Prediction of Positive Behaviors in Physical Education: A Self-Determination Theory Perspective

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Abstract

This study examines the motivational antecedents that might influence on positive behaviors in physical education classes. The sample comprised 1692 pupils ranging in age from 12 to 16 years old ($M = 13.34$; $SD = .76$), recruited from 99 school classes in 32 public secondary schools. A complete model of structural regression is tested taking into account the multilevel nature of the data, showing how the perception of basic psychological needs support predicts the types of motivation through the basic psychological needs satisfaction, and the types of motivation predict the positive behaviors. The results emphasize motivational processes as key factors for the development of adaptive behaviors in physical education context.

Keywords: Basic psychological need, self-determinated motivation, adaptative behaviours, adolescents.

Resumen

El presente estudio analiza los antecedentes motivacionales que pueden incidir en la realización de comportamientos positivos en las clases de educación física. La muestra está formada por 1692 alumnos con edades comprendidas entre los 12 y los 16 años ($M = 13.34$; $DT = .76$), pertenecientes a 99 clases de 32 centros educativos públicos. Se somete a verificación un modelo completo de regresión estructural que, teniendo en cuenta la naturaleza multinivel de los datos, refleja cómo la percepción de apoyo a las necesidades psicológicas básicas predice el tipo de motivación a través de la satisfacción de las necesidades psicológicas básicas, y cómo el tipo de motivación actúa como predictor de los comportamientos positivos. Los resultados destacan los procesos motivacionales como elementos claves para el desarrollo de comportamientos adaptativos en el contexto de la educación física.

Palabras clave: Necesidades psicológicas básicas, motivación autodeterminada, conductas adaptativas, adolescentes.

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Introduction

One of the main objectives of Compulsory Secondary Education (ESO) in Spain is that students "assume […] their duties and […] exercise their rights having respect for others, practice tolerance, cooperation and solidarity between people, […] by strengthening human rights as common values in a pluralistic society and prepare to exercise democratic citizenship" (Boletín Oficial del Estado, 05-01-2007, p. 679). Physical education (PE) classes provide an appropriate context for the development of these behaviours and values because these classes involve personal interactions among students in an open space (Holt, Sehn, Spence, Amanda, & Ball, 2012).

Numerous studies have emphasised the importance of the motivational processes that students develop within the PE context, as such processes serve as key elements in determining the behaviours that are developed during classes (Ntoumanis & Standage, 2009). An increasing number of studies have relied on the Self-Determination Theory (SDT) to analyse motivation in the PE context (Deci & Ryan, 2000; Ryan & Deci, 2000). According to the SDT, motivation lies along a continuum. Motivation can be differentiated into autonomous motivation (intrinsic motivation, integrated and identified regulations), controlled motivation (introjected and external regulations) and amotivation

(Deci & Ryan, 2000; Vansteenkiste, Niemiec, & Soenens, 2010). Intrinsic regulation is the highest level of self-determination. It is defined as voluntary participation in an activity because of the interest, satisfaction and pleasure that results from the participation itself. Integrated regulation refers to involvement in a determined activity because it is part of personal identity whereas identified regulation refers to involvement because of the positive value placed on the activity. Within controlled motivation, introjected regulation refers to engagement in an activity to avoid feelings of guilt and to improve feelings that are related to personal ego or pride. Along the continuum, external regulation refers to the performance of an activity to obtain an external reward or avoid punishment. Finally, amotivation represents the absence of both intrinsic and extrinsic motivation, which occurs when people lack the intention or volition to engage in an activity.

Moreover, within the SDT, the subtheory of Basic Psychological Needs (Ryan & Deci, 2002) posits that the different levels of self-determination are defined by the level of satisfaction of three basic psychological needs (BPN). These BPN include the need for autonomy, which is satisfied when a person has personal control of his or her conduct and willingly participates; the satisfaction of competence refers to the feeling of effectively interacting with the environment and develop-

ing a sense of accomplishment; and the satisfaction of relatedness refers to the positive interaction with other people and development of belongingness within the social context in which the activity is performed. This idea has been supported by various studies on PE, which have shown that students with higher BPN satisfaction develop greater self-determined motivation (Moreno-Murcia & Vera, 2011; Ntoumanis, 2005; Rutten, Boen, & Seghers, 2012; Standage, Duda, & Ntoumanis, 2005; Zhang, Solmon, Kosma, Carson, & Gu, 2011).

As a complement to SDT, the Hierarchical Model of Motivation (Vallerand, 2007) largely explains the social factors that can determine the type of student motivation as well as the effects of the different forms of regulation. Concerning motivational antecedents that may influence the PE context, researchers have emphasised the teacher's role as a key element that influences the level of students' BPN satisfaction and, in turn, the type of regulation that is developed during PE classes. Specifically, one line of research (Haerens et al., 2013; Rutten et al., 2012; Standage et al., 2005, Zhang et al., 2011) categorises these social factors into three components. First, autonomy support refers to shifting the teacher's responsibility of selecting the tasks that the students perform as well as the use of cognitive teaching styles that allow student freedom in decision-making. Second, competence support

is related to optimising students' perceptions of their ability through activities that are adjusted to their level and provide a sufficient time frame to achieve the proposed aims. Finally, relatedness support refers to the teacher's resources that encourage the inclusion and integration of classmates in the class. On this basis, studies have found that students who perceive BPN support from the teacher during PE lessons show greater needs satisfaction (Rutten et al., 2012; Standage et al., 2005; Zhang et al., 2011).

Similarly, the model proposed by Vallerand (2007) explains that the different types of motivation have behavioural, cognitive and emotional effects. Specifically, studies conducted within the PE context have shown that high levels of self-determination involve positive effects, such as effort, vitality and intention to be physically active, whereas low levels of self-determined motivation are related to negative effects, such as boredom and unhappiness (Mouratidis, Vansteenkiste, Lens, & Sideridis, 2008; Ntoumanis, 2005; Standage et al., 2005; Taylor, Ntoumanis, Standage, & Spray, 2010).

However, few studies have included the emergence of adaptive behaviours, which is an essential element during the students' adolescence, as an effect. Of note, Sánchez-Oliva, Leo, Sánchez-Miguel, Amado, and García-Calvo's study (2013) showed that self-determined motivation positively pre-

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dicted adaptive behaviours within PE lessons and that non-self-determined motivation negatively predicted these behaviours. Thus, their study significantly contributes to our understanding of the importance of motivational processes to explain the development of adaptive behaviours within the PE context. Concretely, the current paper is based on Sánchez-Oliva, Sánchez-Miguel, Leo, Amado, and García-Calvo's (2013) approach, which employed the contributions of various authors (Beregüí & Garcés de los Fayos, 2007; Gómez Rijo, 2005) to analyse the personal determinants (self-control and assessment of effort) and social determinants (respect for facilities and materials, cooperation, tolerance and respect for classmates) of prosocial behaviours.

Few studies have tested Vallerand's model and included factors that are related to the development of prosocial behaviours. Thus, the purpose of the current study is to analyse the students' perceptions of the impact of social factors on motivational processes, which may determine the realisation of adaptive behaviours within PE lessons. More specifically, the first hypothesis proposes that learning environments where students perceive support for autonomy, competence and relatedness will predict the students' greater satisfaction of these needs. The second hypothesis proposes that BPN satisfaction will predict greater self-determined motivation in the learners. Finally, the third hy-

pothesis proposes that higher levels of self-determination will positively predict positive behaviours and have an inverse relationship with amotivation.

Method

Participants

The study sample was composed of 1692 students from 32 state schools of ESO that were located in the autonomous community of Extremadura. The age range of the sample was 12-16 years old (M_{age} = 13.34, SD = 0.76). Of the participants, 851 students were male, 839 were female and 2 did not specify their gender. In addition, 876 students were in the first year of secondary school, 803 students were in the second year and 13 students did not answer this question. All participants were selected through cluster sampling based on the 99 classrooms in which they were enrolled. The questionnaires that showed unusual response patterns and response processes were excluded from the study (26 cases, 1.50%). The detection of unusual test-response patterns was conducted through two methods: identifying outliers using SPSS software and identifying the students who assigned the same score to all items using manual analysis.

Regarding the grouping into classes and schools, between 3 and 31 students per class completed the

questionnaires ($M_{students}$ = 17.00). The 99 classes were grouped into 32 schools. Therefore, between 1 and 8 classes per school and an average of 3 classes and 51 students per school participated. Of note, each school had only one PE teacher; therefore, the classes within a particular school had different classmates but the same teacher.

Instruments

Perception of teacher's support of basic psychological needs. The Questionnaire of Basic Psychological Needs was used (Sánchez-Oliva, Leo, Amado, Cuevas, & Garcia-Calvo, 2013). This instrument has 12 items (4 items per factor) that follow the initial statement "In Physical Education classes, our teacher..." tapping *autonomy support*, *competence support* and *relatedness support*.

Satisfaction of basic psychological needs. The Spanish adaptation (Moreno, Gonzalez-Cutre, Chillon, & Parra, 2008) of the Basic Psychological Needs in Exercise Scale (BPNES: Vlachopoulos & Michailidou, 2006) was employed. This instrument has 12 items (4 items per factor) that follow the initial statement "In my PE class..." and measure the satisfaction of the basic psychological needs of *autonomy*, *competence* and *relatedness*.

Type of motivation. The Questionnaire of Motivation in Physical Education Classes (CMEF:

Sánchez-Oliva, Amado, Leo, González-Ponce, & García-Calvo, 2012) was used. This questionnaire contains 20 items (4 per factor) that follow the initial statement "I take part in this Physical Education class..." and measure five factors: *intrinsic motivation, identified regulation, introjected regulation, external regulation* and *amotivation*.

For all of the above questionnaires, participants expressed their level of agreement using a 5-point Likert-type scale that ranged from 1 (*strongly disagree*) to 5 (*strongly agree*) with respect to each sentence item.

Perception of positive behaviours. To assess the students' perceptions of the development of positive behaviours in PE classes, the Questionnaire of Positive Behaviours in Physical Education (CCPEF: Sánchez-Oliva, Miguel Sanchez et al., 2013) was employed. This instrument contains 18 dichotomous items that follow the initial statement "In Physical Education classes..." and inquire into rule *compliance, respect for facilities and materials (4 items), assessment of effort (3 items), tolerance and respect for classmates (4 items), cooperation (3 items)* and *self-control (4 items)*. Participants indicated their level of agreement with each question using a 5-point Likert-type scale, with 1 corresponding to "strongly agree" with the negative statement and 5 corresponding to "strongly agree" with the positive statement.

Procedure

First, the study was approved by the university's Ethical Review Committee. Then, the head researcher contacted the schools to explain the objectives of the study and to request their participation. Through the schools' administration, parental informed consent was obtained because the participants were minors. All participants were treated according to the ethical guidelines of the American Psychological Association with regards to consent, confidentiality and anonymity of responses. The participants completed the questionnaire online in the classroom during school hours via Google Doc. Prior to the administration of the questionnaire, the head researcher explained each of the instruments to the teachers so that they could answer any questions that the students raised. In all cases, the classrooms were equipped with computers with an Internet connection, and each student had approximately 25-30 minutes to complete the set of questionnaires.

Data analysis

First, the descriptive statistics (means and standard deviations) of the study variables were computed and the bivariate correlations were calculated using the Pearson correlation coefficient. Subsequently, the reliability of the various subscales was analysed using Cronbach's al-

pha coefficient, and the composite reliability was estimated via the Omega-h coefficient (McDonald, 1999, p. 89). Missing values for each item ranged 3-18 ($M = 8.00$). Moreover, due to the multilevel nature of the data, in which students were nested within their class and classes were nested within schools, the intraclass correlation coefficients (*ICC*) were obtained for all variables and each level. The Statistical Package of the Social Sciences SPSS 19.0 and Mplus 7.0 (Muthén & Muthén, 1998-2012) was used for all analyses described above.

Subsequently, the subscales' unidimensionality was assessed via principal axis factoring. Separated analyses were conducted for each subscale Kaiser-Meyer-Olkin values were between .68 and .83 and Bartlett's sphericity test values were between 847.21 and 2423.36, with degrees of freedom between 3 and 6. These values were statistically significant in all cases *(p = .00)*. Finally, the percentages of variance explained were between 34% and 63% for the first factor and between 1% and 4% for the second factor. The unidimensionality of the subscales is supported by the clear difference between the variance explained by the first factor and the second factor.

Additionally, a two-step modelling approach (Anderson & Gerbing, 1988) was conducted to check the adequacy of the proposed model. Regarding the first

step, a confirmatory factor analysis was performed to test the measurement model. With the second step, a regression model was tested based on a structural equation in which scores in the different subscales was considered as indicators of different latent factors. To confirm an acceptable fit of the model to the data, the following fit indices were used: X^2 (Chi-square statistic) with df (degrees of freedom), CFI (Comparative Fit Index), TLI (Turker-Lewis Index), SRMR (Standardised Root Mean Residual) and RMSEA (Root Mean Square Error of Approximation). Both analyses were performed using the robust maximum likelihood estimation method with standard errors corrected for nested data within the 99 class groups using Mplus 7.0 software (Muthén & Muthén, 1998-2012).
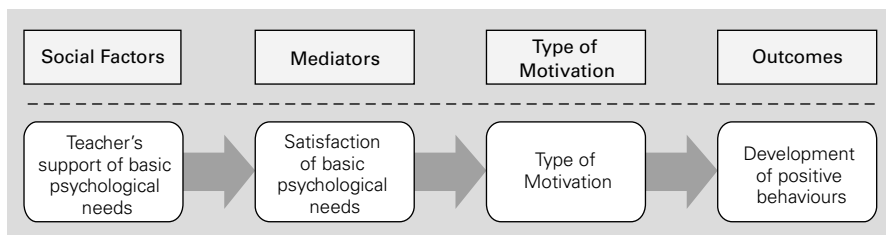

Figure 1. Diagram of the proposed model. Adapted of Vallerand (2007).

Results

Descriptive analysis, internal structure and bivariate correlations

Table 1 shows the descriptive statistics of the study variables. The perception of support and the satisfaction of *competence* and *relatedness* needs, the *intrinsic* and *identified* regulations and *positive behaviours* displayed high scores, whereas the perception of support, the satisfaction of *autonomy* and *introjected* and *external* regulations showed average scores. Only *amotivation* displayed a low score. In terms of internal consistency, both the Cronbach's alpha and the Omega-h values showed acceptable values for all factors, except *assessment of effort* and *respect for classmates*, which had slightly lower values than the recommended value of .70.

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Table 1

Descriptive Analysis, Internal Structure and Bivariate Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Autonomy Support	—															
2. Competence Support	.59**	—														
3. Relatedness Support	.61**	.72**	—													
4. Autonomy Satisfaction	.69**	.50**	.54**	—												
5. Competence Satisfaction	.52**	.54**	.53**	.70**	—											
6. Relatedness Satisfaction	.44**	.51**	.52**	.54**	.61**	—										
7. Intrinsic Motivation	.51**	.53**	.51**	.60**	.66**	.54**	—									
8. Identified Regulation	.51**	.55**	.51**	.60**	.64**	.51**	.75**	—								
9. Introjected Regulation	.45**	.32**	.34**	.53**	.43**	.33**	.46**	.49**	—							
10. External Regulation	.44**	.34**	.37**	.53**	.47**	.35**	.51**	.49**	.67**	—						
11. Amotivation	.20**	-.07**	.01	.21**	.05	-.03	-.06**	-.01	.32**	.26**	—					
12. Respect for the materials	.17**	.26**	.27**	.15**	.25**	.22**	.25**	.27**	.16**	.15**	-.13**	—				
13. Assessment of effort	.23**	.29**	.31**	.23**	.32**	.33**	.31**	.33**	.23**	.20**	-.11**	.57**	—			
14. Respect for classmates	.25**	.28**	.32**	.27**	.30**	.39**	.30**	.32**	.25**	.22**	-.05*	.55**	.63**	—		
15. Self-Control	.24**	.28**	.28**	.28**	.33**	.28**	.27**	.30**	.24**	.21**	-.04	.45**	.44**	.53**	—	
16. Cooperation	.22**	.29**	.28**	.28**	.32**	.44**	.34**	.33**	.22**	.22**	-.09**	.44**	.47**	.53**	.37**	—
Mean	3.97	4.51	4.41	3.82	4.15	4.39	4.32	4.24	3.60	3.85	2.33	4.66	4.58	4.29	3.89	4.33
Standard Deviation	.91	.65	.70	.94	.78	.70	.79	.79	1.10	1.04	1.37	.56	.56	.65	.90	.77
Internal Consistency (α)	.79	.77	.81	.82	.80	.81	.82	.81	.79	.82	.87	.77	.69	.68	.79	.74
Compound Reliability (ω_h)	.80	.78	.81	.82	.80	.81	.82	.81	.79	.82	.87	.78	.70	.69	.79	.74
ICC_1	.15	.08	.09	.15	.07	.07	.11	.09	.13	.12	.13	.10	.06	.11	.06	.06
ICC_2	.10	.05	.06	.08	.03	.03	.05	.04	.09	.06	.08	.06	.06	.07	.03	.04

* $p < .05$.   ** $p < .01$.

Note. ICC_1 = Intraclass correlation coefficients. ICC_2 = Intracentre correlation coefficients.

Furthermore, the bivariate correlations analysis showed that the perception of BPN satisfaction and support was positively associated with *intrinsic motivation, extrinsic* regulations and *positive behaviours* and negatively associated with *amotivation*. Similarly, *intrinsic motivation* and *extrinsic* regulations were positively associated with *positive behaviours,* and *amotivation* was negatively associated with *positive behaviours*.

Finally, the ICC values ranged from .03 to .15. These low values suggest that a multilevel analysis would not produce results that greatly differed from those of the individual-level analysis. The design effects that were calculated from the average size of the student groupings were between 1.97 and 3.38 at the class level and between 2.35 and 6.18 at the school level. Based on these effects, two multilevel analyses were carried out. First, a confirmatory factor analysis was specified with the same factors at the individual level and at the class level. Strong effects of collinearity were observed at the class level, as is often the case (e.g., Myers, Beauchamp, & Chase, 2011). The subsequent exploratory factor analysis resulted in factors that could not be interpreted within the scope of the present theory. As a result, information about the nesting of individuals within classes was incoporated via correction of standard errors of the parameters, using the Mplus COMPLEX instruction.

Structural equation modelling

Based on Vallerand's (2007) model of motivation, a complete structural regression model (see Figure 1), including social factors (perception of BPN support), mediators (BPN satisfaction), types of motivation *(autonomous, controlled* and *amotivation)* and effects (perception on the development of *positive behaviours)* was tested. The basic needs support factor was defined by three indicators, *autonomy support, competence support* and *relatedness support*. The satisfaction of basic needs factor was defined by three conceptually comparable indicators, *satisfaction of autonomy, satisfaction of competence* and *satisfaction of relatedness*. Behavioural regulations were described in terms of *autonomous motivation* (defined by *intrinsic* and *identified* regulations), *controlled motivation* (defined by *introjected* and *external* regulations) and *amotivation*. Finally, *positive behaviours* were defined by the following subscales: *respect for the materials, assessment of effort, respect for classmates, cooperation* and *self-control*.

Previously, the measurement model was tested with the latent variables freely correlated. Fit-indices showed that the measurement model adequately described the data: $\chi^2_{df} = 776.08_{90}$; CFI = .93; TLI = .91; SRMR = .05 and RMSEA = .07 When selecting an estimation method, both Mardia's high coefficient of multivari-

ate kurtosis (146.40) and the multi-level nature of the data were taken into account Subsequently, the full structural regression model underwent verification.. The model showed the following fit indices: $\chi^{2/}_{df} = 1046.65_{98}$; CFI = .90; TLI = .88; SRMR = .06 and RMSEA = .08. In general, these values were within the acceptable range, with the exception of TLI, which was slightly below the recommended value of .90. The TLI index penalises models that include parameters that contribute little to the fit (e.g. see Brown, 2006). However, because all the estimated parameters we statistically significant, we retained all of them in the model.

The standardised parameters are presented in Figure 2. The students' perception of BPN support was a strong positive predictor of satisfaction of these psychological needs ($\beta = .83$). Furthermore, BPN satisfaction was a predictor of *autonomous motivation* ($\beta = .89$) and *controlled motivation* ($\beta = .72$), but it evidenced much less predictive power for *amotivation* ($\beta = .10$). Finally, both *autonomous motivation* and *controlled motivation* predicted *positive behaviours* ($\beta = .38$ and $\beta = .17$, respectively), whereas *amotivation* negatively predicted *positive behaviours* ($\beta = -.16$). However, these direct effects combined only explained 26% of the variance of *positive behaviours*.

The standardised indirect effects were calculated using the delta method (Muthén & Muthén,

1998-2012). In agreement with Figure 2, BPN support showed a very low indirect effect on *amotivation* (.08, CI 95% = .03-.13), a high effect on *controlled motivation* (.59, CI 95% = .55-.64), an even higher effect on *autonomous motivation* (.73, CI 95% = .69-.78) and an overall moderate effect on *positive behaviours* (.37, CI 95% = .32-.41). Similarly, the indirect effect of BPN satisfaction on *positive behaviours* was moderate (.44, CI 95% = .40-.49) and was mainly applied through *autonomous motivation* and, to a lesser extent, *controlled motivation*.

Discussion

The purpose of this study was to assess the motivational processes that may determine the development of students' positive behaviours in the PE context. Accordingly, Vallerand's hierarchical model of motivation (2007) served as a basis for the study. Additionally, the incidence of motivational variables explained and predicted the emergence of certain adaptive behaviours during PE classes.

First, the model emphasised the importance of the learning environment that was fostered by the teacher. More specifically, students who perceived support for *autonomy, competence* and *relatedness* needs from their teacher developed greater BPN satisfaction. Similarly, BPN satisfaction was an important predictor of the students' type of
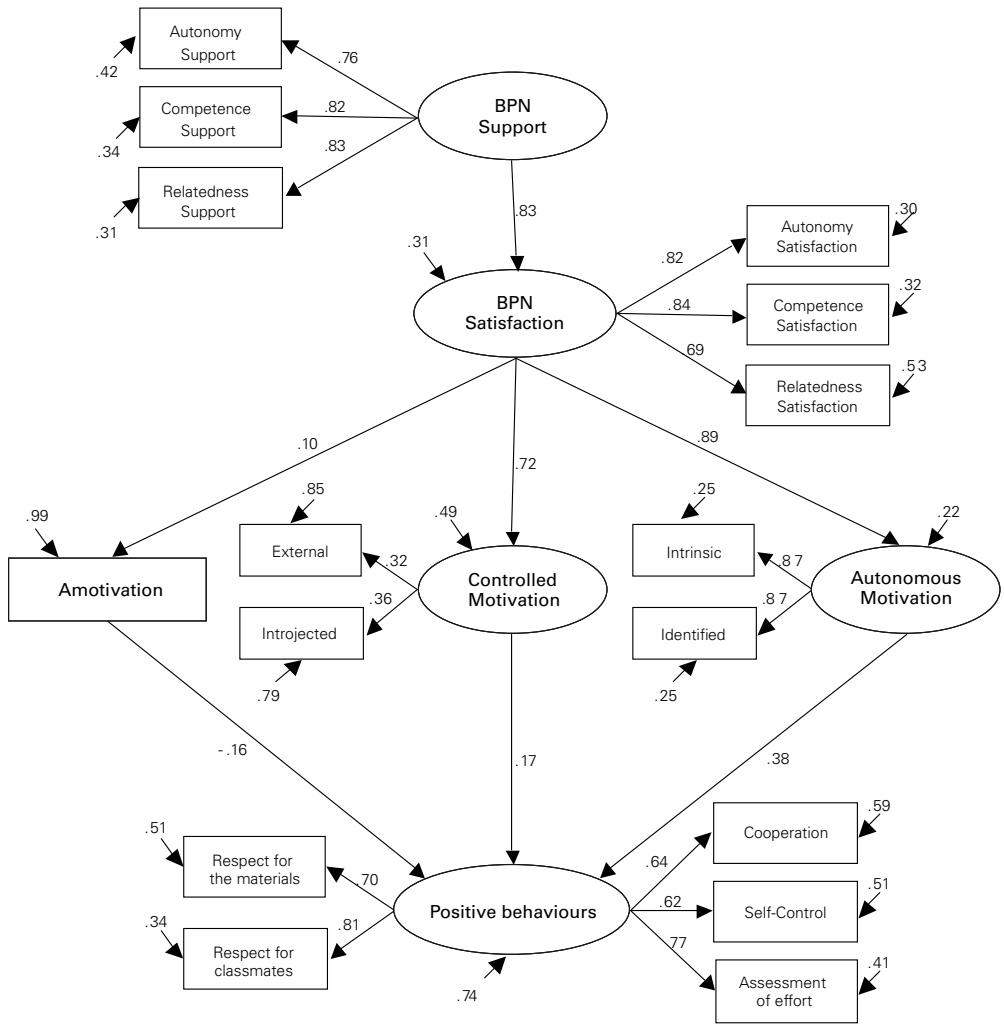
Figure 2. Structural equation modelling with standardized parameters and variances. All regression weights are significant (*p* < .01).

motivation during PE classes, highlighting a positive correlation with *autonomous* and *controlled* motivations and no relevant association with *amotivation*.

These results confirm the first two study hypotheses and are in line with previous results (Moreno-Murcia & Vera, 2011; Rutten et al., 2012; Standage et al., 2005; Zhang et al., 2011). These results emphasise the importance of the teacher's role in fostering a learning environment in which tasks and activities are carried out with appropriate guidelines to provide students with satisfaction of *autonomy, competence* and *relatedness needs*. If teachers develop motivational strategies to encourage such conditions, students will experience greater autonomy, a stronger perception of ability and a greater feeling of group relatedness. These experiences establish greater self-determined motivation among students, who thereby participate in activities for reasons that are intrinsic to the activity, such as fun, pleasure or personal satisfaction (Deci & Ryan, 2000; Vansteenkiste et al., 2010).

More specifically, the support of students' autonomy can foster a greater sense of control. That is, students may feel that they are the driving force of their behaviour, which can cause an internalisation of the perceived locus of causality and, thus, increase levels of self-determination (Reeve, 2006). Similarly, the extent to which the teacher

designs tasks that support students' competence significantly helps students strive to learn and improve, thereby optimising their perceived ability and favouring the emergence of a self-determined motivation (Jang, Reeve, & Deci, 2010). Finally, when the teacher invests resources to foster student integration (relatedness support), an increase in trust between classmates occurs. This increased trust helps students to overcome the "fear of making mistakes", thereby increasing the feeling of belongingness to the group (Tessier, Sarrazin, & Ntoumanis, 2010). Although *autonomy support, competence support* and *relatedness support* are considered to be independent dimensions, they must be treated as complementary strategies in the interpersonal style of the teacher (Jang et al., 2010). Thus, student motivation is optimised under conditions in which teachers provide learning environments where that integrate these conditions.

Finally, the proposed model analysed the predictive ability of different types of motivation in the development of positive behaviours. *Autonomous motivation* and *controlled motivation* positively predicted *positive behaviours*. Previous studies have highlighted the predictive ability of high levels of self-determination on the perception of adaptive behaviours (Durão, 2008, Sánchez-Oliva, Leo, Sánchez-Miguel et al., 2013). These studies have shown that students with self-

determined motivation and, therefore, an internal locus of causality have a positive predisposition towards activities and, hence, display prosocial behaviours. In the case of controlled motivation, the current results did support those of Durão (2008), in which extrinsic motivation predicted discipline in a negative way. However, within the PE context, the students' exposure to continuous evaluation seems to be an influential element in the students' extrinsic motivation. Some students appear to have external regulation and may enact adaptive behaviours to obtain the teacher's approval (Ntoumanis & Standage, 2009).

Amotivation negatively predicted prosocial behaviours. These results are similar to those of previous studies with PE students (Durão, 2008, Sánchez-Oliva, Leo, Sánchez-Miguel et al. 2013). This show that students who experience pressure or amotivation display fewer prosocial behaviours during PE classes, indicating that this is an important element that teachers should avoid. Thus, it seems reasonable to assume that students who do not find (either intrinsic or extrinsic) reasons to engage in PE classes show greater feelings of boredom and, thus, underdeveloped adaptive behaviours, such as respect for the materials and classmates and cooperation with classmates to achieve objectives. These findings confirm the third hypothesis of the study. This result is in line with the prin-

ciples in Vallerand's model (2007), highlighting the impact of the type of motivational regulation on the prediction of certain effects within the PE context.

With regard to the grouping of responses at the class and the school level, the ICC values did not exceed .15. Thus, these groupings did not have a significant effect in this study. In other words, there was no remarkable variability between classes or between the different schools. Within a single school, the lack of variability between classes may be explained by the different groups' exposure to the same teacher, which may reduce disparities. However, this does not explain the lack of variability between schools. More specifically, we consider that the lack of variability between schools is due to either a lack of power due to the small sample size of schools (32) or to actual small differences between the schools.

In conclusion, this study emphasises the importance of motivational processes for students' development of adaptive behaviours during PE classes. It highlights BPN satisfaction as a key element in the process of teaching and learning. Therefore, teachers' use of motivational strategies to promote autonomy, competence and relatedness (Aelterman et al., 2013) will likely increase the levels of adolescents' self-determination, thereby promoting the emergence of adaptive behaviours during PE classes.

Various authors have presented the necessary conditions to create learning environments that support BPN satisfaction. More specifically, for autonomy support, students' active participation should be encouraged. Students should be given some responsibility in performing tasks whenever possible (e.g., use of individual-focused teaching styles). Similarly, teachers should consider students' feelings and perspectives (e.g., "I know it's an exam period, so try to do everything you can during this class"). Furthermore, the use of creative teaching styles that are based on problem-solving is recommended as a means of providing students with some freedom in decision-making (Aelterman et al., 2013; Reeve, 2006, Tessier et al., 2010).

For competence support strategies, the main contribution focuses on teaching adaptation by offering tasks that are adjusted to the students' level (balancing difficulty-capacity) and providing sufficient time for all students to achieve the set objectives (e.g., making headway on the tasks when all students have achieved the goal rather than when the first three students have done so). Likewise, the information that students receive must focus on progress by providing task-focused feedback (e.g., "Great, you're doing much better than the previous days") and by acknowledging the students' effort and/or improvement rather than the result (e.g., "Do not worry if you can't score a goal;

what matters is that the technique is appropriate"). Finally, class goals are an approach that may help students develop learning expectations (e.g., "For today's class, we need to meet three goals...") (Jang et al., 2010; Tessier et al., 2010).

Finally, with the aim of promoting satisfaction of relatedness, the teacher can use either methodological or content strategies. For methodological strategies, the criteria that are used for the creation of groups represent a critical aspect in optimising the students' feeling of participation. It is important that these criteria change throughout the course (e.g., list order, date of birth, personal tastes, grouping games...), thereby changing the members who compose each group. Similarly, a suitable communication style that is close, positive and plural (e.g., "Keep going, you are doing very well") and a positive interest in students' well-being (e.g., "Are you all able to make it? If someone is ill, please do not hesitate to tell me") are recommended. Additionally, the teacher can use content strategies through specific activities with the aim of promoting relatedness among students. These strategies should emphasise group dynamics, role plays or trust activities to improve all students' feeling of belongingness to the group (Aelterman et al., 2013; Tessier et al., 2010.).

The study limitations must be acknowledged. The current study analysed students' perceptions of the development of certain be-

haviours during PE classes. This method is consistent with the Social Learning Theory (Bandura, 1977), according to which students' perception is the most significant antecedent of behavioural development. Therefore, it offers rich information about variables that can promote adolescents' development of adaptive behaviours during PE classes. However, in line with previous education studies (Reeve, Jang, Carrell, Jeon, & Barch, 2004), future research must directly assess students' behaviours. Similarly, PE teacher training programs should be implemented to provide them with a series of motivational and methodological strategies that promote positive behaviours by supporting autonomy, competition and related-

ness needs. Moreover, the size of the ICC, the limited sample size of schools and the shared teacher between different classes within the same school limited the multilevel analysis to the standard error estimation correction. Nevertheless, future research should confirm the values of ICC and study the model behaviour at the various levels of analysis using a larger school sample.

Ultimately, the study results confirm the importance of students' development of motivational processes during PE classes, with an emphasis on BPN satisfaction as a key element in promoting adequate motivation for PE and, thereby, promoting the emergence of adaptive behaviours.

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