Evaluating the Youth Physical Activity Promotion Model Among Portuguese Elementary Schoolchildren

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Background: The Youth Physical Activity Promotion (YPAP) model provides an integrated approach to understanding the predisposing, enabling, and reinforcing factors influencing physical activity (PA) behavior. The purpose of this study was to evaluate an adapted version of the YPAP model for explaining PA among Portuguese schoolchildren. Methods: A random cross-sectional sample of 683 children (8–10 years of age) attending elementary public schools in the north of Portugal completed a detailed survey assessing attraction to PA, perceived physical competence, parental influences and leisure time PA. Structural equation modeling techniques were conducted (EQS6.1). Results: Attraction to PA was directly associated with children’s PA participation ($\beta = 0.271, P < .05$). Perceived physical competence imposed an indirect effect on children’s PA through children’s attraction to PA ($\beta = 0.253, P < .05$). Parental influence had an indirect effect on children’s PA through perceived physical competence and attraction to PA ($\beta = 0.318$ and $0.662$, respectively, $P < .05$). Perceived physical competence and parental influence were not directly associated with children’s PA ($\beta = 0.069$ and $0.180$, respectively, $P > .05$). Conclusions: The adapted version of YPAP model was useful in explaining PA participation in elementary Portuguese schoolchildren. Intervention programs intended to enhance attraction to PA, perceived physical competence and favorable parental influence should be developed to promote children’s PA participation.

Keywords: children, attraction to physical activity, perceived physical competence, parental influence

While the benefits of regular participation in physical activity (PA) have been well-documented for children, 1 about 30%–50% are not reaching the recommended minimum levels of PA that would be beneficial to their health. 2 In addition, active lifestyles appear to steadily decline as children age. 3 Physical inactivity and a sedentary lifestyle during childhood have been associated with negative health outcomes and contribute to the increased risk of overweight and obesity in youth. 4 Therefore, it is important to design, test and implement health intervention programs to enhance PA at the population level beginning in childhood. To maximize the effectiveness of such programs, contributors to children’s PA need to be clearly identified. A broad range of social, psychological and environmental factors have been identified as potential correlates of children’s PA, 5, 6 and several theoretical models have been proposed to specify patterns of influence of such variables upon children’s PA. 7–11

The Youth Physical Activity Promotion (YPAP) model has been proposed as a social-ecological framework designed to bridge the gap between theory and practice by identifying modifiable forms of influence upon children’s and adolescents’ desire to be physically active. 9 The YPAP model offers a broad basis for analyzing correlates of PA and then facilitating PA. Constructs within the YPAP model include psychological attributes (predisposing factors), social influences (reinforcing factors), and environmental influences (enabling factors). Predisposing factors are personal knowledge and perceptions that influence children’s participation in PA. They reflect the child’s interest in performing PA and consist of 2 constructs: outcome expectations and efficacy expectations. 7 Outcome expectations are defined as enjoyment from and attraction to PA, while, the efficacy expectation is defined as the child’s perception of physical competence to undertake PA. 9 Reinforcing factors are rewards received or the feedback people get from others following a behavior that may encourage or discourage adoption and/or continuation of the behavior. This dimension of influence includes variables that reinforce a child’s PA directly or indirectly through his/her predisposing factors (parental and peers influences). Direct effects may be through facilitating the child’s efforts to be active, while
The study had been previously approved by the research committee at the researchers’ university and by authorities at the individual schools which the children attended. The administrators of 20 of the contacted schools agreed to participate in this study. Four weeks before data collection the families were mailed a passive consent form which instructed the parents to return the form to the school if they did not want their child to participate, which is a customary protocol for research conducted with children through Portuguese educational institutions and which was the approach approved for this research. The refusal rate was 45.3% (n = 566). This provided a final sample of 683 children (331 girls and 352 boys; 54.7% response rate). Data were collected between February and March 2010.

**Measures**

**Psychosocial Variables.** The psychosocial variables used in this study included attraction to PA, perceived physical competence, and parental influence on children’s PA involvement. A reduced version of the Children’s Attraction to Physical Activity scale (CAPA) developed by Brustad\(^\text{16}\) was used as the Portuguese-language version includes 14 items designed to measure the extent of children’s interest in engaging in PA. The CAPA includes 5 dimensions of attraction to participation in PA, including attraction to participate in vigorous PA, perceived importance of participating in PA, liking of games and sports, assessments of whether physical exertion is perceived to be fun or important, and attraction due to perceived peer acceptance in games and sports.\(^\text{16}\) The CAPA short version is recommended for use in computing an overall measure of children’s attraction to PA. A perceived physical competence subscale was included that represented a translated version of Brustad’s\(^\text{16}\) adaptation of Harter’s\(^\text{18–19}\) previous work. Parental influences on children’s PA socialization were assessed through a 9-item scale developed by Brustad\(^\text{16–17}\) that measures 3 different dimensions of parental support: parental role modeling behavior, parental encouragement, and parental enjoyment of PA. All items were scored on a 4-point response using Harter’s\(^\text{19}\) “structured alternative” approach that is designed to reduce the tendencies for socially desirable responses from children.

The CAPA, children’s perceived physical competence, and parental influences scales were translated and adapted from the English versions to their Portuguese versions and then back translated to English. In addition, a pilot study was conducted to assure that the contents of all scales were understood and comprehended by all children. The alpha reliability coefficients assessed through Cronbach’s alpha statistics revealed acceptable internal consistency for all scales as each Cronbach alpha value exceeded 0.60 (CAPA scale: 0.71; perceived physical competence scale: 0.61; parental influence scale: 0.73).\(^\text{16}\)

**Leisure-Time Physical Activity.** The evaluation of PA in leisure time was measured by using a personal interview approach at the school site using the Godin and Shephard\(^\text{20}\) questionnaire. This procedure has been previously evaluated...
used in several published studies of children’s PA in Portugal and the USA. The face-to-face interviews placed all questions in the context of the daily leisure routines of the children. Participants reported the number of times per week that they participated in different physical activities that lasted for a period of at least 15 minutes. Three PA categories were used: mild (3 METs: activities such as casual walking, archery, stretching, and fishing from the river bank), moderate (5 METs: activities such as fast walking, tennis, leisurely bicycling, volleyball, badminton, noncompetitive swimming), and strenuous (9 METs: activities such as running, soccer, basketball, judo, roller skating, vigorous swimming). A total score was derived by multiplying the frequency of each category by the associated MET value, and the products were summed.

Reliability

Test-retest reliability for the individual responses was assessed through a pilot study in which data for a random subsample of 41 children was compared across a 2-week period. The 95% confidence interval of the intraclass correlation coefficients (R) were as follows: CAPA scale, R ≥ .96; perceived physical competence scale, R ≥ .99; parental influence scale, R ≥ .98, and between R ≥ .77 for leisure-time PA.

Data Analysis

Frequencies and means (standard deviations) were analyzed for all variables, and normality and multicollinearity checks were also conducted. Since children’s PA data exhibited moderate levels of skewness and kurtosis a log transformation was performed. To reduce the number of parameters that would be estimated, the 1-dimensional factor structure of these latent constructs (attraction to PA and parental influence) were used instead of the specific aspects of attraction or parental influence that might differentiate children. This approach has also been used in previous, similar studies.

Data were analyzed using structural equation modeling (SEM) through the software package EQS 6.1 with maximum likelihood estimation (ML), that allows for the simultaneous estimation and testing of relationships among multiple predictors including mediating, and outcome variables. The SEM was used to test the relationships among PA and the psychosocial correlates and provides information about the processes through which theoretical constructs influence PA as it permits calculation of a variable’s direct, indirect, and total effects on outcomes. Model fit was evaluated using the chi-square goodness-of-fit test, which assesses the adequacy of the theorized model’s covariance matrix in comparison with the observed matrix. Because the chi-square test has been criticized for its dependence on sample size, the addition of absolute and incremental fit indices has been recommended. The root mean square of error approximation (RMSEA) and its 90% confidence interval was used as an absolute fit index, while the comparative fit index (CFI) was used as an estimate of incremental fit. An adequate model fit is obtained when the nonnormed fit index (NNFI) and CFI are > 0.90 and the RMSEA is < 0.08, while a good model fit is obtained when the NNFI and CFI are > 0.95 and the RMSEA is < 0.05. These indices reflect current standards and recommendations for reporting in SEM analyses. Factor loadings, factor correlations, residual variances, and path coefficients for the measurement and structural models were inspected for sign and/or magnitude according to what was proposed in the YPAP model. Analyses of alternative structural models were also conducted if model fit was not good enough. The purpose of the alternative structural models analysis was to further evaluate the direct and indirect relationships among variables. Indirect effects represent the mediatory role of an independent variable on a dependent variable. A significant chi-square difference would mean that the fit of the alternative model was significantly better than that of the original model.

Results

Descriptive statistics for age, gender, height, weight, BMI, psychosocial variables (attraction to PA, perceived physical competence and parental socialization influences) and PA in leisure time are summarized in Table 1.

The initial structural model, which served as the baseline model, was a parameterized model that included paths that emanated directly from parental influence, attraction to PA and perceived physical competence with direct effects upon children’s PA. In addition, it was proposed that parental influence and perceived physical competence variables would have their effects on attraction to PA as mediated through these variables (ie, indirect effects). Parental influence was also hypothesized to influence levels of physical competence (ie, direct effect), which in turn would influence attraction to PA and children’s actual PA. Figure 1 represents the proposed theoretical model for the study.

Table 1 Characteristics of the Study Sample (Mean ± SD)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total (n = 683)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>8.83 ± 0.76</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Girls n (%)</td>
<td>331 (48.5)</td>
</tr>
<tr>
<td>Boys n (%)</td>
<td>352 (51.5)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>35.22 ± 8.35</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.36 ± 0.07</td>
</tr>
<tr>
<td>BMI (kg/m2)</td>
<td>18.90 ± 3.19</td>
</tr>
<tr>
<td>Psychosocial variables</td>
<td></td>
</tr>
<tr>
<td>Attraction to PA</td>
<td>44.83 ± 6.50</td>
</tr>
<tr>
<td>Perceived physical competence</td>
<td>2.96 ± 0.62</td>
</tr>
<tr>
<td>Parental socialization influences</td>
<td>3.18 ± 0.58</td>
</tr>
<tr>
<td>Physical activity (MET/Week)</td>
<td>45.33 ± 23.94</td>
</tr>
</tbody>
</table>
The overall model (Model A, Figure 1) provided acceptable fit to sample data; $\chi^2(28) = 101.796$; NNFI = .888; CFI $= .933$; and RMSEA $= .062$ (90% CI: .049–.075). However, a review of the parameter estimates revealed that there were 2 factors with unsupported path coefficients: parental influence on PA ($-0.081 \pm 0.101$; $P > 0.05$) and perceived physical competence on PA ($0.025 \pm 0.548$; $P > 0.05$).

Considering these results, the model was respecified and these 2 paths were eliminated one at a time (Model B1: perceived physical competence was removed, Model B2: parental influence was removed) with subsequent reanalysis and evaluation of the effects on model fit with the subsequent elimination of these 2 paths (in Model B3, perceived physical competence and parental influence were removed). The results showed acceptable fit indices in the respecified models (see Table 2). Differences in model fit between the baseline model and the final model were based on a chi-square difference test and comparisons of the additional fit indices.

The final model (Model B3) is presented in Figure 2 and was based on both theoretical and measurement considerations. For theoretical support, the results indicated that all the significant paths were in the expected direction. However, parental influence and perceived physical competence did not have a direct effect on PA as proposed in the theoretical model. In the final model, a) attraction to PA had a direct effect on actual PA, b) parental influence had an indirect effect on actual PA through perceived physical competence and attraction to PA, and c) perceived physical competence had an indirect effect on actual PA through attraction to PA. In terms of statistical support, the results indicated a good fit of the model to the sample data and all fit indices were acceptable. Compared with the original model (Model A), the B3 model showed better RMSEA fit indices and was more parsimonious. Fit indices of indicators in models A and B1, B2 and B3 are displayed in Table 2.

The nonstandardized and standardized coefficients of attraction to PA, perceived physical competence and parental influence on PA are shown in Figure 2. The parameter estimates from Model B3 indicated that attraction to PA had a direct effect on PA ($\beta = 0.271$, $P < 0.05$) meaning that children who had a stronger desire

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**Table 2  Fit Indices of Model A and Model Respecified (Model B1, B2, B3)**

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$P$</th>
<th>NNFI</th>
<th>CFI</th>
<th>RMSEA (90% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model A (overall model)</td>
<td>101.796</td>
<td>28</td>
<td>$&lt; 0.01$</td>
<td>0.888</td>
<td>0.933</td>
<td>0.062 (0.049–0.075)</td>
</tr>
<tr>
<td>Model B1 (perceived physical competence removed)</td>
<td>102.093</td>
<td>29</td>
<td>$&lt; 0.01$</td>
<td>0.893</td>
<td>0.934</td>
<td>0.061 (0.048–0.074)</td>
</tr>
<tr>
<td>Model B2 (parental influence removed)</td>
<td>102.418</td>
<td>29</td>
<td>$&lt; 0.01$</td>
<td>0.893</td>
<td>0.934</td>
<td>0.061 (0.048–0.074)</td>
</tr>
<tr>
<td>Model B3 (perceived physical competence and parental influence removed)</td>
<td>102.849</td>
<td>30</td>
<td>$&lt; 0.01$</td>
<td>0.897</td>
<td>0.934</td>
<td>0.060 (0.047–0.073)</td>
</tr>
</tbody>
</table>

Abbreviations: $\chi^2$, Chi-square; df, degrees of freedom; NNFI, nonnormed fit index; CFI, comparative fit index; RMSEA, root mean square error of approximation.
to participate in PA reported higher levels of actual PA. Thus, this finding supports the first hypotheses. Perceived physical competence had an indirect effect on actual PA through attraction to PA ($\beta = 0.253$, $P < .05$) and parental influence had an indirect effect on children’s PA through perceived physical competence and attraction to PA ($\beta = 0.318$ and 0.662, respectively) and these path coefficients were significant ($P < .05$). However, the paths between perceived physical competence and parental influence on children’s PA participation were not significant ($\beta = 0.069$ and 0.180, respectively, $P > .05$). In this regard, perceived physical competence and parental influence did not have a direct effect on the actual PA of Portuguese children. Thus, the results from final model (B3) were not supportive of the second and third hypotheses.

**Discussion**

The current study evaluated an adapted version of the YPAP model linking predisposing (attraction to PA and perceived physical competence) and reinforcing (parental influences) factors to children’s PA behavior. It was hypothesized that attraction to PA would have a positive direct effect on children’s participation in PA; that perceived physical competence would have a positive direct effect on PA and an indirect effect on attraction to PA; and that parental influence would positively and directly influence children’s PA and also have an indirect effect through its influence on the psychosocial variables of children’s attraction to PA and perceived physical competence.

In agreement with findings obtained in research with primary school children, the variable of attraction to PA exerted a direct and positive influence on children’s PA participation ($\beta = 0.271$, $P < .05$). In this regard, children who were more attracted to PA had higher levels of actual PA. Attraction to PA refers to children’s inherent desire to participate in PA due to the anticipated affective consequences of the involvement. Given the importance of attraction to PA to children’s actual PA behavior, future intervention programs might be designed to include enjoyable and preferred physical activities and sports where children feel confident and which provide children with favorable peer experiences.

Perceived physical competence is also an important predisposing factor in the YPAP model, and denotes an individual’s belief in his/her ability to make changes with regard to a specific behavior. An individual must not only intend to perform a behavior, he/she must also believe that he/she is capable of performing it before action will be taken. Some studies have observed a direct relationship between perceived physical competence and children’s PA participation, and have suggested that the more children perceived they are competent in regard to PA, the more likely they are to engage in this activity. Other studies have found an indirect link between perceived physical competence and children’s PA participation mediated through its positive association with children’s attraction to PA. In the current study, perceived physical competence was found to influence children’s PA primarily through its positive effects on the children’s attraction to PA ($\beta = 0.253$, $P < .05$). In this case, higher levels of perceived physical competence

![Figure 2 — Final model (Model B3). Abbreviations: $R^2$—Squared multiple correlations; Solid lines represent statistically significant standardized path; dashed lines represent nonsignificant standardized path; ST—Standardized coefficients, NS—No standardized coefficients; § $P > .05$; * $P < .05$.](image)
were linked to children’s interest in, and desire to, engage in PA. A direct effect was hypothesized but the results show that perceived competence operates indirectly through this other affective component. These findings are consistent with competence motivation theory (and the original tenets of the YPAP model) which suggest that youth become more attracted to PA when they feel competent performing PA. While causality can’t be confirmed, research suggests that attraction to PA will promote both current and future PA participation.13–15,19,32

Parental influence is generally considered to be an important reinforcing factor for children’s PA.33 Parents may influence children’s PA participation, directly and indirectly, through a variety of distinct behaviors. Direct influence can come from parents actively facilitating their child’s participation or from parents’ direct encouragement to be active, whereas the indirect influences stem from forces that shape a child’s predisposition or attraction to PA participation.13,16,34 Surprisingly, in the current study, parental influence was shown to influence children primarily through the enhancement of children’s perception of their own physical competence and attraction to PA. While direct paths were expected, the indirect path is consistent with the original tenets of the YPAP model.34 A number of other studies have also demonstrated positive relationship between parental influences and children’s perceived physical competence and attraction to PA participation.16,35 The findings suggest that parents indirectly influence their children’s behavior by influencing the attitudes and cognitions that children develop.30 Many studies have reported that children are more likely to be active when their parents believe in the importance of PA, are role models through their own participation, and encourage their children to be active, or provide supportive equipment.3,13,33,35 The results here suggest that parental influence may operate primarily by changing children’s perceptions of their competence and by promoting interest and enjoyment. This requires further study but it is consistent with the models of parental socialization in other domains.36

Any interpretation of the present findings should bear in mind certain methodological limitations. First, the study was cross-sectional in nature which limits conclusions regarding relationships between the hypothesized predisposing and reinforcing factors and children’s PA participation. Even though pathways are drawn in a particular direction, a cause-and-effect relationship among variables should not be concluded. Second, it is important to note that our sample is somehow homogeneous and was limited to a unique region of the North of Portugal. Consequently, the generalizability of the results may be limited. Third, this study focused specifically on some predisposing and reinforcing factors related to children’s PA. It is likely that other important correlates of PA such as the siblings, peers, teachers, and coaches may also contribute significantly to the prediction of children’s PA participation.

Notwithstanding these study limitations, the present findings demonstrate that the adapted version of YPAP model has utility for explaining associations between predisposing (attraction to PA and perceived physical competence) and reinforcing (parental influences) factors and children’s PA. Although, the percentage of total variance explained by the model was modest (7%), one of the most important finding in this study was the direct relationship noted between attraction to PA and children’s PA participation among primary Portuguese school children. In addition, it is important to note that children who possessed a strong belief in their physical competence and who were more exposed to a positive parental influences were more attracted to PA participation, and consequently may increase their likelihood to be engaged in PA. National and regional educational and public health authorities should be encouraged to use these findings to design intervention programs that effectively promote children’s PA. Clearly, enhancing children’s attraction to participate in PA and their perceived physical competence should be a goal for practitioners and researchers interested in the promotion and maintenance of PA. An important contribution should be also the recognition that parents can influence their children’s PA participation in an indirect manner through an increase in their perceived physical competence and attraction to participate in PA. Nevertheless, future prospective studies are needed to extend these findings and to further explore the direct and indirect effects of additional predisposing and reinforcing influences on children’s PA participation.

Acknowledgments

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References


