Measuring Enjoyment of Physical Activity in Adolescent Girls

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Background: Enjoyment has been implicated as a determinant of physical activity among youth, but advances in understanding its importance have been limited by the use of measures that were not adequately validated. The present study examined: (1) the factorial validity of the Physical Activity Enjoyment Scale (PACES), and (2) the construct validity of PACES scores.

Methods: Adolescent girls (N=1797), who were randomly assigned to calibration (n=899) and cross-validation (n=898) samples, completed the PACES and measures of factors influencing enjoyment of physical education, physical activity, and sport involvement. The factorial validity of the PACES and the measure of factors influencing enjoyment of physical education was tested using exploratory and confirmatory factor analysis. The hypothesized relationships among the measures were tested using structural equation modeling.

Results: Unidimensional models fit the PACES and the measure of factors influencing enjoyment of physical education in the calibration and cross-validation samples. The hypothesized relationships between the PACES and the measures of factors influencing enjoyment of physical education, physical activity, and sport involvement were supported in the entire sample, were similar in African-American and Caucasian girls, and were independent of physical fitness.

Conclusions: Evidence of factorial validity and convergent evidence for construct validity indicate that the PACES is a valid measure of physical activity enjoyment among adolescent girls, suitable for use as a mediator variable in interventions designed to increase physical activity.

Medical Subject Headings (MeSH): behavioral medicine; exercise; factor analysis, statistical; health promotion; psychometrics (Am J Prev Med 2001;21(2):110–117)

Introduction

Physical inactivity is a health burden among youth in the United States.[1] The high prevalence of physical inactivity[2] underscores the need to identify correlates of physical activity in youth and then design interventions to increase physical activity.[3,4] Expectancy-value theories have been employed to identify correlates of physical activity in youth. An understudied component of expectancy-value theories that has been associated with physical activity is enjoyment (i.e., intrinsic motivation).[4,5] Enjoyment can be described as a positive affective state that reflects feelings such as pleasure, liking, and fun.[6,7] Correlational and descriptive studies have indicated that enjoyment may be associated with physical activity in youth.[8–13]

Studies that have examined the association between enjoyment and physical activity did not use measures that had been adequately validated. Enjoyment has been measured using single items[8–10] having little evidence of reliability and validity.[4,14] The Physical Activity Enjoyment Scale (PACES)[14] is a promising option for measuring enjoyment of physical activity.[7] It has differentiated between the experience of exercising in pleasant versus unpleasant conditions and between modes of physical activity selected by participants versus modes selected by an investigator.[14] However, the PACES requires further evaluation. Its factorial validity has not been adequately established among youth,[15] particularly among adolescent African-American and Caucasian girls who are at high risk for inactivity.[2] Factorial validity is directly tested using confirmatory factor analysis.[16] The validity of inferences from scores on the PACES has not been evaluated in youth. One method of evaluating the validity of inferences from scores on the PACES involves examining the hypothe-

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sized relationship between the PACES and measures of antecedents and consequences of enjoyment (i.e., convergent evidence of construct validity).[17,18]

In the present study, we evaluated the factorial validity of PACES scores in adolescent girls using exploratory and confirmatory factor analyses with calibration and cross-validation samples. The construct validity of PACES scores was tested by using structural equation modeling of hypothesized relationships between enjoyment and factors influencing enjoyment of physical education, physical activity, and sport involvement. Secondary analyses tested the invariance of the hypothesized relationships across race and controlled for physical fitness.

Methods

Participants

Participants (N=1797) were girls in the eighth grade who were assessed prior to participation in a school-based intervention to increase physical activity and fitness. The sample had a mean age of 13.6 years (standard deviation [SD]=0.6) with racial proportions of 49.9% African American, 45.8% Caucasian, and 3.6% other; 0.7% did not report race. We randomly generated calibration (n=899) and cross-validation (n=898) samples using SPSS for Windows 9.0.[19] The calibration and cross-validation samples did not significantly differ in age (t[1788]=1.12, p=0.26, or distribution of race, χ^2 [2, n=1784]=0.31, p=0.86).

Measures

Enjoyment. PACES was developed to measure physical activity enjoyment using college-aged students.[14] It originally included 18 bipolar statements with seven points between statements, and item scores were summed to form a unidimensional measure of enjoyment. We made several modifications to the PACES based on an evaluation of the instrument by focus groups of eighth-grade girls using standard methodology.[20] Two of the 18 items (Item 5, "I am very absorbed in the activity," and Item 11, "It's very invigorating") were removed because the content was not relevant to enjoyment in eighth-grade girls (Item 5) or the content was redundant with other items (Item 11). Some of the remaining 16 items were rewritten to improve comprehension by eighth-grade girls (see Appendix). The rating scale was changed from a 7-point bipolar scale to an easy-to-understand, 5-point Likert-type scale that ranged from 1 ("Disagree a lot") to 5 ("Agree a lot").

Factors influencing enjoyment of physical education. One component of the planned intervention was a focus on increasing enjoyment of physical education. Thus, the measure of factors influencing enjoyment of physical education was included to examine the construct validity of PACES scores in a curriculum-relevant context. The initial item pool consisted of 32 items generated based on previous research.[21,22] The items were evaluated by focus groups of eighth-grade girls using standard methodology,[20] and some items were revised and others were deleted. The final item pool consisted of 12 items (see Appendix) rated on a 5-point Likert-type scale ranging from 1 ("Dislike a lot") to 5 ("Enjoy a lot").

Physical activity. Physical activity was assessed using the Three Day Physical Activity Recall (3DPAR), which is an extension of the Previous Day Physical Activity Recall (PDPAR).[23] The 3DPAR required participants to recall physical activity behavior from the previous 3 days, beginning with the most recent day. Data from the 3DPAR were reduced to the number of 30-minute blocks per day in which the main activity was greater than three metabolic equivalents (i.e., moderate to vigorous physical activity [MVPA]).

Sport involvement. Sport involvement during the previous 12 months was measured by two items: (1) "During the past 12 months, on how many sports teams run by your school did you play?" and (2) "During the past 12 months, on how many sports teams run by organizations outside of your school did you play?"

Physical fitness. The Physical Work Capacity 170 (PWC 170) test was employed to measure the cardiorespiratory endurance component of physical fitness. The PWC 170 involved performing graded, submaximal exercise on a cycle ergometer. Heart rate was recorded as the subject performed three submaximal work rates that approximated heart rates of 120, 150, and 180 bpm. Cardiorespiratory endurance was estimated as the power output corresponding to a heart rate of 170 bpm using a linear regression of heart rate versus power output.

Procedures

The procedures were approved by the University of South Carolina Institutional Review Board; all participants and the parent or legal guardian provided written informed consent. Trained data collectors administered the measures to participants in groups of 6 to 10 girls. Analyses were performed on data collected in the spring 1999 semester when students were in the eighth grade.

Data Analysis

Exploratory factor analysis (EFA) was performed to initially estimate the factor structure with the calibration sample. The factor structure was then tested and modified using confirmatory factor analysis (CFA). When a two-factor model emerged that consisted of positively and negatively worded items, it was tested for being a methodologic artifact related to item wording. The final factor structure was tested with the cross-validation sample. The hypothesized relationships among scores from the four measures (of enjoyment, factors influencing enjoyment of physical education, physical activity, and sport involvement) were tested using structural equation modeling with the entire sample.

Exploratory Factor Analysis

The EFA was conducted using principal axis factor (PAF) extraction with an oblique rotation (i.e., oblimin; δ=0) in SPSS for Windows version 9.0.[19] PAF extraction uses squared multiple correlations (SMCs) as the initial communality estimates,[24] and it attempts to explain the common factors underlying the intercorrelations among responses to items on a questionnaire.[25] Solutions were extracted based on expectations of the factor structure as well as initial and final communality estimates, eigenvalues, scree plot, reproduced correlations, and factor pattern parsimony and interpretability.[24,25]

Confirmatory Factor Analysis

The CFAs were performed using full-information maximal likelihood (FIML) estimation in AMOS 4.0.[26] FIML was selected because there were missing responses to items on the measures. FIML is an optimal method for the treatment of missing data in CFA.[26,27] Standard procedures were employed to establish the parameters in the factor loading, factor variance-covariance, and uniqueness matrices. The size of the calibration and cross-validation samples was adequate to estimate the models.[28,29]

Model fit. Model fit was assessed using multiple indices. The chi-square statistic assessed absolute fit of the model to the data, but it is sensitive to sample size.[28–30] The root mean square error of approximation (RMSEA) represents closeness of fit, and values approximating 0.06 and zero demonstrate close and exact fit of the model, respectively.[31,32] The 90% confidence interval (CI) around the RMSEA point estimate should also contain 0.06 or zero to indicate the possibility of close or exact fit. The relative noncentrality index (RNI) and non-normed fit index (NNFI) test the proportionate improvement in fit by comparing the target model with the independence model.[32–35] Minimally acceptable fit was based on RNI and NNFI values of 0.90[33,34]; values approximating 0.95 indicated good fit.[32] The factor loadings, uniquenesses, standard errors, *t* values (i.e., parameter estimate divided by its standard error), and SMCs were inspected for appropriate sign and/or magnitude.

Model modifications. Modifications to the measurement models were performed based on substantive information (i.e., similarity of item content); modification indices and residuals are not provided by FIML in AMOS 4.0. The correlation between uniquenesses was estimated when the content between two items was similar and the correlation was interpretable.[16,29,30] The CFA was rerun to determine whether the modification resulted in an improved fit. The modification process was continued until a reasonable model was generated as indicated by the fit indices.

Method factors. Two-factor solutions consisting of positively and negatively worded items might represent method variance rather than common variance, and were tested using CFA methodology.[36] The CFA methodology involved testing four nested models based on a correlated trait, correlated uniqueness (CTCU) framework[36]: Model 1 posited a single factor underlying responses; Model 2 posited a two-factor model of negatively and positively worded items; Models 3 and 4 posited single factor models with correlated uniquenesses among negatively or positively worded items. The two-factor model should fit better than a simple one-factor model, and the one-factor models with correlated uniquenesses should fit better than the other two models to demonstrate that two-factor models are methodologic artifacts.[36]

Cross-validation. The final factor structures were cross-validated. Cross-validation involves an independent test of the factor structure following post-hoc model modifications performed using a calibration sample, which is necessary because a specification search performed in a single sample might capitalize on chance features of the data.[37] The final model, therefore, needs to be tested in an independent, cross-validation sample.[37]

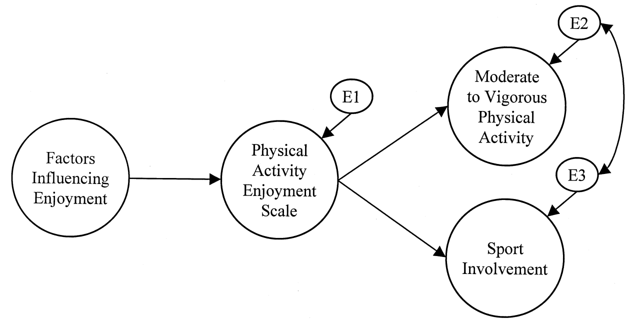

Figure 1. Model depicting hypothesized relationships among enjoyment and factors influencing enjoyment, physical activity, and sport involvement.

Structural Equation Modeling

Structural equation modeling (SEM) was performed using FIML estimation in AMOS 4.0 to test the hypothesized relationships among measures of enjoyment, factors influencing enjoyment of physical education, physical activity, and sport involvement. The entire sample of adolescent girls was adequate to estimate the structural model.[28,29]

Model specification. The two-step procedure was employed to test the hypothesized relationships among latent variables.[38] The first step involved using CFA to test an overall measurement model, which consisted of four correlated latent variables (i.e., enjoyment, factors influencing enjoyment of physical education, physical activity, and sport involvement). The four-factor measurement model served as a baseline model for the structural model. We then tested the expected relationships among the latent variables using SEM.

The measurement models for the 16-item PACES and 12-item measure of factors influencing enjoyment were specified according to the results of the CFAs. Unidimensional measurement models were specified for the three-item measure of MVPA and the two-item measure of sport involvement. As seen in Figure 1, the structural model included paths from factors influencing enjoyment (exogenous variable) to the PACES (endogenous variable) and PACES to MVPA and sport involvement (endogenous variables). There was a correlation between error terms for the MVPA and sport involvement endogenous variables because both latent variables measure physical activity.

Model fit. Model fit was assessed using the chi-square test statistic and the aforementioned guidelines for the RMSEA point estimate and 90% CI, RNI, and NNFI values. The factor loadings, uniquenesses, path coefficients, covariances, standard errors, *t* values, and SMCs were inspected for appropriate sign and/or magnitude.

Invariance analysis. We tested the invariance of the structural model across African-American (n=896) and Caucasian

Table 1. CFAs testing whether the two-factor solution to the PACES was substantively meaningful or method artifact

Model	df	χ^2	RMSEA (90% CI)	RNI	NNFI
Model 1	104	1481.55	0.121 (0.116–0.127)	0.75	0.74
Model 2	103	371.43	0.054 (0.048–0.060)	0.95	0.94
Model 3	83	303.11	0.054 (0.048–0.061)	0.95	0.94
Model 4	68	182.79	0.043 (0.036–0.051)	0.98	0.96

Model comparisons	df	χ^2_{diff}	p
Model 1 vs 2	1	1110.12	<0.05
Model 1 vs 3	21	1178.44	<0.05
Model 1 vs 4	36	1298.76	<0.05
Model 2 vs 3	20	68.32	<0.05
Model 2 vs 4	35	188.64	<0.05
Model 3 vs 4	15	120.32	<0.05

CFA, confirmatory factor analysis; CI, confidence interval; df, degrees of freedom; NNFI, non-normed fit index; PACES, Physical Activity Enjoyment Scale; RMSEA, root mean square error of approximation; RNI, relative noncentrality index; χ^2, chi-square statistic; χ^2_{diff}, chi-square difference test.

(n=823) girls using a multistep procedure.[16,28] The invariance routine involved initial tests of the structural model in the two samples. The next portion of the invariance routine involved five nested SEMs in which successive analyses contained the previous restriction(s) plus one additional restriction. The five nested SEMs tested the invariance of the structure (Model 1), factor loadings (Model 2), path coefficients (Model 3), factor variances and single covariance (Model 4), and item uniquenesses and correlations between uniquenesses (Model 5) across African-American and Caucasian girls.

Results

PACES

Calibration sample. EFA indicated that one or two factors might underlie responses to the 16-item measure of enjoyment. The CFA indicated that the two-factor model (χ^2=371.43, df=103, RMSEA=0.054 [90% CI=0.048–0.060], RNI=0.95, NNFI=0.94) represented a better fit than the one-factor model (χ^2=1481.55, df=104, RMSEA=0.121 [90% CI=0.116–0.127], RNI=0.75, NNFI=0.74). The negatively worded items loaded on one factor and the positively worded items loaded on the other factor.

Using the CFA–CTCU methodology,[36] we tested whether the two-factor model was substantively meaningful or a methodologic artifact of item wording. (See results in Table 1.) The two-factor model (Model 2) fit better than the one-factor model (Model 1), but the one-factor model with correlated uniquenesses among the positively worded items (Model 4) fit better than the other three models. The estimates of factor loadings, uniquenesses, standard errors, t values, and SMCs were of the appropriate sign and/or magnitude. The PACES consisted of a single factor representing enjoyment with substantively irrelevant methodologic effects associated with the positively worded items.

Cross-validation sample. We utilized the CFA–CTCU methodology to further test the two-factor model in the cross-validation sample. (See results in Table 2.) The pattern of results was identical to the analyses with the calibration sample, and provided further evidence that the PACES consisted of a single factor (i.e., enjoyment)

Table 2. CFAs testing whether the two-factor solution to the PACES was substantively meaningful or method artifact

Model	df	χ^2	RMSEA (90% CI)	RNI	NNFI
Model 1	104	1509.48	0.123 (0.117–0.128)	0.77	0.74
Model 2	103	392.00	0.056 (0.050–0.062)	0.95	0.95
Model 3	83	304.08	0.054 (0.048–0.061)	0.96	0.95
Model 4	68	194.15	0.045 (0.038–0.053)	0.98	0.96

Model comparisons	df	χ^2_{diff}	p
Model 1 vs 2	1	1117.48	<0.05
Model 1 vs 3	21	1205.40	<0.05
Model 1 vs 4	36	1315.33	<0.05
Model 2 vs 3	20	87.92	<0.05
Model 2 vs 4	35	197.85	<0.05
Model 3 vs 4	15	109.93	<0.05

CFA, confirmatory factor analysis; CI, confidence interval; df, degrees of freedom; NNFI, non-normed fit index; PACES, Physical Activity Enjoyment Scale; RMSEA, root mean square error of approximation; RNI, relative noncentrality index; χ^2, chi-square statistic; χ^2_{diff}, chi-square difference test.

Table 3. SEM analyses testing the invariance of the structural model across race

Model	df	χ^2	RMSEA (90% CI)	RNI	NNFI
African-American girls	453	1150.63	0.041 (0.039–0.043)	0.93	0.91
Caucasian girls	453	1052.32	0.040 (0.037–0.043)	0.94	0.93
Model 1	906	2202.95	0.029 (0.027–0.030)	0.93	0.92
Model 2	935	2288.94	0.029 (0.028–0.031)	0.93	0.92
Model 3	938	2297.77	0.029 (0.028–0.031)	0.93	0.92
Model 4	943	2303.45	0.029 (0.027–0.030)	0.93	0.92
Model 5	1014	3042.70	0.034 (0.033–0.036)	0.89	0.89

Model comparisons	df	χ^2_{diff}	p
Model 1 vs 2	29	85.99	<0.05
Model 2 vs 3	3	8.83	<0.05
Model 3 vs 4	5	5.68	<0.05
Model 4 vs 5	71	739.25	<0.05

CI, confidence interval; df, degrees of freedom; NNFI, non-normed fit index; RMSEA, root mean square error of approximation; RNI, relative noncentrality index; SEM, structural equation modeling; χ^2, chi-square statistic; χ^2_{diff}, chi-square difference test.

with substantively irrelevant methodologic effects among positively worded items.

Factors Influencing Enjoyment of Physical Education

Calibration sample. EFA indicated that one factor best represented responses to the 12-item measure of factors influencing enjoyment of physical education. The CFA indicated that the one-factor model did not represent an entirely acceptable fit (χ^2=343.83, df=54, RMSEA=0.077 [90% CI=0.070–0.085], RNI=0.90, NNFI=0.88). We estimated a correlation between the uniquenesses of Items 3 and 6 because the content was similar, but not redundant. The modification resulted in an improved (χ^2_{diff}=80.30, df=1, p<0.05), but not entirely acceptable, fit (χ^2=263.53, df=53, RMSEA=0.067 [90% CI=0.059–0.067], RNI=0.93, NNFI=0.91). Next, we estimated a correlation between uniquenesses of Items 2 and 9 because the items possessed similar content. The second modification resulted in an improved (χ^2_{diff}=42.73, df=1, p<0.05) and acceptable fit of the one-factor model (χ^2=220.80, df=52, RMSEA=0.060 [90% CI=0.052–0.068], RNI=0.94, NNFI=0.93). The estimates of factor loadings, uniquenesses, standard errors, *t* values, and SMCs were of the appropriate sign and/or magnitude.

Cross-validation sample. We then tested the one-factor model with correlated uniquenesses between Items 3 and 6 and Items 2 and 9, using CFA on the responses from the cross-validation sample. The model represented an acceptable fit (χ^2=223.49, df=52, RMSEA=0.061 [90% CI=0.053–0.069], RNI=0.94, NNFI=0.92). The estimates of factor loadings, uniquenesses, standard errors, *t* values, and SMCs were of the appropriate sign and/or magnitude.

Structural Equation Model

The overall measurement model, which consisted of four correlated latent variables (i.e., enjoyment, factors influencing enjoyment of physical education, physical activity, and sport involvement), was tested using CFA. The CFA indicated that the measurement model represented an acceptable fit (χ^2=1769.57, df=451, RMSEA=0.040 [90% CI=0.038–0.042], RNI=0.93, NNFI=0.92). The factor loadings, uniquenesses, standard errors, t-values, and SMCs were of the appropriate sign and/or magnitude. The interfactor correlations were significant and ranged between 0.19 and 0.45 (M=0.30, Md=0.28).

SEM was employed to test the hypothesized relationships depicted in Figure 1, and the model resulted in a good fit (χ^2=1801.83, df=453, RMSEA=0.041 [90% CI=0.039–0.043], RNI=0.93, NNFI=0.92). Although the structural model differed significantly from the baseline measurement model (χ^2_{diff}=32.26, df=2, p<0.05), the RMSEA point estimate and 90% CI, RNI, and NNFI were identical and indicative of good fit. The factor loadings, uniquenesses, standard errors, *t* values, and SMCs were of the appropriate sign and/or magnitude. There were significant direct effects between factors influencing enjoyment of physical education and the PACES (standardized estimate=0.46), PACES and MVPA (standardized estimate=0.23), and PACES and sport involvement (standardized estimate=0.25). The correlation between error terms for MVPA and sport involvement was significant (standardized estimate=0.37).

Secondary analyses. We tested the invariance of the structural model across African-American and Caucasian girls. (See results in Table 3.) The structural model fit acceptably in the samples of African-American and Caucasian girls. Based on the overlapping and acceptable RMSEA point estimates and 90% CIs as well as RNI and NNFI values, the nested SEMs provided support for the invariance of the structure (Model 1), factor loadings (Model 2), path coefficients (Model 3), and factor variances and covariance (Model 4). The uniquenesses were not entirely invariant across race (Model 5).

We performed another SEM that included a measure of physical fitness (i.e., PWC 170) along with the measures of enjoyment, factors influencing enjoyment of physical education, physical activity, and sport involvement. Physical fitness was modeled as an observed variable, and paths were specified linking it to physical activity and sport involvement. The model represented a good fit (χ^2=1843.41, df=484, RMSEA=0.040 [90% CI=0.038–0.041], RNI=0.93, NNFI=0.92), and fitness was related to MVPA (standardized estimate=0.17) and sport involvement (standardized estimate=0.24). The relationships between the PACES and MVPA (standardized estimate=0.22) and sport involvement (standardized estimate=0.25) remained stable.

Discussion

The results provide support for the validity of scores from the PACES as a measure of physical activity enjoyment among African-American and Caucasian adolescent girls. We hypothesized that factors influencing enjoyment of physical education, physical activity, and sport involvement would be related to enjoyment. The significant relationships observed among scores from the measures provide convergent evidence of the construct validity of PACES scores in adolescent girls.[17,18]

Factorial Validity

PACES. Based on the CFA–CTCU methodology,[36] the modified, 16-item version of the PACES was best represented by a single substantive factor (i.e., enjoyment). The inclusion of a substantively irrelevant methodologic effect in the one-factor model, however, was necessary to achieve a good fit. The methodologic effect was associated with the positively worded items, and it may explain the lack of support for the unidimensional model to the original 18-item version of the PACES observed in a sample of youth sport participants.[15] Unfortunately, previous researchers adopted a strictly confirmatory approach when testing the factor structure of the PACES and did not report alternative models to the PACES or test for the existence of a methodologic effect associated with item wording.

The methodologic effect observed in the present study was associated with the positively worded items. Previous researchers examining a measure of self-esteem have reported methodologic effects among negatively worded items.[36] Therefore, methodologic effects can result from *either* positively or negatively worded items, and researchers should test for the presence of methodologic effects in studies of factorial validity.[36]

Factors influencing enjoyment. The 12-item measure of factors influencing enjoyment of physical education was generated based on previous research and employed to establish convergent evidence for the construct validity of PACES scores. The measure was best described by a single factor with correlated uniquenesses between two pairs of similarly worded items. Support for the model was obtained using the calibration and cross-validation samples. Accordingly, the one-factor model represented a good fit to the measure of factors influencing enjoyment of physical education in African-American and Caucasian adolescent girls.

Structural Equation Modeling

The initial four-factor measurement model represented a good fit; the interfactor correlations among enjoyment, factors influencing enjoyment, physical activity, and sport involvement were significant and of the expected magnitude. The SEM supported the hypothesized relationships depicted in Figure 1 as one way of describing the correlations among enjoyment and factors influencing enjoyment of physical education, physical activity, and sport involvement. There were direct positive effects between factors influencing enjoyment of physical education and enjoyment, and between enjoyment and physical activity and sport involvement. The endogenous physical activity and sport involvement variables also were intercorrelated. The secondary analyses demonstrated that: (1) the constructs of enjoyment, factors influencing enjoyment of physical education, physical activity, and sport involvement were measured similarly across African-American and Caucasian girls; (2) the hypothesized relationships among constructs were comparable across African-American and Caucasian girls; and (3) enjoyment was associated with physical activity and sport involvement even when controlling for fitness.

The present study extended previous research by: (1) employing established and validated measures of enjoyment and physical activity, (2) demonstrating that the relationships were invariant across race and independent of physical fitness, and (3) utilizing SEM rather than traditional analytic approaches of bivariate correlation and multiple regression analyses on observed variables. Notwithstanding the present results, invariance of the factorial validity of the modified PACES should be tested in other groups and across time.

Future Research

The availability of a valid measure of enjoyment of physical activity will permit researchers to pursue several important questions. Interventions that focus on promoting enjoyment to increase participation in physical activity by youth can be developed and evaluated. Examining sources of enjoyment beyond the physical education setting would expand the understanding of the origins of enjoyment and could help guide such interventions. Also, the structural equation modeling approach we have taken could be employed to compare enjoyment with variables representing instrumental or extrinsic motivation as predictors of the adoption and maintenance of physical activity or as mediators of interventions designed to increase physical activity.

Implications

The observed correlations among enjoyment, physical activity, and sport involvement lend support to the importance of the enjoyment (i.e., intrinsic motivation) component of expectancy-value theories as a possible target for interventions. Previous research in preventive medicine has focused mainly on extrinsic or instrumental variables such as perceived health outcomes of physical activity. Extrinsic or instrumental variables typically represent distal rather than proximal influences on behavior and may be more closely related to adoption rather than maintenance of physical activity.[40] In contrast, enjoyment may be more strongly related to maintenance of physical activity because it is a proximal influence of behavior and provides an immediate reinforcement for being physically active. Accordingly, interventions designed to increase physical activity should focus on promoting enjoyment. Promoting enjoyment of physical activity may increase maintenance of physical activity and sport by youth[41] and perhaps decrease the attractiveness of alternative sedentary activities (e.g., watching television, telecommunicating, or playing video games), which are prevalent among adolescent girls and boys[42] and may reduce physical activity during leisure time.

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Appendix

Physical Activity Enjoyment Scale

When I am active. . . (1) Disagree a lot . . . (5) Agree a lot

1. I enjoy it
2. I feel bored
3. I dislike it
4. I find it pleasurable
5. It's no fun at all
6. It gives me energy
7. It makes me depressed
8. It's very pleasant
9. My body feels good
10. I get something out of it
11. It's very exciting
12. It frustrates me
13. It's not at all interesting
14. It gives me a strong feeling of success
15. It feels good
16. I feel as though I would rather be doing something else

Factors Influencing Enjoyment of Physical Education

When I am in PE class. . . (1) Dislike a lot . . . (5) Enjoy a lot

1. Learning new skills is something that I
2. Changing clothes is something that I
3. Working out with other students is something that I
4. Doing different types of physical activities is something that I
5. Getting warmed up and breaking a sweat is something that I
6. Being with the other students in class is something that I
7. Getting a break from other classes is something that I
8. Being in the gym or on the playing field is something that I
9. Showering after class is something that I
10. Learning about physical fitness and health is something that I
11. Being with the PE teacher is something that I
12. Getting some exercise is something that I