Cuadernos de Psicología del Deporte, vol. 25, 1, 94-110
Recibido: 16/09/2024
Aceptado: 27/12/2024

Murcia (España) ISSN edición impresa:1578-8423
ISSNediciónweb(http://revistas.um.es/cpd):1989-5879

Cita: Bastos, V., Santos, F. & Teixeira, D. S. (2025). The Physical Activity Enjoyment Scale (PACES): Portuguese Translation, Validity, Reliability, and Sex Invariance. *Cuadernos de Psicología del Deporte, 25*(1), 94-110

La Physical Activity Enjoyment Scale (PACES): Traducción al Portugués, Validez, Fiabilidad e Invarianza de Sexo

The Physical Activity Enjoyment Scale (PACES): Portuguese Translation, Validity, Reliability, and Sex Invariance

A Physical Activity Enjoyment Scale (PACES): Tradução Para Português, Validade, Fiabilidade e Invariância de Sexo

Bastos Vasco[1,2], Santos, Filipe[1,2], Teixeira, Diogo[1,2]

[1]*Faculty of Physical Education and Sport, Lusófona University, Lisbon, Portugal;* [2]*Research Center in Sport, Physical Education, and Exercise and Health (CIDEFES), Lisbon, Portugal*

RESUMEN

La investigación ha demostrado repetidamente que la diversión es un predictor relevante de la adherencia a la actividad física (AF). En consecuencia, una medida adecuada de la diversión es necesaria para el avance adecuado de la investigación de la adherencia a la AF, con la *Physical Activity Enjoyment Scale* (PACES) cumpliendo comúnmente este papel. Sin embargo, hasta ahora no se ha desarrollado una versión en portugués de la PACES original, lo que limita la investigación sobre el disfrute en este idioma. Como tal, este estudio tuvo como objetivo traducir y validar la primera versión Europea Portuguesa de 18 ítems de la PACES. Un total de 360 participantes (192 hombres), con edades comprendidas entre 19 y 73 años (*M* = 37.54; *SD* = 13.76), participaron en este estudio. Se utilizó el análisis factorial confirmatorio para probar las propiedades psicométricas con el software SPSS v. 27.0 y AMOS 23.0. También se realizaron análisis de fiabilidad compuesta, validez convergente, validez concurrente e invarianza de sexo. El modelo demostró un ajuste adecuado para la muestra del estudio. Además, se alcanzaron la fiabilidad compuesta y la validez convergente y concurrente. También se confirmó la invarianza de sexo, asegurando una medición adecuada tanto con varones como con mujeres. El PACES Europeo Portugués de 18 ítems es un instrumento válido, fiable e invariante de sexo para medir la diversión en la AF. Se espera que este cuestionario permita la investigación hacia la adherencia a la AF. Futuros estudios deberán probar las propiedades psicométricas del PACES, particularmente con diferentes muestras y en exploraciones más amplias del constructo de la diversión.

Palabras clave: medición de la diversión; afecto; análisis factorial confirmatorio; adherencia a la actividad física; análisis multigrupo.

Correspondencia: **Vasco Bastos.** Dirección Postal: Faculdade de Educação Física e Desporto, UL, Campo Grande, 376, 1749-024. Tel: 217515500.
Email: vasco.bastos@ulusofona.pt

ABSTRACT

Research has repeatedly demonstrated that enjoyment is a relevant predictor of physical activity (PA) adherence. Accordingly, adequate enjoyment measurement is necessary for the proper advancement of PA adherence research, with the Physical Activity Enjoyment Scale (PACES) commonly fulfilling this role. However, no European Portuguese version of the original PACES has been developed so far, limiting enjoyment research in this language. As such, this study aimed to translate and validate the first 18-item European Portuguese version of the PACES. A total of 360 participants (192 males), with ages ranging from 19 to 73 years old (M = 37.54; SD = 13.76), participated in this study. Confirmatory factor analysis was used to test the psychometric properties with the SPSS v. 27.0 and AMOS 23.0 software. Composite reliability, convergent and concurrent validity, and sex invariance analyses were also conducted. The model demonstrated an adequate fit adjustment for the study's sample. Additionally, composite reliability and both convergent and concurrent validity were achieved. Sex invariance was also confirmed, assuring adequate measurement with both males and females. The 18-item European Portuguese PACES is a valid, reliable, and sex-invariant instrument to measure enjoyment in PA. It is expected that this questionnaire will enable research towards PA adherence. Future studies should further test the psychometric properties of the PACES, particularly with different samples and in more comprehensive explorations of the enjoyment construct.

Keywords: enjoyment measurement; affect; confirmatory factor analysis; physical activity adherence; multi-group analysis.

RESUMO

A investigação científica tem demonstrado repetidamente que o divertimento é um preditor relevante da adesão à atividade física (AF). Assim, uma medida adequada do divertimento é necessária para o avanço da investigação sobre a adesão à AF, com a *Physical Activity Enjoyment Scale* (PACES) a desempenhar comummente esta função. No entanto, até à data, não foi desenvolvida uma versão Europeia Portuguesa do PACES original, o que limita a investigação do divertimento nesta língua. Por conseguinte, este estudo teve como objetivo traduzir e validar a primeira versão Europeia Portuguesa de 18 itens do PACES. Um total de 360 participantes (192 do sexo masculino), com idades compreendidas entre os 19 e os 73 anos (M = 37.54; DP = 13.76), participaram neste estudo. A análise fatorial confirmatória foi utilizada para testar as propriedades psicométricas com o software SPSS v. 27.0 e AMOS 23.0. Foram também efetuadas análises de fiabilidade compósita, validade convergente, validade concorrente e invariância entre sexos. O modelo demonstrou um ajuste adequado para a amostra em estudo. Adicionalmente, foi atingida a fiabilidade compósita e a validade convergente e concorrente. A invariância entre sexos também foi confirmada, assegurando uma medição adequada tanto para o sexo masculino como para o feminino. O PACES Europeu Português de 18 itens é um instrumento válido, fiável e invariante em relação ao sexo na medição do divertimento na AF. Espera-se que este questionário potencie a investigação sobre a adesão à AF. Estudos futuros deverão expandir a testagem das propriedades psicométricas do PACES, nomeadamente com diferentes amostras e em explorações mais amplas do constructo do divertimento.

Palavras chave: medição do divertimento; afetos; análise fatorial confirmatória; adesão à atividade física; análise multigrupos.

INTRODUCTION

Decades of scientific literature have established physical activity (PA) and its different manifestations as crucial for physical and mental health (American College of Sports Medicine, 2021; Pedersen & Saltin, 2015; Warburton & Bredin, 2017). Paradoxically, PA adherence remains elusive worldwide (Sperandei et al., 2016; The Lancet, 2021;

World Health Organization, 2022). As such, identifying relevant determinants and effective behavior change strategies that result in more impactful levels of PA adoption and maintenance is paramount.

Contemporary research on behavior change has increased its focus on affect (Dukes et al., 2021). Indeed, an increasing number of studies have demonstrated the predictive value of affect and affect-related variables for PA adherence (Ekkekakis et al., 2011; Rhodes & Kates, 2015; Williams, 2008). One of these relevant affect-related variables is enjoyment, which is characterized as generalized feelings of pleasure and satisfaction (Moore et al., 2009). More specifically concerning PA, enjoyment can be considered a positively valenced emotion, directed towards the PA associated with feelings of pleasure, joy, and fun (Chen et al., 2021; Jekauc et al., 2020) or as a mixture of affective experiences and consequent cognitive appraisals (Ekkekakis et al., 2018). Overall, enjoyment can be considered a construct encompassing both affective and reflective characteristics (Stevens et al., 2020) that can be identified in the well-being literature (Davidson, 2018) close to constructs such as intrinsic motivation (Deci & Ryan, 1985) and the state of flow (Czikszentmihalyi, 1990). In PA research, enjoyment has been associated with habit formation, intention to continue exercising (Rodrigues et al., 2020a; Teixeira et al., 2022), and intrinsic motivation (Nielsen et al., 2014), and it has been identified as a relevant predictor of PA adherence (Allender et al., 2006; Gardner et al., 2017; Rodrigues et al., 2020b).

Many instruments have been used throughout the years to measure the perception of enjoyment towards PA. For instance, Kendzierski & DeCarlo (1991) created the Physical Activity Enjoyment Scale (PACES), an 18-item instrument where answers are given on a seven-point bipolar Likert scale that uses antithetically worded statements (e.g., *"I enjoy it – I hate it"*). Other examples are the four-item Exercise Motives Scale developed by Markland & Hardy (1993) to measure joy during exercise and a single-item instrument used to assess enjoyment by DiLorenzo et al. (1998) (although with a lack of evidence on its validity and reliability). In the years following its initial validation (Kendzierski & DeCarlo, 1991), PACES became one of the most commonly used instruments to measure enjoyment, resulting in several adaptations of its original version (Nasuti & Rhodes, 2013; Rhodes et al., 2009; Stevens et al., 2020).

These new versions received several modifications, sometimes becoming shorter and, in some cases, using a unipolar scale instead of the original bipolar one. For example, Motl et al. (2001) used a 16-item adaptation, with answers being given on a five-point unipolar Likert scale ranging from 1 ("Disagree a lot") to 5 ("Agree a lot"). This version of the PACES was validated for adolescent girls (Motl et al., 2001) and later for children (Moore et al., 2009). Later, Dishman et al. (2005) opted to shorten this second version of the PACES to seven items, creating the first short version of the PACES. Another short version was used by Raedeke (2007), presenting only eight items but retaining the original's bipolar properties. A third short version of the PACES was later developed by Mullen et al. (2011) opting to create a new eight-item short version (PACES-8). This version presented a seven-point Likert scale ranging from 1 ("*It's no fun at all*") to 7 ("*It´s a lot of fun*"). Lastly, Chen et al. (2021) developed the shortest version of the PACES to date (PACES-S), presenting an instrument with five items (e.g., "*I enjoy it*") answered with a five-point unipolar Likert scale ranging from 1 ("Strongly disagree") to 5 ("Strongly agree"). In sum, the PACES has received considerable attention throughout the years, with researchers trying to understand how to better use and refine this instrument.

Concerning the usage of the PACES in countries where English is not the primary language, several different versions have been translated and validated. For instance, the 16-item version by Motl et al.(2001) has been translated into German (Jekauc et al., 2013), Spanish (Moreno et al., 2014), and Thai (Khongrassame et al., 2023), while the PACES-8 (Mullen et al., 2011) has been translated into Mandarin (Chung & Leung, 2019). Regarding Portuguese versions, a total of three studies have attempted to test the psychometric properties of the PACES-8 (Monteiro et al., 2017; Rodrigues et al., 2021; Teques et al., 2020). The first was a translation and validation study by Monteiro et al. (2017) with a sample of Portuguese athletes. A second translation and validation was carried out by Teques et al. (2020) with a sample of fitness group exercisers. Later, Rodrigues et al. (2021) further tested the PACES-8 aiming to explore its dimensionality. Following a novelty approach, two correlated but distinct dimensions of enjoyment were considered for these analyses and showed a better fit than the unidimensional model, leaving suggestions that the concept of enjoyment could be more complex than previously thought and

needed to be further explored. In addition to these Portuguese European versions, a translation and validation of the 18-item PACES (Kendzierski & DeCarlo, 1991) to Brazilian Portuguese was also conducted by Alves et al. (2019), opting to use the original version instead of the PACES-8.

Although the last few years have provided a considerable number of Portuguese PACES versions and the testing of their psychometric properties, some limitations for the proper measurement of enjoyment in the Portuguese language remain. One is the absence of a European Portuguese version of the original 18-item PACES (Kendzierski & DeCarlo, 1991). Such an effort is needed considering that cultural differences tend to influence the way the instrument is understood and answered, something already noticed in other related samples and instruments (e.g., PRETIE-Q-PT Portuguese vs. Brazilian Portuguese; Teixeira et al., 2023). In addition, some issues can be identified in the translation and validation of other versions of the PACES. For example, in Monteiro et al. (2017), the original seven-point bipolar scale of the PACES-8 (Mullen et al., 2011) was not retained, using instead the five-point unipolar scale of the 16-item PACES by Motl et al. (2001). This resulted in a hybrid version that neither follows the works of Mullen et al. (2011) nor Motl et al. (2001) thoroughly. Furthermore, the departure from the bipolar to a unipolar scale implies a change in fundamental theoretical assumptions of the measured construct (i.e., enjoyment), no longer reflecting the assumption of bipolarity that enjoyment presented in the original PACES (Kendzierski & DeCarlo, 1991). Researchers should ensure the integrity of the conceptual foundations of the tested constructs and let these guide them in their methodological and statistical decisions (Cid et al., 2022; Hair, 2019). As such, despite each making valuable contributions to enjoyment research in their own right (e.g., Monteiro et al., 2017, provided the first Portuguese PACES), the versions of the PACES with a unipolar response scale may present some conceptual limitations. Of the other two PACES-8 versions, only Teques et al. (2020) closely follows the original work (the psychometric tests of Rodrigues et al. (2021), were performed with a version similar to Monteiro et al., 2017), thus presenting a valid and reliable measure of PA enjoyment more closely related to the original English version. However, the PACES-8 was developed on the grounds of two appointed limitations of Kendzierski & DeCarlo (1991) original version: (1) factor structure problems detected in the study of Crocker et al. (1995); and (2) lack of fit with the sample of older individuals collected by Mullen et al. (2011). The first point has some limitations on its own because the sample of Crocker et al. (1995) comprised children between 12 and 16 years old, and the authors of the original PACES stated that "given the vocabulary in the PACES, the instrument is probably best suited for use with individuals of at least high school standing" (Kendzierski & DeCarlo, 1991, page 59). This implies that part of the sample might have lacked the ability to appropriately respond to the PACES at the time. As such, these results should be interpreted with some caution.

Regarding the second point, to the best of our knowledge, no adequate and advanced psychometric testing of the original PACES with a broader aged sample was performed. Research reproducibility with different samples is paramount for the continuous psychometric testing and refinement of instruments. Thus, testing the model fit of the original PACES with, for example, a CFA in a wide-aged sample would present both novelty and relevant advancements in PA enjoyment measurement. Additionally, this would allow for the development of the first 18-item European Portuguese PACES, which, as mentioned before, would further enable future enjoyment research.

Accordingly, the present study aimed to translate and validate the original 18 items PACES (Kendzierski & DeCarlo, 1991) to the European Portuguese language. First, a CFA was conducted to test the model of the PACES according to recommended fit indices (Hair, 2019; Marsh et al., 2004). Secondly, the internal reliability and convergent validity were tested by calculating the model's composite reliability (Raykov, 1997) and average variance extracted (Hair, 2019), respectively. Next, a multigroup analysis was performed to test invariance assumptions between sexes (Hair, 2019; Morin et al., 2016). Lastly, concurrent validity was tested by performing a bivariate correlation analysis between enjoyment and the pleasure-displeasure factor of the past core affective experiences of the AFFEXX (Ekkekakis et al., 2021) questionnaire.

METHOD

Study design

The present study applied an observational design (Argilaga et al., 2011). Considering the study design and the conducted analyses, the recommendations of Cid et al. (2022) were followed.

Participants

The global sample had a total of 360 participants (192 males) with an age ranging from 19 to 74 years old (M = 37.54; SD = 13.76). Most of the included participants reported practicing some type of PA (e.g., individual training in the gym; participate in group classes; outdoor training) regularly (332; 92%). For the sex invariance analysis only, the global sample was split into two groups: males (M_{age} = 33.50; SD_{age} = 13.73) and females (M_{age} = 41.27; SD_{age} = 12.73). Most of the sample data collection was carried out online (n = 350), with a supplemental physical collection (n = 10) being conducted only when necessary (i.e., due to technological difficulties by the participant or preference).

Instruments

The Brazilian Portuguese version by Alves et al. (2019) was used to develop its European counterpart by performing the necessary cultural adjustments and changes in linguistic characteristics. This was made through several steps: 1) A Portuguese version was created by a researcher [blinded for review] through minor word adjustments and comparison with the existing items in previous Portuguese versions; 2) the PACES Portuguese version was sent to two independent sport and exercise psychology experts who read and proposed, independently and when in need, adjustments to the proposed version; 3) all the authors [blinded for review] read and reached the final version by consensus. The resulting European Portuguese PACES comprises 18 items assessing the perception of exercise enjoyment, preserving the same structure as the original English version of the 18-item PACES (Kendzierski & DeCarlo, 1991). Eleven of the scale's items are reverse-scored to reduce response bias. The stem asks respondents how they feel at the moment about the physical activity they have been doing, with the answers being given on a seven-point Likert scale, ranging from 1 to 7, that uses antithetical statements (e.g., *"It´s no fun at all – It´s a lot of fun"*).

Core affective experiences associated with past exercise participation were measured with four items of the Affective Exercise Experiences (AFFEXX) questionnaire (Ekkekakis et al., 2021). These four items represent the pleasure-displeasure factor of the past core affective experiences of the AFFEXX. A seven-point Likert scale, ranging from 1 to 7, with antithetical statements ("*exercise makes me feel worse – exercise makes me feel better"*) was used to give responses.

Procedures

Invitations to complete a battery of psychometric questionnaires were distributed by email, on social media, and in three different health clubs from January to October 2023. Google Forms was used to collect the data anonymously from anyone willing to participate in this study. For the data collection in the health clubs, authorizations from the club directors were obtained beforehand. A letter of explanation and a signed informed consent were provided before completing the questionnaires. In the online form, a box stating that the participant has read and understood the letter of explanation and informed consent had to be selected before the questionnaires were presented. In the physical format, the questionnaires were only presented after signing the informed consent. In both data collection formats, explanations of the expected participation, risks, and confidentiality of given data were detailed. Answering the complete battery of questionnaires took approximately 10 minutes. After the data collection, the responses were screened, and 11 individuals were removed from the database because they refused to participate. The present study was approved by the ethics committee [blinded for review purposes] and abided by the Helsinki

Declaration and later amendments related to Human research, by the Organic Law 3/2018, of December 5 Protection of Personal Data and guarantee of digital rights, and by the ethical standards in sport and exercise science research (Harriss et al., 2019).

Statistical analysis

Descriptive statistics were calculated for all the studied variables using IBM SPSS version 27.0. Normal univariate data distribution was analyzed considering threshold values of -2 and +2 for skewness and -7 and +7 for kurtosis (Gravetter et al., 2021). The PACES model fit was examined with CFA, using maximum likelihood estimation, which was performed with AMOS v. 23. The CFA was applied according to several recommendations (Byrne, 2016; Hair, 2019; Marsh et al., 2004), and the following goodness-of-fit indexes and cut-off criteria were considered: Comparative Fit Index (CFI ≥ .90), Tucker-Lewis Index (TLI ≥ .90), Standardized Root Mean Square Residual (SRMR ≤.08), and Root Mean Square Error of Approximation (RMSEA ≤.08) with a 90% Confidence Interval (CI 90%). Analysis of the individual items and the respective loading on the target factors was also taken into account, with a significance of $p < .05$ and weights greater than .50 explaining at least 25% of the variance (Hair, 2019).

Composite reliability was calculated to examine the model's internal consistency. The Raykov (1997) formula was used for this purpose and values ≥ .70 were deemed acceptable (Hair, 2019; Raykov et al., 2016). Convergent validity was evaluated by calculating the Average Variance Extracted (AVE), accepting values ≥ .50 (Hair, 2019). Concurrent validity was tested by performing a correlation analysis between PACES and the items of the AFFEXX representing the pleasure-displeasure factor of past core affective experiences. Multigroup analysis was tested between sexes after conducting the CFA model in each subsample, with several levels of measurement invariance being considered, following a method of testing increasingly restrictive hypotheses (Hair, 2019; Morin et al., 2016). These levels are as follows: (1) configural invariance (i.e., factor structure is the same between groups; same items associated with the same factors), (2) weak factorial invariance (i.e., factor structure and factor loadings are equal between groups), (3) strong factorial invariance (i.e., item factor structure, factor loadings, and item thresholds are equal between groups), and (4) strict factorial invariance (i.e., item factor structure, factor loadings, item thresholds, and item residuals are equal between groups). Comparisons between the resulting models were made according to several assumptions regarding differences between indexes, more specifically, differences in CFI ≤ .01, SRMR < .03, and RMSEA ≤ .015 (Byrne, 2016; Chen, 2007; Cheung & Rensvold, 2002).

RESULTS

A thorough inspection was performed on the final data set to detect errors and remove random answers. To check for multiple individual fulfilments, general sociodemographic data was crossed (e.g., date of birth, height, weight). The descriptive analysis is presented in Table 1. As can be observed, skewness and kurtosis scores generally indicate a normal univariate data distribution. Regarding multivariate normality, one outlier was identified and removed from the analysis according to previous recommendations (Mahalanobis distance = p1 < .001; p2 < .001) (Byrne, 2016; Hair, 2019). Given that the assumption of multivariate normality was not met (Byrne, 2016), a Bollen-Stine bootstrap with 2000 samples was used for subsequent analysis (Nevitt & Hancock, 2001).

The psychometric properties of the measurement model can be observed in Table 2. Overall, the model presents an adequate adjustment. The possibility of further improving the fit indices was explored by correlating the errors of items six and 10 in a post-hoc analysis due to their covariance in the modification indices. This would slightly improve the model's adjustment (i.e., CFI = .95; TLI = .94; RMSEA = .083; SRMR = .0323) with a correlation of -.44 between both item's errors. However, the model's adjustment was deemed acceptable without this correlation. As such, this possibility was discarded, and the errors remained uncorrelated. The European Portuguese 18-item PACES model can be observed in Figure 1.

Table 1

Descriptive analysis of the PACES European Portuguese version items.

	Skewness	z-value	Kurtosis	z-value
Item 1	–1.845	–14.350	3.688	14.343
Item 2	–1.882	–14.636	3.605	14.021
Item 3	–2.205	–17.153	5.354	20.823
Item 4	–1.795	–13.959	3.041	11.828
Item 5	–1.470	–11.434	1.626	6.322
Item 6	–1.633	–12.700	2.684	10.437
Item 7	–1.054	–8.196	.336	1.307
Item 8	–1.951	–15.179	4.185	16.275
Item 9	–1.563	–12.159	2.433	9.461
Item 10	–1.835	–14.270	3.383	13.155
Item 11	–1.388	–10.797	1.944	7.561
Item 12	–1.492	–11.604	1.705	6.630
Item 13	–1.722	–13.396	3.199	12.442
Item 14	–1.164	–9.055	1.307	5.081
Item 15	–1.594	–12.399	2.461	9.573
Item 16	–1.694	–13.178	2.796	10.875
Item 17	–1.348	–10.485	1.980	7.701
Item 18	–.862	–6.702	.123	.478

The composite reliability score surpasses the threshold of .70 (see Table 2), achieving internal consistency. Concerning the model's validation, the root square of the AVE score was above .50, assuring convergent validity. Additionally, the bivariate correlation analysis between enjoyment and the pleasure-displeasure factor of the past core affective experiences of the AFFEXX (Ekkekakis et al., 2021) questionnaire demonstrated a positive association between both constructs (r = .82; p < .001), which is to be expected considering the theoretical relationship between pleasure-displeasure and enjoyment.

Lastly, the results of the multi-group analysis presented in Table 3 support invariance assumptions between sexes. More specifically, (1) both groups demonstrated the same number of factors and remained associated with the same items (ensuring configural invariance), (2) items presented a similar understanding in both sexes (weak factorial invariance), (3) comparisons between both groups demonstrated that latent and observable means were valid (strong factorial invariance), and (4) comparison between observable items was verified (strict factorial invariance).

Figure 1
Standardized individual parameters, all of which were significant in the measurement model.

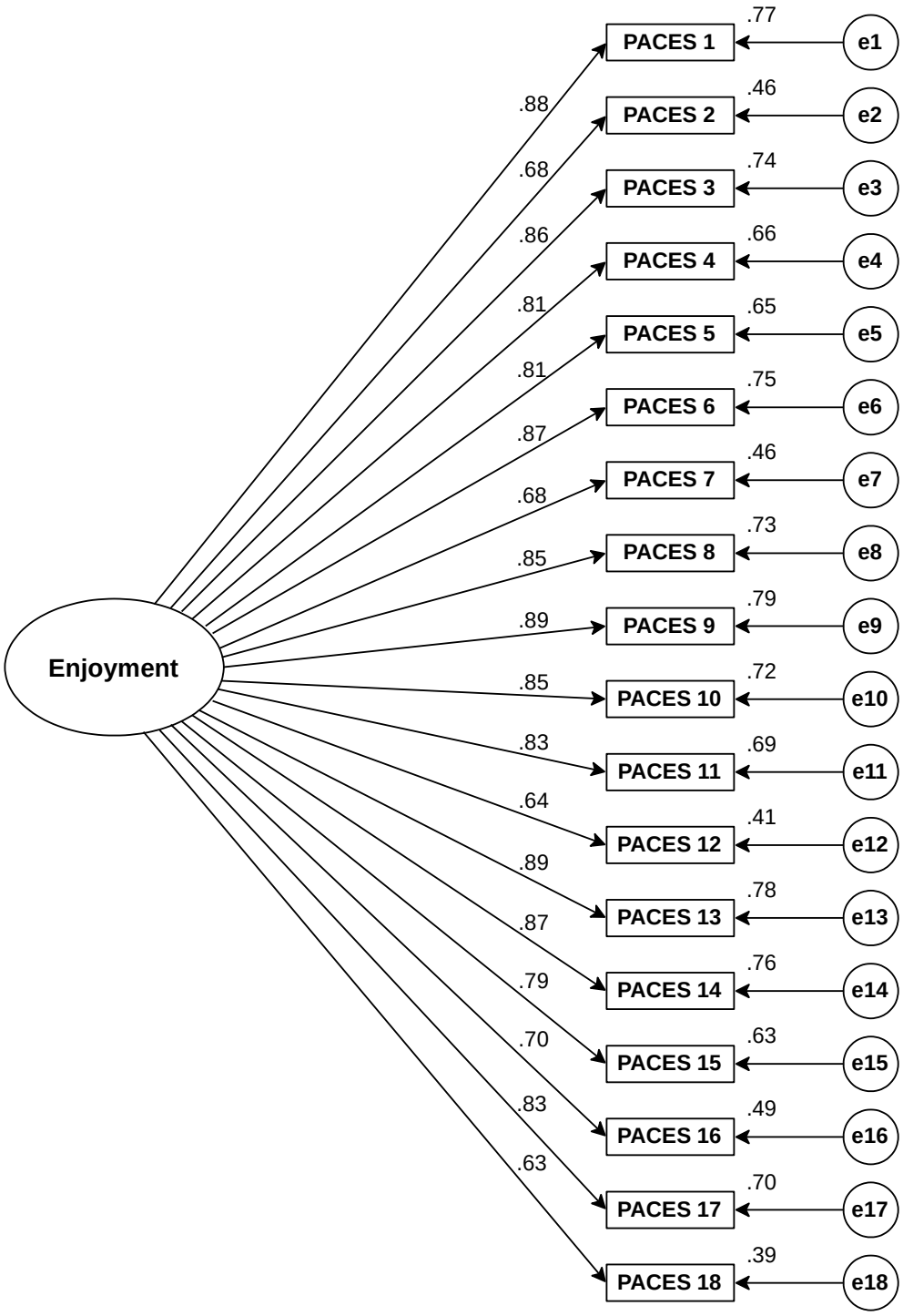

Table 2

Psychometric properties, composite reliability, convergent validity and average variance extracted of the tested models.

Model	$\chi 2$	df	CFI	TLI	SRMR	RMSEA	CR	AVE
18-Item Portuguese PACES†	528.795*	135	.936	.928	.033	.090	.97	.643
Female sample	394.561*	135	.922	.912	.038	.107		
Male sample	340.764*	135	.932	.923	.038	.089		
Mullen et al. (2011)††	24.164	20	.988	.938	–	.037		
Monteiro et al. (2017)†††	181.96**	20	.96	.94	.04	.07		
Teques et al. (2020)††	80.18*	20	.966	.952	.028	.087		
Rodrigues et al. (2021)†††	248.829	20	.949	.943	–	.076		

Note. $\chi 2$ = qui-square test; df = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; SRMR = Standardized Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation; CR = Composite Reliability; AVE = Average Variance Extracted; *B-S p < .001; **p < .01; †18-items bipolar scale; ††8-items bipolar scale; †††8-item unipolar scale.

Table 3

Multigroup analysis between sexes.

Model	$\chi 2$	df	CFI	ΔCFI	TLI	ΔTLI	SRMR	ΔSRMR	RMSEA	ΔRMSEA
Configural Invariance	735.361*	270	.927	–	.917	–	.038	–	.069	–
Weak Factorial Invariance	764.903*	287	.925	.002	.920	.003	.041	.003	.068	.001
Strong Invariance	790.510*	305	.924	.003	.923	.006	.040	.002	.061	.008
Strict Factorial Invariance	792.038*	306	.924	.003	.924	.007	.046	.008	.061	.008

Note. ΔCFI = differences in CFI; ΔTLI = differences in TLI; ΔSRMR = differences in SRMR; ΔRMSEA = differences in RMSEA; *p < .001.

DISCUSSION

The purpose of the present study was to translate and validate the original 18 items PACES (Kendzierski & DeCarlo, 1991) to the European Portuguese language. To accomplish this objective, several psychometric testing procedures were conducted to test the model's goodness of fit, validity, and reliability in our sample of the Portuguese population. Overall, the results demonstrate that the model has an adequate fit, good internal consistency, good convergent validity, and the expected association in the concurrent validity. As such, this new 18-item European Portuguese PACES is expected to solve some limitations regarding previous PACES versions in this language, and thus, enable future enjoyment research in PA.

The results of the conducted CFA exhibit adequate goodness of fit indices for the tested 18-item PACES model, complying with cut-off values recommended in the literature (Byrne, 2016; Hair, 2019; Marsh et al., 2004). The RMSEA fit index is the only exception, presenting a value (i.e., .09) slightly superior to methodological recommendations (i.e., <.08). The possibility of correlating the errors of items six and 10 to improve the model's adjustment was explored due to their covariance in the modification indices. However, this possibility was ultimately discarded because this would only marginally improve the RMSEA value (i.e., .83) and correlating errors in a CFA, although possible, is not a statistical procedure that gathers consensus in the literature (Cid et al., 2022; Hermida, 2015). Importantly, some authors consider that RMSEA values between .08 and .10 can be indicative of a reasonable adjustment (e.g., Arbuckle, 2008; Cid et al., 2022; Marsh et al., 2004). Moreover, RMSEA can be influenced by other parameters, such as sample size and degrees of freedom (Chen, 2008). As such, the recommended RMSEA cut-off value should not be interpreted as a universal rule that immediately dictates if the model fits or not. All in all, it can be considered that the model fit of the 18-item Portuguese PACES presents an adequate adjustment.

Further psychometric testing also demonstrated that the model presents good internal consistency and validity. More specifically, the composite reliability and average variance extracted scores) are above cut-off recommendations (i.e., .70 and .50 respectively; Hair, 2019; Raykov et al., 2016), and concurrent validity was achieved with a strong correlation between enjoyment and the pleasure-displeasure factor of the AFFEXX (Ekkekakis et al., 2021) questionnaire, thus reflecting the positive associations existing between enjoyment and affective responses (e.g., Bastos et al., 2022; Hutchinson et al., 2020). Additionally, all criteria of the invariance testing were met, demonstrating that the model is equivalent between sexes. These results ensure that this instrument can be adequately used for enjoyment measurement with both males and females.

With all the necessary psychometric procedures supporting its validity and reliability, the presented 18-item PACES represents the first translated and validated version of the original instrument (Kendzierski & DeCarlo, 1991) to European Portuguese, allowing for an adequate, and culturally adjusted, enjoyment measurement in this language. One particular strength of this version is the maintenance of enjoyment's theoretical roots, with psychometric testing decisions being approached from a conceptual standpoint instead of a purely statistical one. This was done to avoid the conceptual issues of some of the previous PACES versions, including some of the Portuguese translations. For example, in the present version, the original 7-point bipolar Likert scale was preserved. This maintained the bipolar assumptions regarding the enjoyment construct, an assumption that can be considered relevant for its conceptual foundations. In addition to this, the model of the 18-item Portuguese PACES achieved an adequate fit without the need, or the intent, to reduce the number of items or perform other adjustments, and thus, preserved the structural integrity of the original work of Kendzierski & DeCarlo (1991).

With this new European Portuguese PACES, researchers now dispose of an enjoyment measurement for the Portuguese population, valid and reliable in both sexes, and tested in a wide age range (16 to 73 years old). Considering the relevance of enjoyment for PA adherence (Allender et al., 2006; Gardner et al., 2017; Rodrigues et al., 2020b), this instrument is expected to facilitate future studies for this endeavor. In addition to this, exercise professionals can periodically use this instrument with Portuguese-speaking exercisers (e.g., as part of physical revaluation processes) to measure current perceptions of enjoyment regarding the exercise program they are

performing and conduct the necessary adjustments accordingly (e.g., prescribe activities perceived as more enjoyable in the case of low scores in the PACES). As such, this instrument can contribute to advancements not only in research but also in the exercise context.

Limitations and Future Directions

Considering the necessity to continuously test the psychometric properties of an instrument (Cid et al., 2022; Hair, 2019), future research should further explore this Portuguese version of the PACES. For example, performing other invariance analyses with more individual characteristics other than sex (e.g., age; exercise experience) is important to further test its adequacy for enjoyment measurement. For example, applying a test-retest analysis could strengthen this instrument's reliability. Furthermore, testing the instrument with different age groups may be particularly relevant considering some reported age-related limitations in previous psychometric testings (Crocker et al., 1995; Mullen et al., 2011), something that our study sample size did not allow.

Moreover, not only the measurement of enjoyment but also the construct of enjoyment itself needs further exploration. Some of the past versions of the PACES originated due to the model of the original (Kendzierski & DeCarlo, 1991) potentially tapping into antecedents and consequences of enjoyment and not only the enjoyment of the activity *per se* (Crocker et al., 1995; Motl et al., 2001; Raedeke, 2007). As such, these versions of the PACES were created based on assumptions that PA enjoyment is unrelated to factors that come before or after PA. However, contemporary research has positioned enjoyment as a more broad and complex construct, potentially not as unidimensional as previously thought. For example, The Affective Health Behavior Framework (Stevens et al., 2020) considers enjoyment as part of reflective affect processing related to PA. This implies that enjoyment has both implicit and explicit characteristics, taking part in reflective processes of past affective experiences, with consequences for the future maintenance of this behavior. This conflicts with the previous assumptions of enjoyment being independent of its antecedents and consequences. Furthermore, enjoyment is also integral to intrinsic motivation (Nielsen et al., 2014; Ryan & Deci, 2017). As positioned by Self Determination Theory (Deci & Ryan, 2013), an intrinsically motivated individual experiences feelings of enjoyment. Although intrinsic motivation and enjoyment are theoretically different constructs, there may be some overlap between them. An example of this is the potential (unintentional) measurement of PA enjoyment of some instruments designed to measure intrinsic motivation (Rhodes et al., 2019). Therefore, the enjoyment construct's complexity should be considered in future psychometric tests. Rodrigues et al. (2021) has already demonstrated that a bi-dimensional approach resulted in a better model fit than a unidimensional one for a version of the PACES-8. Such an exploration would be important for continuously refining the present 18-item Portuguese PACES.

Finally, it should be noted that the European Portuguese version of the AFFEXX has yet to be published. While this version of the AFFEXX is still pending publication, this instrument has been successfully translated and is currently undergoing the appropriate psychometric testing. Additionally, a previous study has applied it with no reported limitations (Teixeira et al., 2024).

CONCLUSIONS

The results of the present study demonstrate that the 18-item European Portuguese PACES possesses adequate psychometric properties for measuring PA enjoyment, in both sexes and a wide range of ages. As an instrument that closely follows the conceptual foundations of its measured construct, it is expected that this new version of the PACES will enable future enjoyment research. More psychometric testing should help to further refine this instrument, particularly with different samples and more ample explorations of the enjoyment construct.

PRATICAL APPLICATIONS

The 18-item European Portuguese PACES enables both researchers and practitioners alike with an instrument that is grounded in enjoyment's conceptual foundations. As such, we expect this new PACES to not only empower future research but also serve as an easy-to-use instrument in promoting PA adherence.

STATEMENTS AND DECLARATIONS

There is no funding or competing interests to report.

REFERENCES

1. Allender, S., Cowburn, G., & Foster, C. (2006). Understanding participation in sport and physical activity among children and adults: A review of qualitative studies. *Health Education Research*, *21*(6), 826–835. https://doi.org/10.1093/her/cyl063
2. Alves, E. D., Panissa, V. L. G., Barros, B. J., Franchini, E., & Takito, M. Y. (2019). Translation, adaptation, and reproducibility of the Physical Activity Enjoyment Scale (PACES) and Feeling Scale to Brazilian Portuguese. *Sport Sciences for Health*, *15*(2), 329–336. https://doi.org/10.1007/s11332-018-0516-4
3. American College of Sports Medicine. (2021). *ACSM's guidelines for exercise testing and prescription.* Lippincott Williams & Wilkins.
4. Arbuckle, J. (2008). Amos 17 users' guide (SPSS Ed.). *Chicago, IL*.
5. Argilaga, M. T. A., Villaseñor, A. B., Mendo, A. H., & López, J. L. L. (2011). Diseños observacionales: Ajuste y aplicación en psicología del deporte. *Cuadernos de Psicología Del Deporte*, *11*(2), 63–76.
6. Bastos, V., Andrade, A. J., Rodrigues, F., Monteiro, D., Cid, L., & Teixeira, D. S. (2022). Set to fail: Affective dynamics in a resistance training program designed to reach muscle concentric failure. *Scandinavian Journal of Medicine & Science in Sports*, *32*(12), 1710–1723. https://doi.org/10.1111/sms.14222
7. Byrne, B. M. (2016). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (3rd. ed.). Routledge.
8. Chen, C., Weyland, S., Fritsch, J., Woll, A., Niessner, C., Burchartz, A., Schmidt, S. C. E., & Jekauc, D. (2021). A Short Version of the Physical Activity Enjoyment Scale: Development and Psychometric Properties. *International Journal of Environmental Research and Public Health*, *18*(21), 11035. https://doi.org/10.3390/ijerph182111035
9. Chen, F. F. (2007). Sensitivity of Goodness of Fit Indexes to Lack of Measurement Invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, *14*(3), 464–504. https://doi.org/10.1080/10705510701301834
10. Chen, F. F. (2008). What happens if we compare chopsticks with forks? The impact of making inappropriate comparisons in cross-cultural research. *Journal of Personality and Social Psychology*, *95*(5), 1005.
11. Cheung, G. W., & Rensvold, R. B. (2002). Evaluating Goodness-of-Fit Indexes for Testing Measurement Invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, *9*(2), 233–255. https://doi.org/10.1207/S15328007SEM0902_5
12. Chung, P.-K., & Leung, K.-M. (2019). Psychometric Properties of Eight-Item Physical Activity Enjoyment Scale in a Chinese Population. *Journal of Aging and Physical Activity*, *27*(1), 61–66. https://doi.org/10.1123/japa.2017-0212

13. Cid, L., Monteiro, D., Teixeira, D. S., Evmenenko, A., Andrade, A., Bento, T., Vitorino, A., Couto, N., & Rodrigues, F. (2022). Assessment in Sport and Exercise Psychology: Considerations and Recommendations for Translation and Validation of Questionnaires. *Frontiers in Psychology*, *13*, 806176. https://doi.org/10.3389/fpsyg.2022.806176
14. Crocker, P. R. E., Bouffard, M., & Gessaroli, M. E. (1995). Measuring Enjoyment in Youth Sport Settings: A Confirmatory Factor Analysis of the Physical Activity Enjoyment Scale. *Journal of Sport and Exercise Psychology*, *17*(2), 200–205. https://doi.org/10.1123/jsep.17.2.200
15. Czikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper & Row.
16. Davidson, S. (2018). *A Multi-dimensional model of enjoyment: Development and validation of an enjoyment scale (ENJOY)*. Embry-Riddle Aeronautical University.
17. Deci, E. L., & Ryan, R. M. (1985). Conceptualizations of intrinsic motivation and self-determination. *Intrinsic Motivation and Self-Determination in Human Behavior*, 11–40.
18. Deci, E. L., & Ryan, R. M. (2013). *Intrinsic motivation and self-determination in human behavior*. Springer Science & Business Media.
19. DiLorenzo, T. M., Stucky-Ropp, R. C., Vander Wal, J. S., & Gotham, H. J. (1998). Determinants of Exercise among Children. II. A Longitudinal Analysis. *Preventive Medicine*, *27*(3), 470–477. https://doi.org/10.1006/pmed.1998.0307
20. Dishman, R. K., Motl, R. W., Sallis, J. F., Dunn, A. L., Birnbaum, A. S., Welk, G. J., Bedimo-Rung, A. L., Voorhees, C. C., & Jobe, J. B. (2005). Self-Management Strategies Mediate Self-Efficacy and Physical Activity. *American Journal of Preventive Medicine*, *29*(1), 10–18. https://doi.org/10.1016/j.amepre.2005.03.012
21. Dukes, D., Abrams, K., Adolphs, R., Ahmed, M. E., Beatty, A., Berridge, K. C., Broomhall, S., Brosch, T., Campos, J. J., Clay, Z., Clément, F., Cunningham, W. A., Damasio, A., Damasio, H., D'Arms, J., Davidson, J. W., De Gelder, B., Deonna, J., De Sousa, R., … Sander, D. (2021). The rise of affectivism. *Nature Human Behaviour*, *5*(7), 816–820. https://doi.org/10.1038/s41562-021-01130-8
22. Ekkekakis, P., Parfitt, G., & Petruzzello, S. J. (2011). The Pleasure and Displeasure People Feel When they Exercise at Different Intensities: Decennial Update and Progress towards a Tripartite Rationale for Exercise Intensity Prescription. *Sports Medicine*, *41*(8), 641–671. https://doi.org/10.2165/11590680-000000000-00000
23. Ekkekakis, P., Zenko, Z., Ladwig, M. A., & Hartman, M. E. (2018). Affect as a potential determinant of physical activity and exercise. *Affective Determinants of Health Behavior*, 237–261.
24. Ekkekakis, P., Zenko, Z., & Vazou, S. (2021). Do you find exercise pleasant or unpleasant? The Affective Exercise Experiences (AFFEXX) questionnaire. *Psychology of Sport and Exercise*, *55*, 101930. https://doi.org/10.1016/j.psychsport.2021.101930
25. Gardner, L. A., Magee, C. A., & Vella, S. A. (2017). Enjoyment and Behavioral Intention Predict Organized Youth Sport Participation and Dropout. *Journal of Physical Activity and Health*, *14*(11), 861–865. https://doi.org/10.1123/jpah.2016-0572
26. Gravetter, F. J., Wallnau, L. B., Forzano, L.-A. B., & Witnauer, J. E. (2021). *Essentials of statistics for the behavioral sciences*. Cengage Learning.
27. Hair, J. F. (2019). *Multivariate data analysis* (8th Ed.). Hoboken, NJ: Pearson Educational.
28. Harriss, D., MacSween, A., & Atkinson, Gjij. (2019). Ethical standards in sport and exercise science research: 2020 update. *International Journal of Sports Medicine*, *40*(13), 813–817.
29. Hermida, R. (2015). The problem of allowing correlated errors in structural equation modeling: Concerns and considerations. *Computational Methods in Social Sciences*, *3*(1), 5–17.

30. Hutchinson, J. C., Zenko, Z., Santich, S., & Dalton, P. C. (2020). Increasing the Pleasure and Enjoyment of Exercise: A Novel Resistance-Training Protocol. *Journal of Sport and Exercise Psychology*, *42*(2), 143–152. https://doi.org/10.1123/jsep.2019-0089

31. Jekauc, D., Nigg, C., Nigg, C. R., Reichert, M., Krell-Roesch, J., Oriwol, D., Schmidt, S., Wunsch, K., & Woll, A. (2020). Measurement properties of the German version of the Physical Activity Enjoyment Scale for adults. *Plos One*, *15*(11), e0242069.

32. Jekauc, D., Voelkle, M., Wagner, M. O., Mewes, N., & Woll, A. (2013). Reliability, Validity, and Measurement Invariance of the German Version of the Physical Activity Enjoyment Scale. *Journal of Pediatric Psychology*, *38*(1), 104–115. https://doi.org/10.1093/jpepsy/jss088

33. Kendzierski, D., & DeCarlo, K. J. (1991). Physical activity enjoyment scale: Two validation studies. *Journal of Sport & Exercise Psychology*, *13*(1).

34. Khongrassame, M., Chainarong, A., Sawanyawisuth, K., & Putthithanasombat, K. (2023). Thai Version of the Modified Physical Activity Enjoyment Scale (PACES) for High School Students. *Journal of Medical Association Thai*, *106*, 1.

35. Markland, D., & Hardy, L. (1993). The exercise motivations inventory: Preliminary development and validity of a measure of individuals' reasons for participation in regular physical exercise. *Personality and Individual Differences*, *15*(3), 289–296. https://doi.org/10.1016/0191-8869(93)90219-S

36. Marsh, H. W., Hau, K.-T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling*, *11*(3), 320–341.

37. Monteiro, D., Nunes, G., Marinho, D. A., Couto, N., Antunes, R., Moutão, J., & Cid, L. (2017). Translation and adaptation of the physical activity enjoyment scale (PACES) in a sample of Portuguese athletes, invariance across genders nature sports and swimming. *Brazilian Journal of Kinanthropometry and Human Performance*, *19*(6), 631–643. https://doi.org/10.5007/1980-0037.2017v19n6p631

38. Moore, J. B., Yin, Z., Hanes, J., Duda, J., Gutin, B., & Barbeau, P. (2009). Measuring enjoyment of physical activity in children: Validation of the physical activity enjoyment scale. *Journal of Applied Sport Psychology*, *21*(S1), S116–S129.

39. Moreno, J.-A., González-Cutre, D., Martínez, C., Alonso, N., & López, M. (2014). Propiedades psicométricas de la Physical Activity Enjoyment Scale (PACES) en el contexto español. *Estudios de Psicología*, *29*(2), 173–180.

40. Morin, A. J. S., Arens, A. K., & Marsh, H. W. (2016). A Bifactor Exploratory Structural Equation Modeling Framework for the Identification of Distinct Sources of Construct-Relevant Psychometric Multidimensionality. *Structural Equation Modeling: A Multidisciplinary Journal*, *23*(1), 116–139. https://doi.org/10.1080/10705511.2014.961800

41. Motl, R. W., Dishman, R. K., Saunders, R., Dowda, M., Felton, G., & Pate, R. R. (2001). Measuring enjoyment of physical activity in adolescent girls. *American Journal of Preventive Medicine*, *21*(2), 110–117.

42. Mullen, S. P., Olson, E. A., Phillips, S. M., Szabo, A. N., Wójcicki, T. R., Mailey, E. L., Gothe, N. P., Fanning, J. T., Kramer, A. F., & McAuley, E. (2011). Measuring enjoyment of physical activity in older adults: Invariance of the physical activity enjoyment scale (paces) across groups and time. *International Journal of Behavioral Nutrition and Physical Activity*, *8*, 1–9.

43. Nasuti, G., & Rhodes, R. E. (2013). Affective judgment and physical activity in youth: Review and meta-analyses. *Annals of Behavioral Medicine*, *45*(3), 357–376.

44. Nevitt, J., & Hancock, G. R. (2001). Performance of bootstrapping approaches to model test statistics and parameter standard error estimation in structural equation modeling. *Structural Equation Modeling*, *8*(3), 353–377.

45. Nielsen, G., Wikman, J. M., Jensen, C. J., Schmidt, J. F., Gliemann, L., & Andersen, T. R. (2014). Health promotion: The impact of beliefs of health benefits, social relations and enjoyment on exercise continuation: Football as health promotion. *Scandinavian Journal of Medicine & Science in Sports*, *24*, 66–75. https://doi.org/10.1111/sms.12275

46. Pedersen, B. K., & Saltin, B. (2015). Exercise as medicine–evidence for prescribing exercise as therapy in 26 different chronic diseases. *Scandinavian Journal of Medicine & Science in Sports*, *25*, 1–72.

47. Raedeke, T. D. (2007). The relationship between enjoyment and affective responses to exercise. *Journal of Applied Sport Psychology*, *19*(1), 105–115.

48. Raykov, T. (1997). Scale reliability, Cronbach's coefficient alpha, and violations of essential tau-equivalence with fixed congeneric components. *Multivariate Behavioral Research*, *32*(4), 329–353.

49. Raykov, T., Gabler, S., & Dimitrov, D. M. (2016). Maximal Reliability and Composite Reliability: Examining Their Difference for Multicomponent Measuring Instruments Using Latent Variable Modeling. *Structural Equation Modeling: A Multidisciplinary Journal*, *23*(3), 384–391. https://doi.org/10.1080/10705511.2014.966369

50. Rhodes, R. E., Fiala, B., & Conner, M. (2009). A review and meta-analysis of affective judgments and physical activity in adult populations. *Annals of Behavioral Medicine*, *38*(3), 180–204.

51. Rhodes, R. E., Gray, S. M., & Husband, C. (2019). Experimental manipulation of affective judgments about physical activity: A systematic review and meta-analysis of adults. *Health Psychology Review*, *13*(1), 18–34. https://doi.org/10.1080/17437199.2018.1530067

52. Rhodes, R. E., & Kates, A. (2015). Can the Affective Response to Exercise Predict Future Motives and Physical Activity Behavior? A Systematic Review of Published Evidence. *Annals of Behavioral Medicine*, *49*(5), 715–731. https://doi.org/10.1007/s12160-015-9704-5

53. Rodrigues, F., Cid, L., Forte, P., Gonçalves, C., Machado, S., Neiva, H., Teixeira, D., & Monteiro, D. (2020a). A perceção de divertimento em jovens, adultos e idosos: Um estudo comparativo. *Cuadernos de Psicología Del Deporte*, *20*(2), 26–36.

54. Rodrigues, F., Forte, P., Teixeira, D. S., Cid, L., & Monteiro, D. (2021). The Physical Activity Enjoyment Scale (Paces) as a Two-Dimensional Scale: Exploratory and Invariance Analysis. *Montenegrin Journal of Sports Science and Medicine*, *10*(1), 61–66. https://doi.org/10.26773/mjssm.210309

55. Rodrigues, F., Teixeira, D. S., Neiva, H. P., Cid, L., & Monteiro, D. (2020b). The bright and dark sides of motivation as predictors of enjoyment, intention, and exercise persistence. *Scandinavian Journal of Medicine & Science in Sports*, *30*(4), 787–800. https://doi.org/10.1111/sms.13617

56. Ryan, R. M., & Deci, E. L. (Eds.). (2017). *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. Guilford Press. https://doi.org/10.1521/978.14625/28806

57. Sperandei, S., Vieira, M. C., & Reis, A. C. (2016). Adherence to physical activity in an unsupervised setting: Explanatory variables for high attrition rates among fitness center members. *Journal of Science and Medicine in Sport*, *19*(11), 916–920. https://doi.org/10.1016/j.jsams.2015.12.522

58. Stevens, C. J., Baldwin, A. S., Bryan, A. D., Conner, M., Rhodes, R. E., & Williams, D. M. (2020). Affective Determinants of Physical Activity: A Conceptual Framework and Narrative Review. *Frontiers in Psychology*, *11*, 568331. https://doi.org/10.3389/fpsyg.2020.568331

59. Teixeira, D. S., Bastos, V., Andrade, A. J., Palmeira, A. L., & Ekkekakis, P. (2024). Individualized pleasure-oriented exercise sessions, exercise frequency, and affective outcomes: A pragmatic randomized controlled trial. *International Journal of Behavioral Nutrition and Physical Activity*, *21*(1), 85.

60. Teixeira, D. S., Ekkekakis, P., Andrade, A., Rodrigues, F., Evmenenko, A., Faria, J., Marques, P., Cid, L., & Monteiro, D. (2023). Preference for and tolerance of the intensity of exercise questionnaire (PRETIE-Q): Validity, reliability and gender invariance in Portuguese health club exercisers. *Current Psychology*, *42*(5), 4119–4132. https://doi.org/10.1007/s12144-021-01718-3

61. Teixeira, D. S., Rodrigues, F., Cid, L., & Monteiro, D. (2022). Enjoyment as a Predictor of Exercise Habit, Intention to Continue Exercising, and Exercise Frequency: The Intensity Traits Discrepancy Moderation Role. *Frontiers in Psychology*, *13*, 780059. https://doi.org/10.3389/fpsyg.2022.780059

62. Teques, P., Calmeiro, L., Silva, C., & Borrego, C. (2020). Validation and adaptation of the Physical Activity Enjoyment Scale (PACES) in fitness group exercisers. *Journal of Sport and Health Science*, *9*(4), 352–357. https://doi.org/10.1016/j.jshs.2017.09.010

63. The Lancet. (2021). A sporting chance: Physical activity as part of everyday life. *The Lancet*, *398*(10298), 365. https://doi.org/10.1016/S0140-6736(21)01652-4

64. Warburton, D. E., & Bredin, S. S. (2017). Health benefits of physical activity: A systematic review of current systematic reviews. *Current Opinion in Cardiology*, *32*(5), 541–556.

65. Williams, D. M. (2008). Exercise, Affect, and Adherence: An Integrated Model and a Case for Self-Paced Exercise. *Journal of Sport and Exercise Psychology*, *30*(5), 471–496. https://doi.org/10.1123/jsep.30.5.471

66. World Health Organization. (2022). *Global status report on physical activity 2022*.