Validation of the Physical Activity and Leisure Motivation Scale in Adolescent School Children in Spain (PALMS-e)

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Abstract: The aim of this study was to translate and adapt the physical activity and leisure motivation scale (PALMS) into Spanish, and to analyse its validity and reliability. The sample comprised 867 adolescents, with a mean age of 14.04 ± 1.19 years, 53.9% of whom were male. During the translation process, some of the items in the instrument were modified slightly, improving its comprehensibility. On the other hand, the exploratory factor analysis did not present an adequate factor structure, so a more in-depth analysis was carried out, using item response theory and confirmatory factor analysis; the conclusion was that it would be appropriate to eliminate several items from the scale. From this, a final shortened version, consisting of 25 items, was produced, with adequate fit indices—CFI = 0.933, TLI = 0.918, SRMR = 0.042, RMSEA = 0.052 (90% CI 0.048; 0.056)—and good reliability for each of the dimensions, ranging from 0.625 to 0.835. It can be concluded that the abbreviated version of the PALMS instrument, adapted for Spanish adolescents (PALMS-e), is a valid and reliable instrument for assessing their motives for doing physical activity.

Keywords: PALMS; translation; adaptation; motivation; physical activity

1. Introduction

Physical activity (PA) has health benefits [1–3] that are both physical [4,5] and psychosocial [6–9]. Unfortunately, a high percentage of adolescents are physically inactive [10–13], even though this life stage is a key time for creating active lifestyle habits that favour psychological well-being in individuals, as an improved self-concept [14] reduced overweight and obesity levels [15], and prevent the emergence of non-transmissible diseases [16].

This last aspect is particularly relevant in Spain, as the latest representative data on the body weight of the population aged between 8 and 16, obtained in the PASOS study [17], revealed that 20.7% of this age group is overweight and 14.2% is obese. These data, compared with the information in the Enkid study [18], carried out in Spain between 1998 and 2000, point to an upward trend in this problem.

Similarly, this recent study warns that only 36.7% of children and adolescents in this same age group (8–16 years) achieve the minimum recommendation of 60 min of moderate–vigorous PA per day, as proposed by the World Health Organisation (WHO) [19].

In this sense, it is important to consider that compliance with these recommendations by the adolescent population seems to be conditioned by how motivated these individuals are to do PA [20]. It is therefore necessary to understand why adolescents decide to engage in PA, in order to develop programmes that are aimed at increasing this motivation [21].
On the other hand, the specific motives that lead people to do PA have been analysed through various theories, including the achievement goal theory (AGT) [22] and the self-determination theory (SDT) [23,24], and have been evaluated using different measuring instruments, some of which have been validated in the Spanish context, such as the following for example: the exercise motivations inventory 2 (EMI-2) by Markland and Ingledew (1997) [25], adapted into Spanish (Autoinforme de Motivos para la Práctica de Ejercicio Físico, AMPEF) by Capdevilla, Niñerola and Pintanel (2004) [26]; motives for PA measure-revised (MPAM-R) by Ryan, Frederick, Lepes, Rubio, and Sheldon (1997) [27], validated in the Spanish context by Moreno, Cervelló and Martínez (2007) [28]; and the Cuestionario motivos de práctica físico-deportiva en la etapa adolescente (survey of motives for the practice of physical sporting activities in adolescents) created by Martínez et al. (2012) [29].

However, the assessment tools that have been cited above do have limitations. Some of them do not have a sufficiently solid theoretical framework to adequately understand this subject, relying only on empirical exploration, based on the individual motives of the subjects or on certain aspects of PA [30,31]. Others, although based on a specific motivation theory, are insufficient when it comes to identifying and covering the whole range of reasons that lead individuals to engage in PA [31].

In this study, we used the PA and leisure motivation scale (PALMS), by Morris and Rogers (2004) [32]. Although there is already a version that has been adapted to the adolescent population (PALMS-Y) [33], it was decided to validate the original scale for the Spanish adolescent population, given that there are a greater number of previous validation studies for this.

The PALMS scale comprises 40 items. These measure the reasons for doing PA, and are equally distributed across its eight factors (ego, appearance, expectations of others, affiliation, physical condition, psychological condition, mastery, and fun), with the first six being considered extrinsic motivational factors, based on the self-determination theory [23], and the latter two being considered intrinsic factors.

However, in terms of the factor structure of the instrument, we found that, in some languages, the content of the scale has been modified in order to achieve a good fit. In the Portuguese version of the scale, 30 items are omitted [31]; in the Farsi version, one dimension has been added, and the items are not grouped in the same way as in the original scale [34]; in the Malaysian version, two items have been removed [30]; and in the adolescent version (PALMS-Y), only 28 items are used [33].

The reasons for choosing this scale were the following:

(1) it has been developed from qualitative information, through semi-structured interviews, in which the individual reasons people do PA are analysed, and, in turn, it is supported by the self-determination theory, which overcomes the limitations that have been described above [31]; (2) it is a short test, as it reduces the number of items from 73 in the original scale (recreational exercise motivation measure; REMM), by Rogers (2000) [35], to just 40, which are grouped into eight factors. Indeed, this is one of the main reasons we selected it, as it reduces the likelihood of the adolescents becoming fatigued and bored while responding to the questions; (3) it possesses good psychometric properties, as shown in studies by Kueh, Kuan, and Morris (2017) (comparative fit index (CFI) = 0.911, Tucker–Lewis index (TLI) = 0.901, standardised root mean square (SRMR) = 0.052, residual root mean square error of approximation (RMSEA) = 0.041) [30], among others; (4) unlike other scales, it has been successfully applied to diverse age groups, ranging from 9 to 89 years old [36]; (5) it is suitable for use with practitioners of both competitive sports and non-competitive physical activities [37,38]; (6) it can be applied in different cultural contexts, as it has been used with Greek dancers [39] and Chinese yogis [40], as well as in various languages, including Farsi [34], Malay [31], Turkish [41], Portuguese [31], Thai [42], and Dutch [43]; and (7) the scarcity of previous studies.
The main objective of this study was to translate and adapt the PALMS scale to make it suitable for Spanish adolescents, and to analyse the validity and reliability of the adapted instrument.

2. Materials and Methods

2.1. Participants

The study sample comprised a total of 867 students in compulsory secondary education (Educación Secundaria Obligatoria; ESO), in the province of Salamanca (Spain), ranging from 12 to 16 years of age. These two aspects represent the inclusion criteria for the study, with all subjects who did not satisfy this age or residence limit being excluded from the analysis.

Their mean age was 14.04 ± 1.19 years. In terms of sex, 53.9% (n = 467) were male. The data were collected between 2015 and 2017.

The sample size of this study is very positive according to the recommendations of Kline [44]. Participants were randomly selected using two-stage proportional cluster sampling. We assumed an error of <0.04 at a confidence level (CI) of 95%. All the adolescents in the selected classes were invited to participate.

2.2. Instrument

We used the PALMS instrument, originally developed by Morris and Rogers (2004) [32].

(a) Description of the PALMS. It consists of 40 items, which measure the motives for doing PA and the questions are equally distributed among its 8 factors. The responses are 5-point Likert-type, where 1 corresponds to “strongly disagree” and 5 to “strongly agree”;

(b) Factors according to the distribution of the PALMS items. Ego (items 6, 17, 27, 29, and 39), appearance (items 11, 23, 32, 36, and 40), other’s expectations (items 1, 7, 18, 21, and 26), affiliation (items 4, 8, 20, 30, and 38), physical condition (items 10, 12, 15, 28, and 33), psychological condition (items 2, 9, 14, 22, and 35), mastery (items 5, 16, 19, 24, and 31), and fun (items 3, 13, 25, 34, and 37);

(c) Reliability of the PALMS. Validations of this scale in adult populations, such as that of Molanorouzi et al. (2014) [37], showed good internal consistency, with a Cronbach’s alpha of 0.82. The same was seen with an earlier version by Zach et al. (2012) [36], which was applied, on this occasion, to a population between 9 and 69 years of age (values between 0.63 and 0.96 for the subscales).

2.3. Procedure

The process was divided into the following three parts: in the first, the PALMS scale was translated and adapted (n = 14); in the second, the adapted scale was applied to a larger population group (n = 198); and in the third, the validity and reliability of the PALMS scale adapted into Spanish was tested (n = 867), resulting in a proposal for a reduced version of this scale.

The translation–adaptation stage was conducted using 14 school students aged between 13 and 16 (8 males, 6 females). The instrument was adapted according to the process of Mungía-Izquierdo, Legaz-Arzrese and Mannerkorpi (2011) [45], through what is known as a translation back-translation [46,47]. Once the instrument had been translated and culturally adapted by an expert, to confirm the reliability of the test for the selected population, a test–retest was administered to 198 subjects, with a mean age of 14 ± 0.09 years, ranging from 12 to 16 years of age, 56.1% (n = 111) of whom were male.

The final questionnaires (n = 867) were administered by the same researcher, within a single 15-min session during the students’ timetabled physical education classes. In all the studies, we had the authorisation of the school and teachers, as well as the written consent of the parents or guardians of the minors involved. Brief instructions were provided and the participants were assured of the confidentiality of their responses. Participation was
entirely voluntary. The respondents received no academic or monetary compensation for their contribution. No student refused to participate. The research was performed according to the ethical guidelines of the current Declaration of Helsinki (Brazil, 2013), complying at all times with the highest standards of safety and professional ethics for this type of work.

2.4. Data Analysis

An exploratory factor analysis (EFA) was run to study the construct validity of the research. Next, since the results did not replicate the factorial structure, the information function was studied using item response theory (IRT) and various reliability indices to assess the quality and relevance of the items in the different dimensions. Finally, once the problematic items had been eliminated, a confirmatory factor analysis (CFA) was performed to check the goodness of fit of the final data to the theoretical model proposed by the authors. Analyses were performed using Jamovi software, version 1.6.15.

3. Results

3.1. Translation and Adaptation

The level of difficulty of the translation and the conceptual consonance perceived by the translators during the translation process were studied. For the level of difficulty, values ranging from 1 to 3 points out of 10 were assigned, while the conceptual consonance scores, also out of 10, fluctuated between 7 and 10 points. The interviews were subsequently analysed for aspects that could generate the most controversy in relation to the comprehension of the questions. Table 1 shows all the questions that were considered in this part of the process, where some items were analysed and discussed in order to improve the respondents’ comprehension, without compromising the authors’ initial proposal.

Table 1. Items that were modified during the process of translation and back-translation, according to the level of comprehension derived from the cognitive test.

| Items | Problem Detected | Agreed-Upon Term |
|-------|------------------|------------------|
| Item 11 (appearance) | The concept of equivalence and comprehension presents difficulties when comparing “lucir mejor” (look better) and “mejorar apariencia” (improve appearance). | Mejorar apariencia, because it evidences good equivalence and presents less comprehension problems, according to the results of the cognitive test. |
| Item 26 (other’s expectations) | The term “prescrito” (prescribed) is difficult to understand, so it is proposed that this is changed for an equivalent term with good levels of comprehension, such as “mandado” (ordered). | Mandado, as it shows acceptable equivalence and good levels of comprehension, according to the results of the cognitive test. |
| Item 27 (ego) | The concept of equivalence and comprehension presents difficulties when comparing “duro” (hard) and “fuerte” (strongly). | Fuerte, since it has an excellent equivalence and improves comprehension, according to the results of the cognitive test, being better understood as referring to the usual group of physical and sporting activities. |
| Item 35 (psychological condition) | The concept of equivalence and comprehension presents difficulties when comparing “tomar” (take) and “pensar” (think). | Pensar, as this maintains optimal equivalence and also improves comprehension, according to the results of the cognitive test. |
| Item 36 (appearance) | The concept of equivalence and comprehension presents difficulty between the real translation of “lucir mejor” (look better) and the option of “mejorar apariencia” (improve appearance). | Mejorar apariencia, because it evidences good equivalence and presents less comprehension problems, according to the results of the cognitive test. |
| Item 39 (ego) | The concept of equivalence and comprehension presents difficulties when comparing “ajustado” (fit) and “en forma” (in shape). | En forma, as this maintains a good equivalence and improves comprehension, according to the results of the cognitive test. |
Table 2 shows the complete translation-adaptation process for the instrument in items 11, 26, 27, 35, 36, and 39. Some of the modified aspects were the following: in items 11 and 36, the expression “lucir mejor” (look better) was replaced by “mejorar la apariencia” (improve appearance); in item 26, the statement “prescrito por el doctor” (prescribed by the doctor) was replaced by “mandado por el médico” (ordered by the doctor); in item 27, “duro” (hard) was replaced by “fuerte” (strongly); in item 35, the verb “tomar” (take) was replaced by “pensar” (think); in item 39, the indicator “ajustado” (fit) was replaced by “en forma” (in shape). In relation to the level of conformity with the questionnaire, all the respondents considered that the format was adequate and no proposals for change were received, since the modified items were already sufficient and permitted the instrument to be interpreted correctly. There was also no loss of data or questionnaires.

Table 2. Complete process of cross-cultural adaptation. Explanation of the different items adapted and the sequence of steps followed.

| Items 11 | Items 26 | Items 27 |
|----------|----------|----------|
| Original version | To define muscle, look better. Because it was prescribed by doctor, physio. To work harder than others. | |
| Direct translation A | Para definir músculos, lucir mejor. Porque fue prescrito por el doctor, fisio. Para trabajar más duro que otros. | |
| Equivalence | 2 | 2 | 4 |
| Difficulty | 9 | 9 | 7 |
| Direct translation B | Para definir músculos, mejorar la apariencia. Porque fue mandado por el médico, fisio. Para trabajar más fuerte que otros. | |
| Equivalence | 4 | 2 | 3 |
| Difficulty | 7 | 7 | 6 |
| First agreed-upon version | Para definir los músculos, verse mejor. Porque fue mandado por el médico, fisio. Para trabajar más fuerte que otros. | |
| Back translation | To define muscles, improve appearance. Because it was ordered by the doctor, physio. To work harder than others. | |
| Second agreed-upon version | The following two options suggested to patients in the cognitive test: • Para definir los músculos, mejorar la apariencia. • Para definir los músculos, verse mejor. The following two options suggested to patients in the cognitive test: • Porque fue mandado por el médico, fisio. • Porque fue recetado por el médico, fisio. The following two options suggested to patients in the cognitive test: • Para trabajar más fuerte que otros. • Para trabajar más fuerte que los otros. | |
| Cognitive test | All respondents prefer the option mejorar la apariencia (improve appearance), as follows: • Mejorar la apariencia has a high equivalence and lower difficulty. • Lucir mejor has a high difficulty and good equivalence with mejorar la apariencia. All respondents prefer the option mandado (ordered), as follows: • Mandado y médico (doctor) have a high equivalence and lower difficulty. • Prescrito has a high difficulty and acceptable equivalence with mandado; médico has high equivalence and lower difficulty than doctor. All respondents prefer the option fuerte (strong) option and los (the), as follows: • Fuerte has a high equivalence and lower difficulty. • Duro has a high difficulty and good equivalence with fuerte. • Los has good item equivalence and decreases the comprehension difficulty with respect to the original version. | |
| Final version | Option B: Para definir los músculos, mejorar la apariencia. | Option B: Porque fue mandado por el doctor, fisio. | Option B: Para trabajar más fuerte que los otros. |
### Table 2. Cont.

| Items | Items 11 | Items 26 | Items 27 |
|-------|----------|----------|----------|
| **Original version** | To take mind off other things. | To lose weight, look better. | To be fitter than others. |
| **Direct translation A** | Para tomar mente en otras cosas. | Para perder peso, lucir mejor. | Para estar más ajustado que otros. |
| **Equivalence** | 3 | 2 | 3 |
| **Difficulty** | 8 | 9 | 8 |
| **Direct translation B** | Para pensar en otras cosas. | Para perder peso, mejorar la apariencia. | Para estar más en forma que otros. |
| **Equivalence** | 2 | 4 | 3 |
| **Difficulty** | 7 | 7 | 7 |
| **First agreed-upon version** | Para pensar en otras cosas. | Para perder peso, mejorar la apariencia. | Para estar más en forma que otros. |
| **Back translation** | To think of other things. | To lose weight, improve appearance. | To be more fit than others. |
| **Second agreed-upon version** | The following two options suggested to patients in the cognitive test: | The following two options suggested to patients in the cognitive test: | The following two options suggested to patients in the cognitive test: |
| | • Para pensar en otras cosas. | • Para perder peso, mejorar la apariencia. | • Para estar más en forma que otros. |
| | • Para ocupar la mente en otras cosas. | • Para perder peso, verse mejor. | • Para estar más apropiado que otros. |
| **Cognitive test** | All the respondents prefer the option pensar, as follows: | All respondents prefer the option mejorar la apariencia (improve appearance), as follows: | All respondents prefer the option en forma, as follows: |
| | • Pensar has a high equivalence and lower difficulty. | • Mejorar la apariencia has a high equivalence and lower difficulty. | • En forma has a high equivalence and lower difficulty. |
| | • Tomar miente has a high difficulty and good equivalence with pensar. | • Lucir mejor has a high difficulty and good equivalence with mejorar la apariencia. | • Ajustado has a high difficulty and good equivalence to en forma. |
| **Final version** | Option B: Para pensar en otras cosas. | Option B: Para perder peso, mejorar la apariencia. | Option B: Para estar más en forma que otros. |

### 3.2. Psychometric Analysis of the Scale

First, an attempt was made to replicate the factor structure through an EFA, but the results were inconclusive. The number of dimensions retained through parallel analysis (or any other more arbitrary factor selection criteria) was not as expected at the theoretical level, and the items classified in each dimension were also not supported by the construct definition.

A comprehensive analysis of both the PALMS dimensions and its component items, as proposed by Morris and Rogers (2004) [32], was therefore carried out, using IRT and CFA (Table 3).

### 3.3. Item Response Theory

To analyse the information provided by the items for each of the proposed dimensions, we used IRT. Once the hypothesis of unidimensionality and the independence of the scales had been tested, the results described in Table 4 were obtained.
Table 3. Exploratory factor analysis.

| Dimensions         | 1   | 2   | 3   | 4   | 5   |
|--------------------|-----|-----|-----|-----|-----|
| PALMS_32 Appearance | 0.774 |     |     |     |     |
| PALMS_23 Appearance | 0.772 |     |     |     |     |
| PALMS_40 Appearance | 0.756 |     |     |     |     |
| PALMS_11 Appearance | 0.744 |     |     |     |     |
| PALMS_36 Appearance | 0.586 | 0.419 |     |     |     |
| PALMS_10 Physical condition | 0.582 |     |     |     |     |
| PALMS_15 Physical condition | 0.572 |     |     |     |     |
| PALMS_28 Physical condition | 0.548 |     |     |     |     |
| PALMS_12 Physical condition | 0.532 |     |     |     |     |
| PALMS_33 Physical condition | 0.475 |     |     |     |     |
| PALMS_18 Other’s expectations | 0.466 |     |     |     |     |
| PALMS_16 Mastery | 0.456 |     |     |     |     |
| PALMS_24 Mastery | 0.437 |     |     |     |     |
| PALMS_31 Mastery |     |     |     |     |     |
| PALMS_22 Psychological condition | 0.800 |     |     |     |     |
| PALMS_2 Psychological condition | 0.750 |     |     |     |     |
| PALMS_14 Psychological condition | 0.741 |     |     |     |     |
| PALMS_13 Fun | 0.695 |     |     |     |     |
| PALMS_9 Psychological condition | 0.643 |     |     |     |     |
| PALMS_25 Fun | 0.622 |     |     |     |     |
| PALMS_34 Fun | 0.605 |     |     |     |     |
| PALMS_3 Fun | 0.561 |     |     |     |     |
| PALMS_35 Psychological condition | 0.533 |     |     |     |     |
| PALMS_37 Fun | 0.494 |     |     |     |     |
| PALMS_17 Ego | 0.786 |     |     |     |     |
| PALMS_27 Ego | 0.751 |     |     |     |     |
| PALMS_29 Ego | 0.748 |     |     |     |     |
| PALMS_6 Ego | 0.732 |     |     |     |     |
| PALMS_39 Ego | 0.709 |     |     |     |     |
| PALMS_19 Mastery | 0.578 |     |     |     |     |
| PALMS_7 Other’s expectations | 0.535 |     |     |     |     |
| PALMS_30 Affiliation | 0.503 | 0.480 |     |     |     |
| PALMS_1 Other’s expectations | 0.423 |     |     |     |     |
| PALMS_20 Affiliation |     | 0.739 |     |     |     |
| PALMS_38 Affiliation |     | 0.722 |     |     |     |
| PALMS_8 Affiliation |     | 0.711 |     |     |     |
| PALMS_4 Affiliation |     | 0.648 |     |     |     |
| PALMS_5 Mastery |     |     |     |     | 0.670 |
| PALMS_21 Other’s expectations |     |     |     |     | 0.673 |
| PALMS_26 Other’s expectations |     |     |     |     |     |

Note: varimax rotation. No. of factors through parallel analysis.
Table 4. Item response theory.

| ITEMS | MIP |
|-------|-----|
| **EGO: MIP = 30.43/EI = 6.08** |
| 6. Because I perform better than others. | 4.98 |
| 17. To be the best in the group/class. | 8.07 |
| 27. To work harder (higher intensity) than others. | 6.45 |
| 29. To compete with other around me (colleagues, friends, etc.). | 5.27 |
| 39. To be fitter than other people (colleagues, friends, etc.). | 5.66 |
| **APPEARANCE: MIP = 37.81/EI = 7.56** |
| 11. To define muscle, look better. | 8.17 |
| 23. To improve/define body shape. | 8.68 |
| 32. To improve (physical) appearance. | 9.49 |
| 36. To lose weight, look better (more attractive). | 4.07 |
| 40. To maintain trim, toned body. | 7.4 |
| **OTHER’S EXPECTATIONS: MIP = 13.63/EI = 2.73** |
| 1. To earn a living. | 1.46 |
| 7. Because I get paid to do it. | 3.19 |
| 18. To manage medical condition. | 0.24 |
| 21. Because people tell me I need to do exercise/sport. | 3.1 |
| 26. Because it was prescribed by doctor, physio. | 5.64 |
| **AFFILIATION: MIP = 25.71/EI = 5.14** |
| 4. Because I enjoy spending time with others. | 5.39 |
| 8. To do activity with others. | 6.23 |
| 20. To do something in common with friends. | 5.64 |
| 30. To talk with friends exercising. | 2.43 |
| 38. To be with friends. | 6.02 |
| **PHYSICAL CONDITION: MIP = 29.63/EI = 5.93** |
| 10. Because it helps me maintain a healthy body. | 7.05 |
| 12. Be physically fit (have more strength, speed, endurance, flexibility, etc.) | 4.24 |
| 15. To maintain physical health. | 8.99 |
| 28. Because it keeps me healthy. | 6.18 |
| 33. To improve cardiovascular fitness (heart, circulatory system, etc.). | 3.16 |
| **PSYCHOLOGICAL CONDITION: MIP = 31.27/EI = 6.25** |
| 2. Because it helps me relax. | 6.57 |
| 9. To cope better with stress. | 4.56 |
| 14. To get away from pressure, to relax and unwind. | 6.21 |
| 22. Because doing sport acts as a stress release. | 10.89 |
| 35. To take mind off other things. | 3.04 |
| **MASTERY: MIP = 25.47/EI = 5.09** |
| 5. To get better at an activity or task. | 2.96 |
| 16. To improve existing skills. | 7.32 |
| 19. To do my personal best. | 3.59 |
Table 4. Cont.

| ITEMS                                                                 | MIP |
|-----------------------------------------------------------------------|-----|
| 24. To obtain new skills or abilities.                                | 6.79|
| 31. To keep current skill level.                                      | 4.81|
| **FUN: MIP = 32.35/EI = 6.47**                                        |     |
| 3. Because it is interesting.                                         | 5.78|
| 13. Because it makes me happy.                                        | 6.87|
| 25. Because it is fun.                                                | 8.34|
| 34. Because I enjoy exercising.                                       | 7.73|
| 37. Because I have a good time (I feel encouraged, motivated, etc.).  | 3.62|

Abbreviations: MIP: maximum information point; EI: expected information.

To interpret the above table, it is necessary to look at the maximum level of information that has been provided by each of the dimensions, and the average amount of information that is expected for each item. If an item provides less information than expected, it becomes a candidate for elimination, because it does not provide sufficient information for that dimension.

To corroborate the proposed candidate items for elimination, after applying IRT, reliability indicators were calculated, verifying that the items that decreased reliability coincided with the previous results.

In addition, a group of experts was consulted with regard to the appropriateness, or lack thereof, of eliminating these items from each dimension, thus contributing to the content validity of the resulting instrument.

The items 1, 3, 5, 6, 9, 12, 18, 19, 29, 30, 33, 35, 36, 37, and 40 were therefore eliminated from the subsequent analyses, resulting in a final abbreviated version of 25 items (PALMS-e) (Table 5). In this version, the items associated with the different dimensions were distributed in the following way: ego (items 11, 19, and 25), appearance (items 6, 15, and 22), other’s expectations (items 3, 13, and 18), affiliation (items 2, 4, 12, and 24), physical condition (items 5, 9, and 20), psychological condition (items 1, 8, and 14), mastery (items 10, 16, and 21), and fun (items 7, 17, and 23).

Table 5. Abbreviated version of the physical activity and leisure motivation scale instrument adapted for Spanish adolescents (PALMS-e).

| Muy en Desacuerdo | En Desacuerdo | Ni de Acuerdo ni en Desacuerdo | De Acuerdo | Muy de Acuerdo |
|-------------------|---------------|-------------------------------|-----------|---------------|
| **Los Motivos por los que Hago Actividad Física son . . .** |     |                               |           |               |
| 1. Porque me ayuda a relajarme                                   |     |                               |           |               |
| 2. Porque me gusta pasar el tiempo con los demás                  |     |                               |           |               |
| 3. Porque me pagan por hacerlo                                    |     |                               |           |               |
| 4. Por hacer actividad con las demás personas                    |     |                               |           |               |
| 5. Porque me ayuda a mantener un cuerpo sano                       |     |                               |           |               |
| 6. Para definir mis músculos, mejorar la apariencia               |     |                               |           |               |
| 7. Porque me hace feliz                                          |     |                               |           |               |
| 8. Para alejarme de la presión, para relajarme y desconectar      |     |                               |           |               |
| 9. Para mantener la salud física                                  |     |                               |           |               |
| 10. Para mejorar mis habilidades                                 |     |                               |           |               |
Table 5. Cont.

| Los Motivos por los que Hago Actividad Física son . . . | PALMS-e |
|--------------------------------------------------------|---------|
|                                                        | Muy en Desacuerdo | En Desacuerdo | Ni de Acuerdo ni en Desacuerdo | De Acuerdo | Muy de Acuerdo |
| 11. Para ser el mejor del grupo/clase                   |             |              |  |  | |
| 12. Para hacer algo en común con los amigos            |             |              |  |  | |
| 13. Porque la gente me dice que necesito hacer actividad física/deporte |             |              |  |  | |
| 14. Porque hacer deporte me relaja                      |             |              |  |  | |
| 15. Para mejorar/definir la forma de mi cuerpo          |             |              |  |  | |
| 16. Para obtener nuevas habilidades o destrezas         |             |              |  |  | |
| 17. Porque es divertido                                |             |              |  |  | |
| 18. Porque me lo ha recetado/mandado el médico o fisioterapeuta |             |              |  |  | |
| 19. Para trabajar más fuerte (mayor intensidad) que los demás |             |              |  |  | |
| 20. Porque me mantiene con buena salud                 |             |              |  |  | |
| 21. Para mantener el nivel actual de habilidad o destreza |             |              |  |  | |
| 22. Para mejorar la apariencia (física)                |             |              |  |  | |
| 23. Porque me gusta hacer ejercicio físico              |             |              |  |  | |
| 24. Para estar con los amigos                          |             |              |  |  | |
| 25. Para estar más en forma que los demás (amigos, compañeros . . .) |             |              |  |  | |

3.4. Confirmatory Factor Analysis

A CFA was then performed on only the items selected via the IRT. The following indices of fit were obtained: CFI = 0.933, TLI = 0.918, SRMR = 0.042, and RMSEA = 0.052 (90% CI 0.048; 0.056).

3.5. Reliability Analysis. Internal Consistency

Finally, Cronbach’s alpha (α) was calculated for each of the subscales, which ranged from 0.625 to 0.835.

For the ego dimension it was 0.787, for appearance 0.835, for other’s expectations 0.625, for affiliation 0.780, for physical condition 0.760, for psychological condition 0.792, for mastery 0.721, and for fun 0.811.

4. Discussion

The main objective of this study was to translate and adapt the PALMS scale to make it suitable for Spanish adolescents, and to analyse the validity and reliability of the adapted instrument.

The reason we decided to use a sample of the adolescent population in this study, unlike other studies that use populations with a distinct or wider age range, with the exception of the PALMS-Y study, is that adolescence is a fundamental stage in the acquisition of healthy habits.
The WHO [19] recommends at least 60 min of moderate- or vigorous-intensity PA per day at this stage, something that young Spaniards do not achieve, and in order to generate commitment to PA, adolescents need to be motivated [47].

In this sense, motivation is influenced by a number of internal and external factors [48,49], which favour the appearance or maintenance of certain behaviours [50], including PA [51]. It is therefore important to understand the reasons why adolescents decide to engage in PA, as this will help to improve healthy habits in the future [21].

In this study, once an EFA had been carried out, we decided to analyse the dimensions of the scale using an IRT and a CFA, resulting in a final version of the scale, consisting of 25 items and 8 dimensions. A good fit and internal consistency were found for this final version of the PALMS (PALMS-e).

According to the recommendations of various authors [52–54], it can be affirmed that, in this study, the scale complies with the quality indicators, both globally and in each of its different dimensions—CFI: 0.933, TLI = 0.918, SRMR = 0.042, and RMSEA: 0.052 (90% CI 0.048; 0.056)—which is in line with other studies, such as those of Roychowdhury (2012)—CFI: 0.969 and RMSEA: 0.078—in Australia [55]; Molanorouzi et al. (2014)—CFI: 0.91 and RMSEA: 0.06—in Malaysia [37]; Lameiras et al. (2020)—CFI: 0.950, TLI: 0.939 and RMSEA: 0.021—in Portugal [31]; and Kueh et al. (2020)—CFI = 0.921, TLI = 0.907 and RMSEA: 0.061—in Thailand [42].

Likewise, the scale showed a reliability between 0.625 and 0.835 for each of the dimensions. Considering a reference value of 0.7 [56,57], this reflects a very good level of reliability in almost all the dimensions, with the exception of “other’s expectations” (0.625). This coincides with the results obtained by Zach et al. (2012) [36], and Sarol and Çimen (2017) [41], who obtained similar, although slightly higher values, ranging between 0.63–0.93 and 0.62–0.92, respectively. However, there are differences with the results reported by Filippos et al. [39], which ranged from 0.89 for the dimension “fun”, and 0.95 for “physical condition”. These differences may be due to the following two aspects: (1) the sample in that study was substantially smaller than in this work; and (2) the sample comprised practitioners of a specific PA, such as dance.

On the other hand, the differences between the factor structure of the original scale (PALMS) and the final version of the scale adapted to Spanish adolescents (PALMS-e) coincide with the validation of this scale in other languages. The final version of the PALMS-e included 25 items, in order to obtain a good fit. In the validation of the scale in Portuguese [31], it was reduced to 30 items; in the Malaysian adaptation, two items were removed [30]; and in the adolescent version (PALMS-Y), a scale with only 28 items was proposed [33].

Similarly, it could be argued that the factor structure obtained, despite being modified, consolidates the self-determination theory approach [23], as it maintains the eight dimensions of the PALMS scale, which encompass intrinsic motivation (mastery and fun), as well as extrinsic factors (ego, appearance, external expectations, affiliation, physical condition, psychological condition) related to PA.

Furthermore, given that a shorter scale is usually associated with greater reliability [34], it could be argued that reducing the number of items contained in the PALMS-e enhances its reliability.

It should also be noted that the data obtained after the test–retest suggest that the PALMS-e is a time-stable instrument for assessing participants’ motives for engaging in PA, just as seen in previous research with the test–retest for the original PALMS scale [34,37].

This study does have a potential limitation, in that it is not possible to ensure that any of the questions in the scale are not misinterpreted, intentionally or unintentionally, by the participants. We did, however, endeavour to minimise this possibility by ensuring anonymity throughout the process. Nevertheless, this aspect could be disregarded as a limitation, given the good reliability and validity of the scale.

In conclusion, we can affirm that the PALMS-e scale is a valid and reliable instrument for ascertaining the reasons adolescents engage in PA. The results obtained may contribute
to improving the comparison between adolescents from different contexts, ages, and gender, through ranking and, particularly, the implementation of intervention strategies that encourage greater adherence to the practice of PA.

Finally, with regard to future lines of research, the present scale could be adapted to younger children (6–12 years old), to encourage and promote the practice of PA from an even earlier age, taking into account preferences related to variables such as age and gender.

Author Contributions: Conceptualization, R.M.S.-L.; method, R.M.S.-L., A.R.M.-V. and M.C.-R.; formal analysis, M.C.-R. and M.S.-B.; research, R.M.S.-L.; data curation, R.M.S.-L.; writing—original draft preparation, R.M.S.-L. and A.R.M.-V.; writing—review & editing, R.M.S.-L., A.R.M.-V. and E.M.A.-A.; supervision, E.M.A.-A. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki.

Informed Consent Statement: We had the authorisation of the school and teachers, as well as the written consent of the parents or guardians of the minors involved.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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