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Psychological factors related to physical education classes as predictors of students' intention to partake in leisure-time physical activity

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Abstract *In view of the rise in sedentary lifestyle amongst young people, knowledge regarding their intention to partake in physical activity can be decisive when it comes to instilling physical activity habits to improve the current and future health of school students. Therefore, the object of this study was to find a predictive model of the intention to partake in leisure- time physical activity based on motivation, satisfaction and competence. The sample consisted of 347 Spanish, male, high school students and 411 female students aged between 13 and 18 years old. We used a questionnaire made up of the* Sport Motivation Scale, Sport Satisfaction Instrument, *and the competence factor in the* Basic Psychological Needs in Exercise Scale and Intention to Partake in Leisure-Time Physical Activity, *all of them adapted to school Physical Education. We carried out confirmatory factor analyses and structural equation models. The intention to partake in leisure-time physical activity was predicted by competence and the latter by satisfaction/fun. Intrinsic motivation was revealed to be the best predictor of satisfaction/fun. Intrinsic motivation should be enhanced in order to predict an intention to partake in physical activity in Physical Education students.*

Keywords *Adolescence, Extracurricular activity, Structural equations, Sports practice*

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Introduction

The benefits of physical education on human health are widely known and have been broadly promoted over the last ten years. We only have to look around to see the problems of today's young people: physical inactivity[1], obesity and hypertension[2] among others. As is the case in many countries, Spain has a 32%-35%[3] obesity level, with physical activity levels well below health authorities' recommendations[4]. In this context, a number of studies have revealed the decisive role of Physical Education in the acquisition of and adherence to long-lasting sports and physical activity habits[1,5] for health improvement. In view of such a challenging situation in Spain, adolescence is a key stage that should be addressed in order to achieve some degree of consolidation of sports and physical activity[1,3] and pursue the improvement of personal health. Therefore, state governments continue to search for models which would favor the increase of sports practice at young ages[6] (given its significant effects in terms of health), and it is thus necessary to assess the intention of partake in leisure-time physical activity in young people. In the specific case of school administration, PE teachers can have adecisive role in the creation and acquisition of healthy habits[5,7] in students and in the increasing of an intention to partake in physical activity outside schools. But how can we get students to adhere to and engage in leisure-time physical activity?A possible solution can be explained based on Achievement Goal Theory[8] and Self-determination Theory[9], both widely known via numerous studies related to science and collective health. Both these theories can contribute important variables to determining whether or not a given population partakes in physical activity[10,11]. Some of the motivational variables with a potential to predict intention to partake in physical activity in the population studied in this paper and which are worth noting here are competence[12] and satisfaction with sports (noted as fun and boredom in Castillo et al.[13]). Added to this, different researchers have concluded that a desire for fun is one of the main reasons young people decide to engage in physical activity[5,14] outside the school environment, which makes them feel more competent.

The aforementioned variables (competence and satisfaction/fun or boredom) are closely related to motivation, as shown by a series of studies[15,16].In this regard, other authors[17] assessing the intention to partake in physical activity in high school students found thatthis intention increased if the PE teacher satisfied some of the students' basic psychological needs (such as competence) and achieved higher self-determined motivation in them. They also found thatthe intention to partake in physical activity was located within the same population profile of those students who were highly motivated to participate in the Physical Education subject, who are in turn the students who partake in more hours of extracurricular physical activity[5].

The aforementioned studies reveal a connection between motivation, competence, satisfaction/fun and boredom and they show potential relationships between these variables and the intention to partake in physical activity amongst young people. Thus, the object of this paper is to find a structural model which will allow for predicting a future intention to partake in leisure-time physical activity based on motivation, satisfaction/fun and boredom and competence. The hypothesis is that motivation predicts the rest of the variables and that the intention of future engagement in physical activity will be predicted by satisfaction/fun and by competence (Figure 1).

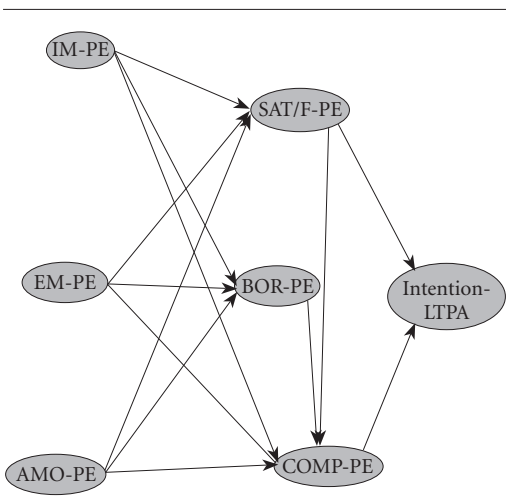

Figure 1. Structural model composed by 7 hypothesized factors.

Method

Participants

We selected a non-probabilistic convenience sample based on to the subjects we were able to access. A total of 758 high school students from the Murcia region in Spain participated in the study (347 male students = 45.8%; 411 female students = 54.2%) from seven state schools located inMolina de Segura, Murcia and Cartagena.All the students accessed for this research had given their agreement. A total of 23 students declined to participate. The medians and standard deviations according to age are shown on Table 1.

The rate of repeaters in this sample was4.93%, that of immigrants or foreign students being approximately 4.61%.The statistical power of the sample ($n = 758$) is 0.98; in the case of regression calculationsa level or error (α) = 0.05 is allowed and effect size was calculated at (p) = 0.13.

Instruments

Sport Motivation Scale (SMS). We used the version adapted to Physical Education[18] of the original *Sport Motivation Scale*[19] (SMS-PE).This instrument includes 28 questions assessing the different types of motivation set by self-determination theory[9] grouped under three factors: intrinsic motivation (IM-PE), extrinsic motivation (EM-PE) and a motivation (AMO-PE). The answers were scaled on a polytomous items scale from 1 (*totally disagree*) to7 (*totally agree*). Internal consistency was as follows: intrinsic motivation, $\alpha = 0.91$, extrinsicmotivation, $\alpha = 0.91$ and a motivation, $\alpha = 0.75$. The confirmatory factor analysis (CFA) showed good fit: $\chi^2 = 1047.22$, $g = 347$, $p < 0.001$, $\chi^2/gl = 3.02$, Goodness of Fit Index (*GFI*) = 0.98, Normalized Fit Index (*NFI*) = 0.96, Non-Normative Fit Index (*NNFI*) = 0.97, Comparative Fit Index (*CFI*) = 0.98, Root Mean Square Error of Approximation (*RMSEA*) = 0.05.

Table 1. Sample Medians and Standard Deviations (N = 758).

Age	Median	Standard Deviation
13 -18	15.22	1.27
Boys	15.2	1.29
Girls	15.18	1.26

Sport Satisfaction Instrument (SSI).We used the Spanish version adapted to Physical Education (SSI-PE)[20], of the *Sport Satisfaction Instrument* (SSI) [21]. This instrument includeseight questions assessing the level of satisfaction/fun of students in the Physical Education class(SAT/F-PE) with five questions and boredom(BOR-PE) in this class(threequestions). Recent studies have revealed that Physical Education students with a satisfaction/fun profile were students with a self-determined profile who valued effort and hard work towards improvement and who placed great importance on Physical Education[5]. Furthermore, it is important to take these variables into account as satisfaction/fun with Physical Education has been proved to positively and significantly predict satisfaction/fun with school whereas boredom with Physical Education positively predicts boredom with school[22].

The answers were scaled on a polytomous items scale from 1 (*totally disagree*) to 5 (*totally agree*). Internal consistency was: SAT/F-PE, $\alpha = 0.77$, BOR-PE $\alpha = 0.71$. Following the original structure we carried out a CFA of the scale, which showed adequate goodness-of-fit indicators: $\chi^2 = 38.53$, $gl = 13$, $p = 0.012$, $\chi^2/gl = 2.96$, $GFI = 0.98$, $NFI = 0.98$, $NNFI = 0.99$, $CFI = 0.99$, $RMSEA = 0.31$.

Competence; we used the Competence (COMP) sub-scale of the *Basic Psychological Needs in Exercise Scale* (BPNES). This sub-scale includes 4 questions assessing how competent students feel in the PE class (COMP-PE). We used the validated Spanish version adapted to Physical Education[23] of the *Basic Psychological Needs in Exercise Scale*[24]. The answers were scaled on a polytomous items scale from 1 (*totally disagree*) to 5 (*totally agree*). Internal consistency was: competence, $\alpha = 0,73$.

Intention to partake in leisure-time physical activity (*Intention-LTPA*). We used the Spanish version[25] of the original by Chatzisarantis et al.[26], which includes three statements to assess students' intention to partake in leisure-time physical activity. The statements are the following: 1. I intend to do physical exercise at least three times a week next month.

2. I'm planning to dophysical exercise at least three times a week next month. 3. I've decided to do physical exercise at least three times a week next month. The answers were scaled on a polytomous items scale ranging from 1 (*very unlikely*) to 7 (*most likely*). In the version validated with Physical Education students[25] the CFA results were $\chi^2 = 1.93$, $df = 1$, $p = 0.165$, $\chi^2/df = 1.93$, *GFI*

= 1.00, *RMR* = 0.02, *NFI* = 1.00, *NNFI* = 0.99, *CFI* = 1.00, *RMSEA* = 0.03, with values α = 0.93. In this study internal consistency was .94. Following the original structure, we carried a CFA of the scale, which showed adequate goodness-of-fit indicators: $\chi^2 = 2.45$, $df = 1$, $p = 0.117$, $\chi^2/df = 2.45$, *GFI* = 1.00, *NFI* = 0.99, *NNFI* = 0.99, *CFI* = 1.00, *RMSEA* = 0.04.

Procedure

We asked the competent institutions –both high schools and universities– for permission to carry out research and the study was validated by the Ethics Committee of the University in which it is conducted. Likewise, students' parents and/or legal guardians gave informed consent to participate in this research. The instruments were administered by the researchers themselves with no teachers in the classroom. Participants were debriefed on the object of the study, its voluntary nature and on the absolute confidentiality for the answers and data management. It was also explained there were no correct or incorrect answers. Each participant hat 20-30 minutes to complete the questionnaires.

Statistical analysis

We carried out an items analysis as well as homogeneity, structure and internal consistency analysis of each sub-scale. We also calculated asymmetry and kurtosis indices, which were generally close to zero and < 2. All these calculations were carried out using SPSS Statistics 22.0 Fix Pack. The statistical power of the sample was calculated with G*Power 3.1. Next, the Mardia-Based Kappa was calculated based on PRELIS relative multivariate kurtosis (RMK) in order to estimate multivariate normality. Following that, each instrument was tested by assessing factor structure with a CFA. The models were assessed by means of a series of both absolute and relative fit indices. In terms of absolute values we calculated the *p*-value, associated to the chi-squared test (χ^2); the ratio between χ^2 and degrees of freedom (*df*) (χ^2/df) is a heuristic value used to reduce the sensitivity of χ^2 to sample size. Ratios < 2.0 are considered to indicate solid goodness-of-fit of the model[27], whereas < 5.0 values are consideredadequate[28]. Furthermore, we have estimated the GFI and some authors[29] consider values ≥ .95 for better fit. The following relative indiceshave been used: NFI, NNFI and CFI; ≥ .95 values are considered to indicate good fit[28]. Some authors[30] recommend using Root Mean Square Error of Approximation (RMSEA), and following Hu and Bentler[28], a ≤ .06 value would indicate good fit. The estimated parameters are considered significant when the associated value with the *t* value is > 1.96 ($p < .05$).

We also calculated the Average Variance Extracted (AVE) for each of the critical dimensions. Finally, we used LISREL 8.80 to carry out a series of structural regression models in order to study the prediction of motivation, satisfaction/fun and boredom and competence in terms of the intention to partake in physical activity.

Results

Structural Equation Models

First, we carried out a multivariate normality analysis and a 0.226 Mardia-Based Kappa was obtained. Given that the data failed the normality test, we carried out this analysis using LISREL 8.80 weighted least squares (WLS) for ordinal variables. The correlation matrix, the polychoric correlations matrix and the asymptotic covariance matrix were used as input for data analysis. Table 2 shows the positive reliability data and the validity of each of the dimensions used in this study to subsequently analyze the structural models.

A series of structural models were formulated and analyzed. Firstly, and based on the reviewed theoretical framework and the initial hypothesis, we tested the model in which SMS-PE would predict both SSI-PE and COMP-PE and the latter two Intention-LTPA. Given that the model fits were not correct ($\chi^2/gl = 6.71$, *GFI* = 0.87, *NFI* = 0.84, *NNFI* = 0.82, *CFI* = 0.86, *RMSEA* = 0.09), the option was chosen to place the variables obtaining the best prediction values – the SSI-PE variables – behind the SMS-PE. Moreover, as the program output showed that the modification indices proposed that the SSI-PE could predict COMP-PE, so improving the model, we opted for placing this variable in the third place to check if the model fit was correct. Once its validity was verified, other models were tested in which the intention to partake in leisure-time physical activity was predicted by all the aforementioned variables, now with the validated SMS-PE, SSI-PE, COMP-PE and Intention-LTPA model. In this case, the model did not work correctly so the modification indices were once again taken

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into account to adjust the structural model definitively, which led to eliminating a number of predictions and to obtaining the model shown in (Figure 2), which presented satisfactory fits. The data in Figure 2 show seven latent variables with a total of 43 observed variables. The model fit results were adequate: $\chi^2 = 3603.84$, $df = 1472$, $p < 0.001$, $\chi^2/df = 2.45$, $GFI = 0.93$, $NFI = 0.97$, $NNFI = 0.98$, $CFI = 0.98$, $RMSEA = 0.06$.

Figure2 shows that IM-PE is the main predictor of SAT/F-PE with highly significant values (β = 0.87), and lower values in the case of EM-PE (β = 0.47). In terms of the SSI-PE, it is worth noting the significant prediction of SAT/F-PE over COMP-PE (β = 0.76), and of the latter over Intention-LTPA (β = 0.58).AMO-PE predicts with low values BOR-PE (β = 0.22) while the latter predicts COMP-EF (β = 0.17). However,the path shows that the best route to increaseIntention-LTPA in our students is for them to achieve higher IM-PE as the latter will predict SAT/F-PE and this in turn will predict COMP-PE.

Table 2. Internal consistency of the dimensions studied.

Dimensions	Composite Reliability	*AVE*	α
IM-PE	0.99	0.92	0.91
EM-PE	0.99	0.88	0.91
AMO-PE	0.85	0.58	0.75
SAT/F-PE	0.90	0.64	0.86
BOR-PE	0.80	0.58	0.72
COMP-PE	0.88	0.64	0.78
Intention-LTPA	0.94	0.85	0.94

Note: AVE = Average Variance Extracted.

Discussion

As revealed by some studies[31], there exist a series of barriers which prevent adolescents from doing physical activity, a decrease being observed

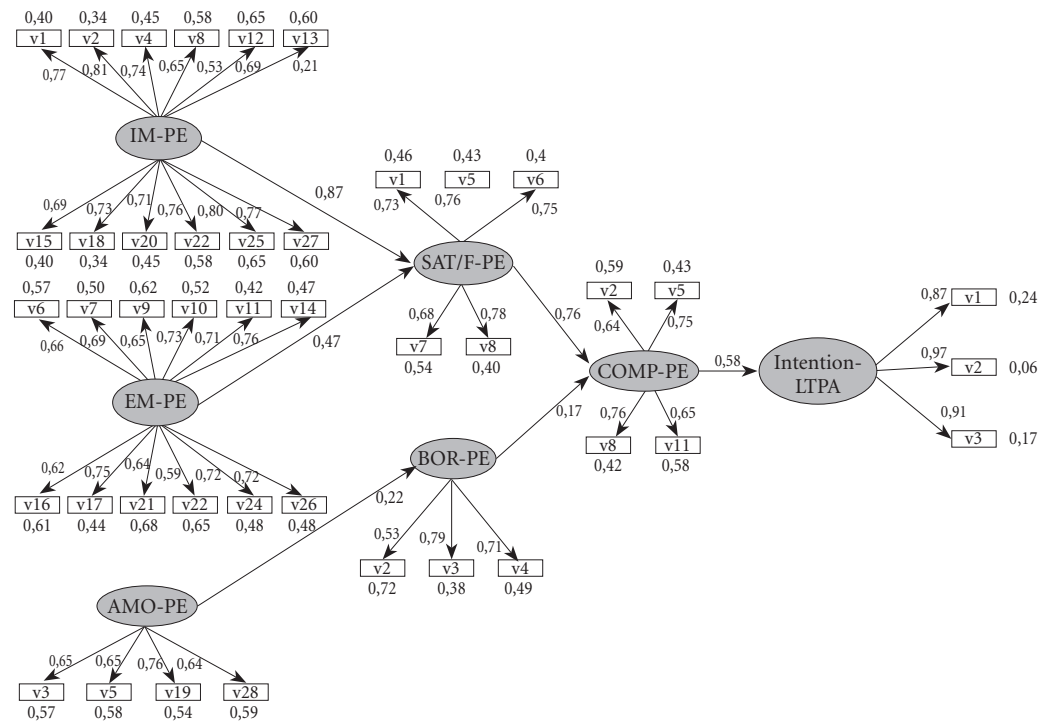

Figure 2. Structural model found. The circles represent the latent constructs and the squares represent the variables measure. All the parameters are standardized and significant in p < .05. IM = Intrinsic Motivation; EM = Extrinsic Motivation; AMO = A motivation; SAT/F = satisfaction/fun; BOR = boredom; COMP = competence; Intention-LTPA = intention to partake in leisure-time physical activity.

from 12-13 years of age[32]. The structural model estimated in this study provides an alternative for students to acquire an intention to partake in leisure-time physical activity based on the Physical Education subject and the variables studied. According to the papers cited in the Introduction section, this practice could establish physical activity habits and contribute, to some extent, to changing the current situation of inactivity and childhood obesity.

An analysis of the prediction model reveals that IM-PE and EM-PE predict SAT/F-PE, which is line with contributions in other studies[33] which found a negative prediction for BOR-PE. This research shows that BOR-PE is predicted only by AMO-PE, with low values. This is a highly interesting result as the path diagram reveals that the reason why students are satisfied with Physical Education is likely to be related to high levels of motivation, especially self-determined motivation. Gómez et al.[34] found that fun was an excellent predictor of sports commitment, whereas Zhang et al.[35] found that students who enjoy Physical Education would be more likely to partake in physical activity inside and outside school when compared to those who are extrinsically motivated or who do not have fun. This study reveals that for SAT/F-PE to predict Intention-LTPA, the former has to necessarily involve COMP-PE; the model tests did not allow direct prediction between these variables.

In terms of competence, it is mainly predicted by SAT/F-PE. In this case, teachers' feedback could be an excellent incentive to improve this prediction.

Finally, COMP-PE is a good predictor of Intention-LTPA. This result is supported by existing knowledge, based on the fact that a high perception of COMP-PE is related to a higher level of participation in physical and sports activity[35]. Further, according to Castillo et al.[13] goal achievement theory assumes that the perception of COMP-PE determines persistence, commitment and the choice to carry out a specific activity, which would lead students to partake in physical activity outside school hours.

An analysis of this structural model allows us to confirm the findings of Hidalgo-Rasmussen et al.[1], who state that the Physical Education subject in schools can actively promote the creation of healthy habits in adolescents. In order to get adolescents to partake in physical education to improve their health in the future, it is important that they should feel competent, satisfied and with high IM-PE. Therefore, when it comes to predicting Intention-LTPA, high IM-PE is not enough, rather, the mediating effect of SAT/F-PE and BOR-PE and of COMP-PE in Physical Education plays an essential role. This adds to the findings of other studies[5,36] which showed that students with better Physical Education motivational profiles were more prone to partaking in physical activity outside school hours, even at a young adult age.

A potential limitation of this research could be in the transversal nature of its design; there is some possibility that the results might change depending on different variables such as e.g. the type of contents taught in class or the type of sample. In terms of the latter, another limitation of this study is that we were not able to obtain a sample design representative of the Murcia Region; this was fundamentally a result of time and budget constraints. Furthermore, the estimated structural regression model is but one of the potential models that could be valid to study the prediction of physical activity. This is due to the issue of equivalent models in the structural equation model technique, according to Hershberger[37]. In view of all this, future studies could re-analyze this model comparing samples from different countries, from different educational institutions or even using the bilingual SSI-PE version[38].

To conclude, it is worth highlighting, regarding the results obtained in this study, that other research already shows the relationship between IM[39-41] and COMP-PE[39,42] and partaking in school and extracurricular physical activity. This study, by contrast, shows a way to bring adolescent students closer to these healthy habits through increasing the intention to partake in leisure-time physical activity. However, it would be necessary to carry out further experimental studies in order to assess whether the structure model is suitable for the actual school system and the effect of increasing motivation and competence in adolescents in order to achieve a higher level of participation in physical activity.

This study estimated a structural model which allows for predicting the intention to partake in leisure-time physical activity in adolescents based on motivation, satisfaction/fun and on the competence students perceive in themselves in Physical Education classes.

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Collaborations

A Baena-Extremera and A Granero-Gallegos worked on the concept and design of the study, data analysis and interpretation, and approval of the final version; A Ponce-de-León-Elizondo, E Sanz-Arazuri and MA Valdemoros-San-Emeterio worked on data interpretation, theliterature review and writing and approval of the final version; M Martínez-Molina was in charge of field work, writing and approval of the final version.

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