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Development and Validation of an Assessment Tool for Physical Education for Sustainable Development

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Abstract: The study presents the design and validation of a Physical Education for Sustainable Development (PESD) instrument. This consists of a 25-item quantitative instrument that assesses the teaching interventions of physical education teachers. A total of 358 physical education teachers completed the questionnaire. The instrument uses an 8-point Likert scale. For the validation of the instrument, content validation, factorial validation, reliability through Cronbach's alpha, and stability through test–retest were considered. The results show that the PESD is a two-factor instrument with very high reliability (0.95). In addition, positive results were found for the temporal stability of the scale. The principal component factor analysis results show that the scale consists of two factors: (1) environmental, health, and economic sustainability; and (2) social sustainability, gender, and inclusion. This questionnaire is the first valid and reliable tool to measure the ability of physical education teachers to promote attitudes that favour sustainable actions.

Keywords: physical education; education for sustainable development; sustainability assessment; instrument validation; teaching intervention

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1. Introduction

The 2030 Agenda has been described as one of the political and institutional priorities of today's global framework [1]. Leading organisations have repeatedly expressed the need for a more just, equitable, and sustainable world [1,2]. This concern is due to the increasing social, economic, and climate instability we are currently experiencing across the world. For example, the past year, 2022, has been one of the hottest years on record [2]. Moreover, as a result of the recent COVID-19 pandemic, economic experts suggest that the coming years could be marked by an uneven economic recovery [3,4]. These inequalities extend to all areas of society, including education [5], where the most significant opportunities for all children and young people should be promoted.

In this context, it is essential to follow the directions set out by the United Nations in 2015 [1]. World authorities from 193 countries approved the proposal to develop 17 Sustainable Development Goals (SDGs), which are based on the Millennium Development Goals (MDGs) previously proposed by UNESCO [6]. The SDGs are set out in 169 specific targets, organised into three main dimensions: social, economic, and environmental. On this baseline, this ambitious agenda aims to end poverty and promote shared economic prosperity, social development, and environmental protection in all countries between now and 2030. However, according to recent global reports, these goals are still far from being achieved [7]. In order to reverse this situation and enable multidimensional development,

it is essential to implement personal, social, and institutional strategies [1,6] and, of course, to implement programmes in the field of education.

As part of these strategies, both education and sport have been considered essential for achieving the SDGs [8,9]. Concerning education, some decades ago UNESCO proposed the concept of Education for Sustainable Development (ESD), which aims to empower people to change the way they think and work towards a sustainable future' [10,11]. Several authors have suggested that this inclusion of sustainability in educational contexts should go beyond the presentation of sustainability-related concepts [4,12,13]. This requirement implies a fundamental change in the way education is understood, and the development of educational programmes designed to enable people to acquire competencies, skills, and values fundamental to achieving a sustainable world [14,15]. ESD proposes the necessary reorientation of education as the only way to transform society by empowering learners to participate as responsible citizens in actions for sustainable development [16]. To achieve this, children and young people must acquire the necessary competencies to make their own decisions and not reproduce the existing social order [17]. This aim, however, will only be achieved if teachers ensure the development of knowledge, skills, and values that change pupils' behaviour and habits [18]. Therefore, the 17 SDGs state the great relevance of education, including specifically SDG 4, 'Quality Education'. This SDG holds special significance due to its catalytic effect on the rest of the Goals [19]; quality education helps to escape poverty and reduce inequalities, enhances social and environmental awareness, and stimulates economic development and innovation. Furthermore, it empowers individuals to lead a healthier, more sustainable life, is essential for fostering tolerance among people, and contributes to creating peaceful societies. Therefore, the different subjects that make up the education system must develop specific strategies, each in line with the nature of the subject, and critical awareness to create a real commitment from students. In physical education (PE), the type of relationships produced and the content of the subject have particular characteristics that allow students to develop attitudes that favour sustainable development [20,21].

1.1. Moving towards the Promotion of Sustainable Development by Physical Education

Since 1978, through the International Charter of Physical Education, Physical Activity and Sport, UNESCO has emphasised the value of physical education and sport (PES) as a tool for social change [22]. Currently, in the 2030 Agenda, PES is recognised as a fundamental part or a key construct that contributes to the achievement of the SDGs [23,24], as it has unique characteristics that contribute to sustainable development, peace, tolerance, and respect [20–24]. Furthermore, the United Nations [1] has highlighted the value of PES because it contributes to women's empowerment, health, education, social inclusion, improved well-being, life satisfaction, youth development, and community activism. Different authors confirm that PE has this potential [25].

Several international institutional documents have emphasised the link between PE and the SDGs (including the Ibero-American Sports Council, Ministers and Senior Officials Responsible for Physical Education and Sport, and the Commonwealth). One of the first foundations of this relationship was established at the Sixth International Conference of Ministers and Senior Officials Responsible for Physical Education and Sport [16]. As a result of this conference, three broad areas of intervention were identified: inclusion for all, maximising the contribution of PES to sustainable development and peace, and protecting sports integrity. Following this document, other institutions have pointed to the relationship between the SDGs and PES [6]. For example, to measure sport's specific contribution, the Commonwealth drafted a report that established a series of indicators to quantify in a specific way how sport is contributing to sustainable development in a given territory [23]. The World Health Organization (WHO) is even more explicit in its call for physical literacy to contribute to the achievement of the SDGs. Its action 3.1 of the Global Action Plan for Physical Activity [26] calls on nations to increase physical education and more positive experiences and opportunities for sport and play for girls and boys in all pre-

school, primary, secondary, and tertiary educational institutions. The aim is to promote and reinforce lifelong health and physical literacy [27,28] and encourage sustainability [29–31]. In addition, the Ibero-American Sports Council [32] presented a proposal containing specific goals that could be worked on through sport, PE, or physical exercise, adding a series of strategies to promote sustainable development from these. In addition to the three documents produced at the institutional level, recent publications have continued to explore the influence of sport on sustainable development. For example, Campillo-Sánchez and colleagues [33] adopted the indicators proposed by the Commonwealth and analysed how different regions in Spain are contributing to specific SDGs through sport. In turn, Dai and Menhas [8] showed how the different SDGs are being developed with Chinese government measures, highlighting the need for more coordinated efforts and national strategies to contribute to sustainable development through sport. This literature review has observed how the primary references for sustainability are approached from a unified triple perspective of sport, physical exercise, and physical education. However, as pointed out in previous studies, none have been addressed exclusively from the PE perspective [20]. This research is, to the best of our knowledge, the first study to work exclusively on SDG-specific goals from a PE perspective. For this purpose, the 169 targets that make up the SDGs were analysed, and those that could be developed in PE, through their content and/or through the methodology used in the classroom, were selected. In this analysis, 21 targets were identified to help PE teachers know which specific tasks are related to their subject, and how the tasks could be used (Table 1).

Table 1. Specific targets of the Sustainable Development Goals grouped by sustainability dimensions *. Adapted from Baena-Morales and colleagues [20,21].

3.4 Reducing premature mortality and promoting mental health and well-being
3.5 Reducing substance abuse
3.6 Halving the number of deaths and injuries caused by road traffic accidents worldwide
3.7 Ensuring universal access to sexual and reproductive health services
4.4 Improving skills for access to employment, decent work, and entrepreneurship
4.5 Reducing gender disparities in education and ensuring equality for vulnerable people
4.7 Improving knowledge to promote sustainable development (e.g., sustainable lifestyles)
4.a Improving school facilities
5.1 Eliminating discrimination against all women and girls
5.2 Eliminating all forms of violence against all women and girls in public and private spheres
5.c Promoting gender equality and empowerment of women and girls
8.3 Promoting entrepreneurship, creativity, and innovation, and the formalisation and growth of enterprises
8.9 Promoting sustainable tourism that creates jobs and promotes local culture and products
10.2 Empowering and promoting the social, economic, and political inclusion of all people
10.3 Ensuring equal opportunities and reducing inequality of outcomes
12.1 Implementing programmes for sustainable consumption and production
12.2 Achieving the sustainable management and efficient use of natural resources
12.5 Significantly reducing waste generation
12.8 Ensuring all people have information and knowledge relevant to sustainable development
13.1 Strengthening the capacity to adapt to climate and natural disaster-related risks in all countries
13.3 Improving education, awareness, and human and institutional capacity for climate change mitigation, adaptation, and early warning
16.7 Ensuring inclusive, participatory, and representative decision-making that responds to need

* The numbering corresponds to the codes established for the targets of each Sustainable Development Goal.

1.2. Sustainability Dimensions from the Perspective of Physical Education

The different SDG targets (Table 1) are related to the three dimensions (social, economic, and environmental) that are integrated to define sustainability. The evidence of how PE contributes to the development of these dimensions is extensive [6,21]. Specifically, in the social dimension, PE contributes to reducing inequalities by promoting the participation of vulnerable individuals and fosters the development of values such as teamwork, gender equality, and collaboration [20,32,34]. Likewise, in the economic dimension, it aids in the development of personal skills related to employability, such as the ability to work in a team, fair play, or goal management [35,36]. Finally, concerning the environmental dimension, it promotes actions to prevent negative environmental impacts; for example, the elimination of plastic bottles [21], and initiatives that are being implemented to promote the use of bicycles to prevent environmental pollution [37,38].

However, it is not proportional. For example, the social benefits of PE seem to have a longer trajectory than those related to environmental factors or the economy.

Regarding the social dimension, Fernández-Balboa [39] has already highlighted the importance of the PE teacher as a fundamental agent of change in social justice. The evidence in the literature is sufficient to confirm that PE leads to the development of social skills [40–42]. To ensure high quality PE, UNESCO highlights the importance of working with an inclusive approach, identifying PE as an ideal context to develop attitudes that favour gender equality and include those with disabilities and disadvantaged groups [1].

In a recent review, Opstoel and colleagues [40] highlighted the fact that most studies report a positive relationship between PE and social and personal skills, and life skills and social development. Moreover, PE has been shown to be an educational resource that develops the inclusion of all people [43]. Therefore, besides promoting social values, PE presents an opportunity to develop gender-equitable attitudes [44], as the benefits of PE and regular physical activity are similar regardless of gender. However, Azzarito and colleagues [45] stress that all this potential to promote the social justice agenda through PE needs to be reconsidered and brought up to date to address the current inequalities produced by globalisation. For this reason, the social goals included in the SDGs should serve as a reference to enable PE teachers to develop a common strategy to satisfy current social demands. Another dimension of sustainability that has some scientific background in PE is environmental care practices. Several strategies can be implemented in this area. For example, the promotion of sustainable commuting to school (targets 4.7 and 13.3), whether on foot or by bicycle, has been recognised as a resource that helps to improve academic performance [46], as well as reducing the emission of gases produced by vehicles [47]. On the other hand, the SDGs indicate the importance of sustainable consumption and production (target 12.1) and the efficient use of natural resources (targets 12.2 and 12.5). PE can work on these goals, as one of its content areas is physical activity in the natural environment, which creates an ideal context for raising awareness about caring for the planet [8]. Some pedagogical models, for example those under the umbrella of Experiential Learning Theory, comprehensively develop this content area. Examples (due to their proximity to nature and adventure) are Outdoor/Wilderness Education, Adventure Education, and Adventure Pedagogy.

Regarding the last dimension of sustainability, the economy, there is less evidence. The relationship between PE and economics has traditionally been reduced to the inverse relationship between healthy habits and hospital costs [48]. However, the above analysis of the different SDG targets points to another economic perspective that should be considered. For example, it highlights the importance of developing skills that favour access to employability (target 4.4), equal opportunities between genders and the reduction of inequality (5.c, target 10.3), the development of entrepreneurship or creativity (target 8.3) and even the promotion of sustainable tourism and local culture (target 8.3). In a previous study, Baena-Morales and colleagues [20] pointed out the possibility of relating all these goals to PE, since with the correct methodology, competencies such as teamwork, respect, and creativity can be developed. In addition, through its content, PE makes it

possible to work on aspects related to popular culture (regional sports and dance) or the development of activities in natural environments as an active leisure option (sustainable tourism) (target 8.9).

However, despite these favourable characteristics, PE teachers have detected significant weaknesses regarding the knowledge and development of sustainability during their classes [20]. For example, in exploratory research, sustainability was associated mainly with environmental problems, and the social and economic aspects were ignored. At the same time, the teachers interviewed identified a lack of time and specific knowledge as the main barriers to working on sustainability with a broad approach. In addition to these specific deficiencies of PE teachers, teacher interventions, in general, are essential in developing attitudes that promote sustainability in students [11]. For this reason, guidelines and indicators are needed to help detect the aspects that are being worked on in PE classes. Using these, teachers can be guided on which aspects favouring sustainable development can be improved in their teaching interventions.

In the educational field, there are a variety of instruments aimed at measuring the contribution of education to the planet's sustainable development [12,17,49,50]. However, in physical education, there are no previous questionnaires focused on evaluating the teaching intervention of the faculty in this subject. Previous instruments have been validated to measure how the training of pre-service physical education teachers might be related to sustainability [51]. These documents allow the educational community to restructure their teachings if necessary and seek alignment with current pro-sustainability intentions. They also serve to detect possible limitations of teaching interventions and consequently strengthen those educational aspects that more effectively promote a pro-sustainability awareness in students. In this context, designing specific assessment instruments for physical education becomes crucial. These instruments should be able to capture not only the content and methodology used by teachers, but also how these practices influence students' perceptions and attitudes towards environmental sustainability. With this information, valuable feedback can be provided to educators, allowing adjustments in pedagogical approaches, and thus contributing to a more comprehensive education that is committed to current environmental challenges.

As a consequence of the above, the extent to which PE teachers provide interventions that promote sustainability needs to be analysed. However, to date no measurement instruments have been developed for this specific purpose. Therefore, this study aimed to design and validate an instrument to measure and evaluate whether the interventions carried out by PE teachers are aligned with the sustainability goals set out in the SDGs. This will allow teachers to reorient their PE sessions and thereby encourage attitudes that develop sustainability in students. To this end, the theoretical foundations, development, construct validity, and reliability of the dimensions that make up the PESD evaluation instrument were evaluated.

2. Methods

2.1. Participants

A total of 358 physical education teachers participated in the study (67.95% males and 32.05% females). Inclusion criteria for participation were to be active physical education teachers with at least five years of teaching experience. In the process of selecting teachers for the study, the educational institution's official email was used as the primary means of contact. Additionally, we encouraged participation from known teachers in the research, aiming to enhance the study's scope and depth. This strategy was intended to ensure an adequate representation of the teachers' perspective in the findings. The mean age was 39.44 ± 11.80. The teachers worked in primary education (6–12 years old, 46.55%) and in high schools (13–18 years old, 53.45%). As regards the country, 19.35% were from Spain, 32.45% from Peru, 34.9% from Ecuador, 12.7% from El Salvador, and 0.6% from Mexico.

2.2. Instruments

The PESD questionnaire was designed and validated. This is a 25-item questionnaire that evaluates whether interventions conducted by PE teachers are aligned with the SDG. The respondents complete the questionnaire on an 8-point Likert scale, with 1 being *totally disagree* and 8 *totally agree*. Table 2 shows the items in the questionnaire.

Table 2. PESD questionnaire.

1. It promotes the development of the physical health of my students.
2. It promotes actions that improve the mental health and well-being of my students.
3. It helps to reduce the use of harmful substances among my students.
4. It contributes to forming habits and attitudes to improve traffic safety.
5. It is accessible to all my students regardless of gender, race, functional diversity or personal situation.
6. It favours the development of competencies in my students that promote an entrepreneurial and business spirit.
7. It helps to reduce gender inequalities among my students.
8. It contributes to promoting equality for vulnerable people.
9. It improves knowledge of how to promote sustainable lifestyles.
10. It promotes and develops actions for the improvement of the school facilities.
11. It promotes among my students the elimination of any kind of discrimination against women and girls.
12. It promotes among my students the elimination of all forms of violence against women and girls.
13. It encourages the participation of women with an equal opportunity.
14. It promotes the empowerment of women.
15. It develops actions that favour my students' capacity for creativity and innovation.
16. It promotes knowledge of local culture and products among my students.
17. It promotes the social, economic, and political inclusion of all people.
18. It encourages the participation of my students, taking into account equal opportunities.
19. It emphasises the importance of the sustainable consumption and production of resources.
20. It promotes the efficient and/or sustainable use of natural resources.
21. It contributes to reducing waste generation.
22. It seeks to provide the information and knowledge necessary for sustainable development.
23. It promotes actions that can mitigate climate change.
24. It promotes improvements in education in, and an awareness of the importance of, individual and global actions to reduce climate change.
25. It ensures inclusive, participatory, and representative decision-making among my students.

For the development of the questionnaire items, the SDG targets from the previous research (Table 1) were related to PE [20]. The questionnaire items were written on the basis that teacher intervention is the way to reach the specific target (Table 2). To validate the questions of this qualitative instrument, we have previously consulted experts in the educational field and sustainable development, specifically recognized researchers in physical education and the integration of the SDGs in this area.

2.3. Procedure

The instrument was constructed in three phases. First, a literature review was conducted to decide which items were most relevant for the questionnaire. The authors included 26 items in the original version of the instrument. Secondly, seven experts were selected to begin to check content validity. These experts had to meet two conditions: (1) they were professionally dedicated to this area of expertise and (2) they had a minimum

of 10 years of experience. They were contacted by the first and fourth authors. They responded on the relevance, wording, and adequacy of each item. Once their responses had been obtained, the second author analysed the results, thus meeting the Lawshe [52] criteria. All authors discussed the results and worked on the final version. One item ('It ensures equal opportunities for my students') was eliminated from the original questionnaire because of the responses obtained. Finally, this final version of the questionnaire was sent by email (online format) to all potential participants in the study. All participants were of legal age and they gave their informed consent about their participation in this study.

2.4. Data Analysis

The analysis used the SPSS programme version 24.0 to test the validity and reliability of the scale statistically. In line with previous research [12], the Kaiser–Meyer–Olkin (KMO) and Bartlett tests, exploratory factor analysis (EFA), and the computation of Cronbach's alpha and stability were performed. The normality tests were conducted using the Kolmogorov–Smirnov test because n was greater than 50 (n = 358). EFA was then performed to discover the factorial structure of the questionnaire. To conduct the EFA, the recommendations of Lloret-Segura and colleagues [53] were followed, choosing as the extraction method Generalised Least Squares (GLS) with oblimin rotation (oblique). The stability of the scale was assessed using a bivariate Pearson correlation. Furthermore, the reliability of the factors was evaluated by calculating Cronbach's alpha coefficient.

3. Results

The KMO and Bartlett tests were the first part of the statistical analysis and were performed to verify the suitability of the data for EFA. A KMO value over 0.90 is optimal, and the values from a Bartlett test suggest that the null hypothesis must be rejected at a significance level of 0.05. The results showed the following: KMO = 0.919; Bartlett test: $\chi 2 = 4376.0$, $p < 0.001$, indicating that exploratory factor analysis on the PESD could be conducted.

Given these results, EFA following the recommendations of Lloret-Segura et al. (2014) [53] was performed, choosing as the extraction method Generalised Least Squares (GLS) with oblimin rotation (oblique). The analysis of the variance suggested the existence of two factors. The first factor corresponds to items 2, 3, 4, 6, 9, 10, 15, 16, 17, 19, 20, 21, 22, 23, and 24 (environmental, health, and economic sustainability), while the second factor refers to items 1, 5, 7, 8, 11, 12, 13, 14, 18, and 25 (social sustainability, gender, and inclusion). Table 3 shows the factorial loads of the items in each factor.

Table 3. Descriptive statistics: mean (M), standard deviation (SD) and factorial loads of the rotated matrix through the oblimin method.

Items	M (SD)	Factors	
		1	2
Item 1	7.44 (0.98)	0.061	**0.165**
Item 2	7.48 (0.92)	**0.288**	0.153
Item 3	6.95 (1.59)	**0.557**	0.070
Item 4	6.65 (1.68)	**0.770**	−0.169
Item 5	7.52 (0.99)	−0.087	**0.596**
Item 6	6.61 (1.58)	**0.672**	0.004
Item 7	7.38 (1.14)	0.079	**0.650**
Item 8	7.41 (1.06)	0.114	**0.666**
Item 9	7.23 (1.08)	**0.648**	−0.097
Item 10	6.79 (1.58)	**0.695**	−0.085
Item 11	7.62 (0.88)	0.001	**0.812**
Item 12	7.61 (0.89)	0.125	**0.715**
Item 13	7.68 (0.96)	−0.126	**0.952**

Table 3. *Cont.*

Items	*M* (SD)	Factors	
		1	2
Item 14	6.89 (1.73)	0.072	**0.395**
Item 15	7.30 (1.08)	**0.405**	0.375
Item 16	6.86 (1.38)	**0.589**	0.199
Item 17	7.05 (1.36)	**0.389**	0.381
Item 18	7.53 (0.94)	0.212	**0.706**
Item 19	6.92 (1.39)	**0.760**	0.113
Item 20	6.97 (1.52)	**0.817**	0.173
Item 21	6.90 (1.52)	**0.727**	0.156
Item 22	6.83 (1.55)	**0.871**	0.054
Item 23	6.60 (1.74)	**0.843**	−0.019
Item 24	6.73 (1.71)	**0.884**	0.081
Item 25	7.30 (1.06)	**0.353**	0.571

The factorial loads of the first factor ranged between 0.28 and 0.88. For the second factor, the factorial loads were between 0.16 and 0.95. The correlation between the two factors was moderate and positive (0.53). The factors explained 60.23% of the total variance. The Cronbach's alpha reliability coefficient was calculated for each factor (the values ranged between 0.88 and 0.94) and for the total score (0.95) to determine the scale's reliability and internal consistency. The results are shown in Table 4 and indicate that the scale has good internal consistency. The descriptive statistics, percentages of variance, and Cronbach's alphas are reported in Table 4.

Table 4. Descriptive statistics: mean (*M*), standard deviation (SD), percentage of variance, and Cronbach's alpha (reliability).

PESD Factors	*M* (SD)	% Variance	Cronbach's Alpha
1	6.92 (1.44)	49.25	0.94
2	7.43 (1.06)	10.98	0.88
Total	7.17 (1.25)	60.23	0.95

Finally, the scale's stability (test–retest) was tested using the bivariate Pearson correlation test to compute the invariance between the two sets of responses on a subsample of 95 of the participants who responded again after about one month. The results indicated a similarity in the responses of the participants for the two measurements. Furthermore, this similarity showed a significant value ($p = 0.002$). The Figure 1 shows the items identified by each factor.

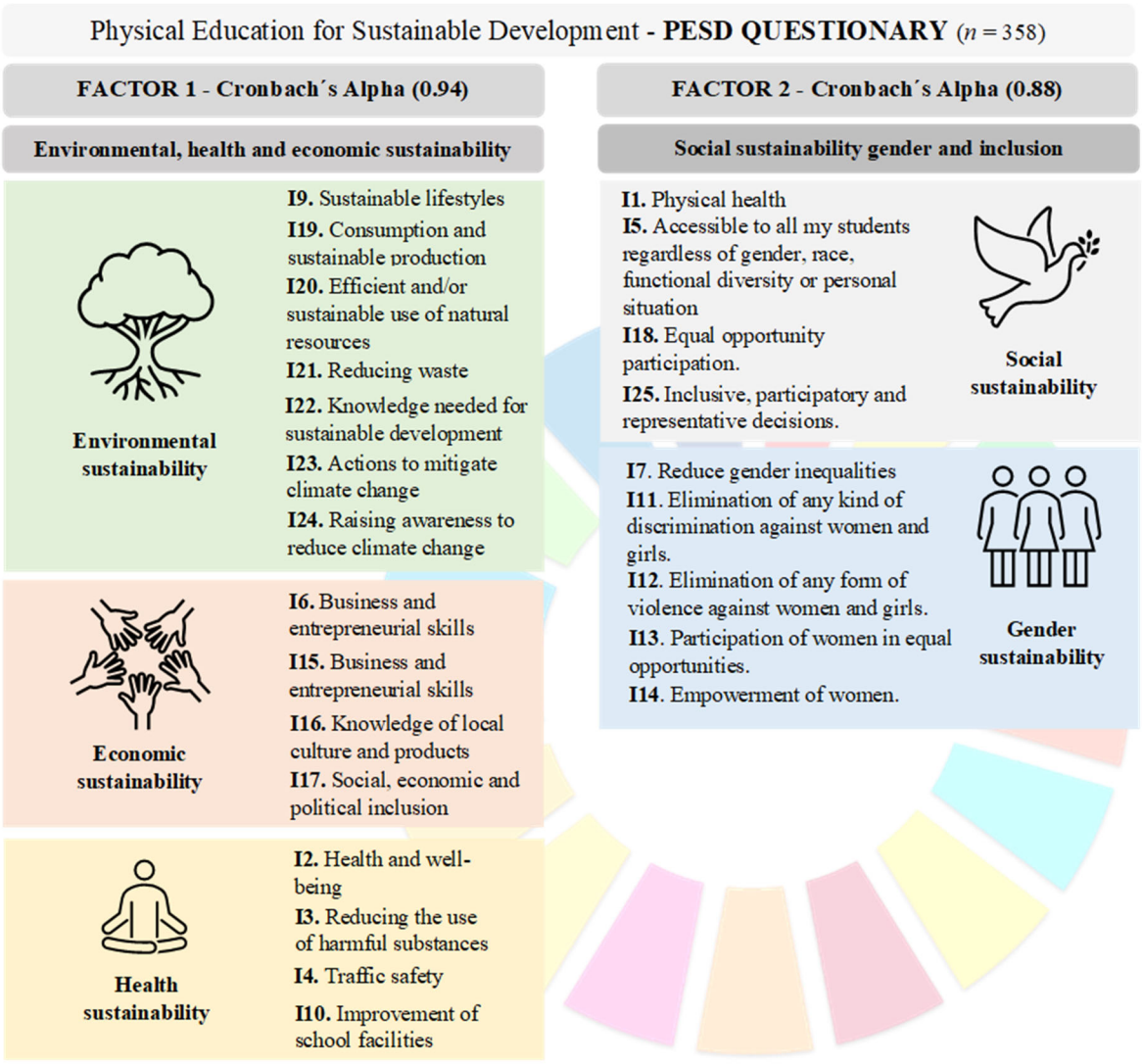

Figure 1. Clustering of the instrument's items by factors.

4. Discussion

This research aimed to design a valid and reliable questionnaire to assess whether PE teachers' teaching interventions promote the development of sustainable attitudes among students. The Physical Education for Sustainable Development instrument was validated with very high reliability (0.95). Factor validity analyses show that the instrument comprises two factors, with a high reliability index (0.95). These results indicate that the PESD is appropriate for measuring the capacity of Physical Education teachers to improve skills and attitudes that support sustainable development. The principal component factor analysis results show that the scale consists of two factors: (1) environmental, health, and economic sustainability; and (2) social sustainability, gender, and inclusion. Thus, the validation of a quantitative scale to measure sustainable development attitudes in PE teaching interventions is presented. This responds to the call raised by UNESCO [54] for the creation of new instruments for assessing sustainable attitudes.

Education is a critical factor in the sustainability of the planet [11,16]. For this reason, an analysis of educational interventions that develop sustainability has been highlighted as essential in achieving the SDGs [16]. Within the different subjects that make up the education system, PE has unique characteristics that allow it to contribute to the achievement of the specific goals of the various SDGs [16,20,21,23,55]. Specifically, of the three dimensions related to sustainability, evidence has been found that PE contributes to social develop-

ment [40,43,44]; however, in the economic and environmental dimension, the literature to confirm this relationship is not as extensive [56]. Therefore, there is a research gap in relation to the teaching behaviours of PE teachers, and analysis and study are needed in the coming years.

The PESD can be added to other instruments already validated within ESD [12,57–60]. Most previous validations have focused on children [61,62], adolescents and young adults [17,49,58,59], or university students [12,57,60]. However, the PESD is unique in that it has been designed with a target population of in-service PE teachers in mind. We consider this aspect to be one of the main virtues of the PESD, as the specificity of the instrument allows us to define sustainable actions with greater precision and educational effectiveness. This idea is in line with pre-established suggestions about ESD, which stress the importance of adopting strategies that promote sustainability in specific learning contexts [11]. It was also considered essential to respect this approach because, as all ESD documents advocate, educators are potent agents of change who can provide an effective educational response to achieve the SDGs [11,60].

The design of the questionnaire was intended to be framed within the three dimensions of sustainability (social, economic, and environmental). However, the results show that the items are grouped into two factors: (1) environmental, health, and economic sustainability; and (2) social sustainability, gender, and inclusion. Some of the previous instruments show the appearance of three or four factors of sustainability in isolation, with education being included as a fourth factor [12]. Another instrument that allowed all three dimensions of sustainability to be assessed was the one presented by Gericke and colleagues [49]. Despite this unique feature, the PESD offers a very high reliability overall (0.95) and for the two factors found (0.94 and 0.88). However, it should be noted that although the results show the existence of only two factors, the questionnaire items allow issues relating to all three dimensions of sustainability (social, economic, and environmental) to be addressed.

Another of the main characteristics of the PESD is its ability to measure teaching interventions from the perspective of the development of sustainability competencies in students. Since different SDG-specific goals have been taken into account in the design of the items, the questionnaire was designed in terms of competencies. As Rieckmann et al. (2017) indicate, the instrument should be designed so that its items are related to sustainability learning objectives and competencies. This feature implies that they should be interpreted as a whole and not as isolated questions without practical application. This idea is similar to that presented in previous instruments such as the SQC [49] or the ACISD-Q [17], which assess attitudes to sustainability from concrete actions.

Therefore, the PESD instrument could be a tool that aids in evaluating teacher behaviours within the dimensions of sustainability. Thus, PESD is the first instrument that measures the teaching interventions of PE teachers and the relationship of these interventions with specific SDG goals, potentially helping to reorient some teaching behaviours if necessary. This questionnaire allows the possibilities of PE to be expanded so that it is a tool that develops sustainability in all its aspects; the relationship between sustainability and PE has previously been mainly approached from the environmental dimension [63–65], and PE teachers seem to understand sustainability primarily as an environmental factor [20,21].

4.1. Contribution and Potential Implications

The present study contributes a psychometrically sound measurement instrument to evaluate teaching interventions in PE that favour sustainable development attitudes in students. While other measurement instruments focus on environmental issues or are oriented towards students, the PESD allows teaching actions that promote sustainability competencies in students to be evaluated; in other words, it focuses on teaching and education. Moreover, no instrument has previously been developed from a PE perspective, although PE is an essential subject for achieving specific SDGs [16,21,23,26,27,30,55].

4.2. Limitations and Future Research

Several limitations must be acknowledged in the present study. First, the participants in this research were Spanish-speaking (Spain and Latin America). Moreover, the participants were not equally distributed, with the majority of them being from Spain or Peru. Therefore, future work should check whether the good index of validity and reliability of the questionnaire found in this study are the same in other countries. To this end, cross-cultural validation would be necessary to enable teachers from countries other than those covered by this study to use the instrument. Confirmatory analysis of the instrument should also be conducted in future research. The results obtained are a stepping stone for future research on attitudes conducive to sustainable development. It is suggested that the PESD be replicated in other educational contexts, validating its content in other languages. Finally, this instrument should help with the design of similar instruments for other subjects that are specific to the particular subject.

We will expand our research to include a diverse range of countries, both Spanish-speaking and European, to understand how the tool's effectiveness varies across different economic and cultural contexts. This will involve a detailed comparison between developed and developing countries, aiming to identify any significant disparities in tool application and outcomes. This comparative approach will enhance our understanding of the tool's universal applicability and potential need for regional adaptations.

5. Conclusions

The PESD is a valid and reliable 25-item questionnaire to measure teaching interventions for sustainability. The development of this instrument has led to the creation of the first questionnaire to assess teaching interventions in PE. The PESD is characterised by an assessment of teaching actions based on the guidelines presented in the different SDG targets. Moreover, it is designed with a target population in mind, specifying actions that favour sustainable development. Consideration should be given to designing and validating similar questionnaires for other subjects to evaluate teaching actions from specific and multidisciplinary perspectives.

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