ORIGINAL

SPANISH VERSION OF THE BASIC PSYCHOLOGICAL NEEDS IN PHYSICAL EDUCATION SCALE

VERSIÓN ESPAÑOLA DE LA ESCALA DE NECESIDADES PSICOLÓGICAS BÁSICAS EN EDUCACIÓN FÍSICA

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ABSTRACT

The *Basic Psychological Needs in Physical Education scale* (BPN-PE), a modified version of the successful and widely used *Basic Psychological Needs in Exercise scale* (BPNES), was designed to provide a specific tool to assess these needs in physical education settings. The goal of this study was to validate this scale for the Spanish context of secondary education. 624 students participated (332 men and 292 women) from eight different schools (age range 12-19 years). The confirmatory factor analysis supported the three-factor structure of the Spanish version of the BPN-PE. Psychometric properties of the scale revealed adequate internal consistency. Correlations among the Spanish version and the Questionnaire of Personal and Social Responsibility and the subscale of *Intrinsic Motivation* of the *Perceived Locus of Causality Scale*

showed satisfactory concurrent validity. The Spanish version of the BPN-EF is a simple, valid and reliable instrument for Spanish physical education contexts.

KEY WORDS: Self-Determination Theory, Spanish validation, physical activity, psychometric properties, Basic Psychological Needs satisfaction.

RESUMEN

La *Escala de Necesidades Psicológicas Básicas en Educación Física* (BPN-PE), una versión modificada de la exitosa *Escala de las Necesidades Psicológicas Básicas en el Ejercicio* (BPNES) fue diseñada para desarrollar una herramienta específica que midiera estas necesidades en la educación física. El objetivo del presente estudio fue validar esta escala al contexto español. Participaron 624 estudiantes de educación secundaria y bachillerato (332 hombres y 292 mujeres) de ocho centros educativos diferentes (rango de edad 12-19 años). El análisis factorial confirmatorio apoyó la estructura de tres factores de la versión española del BPN-PE. Sus propiedades psicométricas revelaron una adecuada consistencia interna. Sus correlaciones con el *Cuestionario de Responsabilidad Personal y Social* y la subescala de *Motivación Intrínseca* de la *Escala del Locus Percibido de Casualidad* señalaron una adecuada validez concurrente. La versión española del BPN-PE es un instrumento simple, válido y fiable para el contexto español de educación física.

PALABRAS CLAVE: Teoría de la Autodeterminación, validación española, actividad física, propiedades psicométricas, satisfacción de las necesidades psicológicas básicas.

1. INTRODUCTION

A major theoretical framework that is being extensively used to study motivation in physical activity settings is the Self-Determination Theory (SDT; Deci & Ryan, 2000). Individuals are motivated to participate by different reasons that lie in a continuum of autonomy from high to low levels of self-determination (Lemyre, Treasure, & Roberts, 2006). This theory identifies three main types of behavioural regulations: intrinsic motivation, extrinsic motivation, and amotivation. Intrinsic motivation has been defined as doing an activity for its inherent satisfaction and it constitutes the most self-determined type of motivation. Extrinsic motivation is apparent when individuals perform an activity because they value its associated outcomes more than the activity itself. Finally, amotivation represents the absence of motivation to perform an activity (Deci & Ryan, 1985).

On the other hand, the SDT also considers that motivation can be affected by three fundamental psychological needs that are directly linked to the individuals' social environment: autonomy, competence and relatedness (Deci & Ryan, 2000). Autonomy has been defined as the desire to be the source of one's own behaviour (Niemec & Ryan, 2009). Competence is the student's perception of

being able to show effectiveness within a particular context (Deci & Ryan, 2000). Finally, relatedness refers to the feeling that one belongs in a particular social setting (Vlachopoulos & Michailidou, 2006; Ryan, Williams, Patrick, & Deci, 2009). Research has showed that any element which could fulfil an individual's needs for autonomy, competence, and relatedness will facilitate the development of intrinsic motivation (Ryan & Deci, 2002; Vallerand, 1997).

Valleran (2001) believes that these psychological needs can modulate the effects of sociocontextual factors (e.g., teachers' attitudes) on the students´ self-determined motivation (e.g., student involvement). The satisfaction of these basic psychological needs have also been linked to positive variables such as subjective vitality (Ryan & Deci, 2002; Ryan & Frederick, 1997) which has been connected to high levels of self-determination and intrinsic motivation (e.g., I enjoy physical education classes).

The Basic psychological needs have been extensively assessed in exercise settings. Adequate reliability and validity evidence has been provided for the *Basic Psychological Needs in Exercise Scale* (BPNES) (Vlachopoulos, 2007, 2008; Vlachopoulos & Neikou, 2007; Vlachopoulos & Karavani, 2009). Sánchez and Nuñez (2007) translated the BPNES to the Spanish context with a sample of 233 subjects who performed exercise. The psychometric properties were adequate with satisfactory levels of internal consistence and a good model fit. Later, Moreno, González-Cutre, Garzón, and Rojas (2008) adapted the BPNES to the physical education setting. The results revealed that the scale was valid and reliable.

Many boys and girls play sports in their free time. However, many others only play sports or practice physical activity in their physical education classes. Moreover, it is in this context where the majority of children will get in touch for the first time with different types of organized sports, and where they will learn the basic skills that they will put into practice in physical activity settings. Sadly, research has pointed out that up to 70% of children will stop participating in sport before they reach the age of 13 (Engh, 2002). Thus, physical education will become the only place where many youngsters will be able to practice physical activity and develop important sociomoral values associated to it.

Physical education has specific features which makes it different from other contexts where individuals perform physical activity. "Whereas in exercise, individuals may be able to choose the content of their exercise program, a PE [physical education] curriculum may not provide the opportunity for such a choice to the student" (Vlachopoulos, Katartzi, & Kontou, 2011, p. 265). Based on this idea, Vlachopoulos et al. (2011) modified the original BPNES to create a new scale: The *Basic Psychological Needs in Physical Education Scale (BPN-PE).* The results obtained with the three different groups of students showed a three factor structure with high internal consistency. Because of the relevance of this new scale, it has already been validated for different languages. Heckmann (2013) validated the German version, obtaining a high internal consistency and a clear three-factor structure, similar to the original one. 272 students, grades 6-10 (11-18 years) agreed to participate. Recently, Cagas, and

Hassandra (2014) validated the Filipino version with 408 students, grades 6-10 (11-19 years). Results also showed satisfactory psychometric properties.

To our knowledge the BPN-PE Scale has not been validated for the Spanish context, and researchers, in light of the numerous articles published, continue to use the original BPNES designed for exercise contexts in educational settings such as physical education (Cuevas, García-López, & Contreras, 2015; García-González, Aibar, Sevil, Almoda, & Clemente, 2015; Gómez, Hernández, Martínez, & Gámez, 2014; Méndez-Giménez, Fernández-Río, & Cecchini-Estrada, 2013a, 2014b, en prensa; Méndez-Giménez, Fernández-Río, & Méndez-Alonso, 2015; Moreno, Cervelló, Montero, Vera, & García, 2012; Moreno, Jiménez, Aspano, & Torrero, 2011; Sevil, Abós, Julián, Murillo, & García-González, 2015). However, "Contextual or domain-specific SDT research requires scales specific to the behavioural domain under study (e.g., school-based PE). Lack of domain specific instrumentation to assess the degree to which the three psychological needs are fulfilled in school-based PE impedes the systematic assessment of the role of the fulfilment of the three needs in students' motivational processes and behaviour in this context (Vlachopoulos et al., 2011, p. 265).

Based on the aforementioned, the goal of the present research was to analyze the psychometric properties of the Spanish version of the BPN-PE Scale in a large sample of secondary education students.

2. METHOD

2.1 Participants

A total of 624 students (M = 14,6, SD = 1,55) belonging to 8 different secondary schools in northern Spain agreed to participate. Their age range was 12-19 years, covering all secondary education courses (grades 6th to 10th). There were 332 men (53.2%) and 292 women (46.8%). Schools' socio-economic status ranged from lower to upper class. 19 questionnaires had to be disregarded because they presented numerous errors.

2.2 Instruments

Basic psychological needs. The Spanish version of the *Basic Psychological Needs in Physical Education Scale* (BPN-PE; Vlachopoulos et al., 2011) was used. This questionnaire is based on the *Basic Psychological Needs in Exercise Scale* (BPNES: Vlachopoulos & Michailidou, 2006), validated to the Spanish context by Moreno, González-Cutre, Chillón, and Parra (2008). The BPNES-PE Scale comprises 12 items (e.g., "We do things that are of interest to me") divided into 3 subscales with four items per subscale to assess autonomy, competence and relatedness (see Table 1). Response options are delivered on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) and it is preceded by the following question: "In general in PE…" The psychometric characteristics of the BPNES-PE original Scale, as far as the factorial structure is concerned, were examined in 3 different samples. The

subscales obtained the following internal consistency for autonomy, competence and relatedness in the 3 samples respectively: 0,84, 0,89, 0,85; 0,85, 0,87, 0,85 and 0,89, 0,92 and 0,89. Appendix 1 shows the final version of the questionnaire adapted to Spanish contexts.

Personal and social responsibility. The Spanish version of the *Personal and Social Responsibility Questionnaire* (PSRQ; Li, Wright, Rukavina, & Pickering, 2008) was used (Escartí, Gutiérrez, & Pascual, 2011). This questionnaire is composed of 14 items divided into 2 factors (7 items per factor): Social Responsibility (e.g., "I respect others") and Personal Responsibility (e.g., "I participate in all of the activities"). The questionnaire was prefaced as follows: "It is natural to behave both well and poorly. We are interested in how you normally behave in your physical education class. Please answer the following statements honestly by checking the box that best represents your behaviour". The response scale ranges from 1 (*strongly disagree*) to 6 (*strongly agree*). The internal consistency of the Spanish version was 0,85 for Social Responsibility and 0,74 for Personal Responsibility.

Intrinsic motivation. The *Perceived Locus of Causality questionnaire* (PLOC; Goudas, Biddle, & Fox, 1994, based on the Self-Regulation Questionnaire from Ryan & Connell, 1989) was used. Participants' motivation was assessed through the Intrinsic Motivation subscale. It is composed of 4 items (e.g., "because I enjoy learning new skills") preceded by the following question: "I take part in physical education…". It was adapted for physical education contexts by Goudas, Biddle, and Fox (1994). Answers are scored on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The complete instrument was validated for Spanish physical education settings by Moreno, González-Cutre, and Chillón (2009). The internal consistency of the Spanish validation was 0,80.

2.3 Procedure

The adaptation of the BPNES-PE Scale to Spanish was done following the international methodological standards recommended by the International Test Commission (ITC) when adapting an instrument to a foreign language (Hambleton, Merenda, & Spielberger, 2005; Muñiz & Bartram, 2007). First, the BPNES-PE Scale was translated into Spanish by two translators who were fluent in Spanish and English. The translations were discussed with three experts, and some corrections were made. The back translation was conducted by two bilingual professors with no previous knowledge of the scale. This back-translated version was compared with the original English version. A pilot study was conducted with 42 students (two groups) to evaluate the language forms and ensure a proper understanding of the scale.

Before collecting any data, permission to conduct the study was obtained from the researchers' University Human Ethics Committee. Then, the first author contacted the headmasters of the secondary schools to request their collaboration. After their consent, in accordance with the recommendations of the University's ethics committee, written parental consent was obtained from

all participants. The questionnaires were administered emphasizing that the responses were anonymous and that there were no right or wrong answers. During administration, any doubts on the meaning of the items were clarified. Participants needed approximately 15 minutes to complete all the scales.

2.4 Data analyses

Statistical analysis was conducted using SPSS 22.0 and AMOS 18.0. First, descriptive statistics were calculated, followed by an inter-item correlation analysis. As Bollen (1989) pointed out, there is multivariate normality if Mardia's coefficient is less than p (p+2) where p is the number of observed variables. Taking into account that the BPNES-PE Scale is composed of 12 observed variables and the Mardia's coefficient was 55.64, we can assume multivariate normality. Therefore, a confirmatory factor analysis (CFA) was conducted using the method of maximum likelihood to study the factorial structure of the scale. Additionally, reliability was assessed by the average variance extracted (AVE) and the composite reliability coefficient (CRC). Finally, to explore concurrent validity, three multiple regression analyses were performed considering the three subscales of the BPNES-PE Scale (autonomy, competence and relatedness) as predictors and the intrinsic motivation and the personal and social responsibility as dependent variables.

In order to accept or reject the original model, a combination of fit indices were used: χ2, χ2 and its degrees of freedom (χ2/df), the RMSEA (Root Mean Square Error of Approximation) with its 90% confidence interval, the GFI (Goodness of Fit Index), the SRMS (Standardized Root Mean Square Residual), the CFI (Comparative Fit Index), the TLI (Tucker-Lewis Index), the IFI (Incremental Fit Index) and the NFI (Normed Fit Index).

Generally speaking, non significant values for χ2, less than 3 for χ2/*df* (less than 5 are also acceptable), equal to or more than 0,95 for the GFI, the CFI, the TLI, the IFI and the NFI, equal to or less than 0,06 for the RMSEA and equal to or less than ,08 for the SRMR were considered indicative of a model that fit the data adequately (Byrne, 1989; Carmines & McIver, 1981; Hu & Bentler, 1999; Schermelleh-Engel, Moosbrugger, & Müller, 2003).

3. RESULTS

3.1 Descriptive statistics and inter-item correlations

Table 1 shows the mean score and standard deviation for each item as well as Pearson´s correlations among items. Mean scores ranged from 3,33 (*SD* = 1,83) for item 12 to 4,64 for item 5 (*SD* = 1,76). Pearson´s correlations were significant in all cases ranging from 0,19 to 0,79.

Table 1. Means (Standard Deviation) and Pearson's correlations of all items of the BPN-PE.

Items	M (SD)	1	2	3	4	5	6	7	8	9	10	11	12
Item 1	4,08 (1,71)		0,22**	0,46**	0,72**	0,24**	0,40**	0,78**	0,40**	0,47**	0,76**	0,25**	0,50**
Item 2	4,41 (1,42)			0,26**	0,28**	0,56**	0,28**	0,30**	0,56**	0,26**	0,27**	0,64**	0,19**
Item 3	4,44 (1,77)				0,43**	0,23**	0,65**	0,46**	0,38**	0,53**	0,40**	0,32**	0,59**
Item 4	4,39 (1,69)					0,27**	0,40**	0,79**	0,33**	0,43**	0,73**	0,24**	0,44**
Item 5	4,64 (1,76)						0,22**	0,29**	0,47**	0,25**	0,26**	0,53**	0,19**
Item 6	4,33 (1,84)							0,39**	0,30**	0,58**	0,36**	0,29**	0,63**
Item 7	4,04 (1,79)								0,41**	0,46**	0,81**	0,28**	0,48**
Item 8	4,58 (1,75)									0,35**	0,40**	0,68**	0,30**
Item 9	3,82 (1,70)										0,43**	0,29**	0,59**
Item 10	3,77 (1,70)											0,27**	0,46**
Item 11	4,08 (1,79)												0,22**
Item 12	3,33 (1,83)												

Note: **$p < 0,01$.

3.2 Confirmatory factor analysis

Following Bollen (1989), there is multivariate normality when Mardia's coefficient is lower that p (p+2), where p is the number of observed variables. Considering that the BPN-EF scale has 12 observed variables and Mardia's coefficient was 55,56 multivariate normality can be assumed. The fit indices evaluating the adequacy of the measured model were satisfactory: $\chi2$ (51, N = 624) = 155,39, $p < 0,05$; $\chi2/df$ = 3,04; GFI = 0,95, CFI = 0,97, TLI = 0,97, IFI = 0,97, NFI = 0,96, RMSEA = 0,05, 90% CI [0,04; 0,06]; SRMR= 0,03. Figure 1 shows that all standardized weights were significant and far above 0,50, ranging from 0,65 to 0,93.
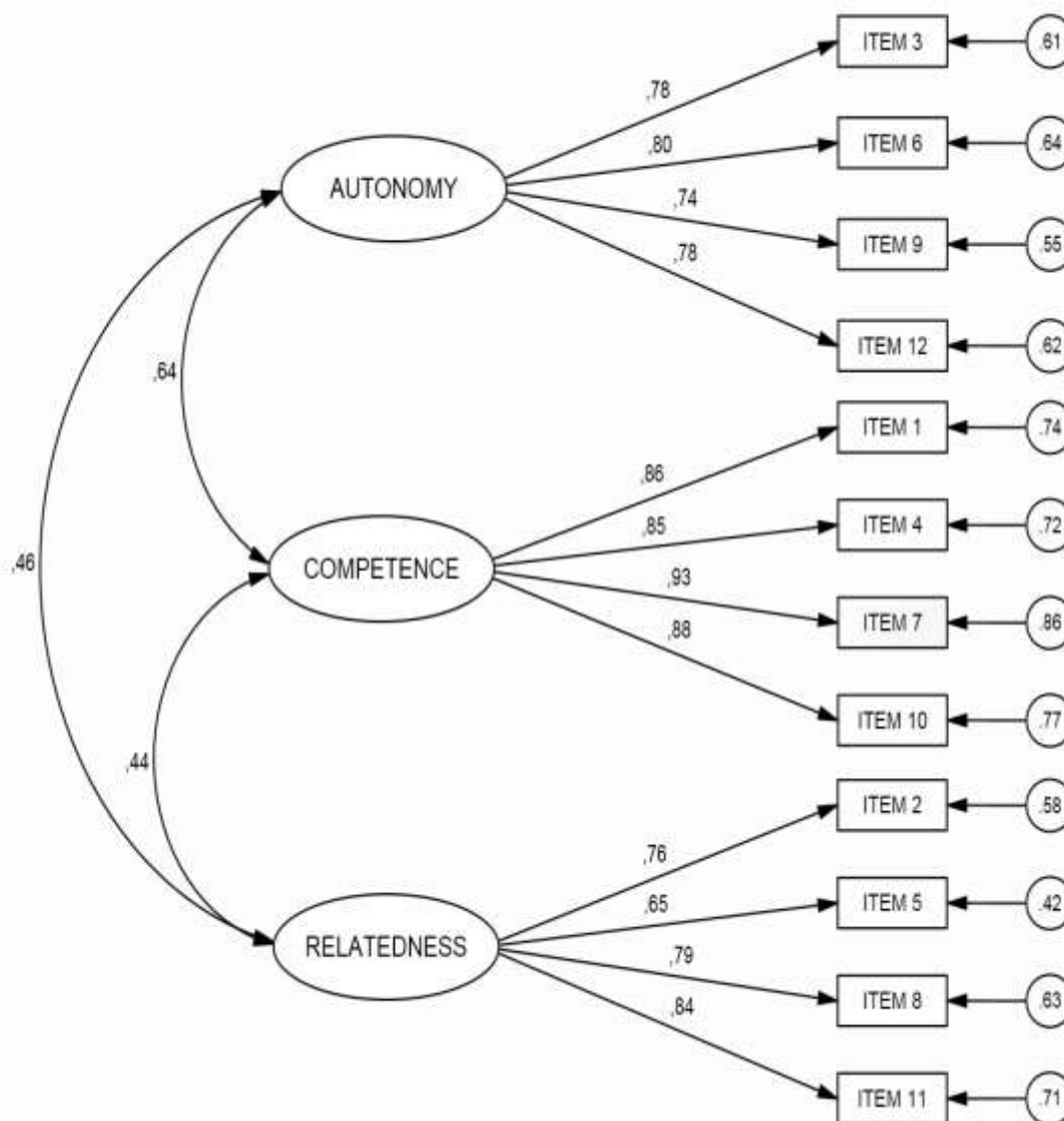
Figure 1. CFA of the BPN-PE scale. Ellipses represent factors and rectangles represent diverse items. Residual variances are in small circles.

3.3 Convergent validity and reliability

To determine the convergent validity the significance of the factor loadings of each construct was used. Table 2 shows that all factor loadings were above 0,5 ($p<0,05$), between 0,65 and 0,93. Regarding critical coefficients, results were above 1,96 ($p<0,05$), ranging between 18,04 and 32,13 (Hair, Black, Babin, Anderson, & Tatham, 2006). Reliability was obtained from the composite reliability coefficient (CRC) and the average variance extracted (AVE). The CRC does not depend on the number of attributes associated, which makes it more accurate than the Cronbach's alpha (Cortina, 1993; Hair et al., 2006). 0,70 or above are considered acceptable (Nunnally, 1978). The three subscales were above this minimum: 0,85 autonomy, 0,93 competence and 0,84 relatedness. On the other hand, the AVE indicates the amount of variance explained by the latent variable. The higher the values, the better, and values above 0,50 are highly recommended (Bagozzi & Yi, 1988; Hair et al., 2006). In the present study, AVE was 0,59, 0,77, and 0,57 for autonomy, competence and

relatedness, respectively. Therefore, all values are above the recommended 0,50.

Table 2. Factorial loadings (λ), critical coefficients (CR), composite reliability coefficient (CRC) and average variance extracted (AVE).

	Items	λ	CR	CFC	VME
Autonomy	Item 3	0,78	-	0,85	0,59
	Item 6	0,80	20,46		
	Item 9	0,74	18,04		
	Item 12	0,78	19,35		
Competence	Item 1	0,86	-	0,93	0,77
	Item 4	0,85	27,73		
	Item 7	0,93	32,13		
	Item 10	0,88	29,35		
Relatedness	Item 2	0,76	-	0,84	0,57
	Item 5	0,75	15,92		
	Item 8	0,79	18,64		
	Item 11	0,84	20,15		

3.4 Concurrent validity

Concurrent validity of the Spanish version of the BPNES-PE Scale was examined through its relations with the *intrinsic motivation* subscale of the PLOC and the *social responsibility* and *personal responsibility* subscales of the PSRQ. Three regression analyses were performed considering the three subscales of the BPNES-PE Scale as predictors and the *intrinsic motivation*, the *personal responsibility* and the *social Responsibility* subscales as dependent variables. Table 3 presents the results of the three regression analyses and the correlations among subscales. All the correlations were significant, ranging from moderate correlations (about 0,30 or below), to high correlations (about 0,35 to 0,72). *Intrinsic motivation* predicted *autonomy* (β = 0,61) and *competence* (β = 0,17), but not *relatedness* (β = 0,04). *Personal responsibility* predicted *autonomy* (β = 0,46) and *competence* (β = 0,16), but not *relatedness* (β = -0,01). Finally, *social responsibility* predicted *autonomy* (β = 0,23) and *relatedness* (β = 0,26) but not *competence* (β = -0,05). In general, the variance explained by the three BPNES-PE subscales was low for *social responsibility* (14%) but higher for *personal responsibility* (32%) and especially for *intrinsic motivation* (54%). Table 3 shows the three linear regression analyses performed and the correlations among subscales. All correlations were significant with low correlations (0,39 or below), moderate (0,40-0,69) and high (0,70-1).

Table 3. Linear regression analyses and Pearson's correlations.

Note: **$p<0,01$; r = Pearson Correlation, β=Standardized Beta, R^2 = Multiple Correlation

		Autonomy	Competence	Relatedness	R^2	AR^2
Intrinsic Motivation	β	0,61**	0,17**	0,04	0,55	0,54
	r	0,72**	0,54**	0,35**		
Personal Responsibility	β	0,46**	0,16**	-0,01	0,32	0,32
	r	0,55**	0,42**	0,23**		
Social Responsibility	β	0,23**	-0,05	0,26**	0,14	0,14
	r	0,30**	0,18**	0,33**		

Coefficient Multiple, AR^2 = R^2 adjusted.

4. DISCUSSION

The main goal of the present study was to assess the psychometric properties of the Spanish version of the BPN-PE scale in a large sample of secondary education students to validate its use in Spanish contexts. Findings confirm the validity of this version. Our results were consistent with those reported in previous studies (Cangas & Hassandra, 2014; Heckmann, 2013; Vlachopoulos et al., 2011), which portray a three-factor solution: autonomy, competence and relatedness. This study has also showed that the Spanish version of the BPN-PE has acceptable reliability. Finally, concurrent validity was established with moderate to high positive correlations with the intrinsic motivation subscale of the PLOC and the social responsibility and personal responsibility subscales of the PSRQ. Therefore, our results showed that the Spanish version of the BPN-PE is a valid, reliable and simple instrument, easy to use in Spanish physical education contexts.

Vlachopoulos et al. (2011) highlighted that research on SDT in specific contexts require specific scales. The lack of specific instruments to assess students' basic psychological needs in physical education prevents the assessment of their motivational and behavioural processes in that specific context. The compulsory character of physical education and the fact that students cannot select the class content make physical education a very different context, compared to sport and physical activity (Vlachopoulos et al., 2011), which requires specially designed instruments. Due to the lack of novel instruments validated for Spanish contexts, researchers have been using the previous scale (BPNES), designed for general context of physical activity (Cuevas, García-López, & Contreras, 2015; García-González, Aibar, Sevil, Almoda, & Clemente, 2015; Gómez, Hernández, Martínez, & Gámez, 2014; Méndez-Giménez, Fernández-Río, & Cecchini-Estrada, 2013a, 2014b, en prensa; Méndez-Giménez, Fernández-Río, & Méndez-Alonso, 2015; Moreno, Cervelló, Montero, Vera, & García, 2012; Moreno, Jiménez, Aspano, &Torrero, 2011; Sevil, Abós, Julián, Murillo, & García-González, 2015).

Several studies have provided enough evidence of the important role that the basic psychological needs exert on individuals' motivation (Ntoumanis &

Standage, 2009; Standage, Duda, & Ntoumanis, 2005). To assess their connection with other variables in the physical education context the BPN-PE is becoming a widely used scale in international contexts (Cagas & Hassandra, 2014; Heckmann, 2013; Kirby, Byra, Readdy, & Wallhead, 2015; Méndez-Giménez, Cecchini-Estrada, & Fernández-Río, 2014; Perlman, 2015). The validation to Spanish contexts made in this research project widens its possibilities even more.

Results for the present study indicate several future lines of research. First, the Spanish version of the BPN-PE could be used with Spanish speaking students all over the world. Second, this specifics instrument will allow researchers to assess how the students' three basic psychological needs (*autonomy*, *competence* and *relatedness*) could be fulfilled in any physical education context and how thee relate to any other variable. Therefore, this instrument will allow more reliable studies on this field of study and on this specific context.

5. CONCLUSIONS

Our results have showed that the BPN-PE is an adequate and reliable instrument to assess students' basic psychological needs in Spanish secondary physical education contexts. This instrument can make a significant contribution to the scientific literature on physical education, basic psychological needs and motivation. Furthermore, its simplicity makes it a very usable research instrument.

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APÉNDIX 1

Spanish version of the *Basic Psychological Needs in Physical Education Scale* (BPNE-PE).

En general, en educación física…

Autonomía
3. Hacemos cosas que son de interés para mí.
6. Pienso que la forma en que se imparte la educación física es tal y como a mí me gusta.
9. Pienso que la forma en que se imparten las clases son fiel reflejo de lo que soy.
12. Siento como si las actividades que realizamos las hubiese escogido yo mismo.

Competencia
1. Creo que mejoro incluso en las tareas que la mayoría de los compañeros considera difíciles.
4. Creo que lo hago de manera correcta incluso en las tareas que la mayoría de los compañeros considera difíciles.
7. Creo que lo hago muy bien incluso en las tareas que la mayoría de los compañeros considera difíciles.
10. Tengo éxito incluso en las clases que la mayoría de los compañeros considera difíciles.

Relación
2. Las relaciones con mis compañeros de clase son muy amistosas.
5. Considero que tengo una estrecha relación con mis compañeros de clase.
8. Siento que soy un miembro valioso de un grupo de buenos amigos.
11. Siento que pertenezco a un gran grupo de buenos amigos.

Nota: Todos los ítems utilizan una escala Likert del 1 (*totalmente en desacuerdo*) al 7 (*totalmente de acuerdo*).