] and all PE related task values,[33,34] especially when children transfer from elementary to secondary school. An increase in expectancy beliefs and task values may require more additional PE classes or support across the transition period, because at that age children meet many remarkable changes in their lives. For example, transitions to another school and transforms in their social and environmental networks. Simmons and Blyth[47] argued that environmental changes often associated with the transition from elementary to secondary school are likely to be especially harmful in that they emphasize competition, social comparison, performance goal orientation, and self-assessment of ability. With these consequences, the risk of negative motivational outcomes increases, especially for students with difficulties in school success. Additionally, a decline in school-age students' motivation toward PE has previously been reported.[24,25,30] It is possible that motivation-related interest value and utility value decreased across the current program for these reasons. This finding should be considered as concern, especially among the most inactive children, as intrinsically motivated students are more likely to perceive their PA related experiences as positive, thus leading them toward being further physically active.[48] It has to be noted that intrinsic value is similar to the self-determination theory's intrinsic motivation,[20] which is an essential motivational factor behind greater enjoyment in PE[6,25,49] and PA levels in PE.[50] Because the amount of school PE classes cannot be substantially increased, it remains unclear whether children's expectancy beliefs can be increased by promoting PE motivation across regular PE without additional classes.

The present findings also showed that boys believed they are physically more competent when compared to other students and valued PE classes more important than girls. According to many previous studies, boys scored higher than girls in terms of expectancy beliefs[22,23,25] and subjective task values.[17,24,25] Similarly, in the studies based on the self-determination theory,[20] gender differences in regard to perceived competence have been observed, with boys scoring more positive perceptions than girls.[51–53] A common element to both theories is the identification of perceptions of competence as contributors to motivation, thus accounting for children's desire to develop and demonstrate achievement outcomes such as PA.[54] Perhaps, another possible explanation for the presented gender difference may be that, girls and boys perceived PE classes in different ways. Several researchers suggested that differences may be a result of participation in gender appropriate activities.[14,28,29] For example, gender differences have been found more regularly in gender preference activities, such as dance or ice hockey, since girls and boys will often tend to value activities that they perceive as appropriate for their gender.[14] From this point of view, the difference between boys and girls was not surprising. In order to promote PE motivation related expectancy beliefs and task values, schools need to place a high priority on encouraging children to engage in daily activities and make it easy to find activities in which both girls and boys have opportunities to feel competent.[15]

The model of expectancy beliefs, subjective task values, PE enjoyment, and total PA revealed that interest value negatively related to total PA. No other statistically significant paths were observed from expectancy beliefs or subjective task values to achievement related variables, enjoyment, or PA. This finding was unexpected, as recent empirical findings on these relationships have supported similar associations. For instance, expectancy beliefs related to effort and persistence in basketball classes,[26] future participation in PE,[14,23] and PA in PE classes.[15,16] Additionally, the 1-mile run was strongly associated with attainment value in the elementary school running program study.[22] Yli-Piipari[25] reported that Finnish children aged 11–13 years, who highly valued PE classes, became more physically active across Grades 6–9. It has to be noted that the present measurements took place in April, when the school year is coming to an end. In addition, many sports such as ice hockey club finished their season in spring, when the measurements were carried out. The present data were collected in a relatively small town, where walking, biking, and snow based activities are common, and local community and school facilities, including sport and exercise settings, parks, trails, and pathways, may promote both girls and boys to be physically active across the different seasons.[55] Previously, the seasonal variation in PA engagement has been widely recognized.[21,55,56] Consequently, the local opportunities for recreational sport and non-organized activities may provide a plausible explanation for the negative relationship between interest value and PA.

The present study was the first empirical study testing the associations of expectancy beliefs, subjective task values, and PE enjoyment. No other studies were found that have used enjoyment in PE as an achievement outcome as used in the

current study. Therefore, the results provided important preliminary insights into the association of expectancy beliefs, values, and enjoyment in school PE classes. Neither the non-related associations between beliefs, values, and enjoyment nor the negative association between interest value and total PA was expected. No clear reasons for the particular relations were found, because, in contrast, the findings indicated that if students do well and believe they are competent on PE tasks, they view PE classes as important, interesting, and useful, and they would participate in PE classes if they had a choice. In addition, the higher the PA level the children reported, the higher the PE enjoyment they perceived. It may be that most physically active children are active members in local sport clubs, and therefore, they do not perceive school PE classes as interesting as leisure time sport. Although the priority of school PE is to provide PAs and positive learning experiences to all children, also the most active children should be given skills and challenges.[57] This latter proposition has not yet been fully determined. However, the conclusions based on these findings are restricted without additional information.

Finally, the current results showed that the relationships between expectancy beliefs, attainment value, interest value, utility value, and cost ranged from modest to strong. These findings were in line with previous research.[15,17,25] In other words, if children do well and believe they are competent on the tasks, they view PE classes more useful, important, and interesting.[36] Furthermore, total PA positively related to PE enjoyment. This outcome supported the notion that the more enjoyment that children attached to PE classes, the more PA they engaged in across the 7-day periods.[21] Therefore, to enhance children's PA participation, an essential objective of school PE should be increasing their enjoyment levels in PE classes.

A key strength of the study was that the data were collected through several time points. The longitudinal data are always vulnerable to missing values, because behavior of participants is difficult to predict or control. The sample size was acceptable through 2 years of program, although all children were not willing to participate in the longitudinal measurement phases. Limitations were mainly related to the use of subjective scales to evaluate the main variables. The truthfulness and accuracy of self-report measures may be compromised because some health and well-being behaviors such as physical activity or enjoyment are difficult to recall and may also be so sensitive that respondents are reluctant to provide exact details. Children may purposely under-report or over-report some health and well-being behaviors because they believe engaging in these behaviors is socially undesirable or desirable.[58] Finally, the present data did not include a control group, and therefore, the associations identified should not be interpreted as cause–effect relationships. Future studies would benefit from the use of the control group design and objective PA measures.

5. Conclusion

Taken together, the results of the Physical Activity as Civil Skill Program were promising, since the development of expectancy beliefs, attainment value, and cost sustained stable through the program. The current program including actions to increase PA through manipulation of psychological (supporting competence and positive experiences in PE) and physical school environment modifications (providing increased opportunities for school day PA) indicated to be an effective strategy to prohibit declining levels of children's expectancy beliefs and task values. However, interest value and utility value decreased over the particular period of time. It is possible that expectancy beliefs and importance are easier to be influenced than interest and utility values in the school context. Despite that, the baseline scores for all study variables could be considered as high through the measurements. Although the positive relationships of expectancy beliefs, subjective task values, and physical education enjoyment or total PA did not materialize, several expectancy–value theory based studies have suggested that PE classes should be considered as potential functions to increase children's daily PA.[15,16,22,26,36]

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Competing interests

The author declares no competing financial interests.

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