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Research article

Translation, Cultural Adaptation and Validation of Perceived Physical Literacy Instrument-Spanish Version (PPLI-Sp) for Adults

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Abstract

To translate and culturally adapt the Perceived Physical Literacy Instrument (PPLI) questionnaire, as well as to evaluate the factor structure. A single-measure cross-sectional study was conducted. For the first phase of the study, a translation and cultural adaptation of the PPLI questionnaire was carried out, as well as an interview, with the aim of assessing the understanding of the instrument. In the second part of the study, exploratory (EFA) and confirmatory (CFA) factorial analyses were conducted. A total of 213 Spanish adults with a mean age of 27.40 (10.58) participated. EFA was performed because of the good results offered by the sampling adequacy indices (Bartlett test = 1081.848; df = 153; $p < 0.001$; and KMO test = 0.825). The factor solution comprised three correlated factors:1) physical competence, 2) motivation and confidence, and 3) knowledge and understanding. After the EFA, items 7, 9, 10, 11, 12, 13, 14, 15 and 17 were excluded. Therefore, through CFA, a factor structure of 9 items grouped into three dimensions was extracted. The PPLI-Sp version for adults, obtained from the back-translation process as well as after individual interviews, proved to be valid and reliable after the EFA and CFA analyses, obtaining an instrument of nine items, divided into three dimensions. This instrument can be used to determine the perception of physical literacy among different Spanish adult populations.

Key words: Healthy behavior, physical activity, exercise, PPLI questionnaire, physical fitness, health status.

Introduction

Physical literacy (PL) has recently become an important focus of physical education, physical activity (PA), and sports promotion worldwide (Giblin et al., 2014). Numerous studies support the growing interest in PL today (Edwards et al., 2017; Lundvall, 2015; Mendoza-Muñoz et al., 2022; Young et al., 2021). Indeed, PL has been proposed as a key construct for understanding PA participation; however, the lack of an agreed definition and measurement has hindered research on this topic (Cairney et al., 2019).

The current literature contains various representations of the PL construct (Edwards et al., 2017). The most commonly used definition of PL is that proposed by Whitehead (2013) who highlighted the importance of distinguishing between PL and PA, defining PL as *"the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for participation in lifelong physical activity"*. Thus, just as reading, writing, listening, and speaking combine to formulate linguistic literacy, which enables a life of reading and communication, PL is a progressive journey in which the different components (daily behaviour, physical competence, motivation and confidence, and knowledge and understanding) interact holistically to facilitate a life of participation and enjoyment (Whitehead, 2010).

In Spain, although there is an increasing interest in PL, it requires more important actions yet. In fact, there is no reference to PL in physical education curricula or any other curricular documents in Spain (Carl et al., 2023), despite PL has been recognised as the main objective of physical education (Whitehead, 2013). In this sense, Rebullido and Faigenbaum (2018) already emphasised in 2018 the lack of visibility given to PL by Spanish educational administrations and policies, despite having been identified as a crucial component for child development. This could lead to a lack of teacher awareness of PL and, thus, a lack of training for its development. In addition to being a fundamental element in preschool and infant age (Shearer et al., 2021), the stage on which most research into PL has focused, together with the period of adolescence and youth (Ke et al., 2022; Mota et al., 2021), the importance of transferring PL to other stages of life is highlighted, the study of which has been little recognised at present, as is the case in adulthood (Holler et al., 2019) and the older adult population (Petrusevski et al., 2021). This line of study may be interesting for children to have references to nearby adults who are physically literate, taking into account the relationship of dependence between parents and children (Hintsanen et al., 2019) as well as its correlation with PA (Petersen et al., 2020).

One of the main lines of current PL research

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(Mendoza-Muñoz et al., 2022) focuses on adapting or developing existing instruments to the specific context of each country or region (Dania et al., 2020; Elsborg et al., 2021; Li et al., 2020; Mendoza-Muñoz et al., 2021; Mota et al., 2021; Valadi and Cairney, 2022). Therefore, future research should focus on the development of new instruments or adaptation of validated instruments to the reality of each country or region and its educational system and customs. In this line, in the Spanish language, there is only one PL self-assessment tool for the adult population "Physical literacy for life self-assessment tool" product of the project "The Physical Literacy for Life (PL4L)", led by the International Sport and Culture Association (ISCA), in which the Unio Barcelona d'Association Esportives (UBAE) participate, bringing together partners from the education, sport, and health sectors. In 2022, the first adaptation of the Canadian Assessment of Physical Literacy-2 (CAPL-2) tool (Pastor-Cisneros et al., 2022) for the assessment of PL in children was published in Spanish, as was the validation of the PPLI in Spanish adolescents in 2023 (López-Gil et al., 2023). This reveals the lack of means available for such an assessment, which may be the reason for the lack of studies on the subject, especially in adults.

A recent review carried out in 2021 (Shearer et al., 2021) compiled a multitude of studies that have attempted to monitor PL from the different domains that comprise it. However, most of these studies have been carried out in children and young people (Cairney et al., 2018; Lodewyk and Mandigo, 2017; López-Gil et al., 2023; Mota et al., 2021; Stearns et al., 2019), and few have tried to validate instruments for monitoring PL in adults (Liu et al., 2022; Sum et al., 2018; Sum et al., 2016).

The recent interest in PL monitoring, as highlighted by Tremblay and Lloyd (2010), may be because the results of the assessments can be very useful at different levels, one of the most relevant being the public administrations conveying the importance of PL to policymakers so that they promote and allocate resources for its development (Tremblay and Lloyd, 2010).

All the above highlights the relevance that PL is currently being acquired among professionals in this field. Therefore, it must be established and consolidated as a key principle in governmental organisations, as PL could provide a basis for physical education, sports, and public health.

Therefore, because of the importance of acquiring PL and the lack of available instruments for its assessment, this study aimed to translate and culturally adapt the "Perceived Physical Literacy Instrument" questionnaire into Spanish adults, as well as to evaluate its factorial structure and reliability.

Methods

Design

A single-measure cross-sectional study was carried out. For the first phase of the study (translation and cultural adaptation of the PPLI questionnaire for Spanish adults), direct and reverse translation was carried out following the WHO recommendations (WHO, 2018) for this type of instrument, as well as an interview to assess the instrument's understanding (Conrad et al., 1999). During the second part of the study (analysis of the psychometric properties of the questionnaire), exploratory (EFA) and confirmatory (CFA) factorial analyses were carried out.

Ethical approval

The study procedures were approved by the Bioethics and Biosafety Committee at the University of Extremadura (197//2022), according to the Declaration of Helsinki.

Instrument

The "Perceived Physical Literacy Instrument" (PPLI) (Sum et al., 2016) is a questionnaire for the assessment of the perceived PL of physical education teachers. This instrument consists of nine items rated on a five-point Likert scale ranging from 1 ("strongly disagree" to 5 "strongly agree"). These items form three domains: (i) knowledge and understanding, (ii) self-confidence, and (iii) self-expression and communication with others. The result of the questionnaire comes from the mean score of the items; the higher the score, the higher the perception of the PL. This instrument has also been adapted for other populations, such as young people (Sum et al., 2018) or older adults (Liu et al., 2022).

Procedures

Phase 1: Obtaining the Spanish version of the PPLI Questionnaire. Translation and cultural adaptation.

This phase started with the translation of the PPLI questionnaire by two Spanish translators, who are expert in Sports Sciences and Physical Education, with a command of the original language (English), where they rated from 0 to 10 the level of difficulty they had in translating each question, with 0 representing no difficulty and 10 representing great difficulty. After an independent translation process by the two translators of each questionnaire, a consensus meeting was convened to obtain a single translation and cultural adaptation of the questionnaires, discussing linguistic differences to obtain the best possible readability for the participants, thus obtaining the initial consensus of the PPLI. Once both versions were translated into Spanish, back-translation was performed. Based on translation into the original language, the questionnaire was translated into Spanish by a translator who was a native English speaker fluent in Spanish. Then, a comparison was made between the original questionnaire version and the back-translated questionnaire in English, making a comparison and finally, the correctly translated questionnaire was obtained.

The Spanish version for adults was evaluated for comprehension in a sample of 10 Spanish adults randomly selected. The participants evaluated the questionnaire as clear and comprehensible. This interview consisted of evaluations using three methods: comprehension on an ordinal scale using a three-point scale:1) clear and understandable; 2) difficult to understand; 3) incomprehensible; evaluation of comprehension on a numerical scale using a scale of 0 to 10, with 0 being very easy to understand and 10 being very difficult to understand and enquiry and paraphrasing where respondents expressed the perceived meaning of the questionnaire items in their own words.

Spanish version of Perceived Physical Literacy Instrument for adults (PPLI-Sp) was given at Supplementary file (Table S1).

Phase 2: Exploratory (EFA) and confirmatory (CFA) Factorial Analyses of PPLI-Sp in adults

Procedure

A total of 213 adults (Table 1) from the autonomous community of Extremadura (Spain) were recruited for convenience. Once the final version of the questionnaire was obtained, it was disseminated through a web link, where participants signed an informed consent form for participation in the study and filled in the information regarding sociodemographic data (age, sex, and employment status) and PPLI in its Spanish version.

Table 1. Second phase participants' characteristics (n = 213).

Age (years)	
27.40 (10.58)	
Gender	
Males	89 (41.8 %)
Females	123 (57.7 %)
No answer	1 (0.5 %)
Work situation	
Undergraduate students	110 (51.6%)
Active worker	103 (48.4%)

Statistical analyses

The Statistical Package for the Social Sciences SPSS (version 25.0; IBM SPSS Inc., Armonk, NY, USA) was used to conduct the exploratory factor analysis (EFA). The maximum likelihood method was applied to extract the factors. Considering the nature of the data, a polychoric correlation matrix (Choi et al., 2011) was used, and an appropriate number of dimensions was established through optimal implementation of parallel analysis (Lloret-Segura et al., 2014). Once the number of dimensions was identified, the Promax with Kaiser normalisation method was selected as the rotation method for defining factor simplicity and structure. The Kaiser–Meyer–Olkin (KMO) and Bartlett tests of sphericity were used as sampling adequacy indices (Frías-Navarro and Pascual Soler, 2012). Coefficients lower than 0.50 were deleted.

Subsequently, the software package AMOS v.18.0.0 (IBM Corporation, Wexford, PA, USA) was used to perform a confirmatory factor analysis (CFA). The different domains and items obtained from the previous EFA were included as elements. To assess the model's goodness of fit, the following indices were selected:1) the chi-square probability setting as appropriate non-significant values ($p > 0.05$) (Green et al., 1997), 2) the root mean square error of approximation (RMSEA) (Xia and Yang, 2019), 3) the comparative fit index (CFI), 4) the Tuker-Lewis index (TLI), 5) the normed fit index (NFI), and 6) the chi-square per degree of freedom ratio (CMIN/DF) (Wells, 2021). Additionally, the Cronbach's alpha and McDonald's omega (Hayes and Coutts, 2020) coefficients were calculated as the reliability index of the instrument. The composite reliability was also computed. Cronbach's alpha was interpreted as follows Glen (2022):
< 0.5, unacceptable; ≥ 0.5 to < 0.6, poor; ≥ 0.6 to < 0.7, questionable; ≥ 0.7 to < 0.8, acceptable; ≥ 0.8 to < 0.9, good; and > 0.9, excellent.

Results

Phase 1: Obtaining the Spanish version of the PPLI Questionnaire for Adults. Translation and cultural adaptation

In Version 1 of the questionnaire, words, expressions, and concepts were modified as a consensus of two previous translations (as detailed in Table 2).

Subsequently, Version 1 was subjected to back-translation by a native English speaker with a good command of Spanish, comparing it with the original version (English) and without detecting any significant differences between the two.

Finally, cognitive interviews were conducted with ten people from the field of physical education, and they reported a good comprehension rating. No comprehension problems were identified by the participants, as all of them rated the questionnaires as clear and understandable (Table 2).

After all of the modifications mentioned above, the final version of the questionnaire was obtained (Table 2).

Phase 2: Exploratory (EFA) and confirmatory (CFA) Factorial Analyses of PPLI-Sp in adults.

The maximum likelihood method reported four factors related to the explained variance based on eigenvalues (Brown, 2015). However, Factor 4 was not considered because it included only two items of the instrument, and every factor should include at least three items. Thus, three factors which complied with this requirement were identified. The EFA was performed because of the good results offered by the sampling adequacy indices (Bartlett test = 1081.848; df = 153; $p < 0.001$; and KMO test = 0.825). Once the number of dimensions was defined, the Promax with Kaiser normalisation rotation method was applied. Table 3 displays the structure and factor loading of each item. The factor solution comprised three correlated factors:1) physical competence, 2) motivation and confidence, and 3) knowledge and understanding. After the EFA, Items 7, 9, 12, 13, 14, 15, and 17 were excluded.

Table 3. PPLI-Sp rotated the factor solution and factor loading.

Items	Factor 1	Factor 2	Factor 3	Factor 4
1. I possess adequate fundamental movement skills	0.997			
3. I am able to apply learnt motor skills to other physical activities	0.821			
2. I am physically fit, in accordance with my age	0.738			
5. I appreciate myself or others doing sports		0.847		
16. I establish friendship through sports		0.841		
4. I have a positive attitude and interest in sports		0.806		
8. I possess self-evaluation skills for health			0.864	
6. I am able to apply PE knowledge in the long run			0.802	
18. I aspire to know the current sports trend			0.612	
11. I have strong social skills				0.887
10. I have strong communication skills				0.846

Moreover, Items 10 and 11 were excluded because they were the only elements which composed Factor 4, and at least three items should be considered a factor as dimension (MacCallum et al., 1999; Raubenheimer, 2004). Therefore, a factor structure consisting of nine items grouped into three dimensions was extracted.

Table 4 shows the correlation between the PPLI-Sp factors:1) physical competence, 2) motivation and confidence, and 3) knowledge and understanding. Moderate associations were observed between the different dimensions (r: 0.623 to 0.672).

Table 2. Versions of the PPLI-Sp in adults.

Items	English version (original)	Translation 1	Translation 2	Version 1. An agreed version of the translations	Final version. Adaptations after cognitive interviews
1	I possess adequate fundamental movement skills	Poseo habilidades de movimiento fundamentales adecuadas	Poseo habilidades motrices básicas adecuadas	Poseo habilidades motrices básicas adecuadas	Poseo habilidades motrices básicas adecuadas
2	I am physically fit, in accordance with my age.	Estoy físicamente en forma, de acuerdo con mi edad.	Estoy físicamente en forma, según mi edad	Estoy físicamente en forma, de acuerdo con mi edad.	Estoy físicamente en forma, de acuerdo con mi edad.
3	I am able to apply learnt motor skills to other physical activities	Soy capaz de aplicar las habilidades motrices aprendidas a otras actividades físicas	Soy capaz de emplear las habilidades motrices aprendidas en otras actividades físicas	Soy capaz de emplear las habilidades motrices aprendidas en otras actividades físicas	Soy capaz de emplear las habilidades motrices aprendidas en otras actividades físicas
4	I have a positive attitude and interest in sports	Tengo una actitud positiva e interés por el deporte	Tengo actitud positiva e interés hacia el deporte	Tengo una actitud positiva e interés hacia deporte	Tengo una actitud positiva e interés hacia deporte
5	I appreciate myself or others doing sports	Aprecio la práctica del deporte por mí mismo o por otros	Valoro mi práctica deportiva y la de otros	Valoro mi práctica deportiva y la de otros	Valoro mi práctica deportiva y la de otros
6	I am able to apply PE knowledge in the long run	Soy capaz de aplicar los conocimientos de educación física a largo plazo	Soy capaz de aplicar los conocimientos de la EF a largo plazo	Soy capaz de aplicar los conocimientos de la EF a largo plazo	Soy capaz de aplicar los conocimientos de la EF a largo plazo
7	I possess self-management skills for fitness	Poseo habilidades de autogestión para el ejercicio físico	Puedo autogestionar mi estado de forma	Puedo autogestionar mi condición física	Puedo autogestionar mi condición física
8	I possess self-evaluation skills for health	Poseo habilidades de autoevaluación para la salud	Puedo autoevaluar mi salud	Puedo autoevaluar mi salud	Puedo autoevaluar mi salud
9	I am willing to do sports for better health	Estoy dispuesto a hacer deporte para mejorar la salud	Estoy dispuesto a hacer deporte para mejorar la salud	Estoy dispuesto a hacer deporte para mejorar la salud	Estoy dispuesto a hacer deporte para mejorar la salud
10	I have strong communication skills	Tengo fuertes habilidades de comunicación	Poseo grandes habilidades comunicativas	Poseo grandes habilidades comunicativas	Poseo grandes habilidades comunicativas
11	I have strong social skills	Tengo fuertes habilidades sociales	Poseo grandes habilidades sociales	Tengo grandes habilidades sociales	Tengo grandes habilidades sociales
12	I am confident in wild/natural survival	Tengo confianza en la supervivencia salvaje/natural	Confío en la supervivencia salvaje/natural	Confío en la supervivencia salvaje/natural	Confío en la supervivencia salvaje/natural
13	I am capable in handling problems and difficulties	Soy capaz de manejar problemas y dificultades	Soy capaz de manejar los problemas y las dificultades	Soy capaz de manejar los problemas y las dificultades	Soy capaz de manejar los problemas y las dificultades
14	I have a mindset for lifelong sports	Tengo una mentalidad para hacer deporte durante toda la vida	Creo en la práctica deportiva permanente	Creo en la práctica deportiva permanente	Creo en la práctica deportiva permanente
15	I can turn doing sports into an on-going habit of life	Puedo convertir la práctica del deporte en un hábito de vida permanente	Puedo convertir la práctica del deporte en un hábito de vida permanente	Puedo convertir la práctica del deporte en un hábito de vida permanente	Puedo convertir la práctica del deporte en un hábito de vida permanente
16	I establish friendship through sports	Establezco relaciones de amistad a través del deporte	Hago amistades a través del deporte	Hago amistades a través del deporte	Hago amistades a través del deporte
17	I am aware of the benefits of sports related to health	Soy consciente de los beneficios del deporte relacionados con la salud	Conozco los beneficios del deporte relacionados con la salud	Conozco los beneficios del deporte relacionados con la salud	Conozco los beneficios del deporte relacionados con la salud
18	I aspire to know the current sports trend	Aspiro a conocer la tendencia deportiva actual	Aspiro a conocer la tendencia deportiva actual	Aspiro a conocer la tendencia deportiva actual	Aspiro a conocer la tendencia deportiva actual

Once the structure of the instrument was defined, a CFA was performed to establish a definitive model. The resulting model is illustrated in Figure 1.

Table 5. PPLI-Sp questionnaire goodness-of-fit indexes.

Index	Value
CMIN/DF	1.958
P (χ^2)	0.003
RMSEA	0.095
CFI	0.951
TLI	0.926
NFI	0.906

CMIN/DF, minimum discrepancy per degree of freedom; P (χ2), chi-squared probability; RMSEA, root mean square error of approximation; CFI, comparative fit index; TLI, Tuker-Lewis index; NFI, normed fit index.

Table 5 illustrates the PPLI-Sp goodness-of-fit indexes after CFA (Kassim et al., 2013). Although the chi-square probability was significant (p = 0.003) and the RMSEA was not within the established limits (0.010–0.050), the rest of the goodness-of-fit indices revealed a good fit between the data and the model (Schumacker and Lomax, 2004). The CMIN/DF index shows good values, considering that it must be below 2 for a correct model fit, and the CFI, TLI, and NFI indices are over 0.9 which indicates a close-to-perfect fit to the model.

Finally, Table 6 shows the reliability outcomes of PPLI-Sp. Overall, all reliability parameters showed good reliability of the final 9-item instrument (Cronbach´s α = 0.888; McDonald's ω = 0.893). Good outcomes were also reported for composite reliability (Spearman-Brown coefficient = 0.844; Guttman two halves coefficient = 0.833).

Table 6. Reliability outcomes of Perceived Physical Literacy Instrument – Spanish version for adults (PPLI-Sp).

Reliability index	Outcome
Cronbach's α	0.888
McDonald's ω	0.893
Composite reliability	
Spearman-Brown coefficient	0.844
Guttman two halves coefficient	0.833

Table 4. PPLI-Sp inter-factor correlation matrix.

	Factor 1: Physical competence	Factor 2: Motivation and confidence	Factor 3: Knowledge and understanding
Factor 1: Physical competence	1.000		
Factor 2: Motivation and confidence	0.672	1.000	
Factor 3: Knowledge and understanding	0.623	0.636	1.000

Extraction method: maximum likelihood; rotation method: Promax with Kaiser normalisation.

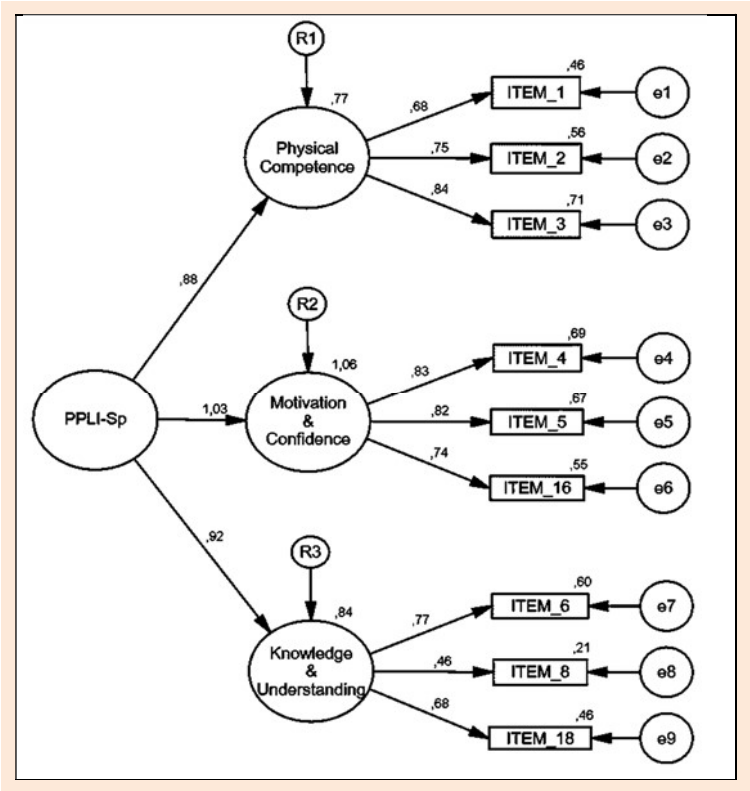

Figure 1. PPLI-Sp factor model.

Discussion

This study aimed to validate the PPLI-Sp in a Spanish adult population using the original PPLI questionnaire (Sum et al., 2016). After the EFA, a 9-item valid instrument with good internal consistency was obtained. This instrument was composed of three different dimensions:1) physical competence, 2) motivation and confidence, and 3) knowledge and understanding, which were established based on the nature of the questions and items, taking as reference one of the most used instruments for physical literacy assessment, CAPL-2, and its dimensions (Longmuir

et al., 2015). Moreover, the CFA outcomes revealed a good fit between the data and the model.

Several instruments attempt to self-report information about at least one of the three domains that constitute PL (Ryom et al., 2022). However, a recent review highlights the lack of explicit instruments for the assessment of PL in adults, with only 6 questionnaires reported (Boldovskaia et al., 2023). Four (Liu et al., 2022; Ma et al., 2020; Munusturlar and Yıldızer, 2019; Sum et al., 2016) of these 6 instruments come from the original PPLI of Sum et al. (2016) and their dimensions are summarised in Table 7. The remaining two, College Student Physical Literacy Questionnaire (CSPLQ) (Luo et al., 2022) and *Dotazníku sebehodnocení pohybové gramotnosti* (DSPG) (Brožovičová, 2022), include dimensions already included in the previous ones, with the only notable difference being that the DSPG includes the "relative ranking of literacies" dimension.

Specifically, PPLI-Sp consists of three dimensions (Table 7). Dimension 1 (Physical Competence) included the items "I possess adequate fundamental movement skills", "I am physically fit, in accordance with my age" and "I am able to apply learned motor skills to other physical activities", items 1, 2 and 3 of the original version by Sum et al. (2016). All these items refer to the possession of fundamental motor skills by test takers and their ability to perform and apply them.

Dimension 2 (Motivation and Confidence) consisted of the items "I have a positive attitude and interest in sports", "I appreciate myself or others doing sports", and "I establish friendships through sports". These attempts to assess the attitude of participants towards physical activity, as well as their attitudinal intentions towards it.

Table 7. Items and dimensions collected in different versions of the PPLI.

	Original versión of PPLI (Sum et al., 2016)	PPLI for Physical Education Teachers (Sum et al., 2016), PPLI for adolescents (Sum et al., 2018), S-PPLI (López-Gil et al., 2023), and PPLI (Turkish)(Munusturlar and Yıldızer, 2019)	Senior PPLI (Liu et al., 2022)	PPLI for undergraduates in Mainland China (Ma et al., 2020)	PPLI -Sp
	Items	**Domain**	**Domain**	**Domain**	**Domain**
1	I possess adequate fundamental movement skills	*N/A*	Ability	Confidence and physical competence	Physical Competence
2	I am physically fit, in accordance with my age.	*Sense of self and self confidence*	Ability	Confidence and physical competence	Physical Competence
3	I am able to apply learnt motor skills to other physical activities	*N/A*	Ability	Confidence and physical competence	Physical Competence
4	I have a positive attitude and interest in sports	*Knowledge and Understanding*	*N/A*	*N/A*	Motivation and Confidence
5	I appreciate myself or others doing sports	*Knowledge and Understanding*	*N/A*	Motivation	Motivation and Confidence
6	I am able to apply PE knowledge in the long run	*N/A*	Ability	*N/A*	Knowledge and Understanding
7	I possess self-management skills for fitness	*Sense of self and self confidence*	*N/A*	*N/A*	*N/A*
8	I possess self-evaluation skills for health	*Sense of self and self confidence*	*N/A*	*N/A*	Knowledge and Understanding
9	I am willing to do sports for better health	*N/A*	Attitude	*N/A*	*N/A*
10	I have strong communication skills	*N/A*	Sociality	Interaction with the environments	*N/A*
11	I have strong social skills	*Self-expression and communication with others*	Sociality	Interaction with the environments	*N/A*
12	I am confident in wild/natural survival	*Self-expression and communication with others*	*N/A*	*N/A*	*N/A*
13	I am capable in handling problems and difficulties	*Self-expression and communication with others*	*N/A*	*N/A*	*N/A*
14	I have a mindset for lifelong sports	*N/A*	Attitude	*N/A*	*N/A*
15	I can turn doing sports into an on-going habit of life	*N/A*	Attitude	*N/A*	*N/A*
16	I establish friendship through sports	*N/A*	Attitude	*N/A*	Motivation and Confidence
17	I am aware of the benefits of sports related to health	Knowledge and Understanding	Attitude	Motivation	*N/A*
18	I aspire to know the current sports trend	*N/A*	*N/A*	Motivation	Knowledge and Understanding

N/A: Not applicable.

Finally, Dimension 3 (Knowledge and Understanding) was completed with the items "I am able to apply physical education knowledge in the long run", "I possess self-evaluation skills for health", and "I aspire to know the current sports trend". This dimension also tries to bring together items related to the participants' perception of the skills or knowledge they possess to manage their sports practice.

As mentioned above, the previous studies that have been carried out on the different versions of the original 18-item PPLI (Sum et al., 2016) are shown in Table 7. Its shows all the items, as well as the dimension to which each item belongs in each of the different existing instruments.

The culture and setting of these studies differ; therefore, some items were not found in Spanish participants or were not grouped in the same way. In general terms, as can be seen in Table 7, the factor structure of the PPLI-Sp in relation to its component dimensions is more similar to the Senior Perceived Physical Literacy Instrument (Liu et al., 2022) and the Perceived Physical Literacy Instrument for undergraduates in Mainland China (Ma et al., 2020). This may be due to the age and type of population that made up the sample of the studies in which the psychometric properties of these instruments were analysed, since the present study was based on a general adult population with a mean age of 27.40 (10.58) years, where half of the participants (51.6%) were university students. Therefore, there were hardly any participants specific to the field of PE (Sum et al., 2016) and no adolescents (López-Gil et al., 2023; Sum et al., 2018). Overall, there most significant difference with previous studies is that they included the social factor (items 10 to 13) with the dimensions of self-expression and communication with others (Sum et al., 2018; Sum et al., 2016), sociality (Liu et al., 2022), and interaction with the environment (Ma et al., 2020).

Specifically, regarding domain 1 (physical competence), there seems to be a lot of overlap between the instruments, as both the Senior Perceived Physical Literacy Instrument (Liu et al., 2022) and Perceived Physical Literacy Instrument for undergraduates in Mainland China (Ma et al., 2020) include such items in similar domains (Ability and Confidence and physical competence, respectively). However, with respect to the PPLI for PE teachers (Sum et al., 2016) and adolescents (López-Gil et al., 2023; Sum et al., 2018), only items 2 “I am physically fit, in accordance with my age”, were found to be considered in the domain sense of self and self-confidence, which could be in line with our physical competence domain, as both refer to self-perception.

More specifically, domain 2 (Motivation and Confidence) of the del PPLI-Sp matched the Attitude domain of the Senior Perceived Physical Literacy Instrument (Liu et al., 2022), in the item “I establish friendship through sports”, and the Motivation domain of the Perceived Physical Literacy Instrument for undergraduates in Mainland China (Ma et al., 2020), in the items ”I appreciate myself or others doing sports”.

In relation to domain 3 (Knowledge and Understanding), only the PPLI for physical education teachers and adolescents considered this domain. However, the item “I possess self-evaluation skills for health” considered by our study in this domain, were considered by Sum et al. (2016) and Sum et al. (2018) in the Sense of self and self-confidence domain, this may be because the domain of knowledge and understanding of this study its items (“I am able to apply physical education knowledge in the long run”, “I possess self-evaluation skills for health” and “I aspire to know the current sports trend”) make greater reference to a more theoretical and self-applied "knowledge" while those belonging to the knowledge domain of the rest of the instruments that consider this domain (López-Gil et al., 2023; Sum et al., 2018; Sum et al., 2016) (“I have a positive attitude and interest in sports”, “I appreciate myself or others doing sports” and “I am aware of the benefits of sports related to health”) refer more to the perception of the attitude or benefits of sport, in line with other studies that associate these items with domains such as Attitude (Liu et al., 2022) or Motivation (Ma et al., 2020).

Finally, despite the good correlation values reported in our EFA for items 10 and 11 (Table 3), they were not considered in our model, as they were only two items that made up Factor 4 and considering that at least three items or elements are needed to consider a factor as a dimension (MacCallum et al., 1999; Raubenheimer, 2004).

This study had several limitations, including its cross-sectional design, which does not allow for the establishment of causal relationships between the factors associated with perceived physical literacy. Thus, a test-retest study should be conducted to see the temporary stability of the instrument. Furthermore, this study only examined factorial validity, convergent validity, and internal consistency reliability, but not the criterion validity of the instrument analysed. Moreover, only three factors of PPLI were examined. Finally, convenience sampling was also used, which makes it difficult to generalise the results.

Therefore, future studies should aim to test the criterion validity of the reported instrument as well as to search for new domains and factors that determine an individual's level of physical literacy, regardless of their characteristics. It is used together with objective measures such as physical competence tests, accelerometry, or other questionnaires aimed at assessing knowledge, motivation, and confidence in sports practice. In addition, it would be interesting to know the perception of physical literacy of different populations, as well as to establish differences between age groups, gender, socioeconomic status, professional area, health status, or contextual variables. In line with the above, this instrument could also be used to establish relationships with other health parameters (body composition, blood pressure, life expectancy, quality of life, and mental health) which could be significant in understanding the importance of physical literacy in relation to other variables, or the possible benefits that may result from having more physically literate societies.

Conclusion

The present study carried out a process of translation and cultural adaptation of the PPLI questionnaire into Spanish through a back-translation process, as well as individual interviews that led to the final version of the PPLI-Sp. In addition, the validity and reliability of the PPLI-Sp question-

naire in Spanish adults were examined based on EFA and CFA, obtaining a valid and reliable instrument consisting of 9 items divided into three dimensions: motivation and confidence, physical competence, and knowledge and understanding.

Therefore, the Spanish version of the PPLI could be used to determine the perception of PL in different Spanish adult populations, as well as to establish differences between age groups, sex, socioeconomic status, professional area, health status, or contextual variables, in addition to being able to establishing relationships with other health parameters, which could be significant for understanding the importance of PL in relation to other variables or the possible benefits that may result from having more physically literate societies.

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Key points

- Physical Literacy should be established and consolidated as a key principle in governmental organizations, as it could provide a basis for physical education, sport and public health.
- A process of translation and cultural adaptation of the PPLI questionnaire into Spanish was successfully carried out through a process of back-translation and individual interviews, resulting in the final version of the PPLI-Sp. In addition, it was tested for validity and reliability in Spanish adults.
- The Spanish version of the PPLI will be able to determine the perception of Physical Literacy in different Spanish adult populations, being able to establish differences between groups according to their status, sex, or different contextual variables, thus being able to contemplate the benefits derived from more physically literate societies.

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SUPPLEMENTARY FILES

Table S1. Perceived Physical Literacy Instrument - Spanish version for adults (PPLI-Sp).

Item	Muy en desacuerdo				Muy de acuerdo
	1	2	3	4	5
1. Poseo habilidades motrices básicas adecuadas					
3. Soy capaz de emplear las habilidades motrices aprendidas en otras actividades físicas					
2. Estoy físicamente en forma, de acuerdo con mi edad.					
5. Valoro mi práctica deportiva y la de otros					
16. Hago amistades a través del deporte					
4. Tengo una actitud positiva e interés hacia deporte					
8. Puedo autoevaluar mi salud					
6. Soy capaz de aplicar los conocimientos de la educación física a largo plazo					
18. Aspiro a conocer la tendencia deportiva actual					