

## Versión portuguesa de la Escala de Estado de Ansiedad en Educación Física: Propiedades psicométricas y su asociación con el sexo, edad y actividad física extracurricular

### Portuguese version of the Physical Education State Anxiety Scale: Psychometric properties and its association with gender, age and extracurricular physical activity

### Versão portuguesa da Escala de Estado de Ansiedade em Educação Física: Propriedades psicométricas e sua associação com o sexo, idade e atividade física extracurricular

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**Resumen:** El objetivo de este estudio fue la traducción y adaptación cultural de la escala PESAS en portugués, evaluar sus propiedades psicométricas, e investigar los efectos del género, la edad y la actividad física extracurricular, en las diferentes dimensiones de PESAS (ansiedad somática, procesos cognitivos y preocupación). La muestra fue de 496 estudiantes (221 varones, 275 mujeres) con edades comprendidas entre 13 y 21 años ( $M = 15,71$ ,  $SD = 1,34$ ). El análisis factorial confirmatorio confirmó una adecuada validez factorial de la estructura multidimensional original de tres factores (procesos cognitivos, ansiedad somática y preocupaciones/miedos). Las estudiantes reportaron niveles más altos en las dimensiones de la ansiedad, en comparación con los varones. Los practicantes de actividad física extracurricular revelaron niveles más bajos de los procesos cognitivos y preocupaciones/miedos. La edad correlacionó negativamente con los procesos cognitivos y la ansiedad somática. Estos resultados apoyan el uso de la versión portuguesa de la escala PESAS y proporcionan información adicional sobre el estado de ansiedad en la educación física escolar.

**Palabras clave:** validez, fiabilidad, estado de ansiedad, educación física.

**Abstract:** This study aims to provide the translation and the cultural adaptation of the Physical Education State Anxiety Scale (PESAS) in Portuguese, assess its psychometric properties, and investigate the effects of gender, age and extracurricular physical activity, on the different dimensions of PESAS (somatic anxiety, cognitive processes and worry). The sample comprised 496 students (221 male, 275 female) aged between 13 and 21 years ( $M = 15,71$ ,  $SD = 1,34$ ). Confirmatory factor analysis confirmed the original factor structure of the scale. There was appropriate factorial validity of the

3-factor structure (somatic anxiety, cognitive processes and worry). Female students reported higher levels in the dimensions of anxiety, in comparison to boys. Students who practiced extracurricular physical activity revealed lower levels of cognitive processes and worries/fears. Age negatively correlated with cognitive processes and somatic anxiety. These findings support the use of the Portuguese version of PESAS and provide additional information about state anxiety in school physical education.

**Keywords:** Validity, reliability, state anxiety, physical education.

**Resumo:** O presente estudo tem como objetivos a tradução e adaptação transcultural do PESAS para Português, assim como, verificar as suas propriedades psicométricas e investigar o efeito do sexo, idade e atividade física extraescolar nas dimensões do PESAS (ansiedade somática, processos cognitivos e preocupações/receios). A amostra foi constituída por 496 alunos (221 rapazes e 275 raparigas) com idades compreendidas entre os 13 e os 21 anos ( $M = 15,71$ ,  $DP = 1,34$ ). A análise fatorial confirmatória confirmou uma apropriada validade fatorial para a estrutura multidimensional original de 3 fatores (processos cognitivos, ansiedade somática e preocupações/receios). As alunas reportaram níveis significativamente superiores nas dimensões de ansiedade em comparação aos rapazes. Os alunos praticantes de atividade física extraescolar revelaram menores níveis de processos cognitivos e preocupações/receios. A idade associou-se negativamente com os processos cognitivos e a ansiedade somática. Estes resultados suportam a utilização da versão portuguesa do PESAS e revelam novas evidências sobre a ansiedade-estado no contexto da educação física escolar.

**Palavras-chave:** Validade, confiabilidade, ansiedade-estado, educação física

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## Introduction

Anxiety has been defined as the emotional reaction triggered by a stimulus which, despite its objective nature, is interpreted as a threat (Spielberger, 1972). Typically, the experience of anxiety corresponds to a negative emotional state followed by feelings of worry, apprehension and nervousness (Weinberg and Gould, 2003). Anxiety has been considered among the most important psychological factors influencing physical performance in several achievement contexts (Barkoukis, 2007) and can be divided into two components: state and trait anxiety. State anxiety refers to a transitory and unpleasant emotional response to a specific stressful situation, whereas trait anxiety refers to a stable predisposition/personality characteristic associated to high degrees of anxiety over a long period of time and across different situations (Martens et al., 1990; Spielberger, 1972).

Physical Education is an achievement context that can elicit anxiety responses (Barkoukis, 2007; Tremayne, 1995). Perceptions of low competence, social evaluation, comparison with peers, and a normative-based evaluation are only some sources that can trigger the experience of anxiety in students. Moreover, participation in drills or tests in high-pressure conditions has also demonstrated to be associated to significant drops on sports performance (Molina, Chorot, Valiente, & Sandín, 2014), especially in students with high anxiety sensitivity (Molina, Sandín, & Chorot, 2014). According to Weinberg and Gould (2003), past evidence in Physical Education revealed anxiety symptoms in the cognitive, emotional, physiological, and behavioural fields, and the processing of information. Still, research evidence on the determinants and consequences of the anxiety experience during physical education lessons is rather limited (Barkoukis, 2007).

One reason is the lack of a psychometrically sound instrument to measure students' anxiety levels. The majority of research investigating the role of anxiety in physical education has used sport-specific measures of anxiety. However, Barkoukis et al. (2012) argued that Physical Education is a unique context involving competition in physical tasks but having as fundamental objective the development of gross motor skills and familiarisation with sport tasks (Klein and Hardman, 2008). Hence, it should be distinguished from other physical activity contexts and Physical Education-specific instruments should be developed to more accurately measure anxiety in this context. With this in mind, Barkoukis (2001) developed the *Physical Education State Anxiety Scale* (PESAS) to measure students' anxiety in the context of Physical Education lessons. This instrument was based on multidimensional anxiety theory (Martens et al., 1990) and assessed two main dimensions proliferated by the theory, namely somatic and cognitive anxiety. As Physical Educa-

tion incorporates both physical and educational elements, Barkoukis suggested the distinction of cognitive anxiety dimension into a) the worry dimension, reflecting negative expectations about performance, and b) the cognitive processes dimension corresponding to the processes associated with learning and influenced by anxiety (see Barkoukis et al., 2005, 2012). Hence, PESAS consists of three subscales, namely somatic anxiety, worry, and cognitive processes.

Development of PESAS has undergone a thorough procedure (see Barkoukis et al., 2005, 2012 for a thorough description of scale development). Barkoukis et al. (2005) provided strong evidence on the factorial validity and reliability of PESAS. Both exploratory and confirmatory factor analyses supported the proposed factor structure. The exploratory factor analysis explained 53.4% of total variance, whereas the incremental indices in the confirmatory factor analysis were acceptable and satisfactory. Internal consistency coefficients provided support on the reliability of the scale's dimensions (Cronbach alphas > 0.79). In addition, Barkoukis, Tsorbatzoudis and Grouios (2008) provided evidence on the construct validity of the scale using a multitrait-multimethod approach. The results of the analyses supported the convergent validity of the scale, and reasonable discriminant validity was also reported. Overall, PESAS has been considered a valid and reliable tool to measure the experience of anxiety during Physical Education lessons.

Past evidence has shown that anxiety levels may differ as a function of gender and age. More specifically, prior research indicated that girls are more anxious compared to boys (Borges et al., 2008; Matos et al., 2003; Souza et al. 2012). This has been attributed to the greater social approval requested by girls and the boys' greater resistance to admit feelings of anxiety (Batista and Oliveira, 2005). With regard to age, younger athletes tend to be more anxious compared to older ones, implying that older athletes demonstrate greater use of coping strategies (Borges et al., 2008). Souza et al. (2012) found that higher sporting experience was associated with lower cognitive and somatic anxiety, as a result of higher self-reliance. These findings may however imply that adolescents participating in competitive sport may report lower anxiety levels in another less competitive and demanding setting, such as physical education. Nevertheless, as anxiety research in Physical Education is scarce, there is no evidence on the function of anxiety with respect to gender, age and out-of-school physical activity participation.

The present study was set out to investigate anxiety in Physical Education settings. The primary purpose of the study was to translate and culturally adapt PESAS to Portuguese. PESAS is the only instrument developed to measure state anxiety in Physical Education. Having in mind the need for situation-specific questionnaires, it is deemed the most appropriate instrument to study Physical Education anxiety in

Portuguese-speaking students. As noted before, PESAS has undergone a thorough development process and considered to be a valid and reliable scale (Barkoukis et al., 2005, 2008, 2012). Thus, we hypothesized that the Portuguese version of the scale will fit to the original scale. A secondary purpose of the study was to investigate the existence of differences in physical education anxiety levels with respect to gender and leisure-time physical activity, and its relations to students' age. There is no past evidence assessing these issues. Thus, relying on evidence in sport settings we assumed that girls will display higher levels of both somatic and cognitive anxiety as compared to boys, students participating in leisure-time physical activity will demonstrate lower levels of cognitive and somatic anxiety as compared to non-participants, and age will be negatively associated with cognitive and somatic anxiety.

## Methods

### Participants

The sample consisted of 496 students (221 males and 275 females), from 7th to 12th grade, who attend physical education classes and belong to a group of schools in the northern region of Portugal. The students' age ranged from 13 to 21 years ( $M = 15,71$ ,  $SD = 1,34$ ). No age differences were found between males and females ( $t_{(494)} = -0,66$ ,  $p = 0,511$ , boys =  $15,67 \pm 1,38$ , girls =  $15,75 \pm 1,30$ ). One hundred seventy five students (36,0%) were physically active out of school, while 311 (64,0%) students were not (10 students did not respond).

### Measures

**Physical Education State Anxiety Scale (PESAS).** The scale consists of 18 items measuring three anxiety dimensions: somatic anxiety (items 2, 5, 8, 11, 14 and 17), worry (3, 6, 9, 12, 15 and 18 items) and cognitive processes (items 1, 4, 7, 10, 13 and 16). The somatic anxiety subscale assesses perceptions of physical symptoms, such as "I feel shortness of breath", "I feel uncomfortable breathing", "I feel dizzy," or "I have a sense of pressure in the chest." The worry subscale reflects negative expectations about the performance and the consequences of possible failures. This subscale emphasizes the learning process ("I'm afraid of making mistakes while performing the exercises", "While performing the exercises, I am afraid to make mistakes"), evaluation ("I'm afraid of failing to perform the exercises.", "I think about the consequences of possible errors during evaluations") and performance ("I worry about a possible poor performance", "I care too much about the physical tests"). The cognitive processes subscale assesses symptoms of concerning to the processing of information during physical education classes, such as attention

("I have difficulties concentrating in the proposed exercises"), memory ("I have difficulties memorising the information for the years presented"), recovery of long-term memory ("I have difficulties remembering exercises and games that I already know"), negative thoughts ("I have strange thoughts that disturb me") and problem solving ("I have difficulties grasping the pattern in complex exercises"). Participants responded on a 5-point Likert scale ranging from 1 (*never*) to 5 (*always*), with higher values reflecting higher levels of anxiety. A composite score was computed for each anxiety dimension. **Translation of PESAS.** The process of translation and cultural adaptation of PESAS involved three steps. The first step included the translation of the scale from English to Portuguese and then back-translated from Portuguese to English, by two independent bilingual teachers. In the second step, a group of three experts with degrees in Sports Science, and Psychology of Sports and Exercise, compared the original and the back-translated versions in order to identify any errors, inconsistencies or biases. Where there was no consensus on the similarity and congruency between the two versions, item wording modifications were suggested, discussed and consensually made by all the experts, resulting in the final version of the scale used in the present study.

### Procedure

This study was approved by the Portuguese Ministry for Education and Science/DGIDC ethics committee, according to reference MIMÉ 0363300001/2013. We handed in the authorisation request to the School Director for the data collection. In addition, signed informed consent was obtained from the parents of all students under age 18 or by students themselves aged 18 or above. Participants were informed about the purpose of the study and they were reassured about the anonymity and confidentiality of their responses. Both written and oral instructions were given to students to facilitate the comprehension of the items. The questionnaires were administered in a calm and quiet place, at the beginning of a Physical Education lesson. Prior questionnaire administration students were informed to be taking a physical test immediately after questionnaire completion. The questionnaire completion was supervised by trained personnel and lasted approximately 10 minutes.

### Statistical analysis

Initially, the descriptive statistics of the items were calculated (absolute and relative frequency, mean and standard deviation). The internal consistency of the factors was estimated using Cronbach's alpha. Indices above 0,80 indicate excellent reliability (Ribeiro, 1999). Normal distribution was estimated via the kurtosis and skewness coefficients, and the

acceptable range was established between -1 and +1 (Maroco, 2007). To test the factorial validity of the scale both exploratory (EFA) and confirmatory (CFA) factor analyses were performed. Firstly, a principal component with varimax rotation (acceptable factor loadings should be above 0,40; see Worthington & Whittaker, 2006) was performed to screen the distribution of the items into the hypothesized factors. These statistical analyses were performed with the IBM® SPSS® Statistics 20.0. Subsequently, CFAs were performed using EQS 6.1 to evaluate the hypothesized factor structures. Satorra-Bentler correction for deviation from normality was used. Both absolute and incremental fit indices were used to estimate model fit. Absolute indices included  $\chi^2$  and  $\chi^2/df$  (chi-square by degrees of freedom). The incremental indices included Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR). One-way MANOVA tests followed by one-way ANOVAs were used to test for differen-

ces between gender and leisure-time physical activity levels. The relation between age and factors in PESAS was assessed using Pearson correlation coefficients. The significance level was set at 5% ( $p < 0,05$ ).

## Results

### Descriptive statistics

Table 1 presents the descriptive statistics for all items of the scale. The mean scores of the PESAS items ranged from 1,42  $\pm$  0,77 (item 8) to 3,09  $\pm$  1,20 (item 9). The values of univariate normality indicated a deviation from the normal range varying between -0,06 and 2,13 (skewness) and between -0,91 and 4,82 (kurtosis). Overall, students reported higher scores on the items of the worry dimension (items 3, 6, 9, 12, 15 and 18).

**Table 1.** Descriptive Analysis of the PESAS' Items.

	M $\pm$ SD	Skewness	Kurtosis
1. I find it difficult to remember information about the tasks presented.	2,16 $\pm$ 0,88	0,77	1,00
2. I feel as though I am short of breath.	1,72 $\pm$ 0,90	1,25	1,26
3. I am concerned about making errors during task execution.	2,81 $\pm$ 1,08	0,19	-0,57
4. I find it difficult to focus on the Physical Education task presented.	1,98 $\pm$ 0,81	0,93	1,49
5. I feel discomfort when I breathe.	1,65 $\pm$ 0,86	1,42	1,91
6. When performing the tasks, I feel uneasy about potential mistakes.	2,43 $\pm$ 1,03	0,46	-0,27
7. I find it difficult to memorise information regarding the tasks presented.	1,95 $\pm$ 0,76	0,94	1,95
8. I feel dizzy.	1,42 $\pm$ 0,77	2,13	4,82
9. I worry a lot about the physical tests.	3,09 $\pm$ 1,20	-0,06	-0,91
10. I find it difficult to remember Physical Education tasks I already know.	1,73 $\pm$ 0,78	1,21	2,08
11. I sense a feeling of pressure on my chest.	1,60 $\pm$ 0,84	1,55	2,40
12. I am concerned about failing when performing the tasks.	2,55 $\pm$ 1,12	0,43	-0,62
13. Irrelevant thoughts disturb my thinking.	1,64 $\pm$ 0,86	1,60	2,85
14. My body is aching.	2,06 $\pm$ 0,90	0,86	0,74
15. I think about the consequences of possible mistakes in the test.	2,91 $\pm$ 1,20	0,06	-0,89
16. I have difficulty understanding the pattern of such complex tasks.	2,06 $\pm$ 0,85	0,93	1,50
17. I feel as if something is choking me.	1,43 $\pm$ 0,76	2,05	4,62
18. I worry that I will perform badly.	2,97 $\pm$ 1,21	0,00	-0,90

### Factorial validity of the scale

**Exploratory Factor Analysis (EFA).** A principal component EFA with varimax rotation was conducted to identify the distribution of the items into factors, and by group together related items. For the analysis of the main components factors with the eigenvalues greater than 1 were selected. In Table 2, the factor solution is presented. The analysis revealed

the existence of three factors with eigenvalues greater than 1 and explaining a 59,73% of the total variance. The commonality of the items ranged from 0,302 (item 9) and 0,702 (items 5 and 12). Factor 1 (Somatic Anxiety) explained 41,06% of the variance (eigenvalue = 7,39), Factor 2 (Worry) 11,94% of the variance (eigenvalue = 2,15), and Factor 3 (Cognitive Processes) 6,73% of the variance (eigenvalue = 1,21). The grouping of the items was almost identical to the

proposed factor structure. Only item 13 “Irrelevant thoughts disturb my thinking” loaded on Somatic Anxiety instead of Cognitive Processes. All factorial saturations were above 0,40.

**Table 2.** Factor loadings, Eigenvalues, Variance of each Subscale and Total Variance.

	F1	F2	F3
5. I feel discomfort when I breathe.	0,807		
11. I sense a feeling of pressure on my chest.	0,805		
17. I feel as if something is choking me.	0,778		
2. I feel as though I am short of breath.	0,775		
8. I feel dizzy.	0,698		
14. My body is aching.	0,597		
13. Irrelevant thoughts disturb my thinking.	0,523		
18. I worry that I will perform badly.		0,790	
12. I am concerned about failing when performing the tasks.		0,781	
15. I think about the consequences of possible mistakes in the test.		0,754	
3. I am concerned about making errors during task execution.		0,739	
6. When performing the tasks, I feel uneasy about potential mistakes.		0,675	
9. I worry a lot about the physical tests.		0,543	
1. I find it difficult to remember information about the tasks presented.			0,759
7. I find it difficult to memorise information regarding the tasks presented.			0,738
4. I find it difficult to focus on the Physical Education task presented.			0,690
10. I find it difficult to remember Physical Education tasks I already know.			0,645
16. I have difficulty understanding the pattern of such complex tasks.			0,581
<i>Eigenvalues</i>	7,39	2,15	1,21
Total variance explained by each factor (%)	41,06	11,90	6,73
Total variance explained (%)		59,73	

Note: F1 = Somatic anxiety, F2 = Worry, F3 = Cognitive processes

**Confirmatory Factor Analysis (CFA).** Four models were tested and compared. The first model, measurement model, included one-dimensional structure. The second model was a two-factor structure comprising a somatic and a cognitive dimension (worry and cognitive processes merged). The third model involved the original factor structure (Barkoukis et al., 2005) consisting of three factors with six items each. The fourth model tested the factor structure obtained in the EFA. The fit indices resulting from the CFA are shown in Table 3. The results demonstrated that the one-factor measurement model has unacceptable levels of model fit ( $\chi^2/_{df} = 8,75$ , CFI = 0,541, SRMR = 0,101, RMSEA = 0,126), as well as the two-factor structure ( $\chi^2/_{df} = 7,54$ , CFI = 0,690, SRMR = 0,092, RMSEA = 0,101). The three factor models revealed better model fit than the one-dimensional measurement model. No significant  $\chi^2$  differences were found between the two three-

factor models ( $p > 0,05$ ), and thus the original factor structure (Barkoukis et al., 2005) was deemed as the most appropriate one. However, the fit indices of this analysis, although close, didn't meet the criterion of acceptable model fit (Hu and Bentler, 1999). The Lagrange Multiplier Test proposed that the addition of residual co-variances between residual errors of items 15 and 18, and between items 9 and 18 would increase the adequacy of the model. Having in mind that these items belong to the same factor and show some similarities of content, the model was re-specified. The results of the CFA indicated a borderline but adequate fit of the data to the proposed factor structure:  $\chi^2/_{df} = 2,61$ , CFI = 0,903; SRMR = 0,051; RMSEA = 0,057 (0,050-0,065). Inter-scale zero order correlations ranged from 0,44 ( $p < 0,001$ ) for the somatic anxiety and the worry dimensions, to 0,67 ( $p < 0,001$ ) for the somatic anxiety and cognitive processes scales.

**Table 3.** Fit Indices of Confirmatory Factor Analysis.

Models	$\chi^2/df$	CFI	SRMR	RMSEA
Unidimensional	8,75	0,541	0,101	0,126 (0,119–0,132)
Bi-dimensional	7,54	0,690	0,092	0,101 (0,094–0,108)
3 Factors – original	3,29	0,859	0,056	0,068 (0,068–0,074)
3 Factors – EFA	3,21	0,865	0,054	0,067 (0,060–0,074)
3 Factors – re-specified	2,61	0,903	0,051	0,057 (0,050–0,065)

### Reliability of the scale

Cronbach's alpha coefficient was used to test the internal consistency of the subscales. The internal consistency coefficients were high and acceptable for all subscales,  $\alpha = 0,83$  for cognitive processes,  $\alpha = 0,88$  for somatic anxiety, and  $\alpha = 0,84$  for worry. Similar scores were found for the version produced by the EFA ( $\alpha = 0,82$  for cognitive processes,  $\alpha = 0,88$  for somatic anxiety, and  $\alpha = 0,84$  for worry).

### Gender differences

The results of the one-way MANOVA, revealed significant gender differences between boys and girls ( $F = 29,98$ ,  $p < 0,001$ ,  $\eta^2 = 0,16$ ) in all PESAS dimensions. Follow-up ANOVAs indicated significant gender differences on Cognitive Processes ( $F = 15,69$ ,  $p < 0,001$ ,  $\eta^2 = 0,003$ ), Somatic Anxiety ( $F = 26,10$ ,  $p < 0,001$ ,  $\eta^2 = 0,05$ ) and Worry ( $F = 83,75$ ,  $p < 0,001$ ,  $\eta^2 = 0,15$ ). In all instances, girls reported higher scores as compared to boys (Table 4).

**Table 4.** Gender and Leisure-Time Physical Activity (LTPA) Participation Differences on the PESAS' Dimensions

	Cognitive Processes M $\pm$ SD	Somatic Anxiety M $\pm$ SD	Worry M $\pm$ SD
Gender			
Boys (n = 220)	10,80 $\pm$ 3,85	8,88 $\pm$ 3,92	14,56 $\pm$ 4,98
Girls (n = 271)	12,07 $\pm$ 3,28	10,69 $\pm$ 3,89	18,49 $\pm$ 4,51
LTPA participation			
Yes (n = 175)	10,89 $\pm$ 3,54	9,47 $\pm$ 3,89	15,65 $\pm$ 5,20
No (n = 306)	11,86 $\pm$ 3,57	10,13 $\pm$ 4,08	17,28 $\pm$ 5,00

### Relation between age and PESAS' dimensions

The results of the correlational analysis between age and the three dimensions of the PESAS indicated that older students tend to show lower levels of Cognitive Processes ( $r = -0,13$ ,  $p = 0,004$ ) and Somatic Anxiety ( $r = -0,16$ ,  $p < 0,001$ ). Age wasn't significantly associated with Worry ( $r = 0,05$ ,  $p = 0,260$ ).

### Analysis of the effect of extracurricular physical activity on the dimensions of PESAS

The results of MANOVA test indicated significant effect of leisure-time physical activity participation in all PESAS' dimensions ( $F = 4,56$ ,  $p = 0,004$ ,  $\eta^2 = 0,03$ ). More specifically, significant differences were found for Cognitive Processes ( $F = 8,17$ ,  $p = 0,004$ ,  $\eta^2 = 0,02$ ), and worry ( $F = 11,64$ ,  $p = 0,001$ ,  $\eta^2 = 0,01$ ). In both cases students participating in physical activity outside school demonstrated lower scores as compared to those not participating (Table 4). No significant differences were found for somatic anxiety ( $F = 3,00$ ,  $p = 0,084$ ,  $\eta^2 = 0,01$ ).

### Discussion

The aim of the study was to examine the psychometric properties of the Portuguese version of PESAS, which assesses students' state anxiety during Physical Education lessons. The results of the analyses provided evidence of the factorial validity and reliability of the Portuguese version of PESAS. With respect to the face validity of the scale, it should be noted that the translation undergone a rigorous process. A group of experts examined the translated versions, and commented on the face validity of the scale.

The exploratory factor analysis initially used verified the three dimensions structure of PESAS, as observed in Barkoukis et al. (2005). With the exception of item 13, all the remaining items loaded on the hypothesized factor. Item 13 loaded on somatic anxiety instead of cognitive processes. This could be ascribed to the use of the word 'disturb' that might have been associated with bodily disturbances associated with the experience of anxiety. These findings are congruent with the results provided by Barkoukis (2001) during the development of the scale, and provide preliminary evidence on the factorial validity of the Portuguese version of the scale. Scale's factor structure was further supported with the use of confirmatory factor analyses. The original version was deemed as the most appropriate structure of the Portuguese version of the scale. These findings support the multidimensional nature of anxiety in physical education settings. Multidimensional anxiety has been extensively studied in sport setting (Craft

et al., 2003; Fernandes et al., 2012, 2013; Woodman and Hardy, 2003), especially through the use of the CSAI-2 scale (Fernandes et al., 2012, 2014), but there was no evidence in Physical Education prior the development of PESAS. These findings imply that even in a non-competitive setting, such as Physical Education, students can experience both cognitive and bodily symptoms of anxiety. The experience of anxiety may decrease the appeal of the physical education lesson and result in drop out. Having in mind that fundamental in physical education lessons is the development of gross motor ability and not sporting expertise and excellence, physical educators should avoid situations that trigger anxiety to students. Importantly, study's findings support the distinction between two facets of cognitive anxiety, i.e. worry and cognitive processes. Worry reflects negative expectations from performance and, similarly to sports, can be experienced in physical education as students perform physical skills in front of their classmates during the lesson. On the other hand, cognitive processes correspond to anxiety-produced disturbances in students' cognitions, such as memory and attention. While this may not be relevant for sports, where anxiety research has mainly focused on precompetitive anxiety, this is of major importance for physical education. Skill display and game playing in physical education are means to learning the sport/game at hand, not the demonstration of competence, ability and training status as in sports. In this sense, they serve the learning process where cognitive process such as memory and attention are crucial for learning. If these processes are disturbed, then learning of the tasks at hand is decreased. An important contribution of PESAS was the distinction between these cognitive anxiety facets that may be significant for the study of anxiety in physical education lessons. This distinction was also verified in the Portuguese version of the scale. Overall, the results of the present study provide preliminary support on the factorial validity of the translated PESAS.

Furthermore, the findings of the study provided evidence on the reliability of the scale. The internal coefficients were high and acceptable. This was evident for both the original version of the scale and the version emerged from the exploratory factor analysis. The scores found in the present study were similar to those reported in past research with PESAS (Barkoukis et al., 2005, 2012), and indicate a good reliability for all anxiety dimensions measured (i.e., cognitive processes, somatic anxiety and worry).

With respect to gender differences, the study's findings are consistent with our hypothesis and past evidence in sport contexts suggesting that females report higher levels of anxiety as compared to males (Borges et al., 2008; Matos et al., 2003; Souza et al., 2012). These differences can be ascribed to biologically determined, but mainly to culturally cultivated reasons (Allen et al., 1998). For instance, there is sufficient

evidence showing that females display higher need for social approval and lower resistance in admitting feelings of anxiety as compared to boys (Batista and Oliveira, 2005). Future research should more thoroughly investigate gender differences during physical education lessons.

With respect to age, the study's results are consistent with our hypothesis and past evidence reported by Borges et al. (2008) and Souza et al. (2012), who found younger athletes experiencing more anxiety than older ones. These findings might imply that during adolescence coping strategies are developed and used (Santos, 2011). Still, age was not related to the dimension of worry which might imply that in this age students may not be able to cope with negative expectations about performance.

Finally, regarding participation in leisure-time physical activities, the study's findings support our hypothesis. Students who engage in physical activities out of school have lower levels of cognitive anxiety (i.e., cognitive processes and worry), as compared to those who reported no physical activity. These findings imply that students who engage in leisure-time physical activities are more familiar with performing physical tasks, have greater experience from performing in more competitive situations, display higher self-confidence in performing these tasks in less competitive and physically demanding situations such as those shown in physical education classes, and learn how to cope with anxiety-inducing situations (Souza et al., 2012).

Some study limitations should be acknowledged. One limitation of the present study concerns the use of a non-probabilistic sample from a specific region of the country. A second limitation of this study is related to the fact that measurement invariance was not assessed for gender, age and extracurricular physical activity variables due to low subsample sizes, which means that caution is needed in generalizing these findings. Therefore, future research should investigate this issue as well as other types of validity, such as convergent, discriminant and predictive validity to further ensure the validity of the scale.

## Conclusions

In summary, the results of the present study show that the Portuguese version of PESAS demonstrates acceptable levels of factorial validity and internal consistency. Importantly, the analyses supported the multidimensionality of the scale and the distinction between two facets of cognitive anxiety. Female students reported significantly higher levels in all anxiety dimensions as compared to male students. Physically active students revealed lower levels of cognitive anxiety. Finally, age was negatively associated with somatic anxiety and cognitive processes.

## Practical Implications

The present study provides further insight on the construct validity of PESAS in a Portuguese sample and on the differentiated effects of state anxiety in Physical Education according to gender, age and sports practice. The implication from these findings is that Physical Educators need to further consider the implementation of student-centred teaching strategies. Given the negative consequences that different forms of anxiety may have on students' performance during Physical Education lessons, a more detailed attention should also be paid to girls, younger students and those who not engage

in extracurricular physical activity, especially during physical tests or other forms of evaluation. In addition, Physical Education teachers should also aim to plan and implement self-referenced programs/strategies designed to help students identify and cope more effectively with their fear of failure motives.

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## Appendix 1. Portuguese version of the Physical Education State Anxiety Scale

(Versão portuguesa da Escala de Estado de Ansiedade em Educação Física)

**Instruções:** Abaixo são apresentadas algumas afirmações acerca de como rapazes e raparigas se sentem quando realizam exercícios nas aulas de Educação Física. Lê atentamente cada uma das afirmações; de seguida circunda o número apropriado à direita da afirmação que descreve **como te sentes agora, antes da execução do(a) exercício/avaliação de Educação Física**. Não existem respostas certas ou erradas. Não dediques demasiado tempo a cada uma das afirmações, mas escolhe a resposta que melhor descreve como te sentes neste momento.

	Nunca	Pouco	Moderadamente	Bastante	Muito
1. Sinto dificuldade em lembrar-me das informações relativas aos exercícios.	1	2	3	4	5
2. Sinto falta de ar.	1	2	3	4	5
3. Tenho receio de cometer erros durante a execução dos exercícios.	1	2	3	4	5
4. Sinto dificuldade em concentrar-me nos exercícios propostos.	1	2	3	4	5
5. Sinto desconforto ao respirar.	1	2	3	4	5
6. Enquanto realizo os exercícios, sinto-me inseguro quanto a possíveis erros.	1	2	3	4	5
7. Sinto dificuldade em memorizar as informações dos exercícios apresentados.	1	2	3	4	5
8. Sinto-me tonto.	1	2	3	4	5
9. Preocupo-me muito com os testes físicos.	1	2	3	4	5
10. Sinto dificuldade em lembrar-me de exercícios e jogos que já conheço.	1	2	3	4	5
11. Sinto uma sensação de pressão no peito.	1	2	3	4	5
12. Tenho receio de falhar ao executar os exercícios.	1	2	3	4	5
13. Tenho pensamentos irrelevantes que me perturbam.	1	2	3	4	5
14. Sinto dores no corpo.	1	2	3	4	5
15. Penso nas consequências de possíveis erros durante as avaliações.	1	2	3	4	5
16. Sinto dificuldade em perceber o padrão nos exercícios complexos.	1	2	3	4	5
17. Sinto que algo me sufoca.	1	2	3	4	5
18. Preocupo-me com um possível mau desempenho.	1	2	3	4	5

