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Cross-validation of the Canadian Assessment of Physical Literacy second edition (CAPL-2) for Spanish children

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ABSTRACT

Background/objective This study aimed to explore physical literacy (PL) using the Canadian Assessment of Physical Literacy, second edition (CAPL-2), adapt it to the Spanish context and provide evidence of its validity for use in Spanish children aged 8–12.

Methods A total of 280 students (150 girls, mean age 10.5±0.9 years) from Extremadura (Spain) completed the CAPL-2. Means and SDs were used to present CAPL-2 scores according to age and sex, as well as frequencies to place participants at different PL levels. Confirmatory factor analysis (CFA) was conducted to establish the best model fit for the data.

Results The median PL of Spanish children was progressing, and girls had a lower PL than boys for all ages except 12 years. The results supported a four-domain model for the CAPL-2 Spanish version and reported good fit indices after CFA (χ^2 per df ratio=1.118; P (χ^2)=0.256; root mean square error of approximation=0.021; comparative fit index=0.987; Tuker-Lewis index=0.991; normed fit index=0.895).

Conclusion The CAPL-2 model is a valid and reliable instrument for Spanish children aged 8–12. It represents the first tool that assesses PL in Spanish children, covering the domains of motivation and confidence, physical competence, knowledge and understanding, and daily behaviour. It may be relevant for all professionals related to physical activity, education and the health field.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Physical literacy (PL) is a multidimensional construct whose validity for increasing and improving physical activity in the population is well established.
⇒ There is no PL assessment instrument for Spanish children.

WHAT THIS STUDY ADDS

⇒ The Canadian Assessment of Physical Literacy model is the first valid and reliable instrument for assessing PL in Spanish children aged 8–12.
⇒ The median PL of Spanish children was progressing, and girls had a lower PL than boys for all ages except 12 years.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Our findings present the first instrument to assess PL in Spanish children, covering the physical competence, motivation and confidence, knowledge and understanding and daily behaviour domains, which has proven to be valid, comprehensive, useful and relevant for professionals in the fields of physical activity, education and health.

INTRODUCTION

There are high levels of physical inactivity worldwide; there is a pressing need to promote healthy lifestyles that include physical activity (PA).[1] It has been reported that only a quarter of young people meet the recommendations for daily PA,[2] in line with the findings of the Active Healthy Kids Global Alliance, which highlighted that only a small proportion (27%–33%) of young people meet the recommended amount of moderate to vigorous PA (MVPA) required after reporting on cards from 57 countries.[3] This lack of PA is considered to be one of the main factors contributing to childhood obesity, which is considered to be a global health burden.[4] Physical inactivity[5] and a sedentary lifestyle[6] can lead to multiple health risks and consequences.

Increasing the number of children and young people involved in PA should be prioritised in our society.[7] However, most interventions promoting PA have not achieved positive results thus far.[8 9] In a recent study,[10] the criteria most valued by the population to promote the success of school-based PA interventions were identified as no costs, sustainability over time and integration into the daily school day. Programme effectiveness and feasibility are also important.

Considering these criteria, physical literacy (PL) is a good solution to the failures of previous PA programmes and interventions. PL is defined in the Bulletin of the International Council on Sport Science and Physical

Education of the United Nations Educational, Scientific and Cultural Organization as the motivation, confidence, physical competence (PC), knowledge and understanding (KU) to value and participate in a physically active lifestyle.[11] Given the inclusion of physical, cognitive, social and affective domains in the definition of PL, it is offered as a tool for examining movement about PA and motor skill outcomes, as well as broader social, cognitive and affective processes.[12]

Academic interest in physical education (PL) has increased because it is related to healthy childhood development,[13] school children show a propensity for physical education,[14] and it helps researchers and practitioners develop more targeted PA support initiatives that address all aspects of PL.[15]

This has led to a growing interest in monitoring PL,[16] possibly because the results of the assessments can be very valuable to educators in adjusting their lesson plans, to school leaders or managers in advocating for additional resources to improve PL and to government agencies in highlighting the importance of PL to policy-makers to encourage and allocate resources to its promotion.[16] Monitoring the PL allows for identifying deficits that may exist in each domain in each population and thus can guide appropriate interventions for improvement. As noted by Do *et al*,[17] children with various chronic conditions resemble their healthy peers, but children with medical conditions have lower PC than their healthy peers but higher motivation and confidence (MC); therefore, programmes based on PC interventions (motor skills, physical fitness) rather than motivation or education may be more useful. Thus, it can be very re jlevant to monitoring it in different demographic groups.

A recent review[18] revealed that numerous studies have attempted to comprehensively monitor various domains of the PL. However, we found only three explicit PL assessment tools—the Canadian Physical Literacy Assessment (CAPL),[19] Passport for Life (PPL)[20] and PlayFun[21 22]—with others under development, such as the Portuguese Physical Literacy Assessment.[23 24]

The CAPL[19] was one of the first assessments of PL. It was developed in Canada to provide a valid, reliable, feasible and informative tool to assess PL in Canadian children. After some adaptations in 2018,[25] the second edition of the CAPL (CAPL-2) was published. This version is divided into four domains: MC, PC, KU and daily behaviour (DB). Shearer *et al*[18] concluded that the CAPL-2 is one of two measures from the PL shown to have high-quality measurement properties for children aged 7–12. Indeed, the interest in this instrument has surged dramatically in recent years, with its adaptation and validation in several countries worldwide, including Greece,[26] Iran,[27] China[26] and Denmark.[28] This highlights its growing relevance and applicability on a global scale. Although the CAPL-2 has also been used in Spanish children and adolescents,[29 30] only the test–retest reliability of the part of the questionnaire has been investigated.[30] In this term, studies that have used the CAPL-2 have detected low or moderate levels of PL, in addition to the fact that most overweight children have lower levels of PL than non-overweight children.[29] Therefore, this study explored the level of the PL and its various domains using interpretive categories to adapt the CAPL-2 to the Spanish context and to assess its validity for use with Spanish children aged 8–12 years.

METHODS

Recruitment and participants

16 schools in the autonomous community of Extremadura, Spain, were contacted to participate in the study. The project was presented to the school headmasters, and those who agreed to participate sent information about the study to the parents of the students. Parents were given an information sheet and consent form with all the information about the study. Those who wanted their child to participate in the study signed the consent form and returned it to the school, along with their child's consent to participate. A total of 280 students from 5 educational institutions in Extremadura completed this study.

The eligibility criteria

Participants met the following eligibility criteria: (1) were between 8 and 12 years old; (2) provided consent from their parents or legal guardians; (3) agreed to participate in the study and (4) had no medical conditions that would prevent their participation in physical fitness or practical tests.

Measures

CAPL-2-related measures

The CAPL-2 assessment aims to assess PL and consists of four domains: MC, PC, KU and DB. Each domain is assessed through various physical tests and questionnaires, and each test is assigned a score ranging from 1 to 100 points. The test protocols are detailed in guides published in different languages and videos on the CAPL website (https://www.capl-eclp.ca/).

For the DB domain, the total score is calculated from two components: a self-reported number of days that the PA was performed for at least 60 min and the number of steps recorded by an activity wristband (Xiaomi mi Band 3, Xiaomi Corporation, Beijing, China) during a whole week (instead of a pedometer as described in the original CAPL-2 protocol). The total score for this domain is derived from the steps recorded (from 1 to 25 points) and the answers to the self-report questions (from 1 to 5 points).

For the PC domain, the final score is calculated by adding the results of three fitness tests: (1) plank position over time,[31] (2) performance on the Progressive Aerobic Cardiovascular Endurance Run (PACER),[32] which assesses cardiorespiratory competence and (3) the assessment of motor skills and agility using the Canadian Agility and Movement Skill Assessment (CAMSA).[33] Each test is scored from 1 to 10 points, for up to 30 points.

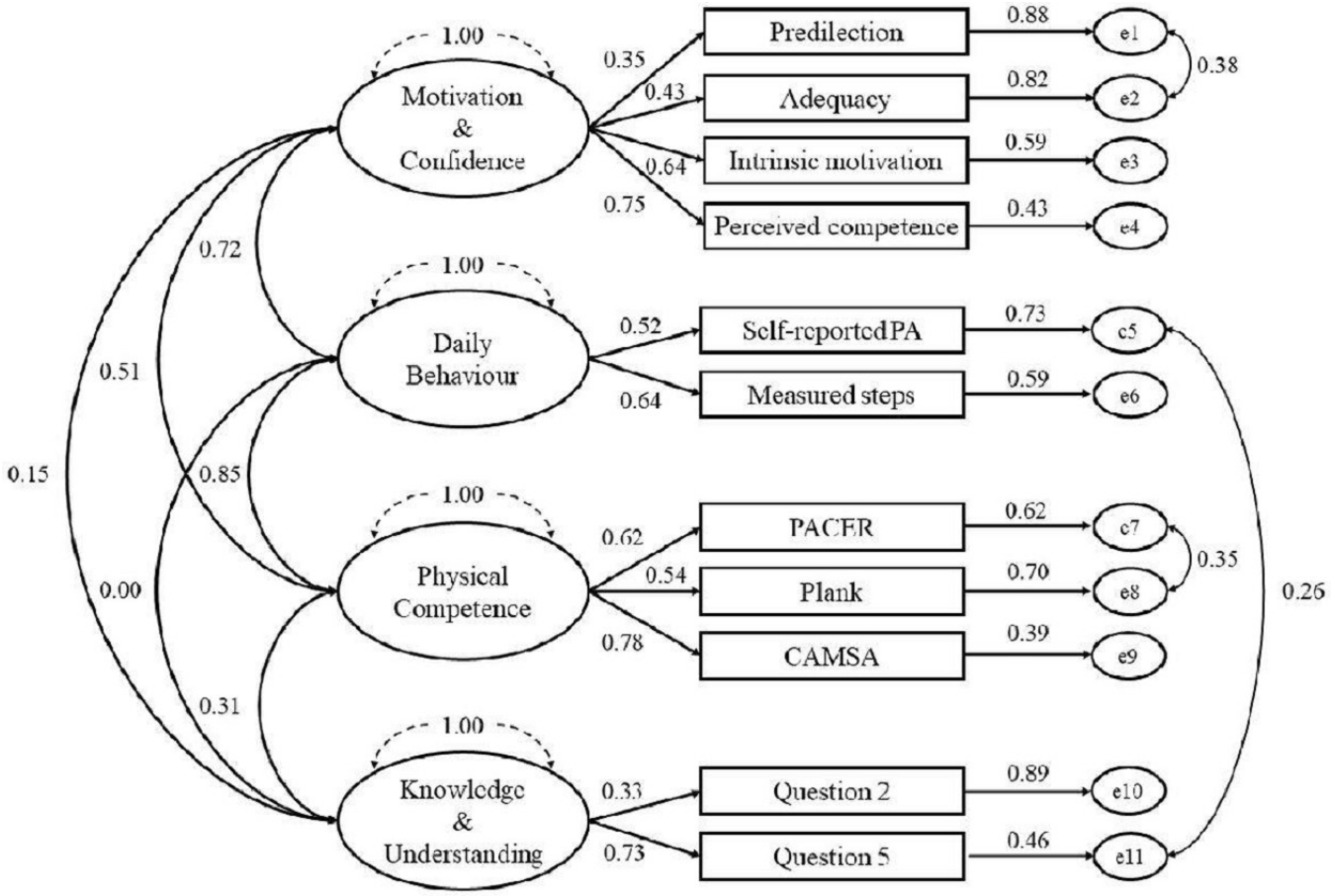

Figure 1 Illustrates the resulting model from the CFA conducted for the Spanish version of the CAPL-2. CAMSA, Canadian Agility and Movement Skill Assessment; CAPL-2, Canadian Assessment of Physical Literacy, second edition; CFA, confirmatory factor analysis; PA, physical activity; PACER, Progressive Aerobic Cardiovascular Endurance Run.

MC was assessed using a specific CAPL-2 questionnaire.[34] The questionnaire consists of 12 items and is divided into 4 subdomains (predilection, adequacy, intrinsic motivation and self-confidence). Each subdomain consists of 3 items and is scored between 1 and 7.5, for a total of 30 points. Participants completed the Spanish version of the questionnaire.[35]

The KU domain assesses knowledge about PA,[34] and participants completed the validated Spanish version.[35] This questionnaire includes five questions divided into two subdomains (KU). The first four questions, belonging to the knowledge domain, are multiple-choice questions with four answer options and a single correct answer (score from 1 to 4 points). Finally, the last questionnaire question corresponds to the understanding subdomain, which is about filling in the gaps in a story and can be scored from 1 to 6 points. The total score for this domain is calculated by adding the scores obtained in both parts of the questionnaire and can reach 10 points.

Finally, the numerical scores of the CAPL-2 (figure 1) ranged from 0 to 100 points and reflected the participants' level of PL. In addition, the PL level of the participants is determined based on their sex, age and score following the normative values of the CAPL-2, resulting in a score from 1 to 4, where 1 corresponds to beginning, 2 to progressing, 3 to achieving and 4 to excelling.[36]

Procedure

The procedure followed for applying the test battery was described in the CAPL-2 manual for 4–5 assessors by appointment. All assessors were previously trained by studying the CAPL training manual (English version: https://www.activehealthykids.org/wp-content/uploads/2022/04/capl-2-manual-en.pdf ; Spanish version: https://www.activehealthykids.org/wp-content/uploads/2022/04/capl-manual-es.pdf)[36] and the CAPL training videos (https://www.activehealthykids.org/capl-2-training-materials/). On the first day of testing, the children completed the CAMSA test, the Plank test and the written questionnaires (in paper format). At the end of the first day of testing, each child was given the activity wristband with instructions for use and the daily step recording sheet, and a joint explanation was given so that all participants understood how the wristband worked. Eight days later, the activity bracelets and the log sheet were collected on the second evaluation day, and the PACER test was performed.

Data analysis

Descriptive statistics are presented as median (M) and IQR for all quantitative variables for the total sample and segmented by age and sex. In addition, the PL level was presented as the frequency for all participants and by sex. The normality of the data was examined using a Q-Q plot and Shapiro-Wilk tests. The Mann-Whitney U test was used to analyse the differences in the scores obtained by the participants according to sex. Relationships between variables were analysed by calculating Spearman correlation coefficients (non-parametric variables). The correlation values were interpreted as 0.30–0.59 for moderate correlation, 0.60–0.79 for high correlation and ≥0.80 for excellent correlation.[37]

Confirmatory factor analysis (CFA) was conducted through the statistical software R (V.4.3.1) (R Core Team, Vienna, Austria) and RStudio (V.2023.03.1) (Posit, Boston, Massachusetts, USA). The different CAPL-2 domains and items were included as elements. To assess the model's goodness of fit, the following indices were selected: (1) the χ^2 probability, which is set as appropriate non-significant values (p>0.05)[38]; (2) the root mean square error of approximation (RMSEA)[39]; (3) the comparative fit index (CFI); (4) the Tuker-Lewis index (TLI); (5) the normed fit index (NFI) and (6) the χ^2 per df ratio (CMIN/DF).[40] Cronbach's alpha coefficient was also calculated as the instrument's reliability index. Cronbach's alpha was interpreted as follows Glen[41]: <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

The total number of participants in this study was 280 (150 girls), aged between 9 and 12 years. Table 1 shows the scores for each domain, the total CAPL-2 score for all participants, and the scores according to sex and age. The highest PL scores were found in 12-year-old boys (76.08), and the lowest was found in 9-year-old girls (55.36). The total PL scores and the scores for the individual domains were generally greater in boys than in girls; scores were significantly greater in boys than in girls at all ages (p from 0.010 to <0.001) except at age 12, where differences were insignificant. In addition, boys scored significantly higher than girls in the DB domain at ages 10 and 11 (p<0.001 and p=0.007, respectively), in the PC domain at age 9 (p=0.003) and in the MC domain at ages 9 and 11 (p=0.015 and p=0.024, respectively).

Table 2 shows the level of PL and each of its domains based on the sex and age of the participants, according to the ranges established by the CAPL-2 manual.[36] Participants, both for total PL and its domains, were mostly at the progressing or beginning level, except for the MC domain, where participants were mainly at the excelling or achieving levels.

The correlations between the factors were significant and positive, except for the KU domain, which did not correlate significantly with either DB, PC or MC (table 3).

Table 4 summarises the CAPL-2 Spanish version model goodness-of-fit indices after CFA.[42] Almost all the goodness-of-fit indices revealed a great fit between the data and the model. The χ^2 probability was non-significant (p=0.256), and the RMSEA was within the established limits (0.010–0.050). Similarly, the CMIN/DF index shows good values, considering that it must be below 2 for a correct model fit, and the CFI and TLI are over 0.9, which indicates a close-to-perfect fit to the model.[43] The NFI did not reach the minimum optimal fit values, although it was close to 0.9 (NFI=0.895).

DISCUSSION

This study aimed to explore PL levels and interpretive categories and to adapt and validate the CAPL-2 for Spanish children aged 8–12. To our knowledge, this is the first study to validate the entire battery in this context by translating and culturally adapting the Spanish battery questionnaires.[35] This is also the first study to present the results of the CAPL-2 by sex and age in a sample of Spanish children, including the level of PL based on the interpretation categories by sex, as only one study previously presented these levels but differentiated between overweight and non-overweight children.[29]

The PL score (66.50) and its domains were similar to those of other studies that reported similar scores of approximately 60 out of 100.[28 29 44] The results confirmed statistically significant sex differences in total scores, with boys having higher scores than girls in all age groups except 12 years (where differences were not significant), consistent with previous results showing such sex differences in schoolchildren.[19 26]

MC was the highest scoring domain (26.10) in total score, as in most studies where this domain is scored above 20 out of a possible 30 points.[26 28 29] In contrast, the most worrying data are the low scores in the DB domain. The WHO daily PA and behavioural guidelines for children aged 5–17 years recommend at least 60 min of MVPA.[45] Colley *et al* suggested that 12 000 steps per day are equivalent to at least 60 min of MVPA, which is in line with the President's Council on Physical Fitness and Sports guidelines, which recommend 12 000 steps for girls and 15 000 steps for boys.[46] Thus, most Spanish schoolchildren do not reach the recommended number of steps, as the medium number of steps obtained is 13.50 (±6.78) out of 25, corresponding to fewer than 11 000 steps per day.

The level of PL was determined using the interpretive categories of the CAPL-2 manual,[36] where the level is obtained from the scores of each participant adjusted for sex and age. The results showed that the PL level of the Spanish children was similar to that of other studies,[26 27 44] mostly at the progressive level. Moreover, this level was largely maintained in the DB and KU domains. In the MC domain, the Spanish children performed best, with 56.8% at the excelling level, consistent with a study with Greek children, who achieved similar scores to Spanish children.[26] However, in the PC domain, the Spanish

Table 1 Total and domain scores for the overall sample and by age and sex

		Median (IQR)								
		Age	9		10		11		12	
		All participants	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
N		280	10	20	60	61	47	45	13	24
Total CAPL-2		66.50 (18.99)	71.15 (22.08)	55.36 (10.18)	72.60 (21.44)	65.07 (18.54)	69.57 (15.71)	61.10 (15.07)	76.08 (19.60)	65.90 (15.00)
DB	Total (0–30)	17.00 (12.75)	15.00 (14.00)	12.40 (6.75)	24.00 (11.75)	16.00 (10.00)	19.00 (13.00)	14.00 (12.50)	18.00 (9.00)	16.00 (9.50)
	Self-report (0–5)	4.00 (3.00)	5.00 (2.00)	3.00 (2.00)	5.00 (1.00)	3.00 (2.00)	3.44 (1.50)	3.00 (2.00)	3.00 (3.00)	2.00 (3.00)
	Step average (0–25)	13.50 (12.00)	10.00 (13.00)	10.00 (4.75)	21.00 (10.75)	12.00 (12.00)	4.00 (3.00)	12.00 (10.50)	15.00 (9.50)	13.50 (9.50)
PC	Total (0–30)	16.07 (8.84)	17.92 (8.64)	11.46 (3.55)	16.78 (9.91)	16.07 (6.79)	16.42 (7.79)	16.50 (10.18)	22.28 (15.32)	17.39 (8.61)
	CAMSA (0–10)	6.07 (2.50)	6.25 (2.59)	3.75 (1.25)	6.78 (2.05)	5.71 (2.32)	6.42 (2.50)	5.35 (2.68)	7.14 (2.50)	6.07 (2.41)
	PACER (0–10)	3.00 (2.00)	3.00 (3.00)	2.00 (2.00)	3.00 (2.75)	3.00 (1.00)	4.00 (3.00)	3.00 (2.00)	8.00 (6.50)	4.00 (3.00)
	Plank (0–10)	7.00 (6.00)	8.50 (5.00)	6.00 (2.00)	7.00 (6.00)	6.00 (5.50)	7.00 (5.00)	7.00 (7.00)	10.00 (6.00)	6.50 (6.50)
KU	Total (0–10)	7.00 (2.00)	7.00 (4.25)	6.00 (2.00)	7.00 (2.00)	7.00 (2.00)	7.00 (2.00)	7.00 (3.00)	6.00 (3.00)	7.50 (2.00)
	Physical activity guideline (0–1)	1.00 (1.00)	0.50 (1.00)	1.00 (1.00)	0.50 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	0.00 (1.00)	1.00 (1.00)
	Cardiorespiratory fitness definition (0–1)	1.00 (1.00)	1.00 (1.00)	1.00 (0.75)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)
	Muscular endurance definition (0–1)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (1.00)	1.00 (0.00)	1.00 (1.00)	1.00 (0.00)	1.00 (1.00)	1.00 (0.00)
	Improve sports skills score (0–1)	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)	1.00 (1.00)
	Physical activity comprehension score (0–6)	4.00 (1.00)	4.50 (2.25)	3.50 (1.00)	5.00 (1.00)	5.00 (1.00)	4.00 (2.00)	4.00 (1.50)	4.00 (1.50)	5.00 (1.00)
MC	Total (0–30)	26.10 (4.00)	30 (2.30)	24.15 (4.09)	27.00 (5.05)	26.20 (3.25)	26.50 (4.00)	24.50 (5.45)	26.20 (5.50)	25.10 (4.65)
	Adequacy (0–7.5)	7.50 (5.70)	7.450 (1.90)	5.90 (2.43)	7.50 (1.90)	7.50 (1.90)	7.50 (1.40)	6.80 (1.90)	7.50 (1.90)	7.50 (1.90)
	Predilection (0–7.5)	7.50 (5.70)	7.50 (0.47)	7.50 (1.90)	7.50 (1.90)	7.50 (0.70)	7.50 (1.90)	7.50 (1.90)	7.50 (1.90)	7.50 (1.90)
	Intrinsic motivation (0–7.5)	6.50 (1.50)	7.50 (1.13)	6.00 (1.38)	6.50 (1.50)	7.00 (1.00)	6.50 (1.50)	6.00 (2.00)	7.00 (1.75)	6.50 (1.88)
	PA competence (0–7.5)	6.00 (1.50)	6.75 (2.00)	6.00 (1.88)	6.00 (1.50)	6.00 (1.50)	6.00 (1.00)	5.00 (1.50)	6.00 (2.00)	5.50 (1.88)

Data are expressed as median (IQR).
CAMSA, Canadian Agility and Movement Skill Assessment; CAPL-2, Canadian Assessment of Physical Literacy; DB, daily behaviour; KU, knowledge and understanding; MC, motivation and confidence; PACER, Progressive Aerobic Cardiovascular Endurance Run; PC, physical competence.

Table 2 Levels of physical literacy and domains for the overall sample stratified by sex

	Frequency (%)							
	Beginning*		Progressing†		Achieving‡		Excelling§	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Total CAPL-2	8 (6.2)	27 (18)	48 (36.9)	73 (48.7)	30 (23.1)	23 (15.3)	44 (33.8)	27 (18.0)
Total participants	35 (12.5)		121 (43.2)		53 (18.9)		71 (25.4)	
DB	7 (5.4)	38 (25.3)	70 (53.8)	79 (52.7)	21 (16.2)	13 (8.7)	32 (24.6)	20 (13.3)
Total participants	45 (16.1)		149 (53.2)		34 (12.1)		52 (18.6)	
PC	40 (30.8)	73 (48.7)	47 (36.2)	43 (28.7)	16 (12.3)	19 (12.7)	27 (20.8)	15 (10.0)
Total participants	113 (40.4)		90 (32.1)		35 (12.5)		42 (15.0)	
KU	29 (22.3)	29 (19.3)	57 (43.8)	56 (37.3)	25 (19.2)	43 (28.7)	19 (14.6)	22 (14.7)
Total participants	58 (20.7)		113 (40.4)		68 (24.3)		41 (14.6)	
MC	1 (0.8)	3 (2.0)	27 (20.8)	28 (18.7)	27 (20.8)	35 (23.3)	75 (57.7)	84 (56.0)
Total participants	4 (1.4)		55 (19.6)		62 (22.1)		159 (56.8)	

Data are presented as number (percentage*f*).
*He/she has just started his/her physical literacy journey and is beginning to acquire the skills he/she needs.
†He/she is progressing on their physical literacy journey.
‡He/she has reached the recommended level of physical literacy.
§He/she has surpassed the recommended level of physical literacy.
CAPL-2, Canadian Assessment of Physical Literacy; DB, daily behaviour; KU, knowledge and understanding; MC, motivation and confidence; PC, physical competence.

children were mostly at the beginning level (40.4%), with the PACER endurance test giving the lowest score (3.86 out of 10). This could be a very important factor to consider, as it found[47] that 1 in 4 Spanish girls and 1 in 10 Spanish boys had cardiorespiratory levels suggestive of future cardiovascular risk, consistent with findings in adolescents.[48]

When broken down by sex, 66.7% of the girls scored at the initial total PL levels (beginning and progressing). In comparison, this percentage was lower for boys (43.1%), consistent with the sex differences in total scores highlighted above.

The correlations found in this study between the domains and the total CAPL-2 were positive and significant, except for the KU domain, which was positively and significantly correlated only with the total battery and the PC domain, consistent with Elsborg *et al*.[28] In contrast, the validation in the Chinese population differs from this study in that a positive and significant correlation was shown between the KU and MC domains in addition to the above results. The highest correlation between domains was found between DB and PC, consistent with several studies.[25 26 28]

The CFA yielded a four-factor model with good fit indices, showing acceptable construct validity. These results are consistent with previous studies that have adapted and validated the CAPL-2 in children aged between 8 and 12 years from countries such as Canada, Greece, Denmark, China and Iran.[25–28 44]

Table 3 Correlation matrix for CAPL-2 (n=280)

	DB	PC	MC	KU	Total CAPL-2
DB	1.000				
PC	0.392*	1.000			
MC	0.265*	0.250*	1.000		
KU	−0.040	0.124	0.050	1.000	
Total CAPL-2	0.826*	0.764*	0.508*	0.161*	1.000

Data are expressed as Spearman's r correlation coefficient.
*p<0.005.
CAPL-2, Canadian Assessment of Physical Literacy; DB, daily behaviour; KU, knowledge and understanding; MC, motivation and confidence; PC, physical competence.

Table 4 Model goodness-of-fit indices for the CAPL-2 Spanish version

Indices	Value
CMIN/DF	1.602
p (χ^2)	0.013
RMSEA	0.046
CFI	0.921
TLI	0.876
NFI	0.825

CAPL-2, Canadian Assessment of Physical Literacy, second edition; CFI, comparative fit index; CMIN/DF, minimum discrepancy per degree of freedom; NFI, normed fit index; p (χ^2), chi-squared probability; RMSEA, root mean square error of approximation; TLI, Tucker-Lewis index.

In the Spanish version of the CAPL-2, all the indicators of the original CAPL-2 were retained except items 1, 3 and 4 for the knowledge subdomain, which belongs to the KU domain, in line with Dania *et al*,[26] which, in addition to deleting a knowledge item, also omitted the predilection subdomain. The Danish[28] and Greek[26] versions retained all items, but the Greek version had low loadings of the predilection scale and three items from the KU domain, consistent with the Chinese[26] and Spanish versions. With this in mind, Gunnell *et al*[25] reported a significant, although weak, factor loading of the KU domain in the original CAPL version and recommended reweighting of the domains, resulting in the CAPL-2, in which the knowledge domain decreased from 18 to 10 points out of the total of 100 points.

Although this study presents a valid instrument for assessing the PL of Spanish schoolchildren, it has certain limitations, including using a limited sample size and a convenient sampling protocol. In addition, as this is the first test battery to assess the PL in Spanish children, there was no way to assess concurrent validity with other batteries assessing the same goal.[49] The daily step count scores should be taken cautiously, as they were obtained using the Xiaomi Mi Band 3 activity wristband (Xiaomi Corporation, Beijing, China) and not a pedometer, as in the original evaluation or other studies that used different accelerometers.[26 28] Nevertheless, the ActiGraph wGT3X-BT accelerometer[50] used to validate the CAPL-2 in China[26] and the instrument used in our study for this evaluation showed good validity.

Although this study confirmed construct validity, the KU domain could have been more problematic. While its test–retest reliability was substantial (Intraclass correlation coefficient=0.725),[30] three of its items were eliminated during the CFA, raising the question of whether this instrument should continue to be used as proposed in this model or whether it would be convenient to adapt it to the Spanish curriculum.

This is the first study to validate a Spanish version of the CAPL-2, which can be of great value to professionals in PA, education and health, as it is a valuable tool for assessing and understanding different domains that influence PL. This tool also makes it possible to track development to identify deficits, take appropriate measures and implement programmes based on the concrete improvement of the results. It also opens the door for adapting and validating the same in adolescents, thus enabling the analysis of the differences between the different age groups and the identification of their importance and the significance of each of their domains.

CONCLUSION

The results show that the level of PL based on the CAPL-2 in Spanish children is consistent with studies in other countries, and there is room for improvement. Girls generally showed a lower PL than boys, with most having the lowest PL.

The CAPL-2 model, which was faithful to the original model except for the removal of one item from the KU domain, proved valid and reliable for Spanish children aged 8–12. We, thus, present the first instrument to assess PL in Spanish children, covering the KU, MC, DB and PC domains. This instrument has proven to be valid, comprehensive, useful and relevant for professionals in the fields of PA, education and health.

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Ethics approval This study involves human participants and was approved by the Bioethics and Biosafety Committee of the University of Extremadura (approval number: 139/2019). The updates of the Declaration of Helsinki, as amended by the 64th General Assembly of the World Medical Association (Fortaleza, Brazil, 2013) and Law 14/2007 on Biomedical Research, were followed. Participants gave informed consent to participate in the study before taking part.

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