Psychometric Evaluation of the Teaching Styles Survey in Physical Education: A Comparative Analysis

Dr. Sofia Rodríguez-González, Dr. Lucas Martínez-Romero, and Dr. Elena García-Prieto

Dr. Sofia Rodríguez-González, Universidad Complutense de Madrid (Spain), ; Dr. Lucas Martínez-Romero, Universidad de Valencia (Spain), ; Dr. Elena García-Prieto, Universidad Autónoma de Barcelona (Spain),

Citation: Dr. Sofia Rodríguez-González, Dr. Lucas Martínez-Romero, and Dr. Elena García-Prieto (2025). Psychometric Evaluation of the Teaching Styles Survey in Physical Education: A Comparative Analysis. Psychiatria, 17(9), 43-54. https://doi.org/10.5281/zenodo.19095165

ABSTRACT

The objective of the study was to analyze the psychometric properties of the questionnaire which values teaching styles with which to preferentially identify physical education teachers. The sample was composed of 120 secondary school teachers. In designing the instrument they started from a DEMEVI questionnaire to which 12 expert judges got the validation of content. After the respective factor, exploratory and confirmatory analysis, five-factor model and 20 items were obtained, which showed satisfactory indexes of adjustment. Acceptable levels of internal consistency and temporal stability were obtained. Teachers under 30 years of age valued more the cognitive, participative and socializing styles, while men under 30 years of age identified more with traditional character styles compared to women of the same age who preferred the cognitive ones. The teaching styles questionnaire in physical education provide reliable and valid evidence for use.

KEYWORDS*:* physical activity, psychometrics, validation, methodology, sport, instruction

RESUMEN

El objetivo principal fue analizar las propiedades psicométricas del cuestionario que valora los estilos de enseñanza con los que se identifican preferentemente los docentes de educación física. La muestra estuvo compuesta por 120 docentes de Educación Secundaria. Para el diseño del instrumento se partió del cuestionario DEMEVI al que 12 jueces expertos dieron la validación de contenido. Tras los respectivos análisis factoriales, exploratorios y confirmatorios, se obtuvo un modelo de cinco factores y de 20 ítems presentando índices de ajuste satisfactorios. Se obtuvieron niveles aceptables de consistencia interna y estabilidad temporal. El profesorado menor de 30 años valoraba más los estilos cognitivos, participativos y socializadores, mientras que en función del sexo, los hombres menores de 30 años se identificaban más con estilos de carácter tradicional frente a las mujeres de la misma edad que preferían los

cognitivos. El cuestionario de estilos de enseñanza en educación física proporciona evidencias fiables y válidas para su uso.

PALABRAS CLAVE*:* actividad física, psicometría, validación, metodología, deporte, docencia.

INTRODUCTION

The aspects related with the teaching methodology are one of the study variables most frequent in research related to the optimization and improvement of the process of teaching-learning (Delgado, 1991; Sicilia-Camacho and Delgado, 2002). In this sense, teaching styles used by teachers may be decisive for the pedagogical approach, fundamental to the advancement of student autonomy (Moreno-Murcia, Conde, and Saenz-Lopez, 2012) and influential in their learning process. Its use causes a particular student interaction and knowledge transfer, it offers teachers a set of teaching options that can generate a particular classroom environment and can be used as a guideline to reflect, refine and revitalize (Mosston and Ashworth, 1993). But even bearing this importance in the teaching-learning process, the design of instruments for measuring teaching styles in physical education are scarce. For this reason, we consider it necessary to present new scales that allow measuring them as objectively as possible.

Delgado (1991) indicates that teaching styles are "the mode or form taken by didactic relationships between the personal elements of the teaching process and the learning of both technical and communicative level as well as at the level of organization of the class group and their relationships, depending on the decisions made by the teacher "and develop styles of teaching along a continuum establishing six major families: traditional, individualizing, participative, socializing, cognitive and creative.

Most studies to date are of a descriptive and correlational character and are based upon studying the role of continuous teaching styles in education (Ashworth, 1992; Delgado, 1991; Mosston and Ashworth, 1993; Sicilia-Camacho and Delgado, 2002; Sicilia-Camacho and Brown, 2008, among others). In some studies (Alarcon and Reyno, 2009; Delgado, Medina, and Viciana, 1996; Isaza and Henao, 2012, González-Peiteado and Pino-Juste, 2013b, 2014) it is noted how physical education teachers show a clear trend in the desire to go towards active teaching styles such as participatory, individualizing, creative and socializing. Conversely, a negative rating to traditional styles is appreciated, especially in its strictest design. Som, Walls, Pascual and Medina (2008) showed that there was no style better than another style of teaching, although the style of teaching most used by teachers and which were safer was the traditional (Conte and Moreno, 2000; Cothran et al.,

2005; Jaakkola and Watt, 2011; Kulinna and Cothran, 2003; Moreno and Conte, 1998; Syrmpas and Digelidis, 2014)

Other works, relate the variables of gender and age in the identification of teachers with different teaching styles, presenting controversial results, establishing a significant influence on the female preference for innovative styles and the more typical masculine styles which are traditional (Aktop and Karahan, 2012; González-Peiteado and Pino Juste, 2014; Saenz-Lopez, SiciliaCamacho, and Manzano-Moreno, 2010) in contrast to other studies that affirm to have no influence (Jakkola and Watt, 2011). Relative to age, certain studies affirm their determination not to use different styles (Jakkola and Watt, 2011) as opposed to others who establish their influence (Syrmpas and Digelidis, 2014).

Among the diversity of instruments for measuring teaching styles the *Learning and Performance Orientations in Physical Education Questionnaire* (LAPOPECQ), used by Papaioannous (1994) stands out, consisting of 27 questions referring to the different ways in which a teacher can intervene. On the other hand, Cothran, Kulinna, y Ward (2000), create an instrument (*Questionnaire of Students' Experiences and Perceptions of Teaching Styles*) which uses the Mosston spectrum to study the experiences they teachers have with teaching styles. Later Cothran et al. (2005) study this with a questionnaire using a Likert scale consisting of variables ranging from 1 (*Never*) to 5 (*Always*) uses that have teaching styles based on Mosston and Ashworth (1993). In Spain and Latin America (the DEMEVI questionnaire developed by Delgado, Medina, and Viciana (1996) has been primarily used, and has been the reference tool in research related to teaching styles developed by Delgado (1991). Other authors such as González-Peiteado, Castedo and Pino-Juste Lopez (2013a) developed a questionnaire called Scale of Teaching Styles (ESEE) analyzing the construct of teaching styles. In this work, they study the psychometric properties of the scale, concluding the existence of six factors identified as academic, individualizing, cooperative, reflective, inquisitive and innovative. In a later work, González-Peiteado and Pino-Juste (2014), delve into the study of the scale identifying two major factors, academic and active, subdividing the latter in five (individualizing, cooperative, reflective, inquisitive and innovative). At the same time they present the results of the study in which they analyzed representations and beliefs of teacher training students from universities in Galicia regarding teaching styles. It is concluded that the active style is preferred to the detriment of academic style and, according to criteria of gender, men have a greater trend towards academic styles than women.

OBJECTIVE AND HYPOTHESIS

The aim of the study was to analyze the psychometric properties of the questionnaire which assesses teaching styles with which we can preferentially identify PE teachers, as well as differences in relation to the variables of gender

and age. It is expected that the survey provides reliable and valid evidence for use, as well as having the creative, participative, individualizing and socializing styles become those with which PE teachers preferentially identify themselves.

METHOD

Participants

We have used two types of participants, firstly, we requested the collaboration of 12 expert judges who formed two distinct groups: the first group was composed of seven expert judges from six different Spanish university colleges. The prerequisites for acquiring the status of expert judge were to be a full professor at the corresponding university in the sciences of physical activity and sport and be specialists in methodology and research and / or teaching in physical education. The second group of judges was composed of five expert physical education teachers in secondary schools. The prerequisites for acquiring the status of expert judge were to be a doctor in physical education or a professor in the faculty and provide direct instruction in public schools at different levels of the educational system of Secondary Education and Formative Cycle.

To provide evidence of validity of the scale, a sample of 120 teachers of physical education in Compulsory Secondary Education Secondary (90 men and 30 women) between 30 and 60 years was used (M = 44,58; DT = 9,72). For this purpose, we performed sampling according to criteria of accessibility.

Instrument

Teaching Styles (TSPE)

We started from the instrument developed by Delgado, Medina, and Viciana (1996) to assess teaching styles preferred by teachers of physical education. The original questionnaire consists of 60 items (10 for each teaching style) expressed in statements that refer to the six groups of styles (traditional, individualizing, participative, socializing, cognitive and creative) developed by Delgado (1991), to be answered by teachers with a Likert scale where 1 corresponds to "strongly agree" and 5 "strongly disagree". The preceding sentence was "As a teacher of physical education, I think ...".

Procedure

A qualitative assessment of the items of the original questionnaire (content validity) by 12 expert judgment (Osterlind, 1989) was performed. Two shipments to the valuation of the items were performed. In a first shipment they assessed items in the original questionnaire according to membership criteria, representativeness and accuracy having to be rated on a Likert scale of 1 to 10.

In addition to globally assessing the questionnaire considering the general format and content criteria using the same scale, they were given a section where they could make annotations and general comments on each of the items and could write an alternative wording for each item, if deemed appropriate. Following the approach of Bulger and Housner (2007), those items that obtained mean scores under seven among the three criteria were eliminated, while the items scored between seven and eight were reviewed and those with scores on average over eight remained. Aiken's V was analyzed (Merino and Livia, 2009) for each of the items having to reach higher values at intervals of 0,70 to 95% to keep it on scale. Following these considerations the questionnaire was initially composed of 36 items. Due to the substantial changes that were made, it was decided to resend the modified questionnaire to the two groups of experts to reassess it following the same requirements on items for their membership on the scale. Finally, the new version of the questionnaire had 36 items that could measure the six theoretical dimensions corresponding to each of the families of teaching styles (Merino-Barrero and Valero, 2014).

The new version of the questionnaire was administered to teachers via e-mail with an attached letter explaining the purpose of the study, requesting their cooperation and ensuring their anonymity. We also attached a link with direct access to a website, where they should respond to the questionnaire by an automated process within a period not longer than three weeks.

DATA ANALYSIS

We calculated descriptive statistics, bivariate correlations, confirmatory factor analysis (CFA) from data taken from exploratory factor analysis (EFA) and an analysis of internal consistency, following the recommendations of authors like Bentler (2007), Byrne, (2001), Clark y Watson (2003), García-Jiménez, GilFlores, y Rodríguez-Gómez (2000) and Kline, (2005).Furthermore, the temporal stability of the scale was found in a second study. To analyze differences in preference for a particular type of teaching styles, multivariate variance analysis (MANOVA) were performed according to sex and age of teachers, considering as independent variables, and the factors of the styles as dependent variables. To perform statistical analysis SPSS 20.0 and AMOS 18.0 was used.

RESULTS

Item analysis and reliability of the scale

In the statistical analysis, the item-factor contained in the original questionnaire and validated in terms of content by the panel of expert judges, detailed distribution is maintained. The characteristics of the items were analyzed by checking if the alpha of the scale increased with the removal of any items, as well as taking into account the criteria assumed to retain an item within a factor: correlation coefficient corrected item-total (CCIT-c) ≥ 0,30 and all response options had been used at some point. The distribution of responses of the items was also found by analyzing the asymmetry and kurtosis, with some of them beating the recommendations of certain authors to values between 0 and 2 as in the case of items 9, 30 and 35. It was decided to maintain and check its performance in subsequent factor analysis (Table I).

Table 1. *Descriptive statistics of Internal Consistency and Homogeneity*

Scale (α = 0,82)	*M*	*SD*	CCIT-c	*α* w/o item	Asymmetry	Kurtosis
Traditional						
1. Item 7	3,23	1,21	0,35	0,37	-0,32	0,96
2. Item 8	3,00	1,20	-0,11	0,52	-0,14	-1,08
3. Item 16	2,68	1,20	0,29	0,39	0,28	-0,94
4. Item 23	3,38	1,10	0,01	0,47	-0,32	-0,67
5. Item 24	2,03	0,96	-0,24	0,41	0,80	0,30
6. Item 33	2,10	1,02	0,30	0,38	0,89	0,31
Individualizing						
7. Item 1	4,16	0,88	0,36	0,55	-1,34	2,48
8. Item 15	3,97	1,00	0,29	0,58	-0,74	-0,05
9. Item 17	4,08	0,76	-0,26	0,59	-0,46	-0,24
10. Item 28	4,36	0,59	0,35	0,56	-0,29	-0,66
11. Item 31	4,26	0,81	-0,22	0,56	-0,98	0,51
12. Item 34	4,20	0,80	0,42	0,52	-0,77	0,54

Participative						
13. Item 3	3,98	0,84	0,39	0,77	-0,46	0,00
14. Item 10	4,58	0,66	0,61	0,70	-1,51	1,65
15. Item 14	4,65	0,56	0,43	0,75	-1,34	0,88
16. Item 22	4,58	0,61	0,64	0,70	-1,16	0,30
17. Item 26	4,58	0,63	0,61	0,71	-1,14	1,80
18. Item 29	4,25	0,73	0,45	0,75	-0,63	-0,43
Socializing						
19. Item 2	3,83	0,99	0,15	0,57	-0,84	0,55
20. Item 6	4,20	0,82	0,31	0,49	-0,84	0,62
21. Item 9	4,53	0,77	0,39	0,45	-2,02	4,64
22. Item 18	4,00	0,87	0,21	0,53	-0,62	-0,20
23. Item 25	4,05	0,85	0,36	0,45	-0,74	0,46
24. Item 35	4,73	0,51	0,42	0,47	-2,17	6,16
Cognitive						
25. Item 4	4,45	0,68	0,46	0,68	-0,85	-0,44
26. Item 13	4,13	0,84	0,52	0,66	-1,01	1,15
27. Item 19	4,69	0,49	0,44	0,69	1,24	0,45
28. Item 27	4,59	0,64	0,40	0,70	-1,51	-1,93
29. Item 32	4,03	0,81	0,49	0,67	-0,34	-0,75
30. Item 36	3,76	0,77	0,44	0,68	-0,42	0,57
Creative						
31. Item 5	4,18	1,06	.31	0,62	-1,23	0,75
32. Item 11	3,64	1,14	.23	0,69	-0,49	-0,60
33. Item 12	4,36	0,96	.44	0,55	-0,77	0,02
34. Item 20	4,26	0,77	.53	0,52	-0,59	-0,71
35. Item 21	4,68	0,62	.46	0,55	-1,74	1,83
36. Item 30	4,73	0,56	.54	0,54	-1,95	2,82

This initial analysis led to a reduction in the scale from 36 to 28 items because the items 2, 8, 11,15, 17, 23, 24 and 31 did not discriminate on the total scale under the above criteria. The remaining items from each of the subscales presented values ≥ 0,30. Item 16 corresponding to the traditional dimension discriminated against a value of 0,29. However, we decided to keep it and check its behavior in the subsequent factor analysis.

We performed a correlation analysis of the 28 items that discriminated on the total scale under the above criteria. Thus, the correlation between the total score in each of the components showed significant correlations with the theoretical dimension to which they belong. A relevant aspect in data analysis,

significant and positive correlation of the items of the participatory dimension and items of socializing dimension was found.

Exploratory factor analysis

An exploratory factor analysis (EFA) with the remaining 28 items was made, but before that, and knowing that one of the fundamental requirements to be met so the factorial analysis makes sense is that the variables are closely correlated, it was observed that items of the participatory dimension and socializing positively correlated. It was decided to group the items into a single factor as the six-factor model tested did not show proper values.

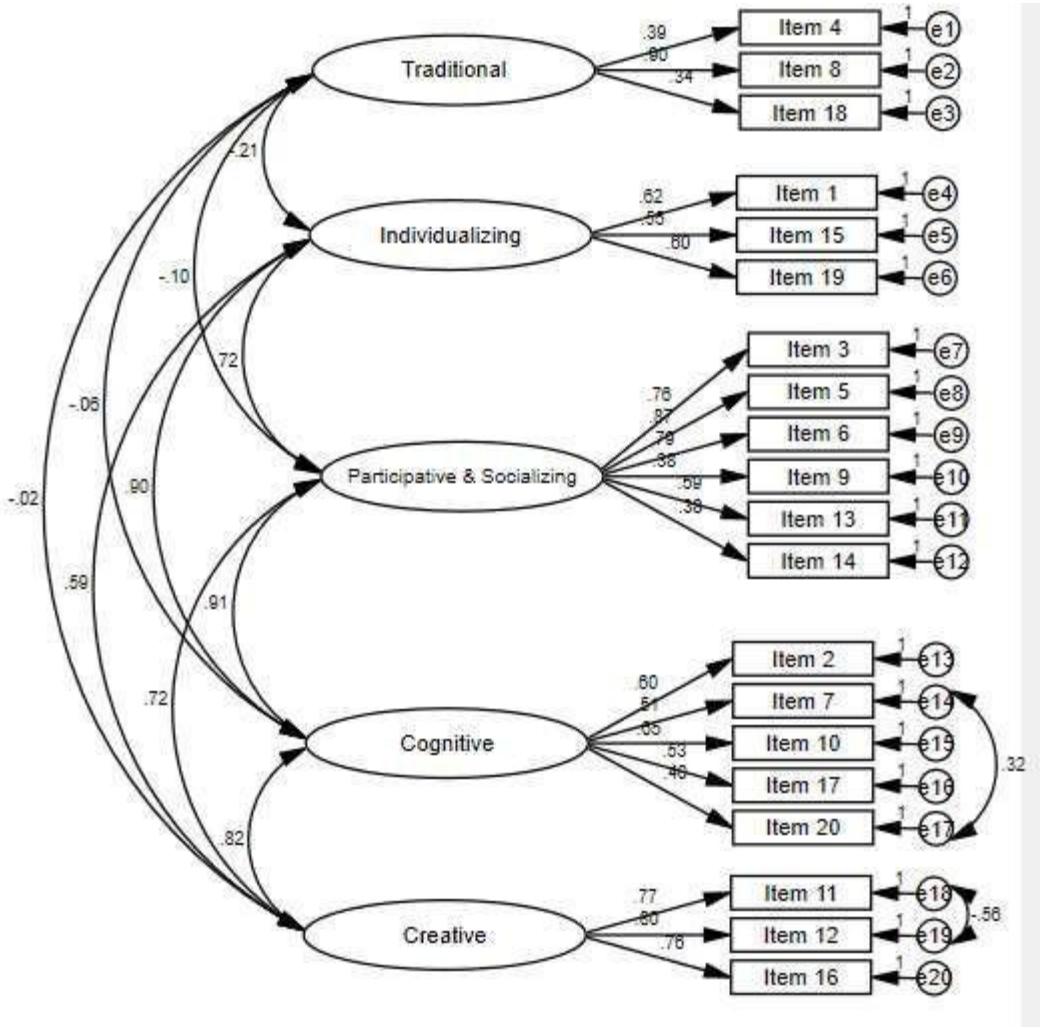
The EFA was performed by maximum likelihood method with varimax rotation. We obtained 0,86 KMO and Bartlett's test of sphericity was significant (p <0,001). When this first EFA an explanation of 61,83% of the total variance, within the requirements pointed in the literature to estimate values higher than 60% of the total variability as suitable values are obtained. Items 3, 5, 12, 14, 25, 27, 35 saturated with values less than 0.30 where the requirement for a certain item to be part of the factor was established.

Confirmatory factor analysis

The factorial structure of the scale was obtained using the covariance matrix as input method for the analysis of the data and the method of maximum likelihood estimation (Mardia coefficient = 54,65; standardized estimate = 13,25), using the bootstrapping procedure to control non-normal distribution of some items that involved the use of robust indices to evaluate the adjustment of the estimated model. The results of the analysis of bootstrapping allowed to assume that the results of the estimates were robust and therefore would not be affected by the lack of normality or limit values of some variables. To try to accept or reject the different models tested, a combination of several adjustment indices were used: χ^2/gl, CFI (*Comparative Fit Index*), TLI (*Tucker Lewis Index*), IFI (*Incremental Fit Index*), RMSEA (*Root Mean Square Error of Approximation*) plus its confidence interval at 90%. Since the χ^2 is very sensitive to sample size, the χ^2 / df was used, which is considered acceptable with values lower than 5. The incremental indices (CFI, TLI and IFIs) show a good adjustment with values of 0,90 or higher, while the error rate is acceptable with equal or less than 0,06 for RMSEA.

We formulated and tested several models previously by testing with 21 items. In the successive steps model adjustment it was decided to remove the item 29 because of problems caused by the setting of partial and global indexes. The results of the five-factor model and 20 items (see Figure 1) showed a satisfactory fit: X^2 = 200,41; df = 158; p = 0,013; X^2 / df = 1,26; IFI = 0,94; CFI = 0,93; TLI = 0,92; RMSEA = 0,04. Regression standardized weights of the items ranged from 0,34 and 0,90 all being statistically significant.

Figure 1. *Confirmatory Factor Analysis of the Questionnaire of Teaching Styles in Physical Education*. The ellipses represent the factors and the rectangles the Different Items. Residual Variances are shown in Small Circles



Analysis of internal consistency and temporary stability

The internal consistency analysis revealed a Cronbach alpha value of 0,79 for the total scale (Traditional = 0,73, individualizing = 0,70; Participatory and Socializing = 0,76; Cognitive = 0,70, Creative = 0,75). A sample of 24 teachers aged between 30 and 58 years (*M* = 42,33 and *SD* = 8,54) was used to analyze the temporal stability of the scale. The scale was administered in a time interval of three weeks between the first and second data collection. In order to prevent any possible social desirability, we insisted on anonymity of data and dates of birth was used to identify the questionnaires. The values of test-retest correlation were 0,98 showing high levels of temporal stability in the scale. We recalculated the internal consistency of the scale with the data from the pilot study (Table 2) and a Cronbach alpha value of 0.78 was obtained. (Traditional = 0,74, individualizing = 0,68, Participatory and Socializing = 0,77; Cognitive = 0,70, Creative = 0,76).

Table 2. *Statistics and correlations pilot study*

				Correlations				
			α	I	II	III	IV	V
Scale(α 0,78)	*M*	*SD*						
I. Traditional	2,68	0,90	0,74			-0,99	-0,14	-0,10	0,00
II. Individualizing	4,30	0,65	0,68				0,51**	0,52**	0,42**
III.Participative/socializing	4,44	0,42	0,77					0,59**	0,54**
IV.Cognitive	4,30	0,48	0,70						0,62**
V.Creative	4,48	0,65	0,76						

** Correlation is significant at 0,01 level (bilateral)

Differences on age & gender

The age variable was coded into three groups according to criteria of homogeneous distribution of the data by setting breakpoints in 30 and 50 years respectively. The results showed differences in relation to the interaction of the variables age and gender (Wilks' Lambda = 0,73, $F_{(2,111);}$ p = 0.02; η^2 = 0,14). The behavior of the independent variables at different levels of the dependent variables were then analyzed. The inter-subject tests showed, in relation to age, differences in the identification with participatory-socialization styles ($F_{(1)}$ = 3,19; p = 0,04; η2 = 0,087; R2 = 0,42) as to cognitive ($F_{(2)}$ = 3,93; p = 0,02; η^2 = 0,10; R2 = 0,52). Since the Levene test was not significant, equal variances were assumed and the Bonferroni test was performed on a posteriori analysis. Regarding cognitive character styles, differences between teachers under 30 years with highest average (4,43) found that those aged between 30 and 50 years (4,14) and those over 50 (4,12). In relation to participatory-socialization styles stockings rating in the different groups were higher in the age group under 30 years (4,62), showing a growing trend by cognitive styles on teachers who were younger (Table 3).

Table 3. *Multivariable Analysis by Gender and Age*

	Total		Gender						Age							
			Male (*n* = 90)		Women (*n* = 30)		*F*	*p*	<30 (*n* = 34)		30<x<50 (*n* = 44)		>50 (*n* = 42)		*F*	*p*
	M	*SD*	*M*	*SD*	*M*	*SD*			*M*	*SD*	*M*	*SD*	*M*	*SD*		
I	2,66	0,83	2,67	0,10	2,26	0,15	1,16	0,28	2,59	0,15	2,46	0,14	2,55	0,15	1,89	0,15
II	4,23	0,57	4,26	0,08	4,49	0,12	1,53	0,22	4,42	0,12	4,34	0,11	4,20	0,11	0,81	0,44
III	4,41	0,98	4,41	0,07	4,57	0,10	0,08	0,76	4,62	0,10	4,35	0,09	4,41	0,10	3,19	0,04
IV	4,21	0,67	4,16	0,06	4,39	0,09	0,13	0,71	4,43	0,09	4,14	0,08	4,12	0,09	3,93	0,02
V	4,55	0,62	4,54	0,07	4,72	0,12	0,00	0,97	4,72	0,11	4,55	0,11	4,50	0,11	2,20	0,11

I: Traditional; II: Individualizing; III: Participative & Socializing; IV: Cognitive; V: Creative; p is significant to value <.05. The values in the Total column do not take into account the difference neither of gender nor age.

We found differences in the interaction of gender and age variables with the identification with traditional styles ($F_{(3)} = 6,50$; $p = 0,002$; $\eta^2 = 0,16$, R2 = 0.89) and cognitive ($F_{(3)} = 4,04$; $p = 0,02$; $\eta^2 = 0,10$, R2 = 0,70), the mean values of traditional style higher in men under 30 years relating to women of the same age . However, the assessment made by women of cognitive styles is higher in general than men, showing major differences between them in teachers under 30 years. The trend in other age groups in relation to cognitive always shows higher in women whose values are superior to men (Table 4).

Table 4. *Interaction Analysis Gender and Age*

	Male (*n* = 90)						Women (*n* = 30)					
	<30 (*n* = 24)		30<x<50 (*n* = 35)		>50 (*n* = 31)		<30 (*n* = 10)		30<x<50 (*n* = 9)		>50 (*n* = 11)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Traditional	3,11	0,16	2,50	0,13	2,74	0,14	2,00	0,25	2,77	0,26	2,54	0,23
Individualizing	4,25	0,11	4,21	0,09	4,02	0,10	4,53	0,17	4,51	0,18	4,42	0,17
Participative & Socializing	4,52	0,09	4,33	0,08	4,23	0,08	4,76	0,15	4,38	0,16	4,60	0,14
Cognitive	4,30	0,09	4,18	0,08	4,01	0,08	4,60	0,15	4,11	0,15	4,38	0,14
Creative	4,62	0,10	4,54	0,09	4,38	0,09	4,90	0,16	4,51	0,17	4,60	0,16

Note: p is significant to value <0,05

DISCUSSION

The aim of the study was to analyze the psychometric properties of the questionnaire which assesses teaching styles with which to preferentially identify physical education teachers.

Initially a positive and significant correlation for each of the items in each subscale occurs, collecting the requirements pointed by Carretero-Dios and Pérez (2007) and Clark and Watson (2003), ensuring the homogeneity of each of the dimensions. The items belonging to the sub-scale participative and socializing significantly correlated, being confirmed its one dimensionality in factor analysis. We must bear in mind that to obtain a model with appropriate adjustment, we had to make a number of changes since the initial model, following the model structure a priori established by Delgado (1991) six dimensions, showed rates of inadequate adjustment. The non-multivariate normality of scale due to the asymmetric distribution and kurtosis of some items taking into account the recommendations of Bollen and Long (1994), was solved using robust indices as it reflected others with the same problem in their research (Bentler, 1989; Bollen and Long, 1994; McDonald and Marsh, 1990; Mulaik et al., 1989; Byrne, 2001) and the combination of full and partial indices (Bentler, 2007), all of which have higher values than the minimum necessary to consider a good model adjustment (Hu and Bentler, 1999). As a final result, five dimensions (Traditional, individualizing, Participatory-Socializing, Cognitive and Creative) were obtained. The internal consistency and temporary stability was adequate (Vincent, 1995).

Drawing on the dimensions listed in the questionnaire, teachers are generally identified with more innovative styles (participatory-socializing, creative and cognitive) to the detriment of traditional ones. These results agree with those found in the investigation of Delgado, Medina and Viciana (1996) and Isaza and Henao (2012), González-Peiteado and Pino-Juste (2013b, 2014), but contrast with those obtained by Cothran et al. (2005), Kulinna and Cothran (2003), Som, Walls, Pascual and Medina (2008), Jaakkola and Watt (2011), and Syrmpas and Digelidis (2014), whose studies conclude that teachers identify more with reproductive styles f education against the most innovative and productive. In this line, Saenz-Lopez, Sicilia-Camacho, and Manzano-Moreno (2010), collected in his research a preference for teaching techniques of direct instruction that underlie more reproductive teaching styles compared to the technique of inquiry, more typical of innovative styles and which connect more with the interests and motivations of students in the preference of these innovative styles (Alarcon and Reyno, 2009).

The use of one teaching style or another did not differ by gender of the teacher, consistent with the study of Jaakkola and Watt (2011) and in contrast to the study of Aktop and Karahan (2012) and Gonzalez-Peiteado and Pino-Juste (2014) who postulated a preference in future teachers on the part of women towards innovative styles as opposed to men who preferred styles of more traditional reproductive character. Other studies such as Saenz-Lopez, SiciliaCamacho and Manzano-Moreno (2010) show the preference of women in the use of creative styles, linked to related content and body language in the development of socio- affective relations.

Regarding age, faculty who are 30 years younger show a preference for identifying with participatory-socializing and cognitive styles, decreasing its rating with an advancement in the age of the teachers, coinciding with the study by Syrmpas and Digelidis (2014). These authors make an exception in their findings on preference in identifying reproductive styles, based on the high valuation obtained by the cognitive styles.

Interacting the variables in gender and age, men under 30 identify more with traditional character styles. Otherwise, cognitive styles are best appreciated by women younger than 30 and older than 50 years of age. By contrast, other studies such as Jaakkola and Watt (2011), where the use and perception of physical education teachers teaching styles based on years of teaching experience is analyzed, these do not reveal any significant difference.

CONCLUSIONS

With this questionnaire, and thanks to the excellent psychometric properties of validity and reliability, we provide a useful tool to measure the opinion or theoretical trends of physical education teachers regarding teaching styles. This will allow further study of methodological variables being able to relate with other variables such as skills of students and faculty, academic performance, implicit theories, motivation, and training received by the student, among others. Other future directions could focus on the analysis of differential item functioning (DIF) contrasting the equivalence between different sub-samples of teachers, at both primary and secondary, of both public and private schools from different countries. In addition, this instrument could also be particularly useful in the diagnosis and academic training of the teacher in Sports Science.

The main limitations of the study are due to the dimensionality of participative and socializing teaching styles, substantiated at statistical level in significant correlations of the items that comprise it and the factorial weights within the same dimension and theoretical level in the necessary presence of more than one student in achieving the objectives pursued by participative styles and socializing like the active participation of students in their learning and that of their peers, suggesting a shared teaching that makes students speak about their own learning process while it also affects social purposes and contents of attitudinal influences, normative values and character. It could also be due to lack of training of teachers in their differentiation. Similarly, the model obtained using structural equations is one of the many models that can be obtained. It would therefore be interesting that a new study could address the criterion validity of this questionnaire to shed an overall score on the use of the questionnaire which would endow it with usefulness in assessing the preferences of teachers under a single scale.

REFERENCES

Aktop, A., y Karanhan, N. (2012). Physical education teacher's views of effective teaching methods in physical education. *Procedia, Social and Behavioral Sciences, 46*, 1910-1913. https://doi.org/10.1016/j.sbspro.2012.05.401

Alarcón, T., y Reyno, A. (2009). Estilos de enseñanza en educación física: Estudio transversal. *Habilidad Motriz, 33*, 15-24.

Ashworth, S. (1992). The Spectrum and Teacher Education. *Journal of Physical Education, Recreation and Dance, 63*(1), 32-35. https://doi.org/10.1080/07303084.1992.10604084

Bentler, P. M. (1989). *EQS structural equations program manual.* Los Ángeles, CA: BDMP Statistical Software.

Bentler, P. M. (2007). On tests and indices for evaluating structural models. *Personality and Individual Differences, 42*, 815-829. https://doi.org/10.1016/j.paid.2006.09.024

Bollen, K. A., y Long, J. (1994). *Testing structural equation models.* Newbury Park, CA: Sage.

Bulger, S. M., y Housner, L. D., (2007). Modified Delphi investigation of exercise science in physical education teacher education. *Journal of Teaching in Physical Education*, *26*, 57-80. https://doi.org/10.1123/jtpe.26.1.57

Byrne, B. M. (2001). Structural Equation Modelling with Amos, EQS and Lisrel: Comparative approaches to testing for the factorial validity of a measuring instrument. *International Journal of Testing, 1*(1), 55-86. https://doi.org/10.1207/S15327574IJT0101_4

Carretero-Dios, H., y Pérez, C. (2007). Standars for the development and the review of instrumental studies: Considerations about test selection in psychological research. *International Journal of Clinical and Health Psychology, 7*, 863-882.

Clark, L. A., y Watson, D. (2003). Constructing validity: Basic issues in objective scale development. En A. E. Kazdin (Ed.), *Methodological issues & strategies in clinical research* (3.ª ed.) (pp. 207-231). Washington: APA.

Conte, L., y Moreno, J. A. (2000). La autoevaluación como elemento de reflexión y formación en Educación Física. En O. R. Contreras (Ed.), *La formación inicial y permanente del profesor de Educación Física (Volumen I)* (pp. 2737). Cuenca: Universidad de Castilla-La Mancha.

Cothran, D. J., Kulinna, P. H., Banville, D., Choi, E., Amade-Escot, C., MacPhail, A., Macdonald, D., Richard, J. F., Sarmento, P., y Kirk, D. (2005). A crosscultural investigation of the use of teaching styles. *Research Quartely for Exercise and Sport*, *76*(2), 193-201. https://doi.org/10.1080/02701367.2005.10599280

Cothran, D. J., Kulinna, P. H., y Ward, E. (2000). Student´s experiences with and perception of Mosston´s Teaching Styles. *Journal of Research and Development in Education*, *34*, 93-103.

Delgado, M.A. (1991). *Los estilos de enseñanza en la educación física. Propuesta para una reforma de la enseñanza*. Granada: I.C.E. Universidad de Granada.

Delgado, M. A., Medina, J., y Viciana, J. (1996). The teaching styles in the preservice of physical education teachers. *International Seminar. AIESEP*. Lisboa. November. 21-24.

García Jiménez, E., Gil Flores, J., y Rodríguez Gómez, G. (2000). *Análisis Factorial*. *Cuadernos de Estadística*. Madrid: La Muralla.

González Peiteado, M., López Castedo A., y Pino Juste, M. R. (2013a). Análisis psicométrico de una escala sobre estilos de enseñanza (ESEE). *Enseñanza*, *31*, 181-198.

González Peiteado, M., y Pino Juste, M. (2014). Aproximación a las representaciones y creencias del alumnado de magisterio sobre los estilos de enseñanza. *Educación XXI, 17*(1), 81-110.

González Peiteado, M., y Pino-Juste, M. (2013b). Percepción del alumnado de Ciencias de la Educación de la Universidad de Santiago de Compostela sobre el uso de los estilos de enseñanza. *Innovación Educativa, 23*, 215229.

Hu, L., y Bentler. P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modelling, 6*, 1-55. https://doi.org/10.1080/10705519909540118

Isaza, L., y Henao, G. (2012). Actitudes-Estilos de enseñanza: Su relación con el rendimiento académico. *International Journal of Psychological Research, 5*(1), 133-141.

Jaakkola, T., y Watt, A. (2011). Finnish physical education teachers' self-reported use and perceptions of Mosston and Ashworth's teaching styles. *Journal of Teaching in Physical Education, 30, 248*-262.

Kulinna, P. H.,y Cothran, D. J. (2003). Physical education teachers' self-reported use and perceptions of various teaching styles. *Learning and Instruction, 31(6),* 597-609. https://doi.org/10.1016/S0959-4752(02)00044-0

Kline, R. B. (2005). *Principles and practise of structural equation modelling* (2ed.). New York: The Guidlford Press.

Mc Donald, R. P., y Marsh, H.W. (1990). Choosing a multivariate model: noncentrality and goodness of fit. *Psychological Bulletin, 107*, 247-255. https://doi.org/10.1037/0033-2909.107.2.247

Merino-Barrero, J. A., y Valero, A. (2014). Validez de contenido de la escala de los estilos de enseñanza recogida en el cuestionario DEMEVI. *Habilidad Motriz, 43,* 12-24.

Merino, C., y Livia, S. (2009). Intervalos de confianza asimétricos para el índice de la validez de contenido: un programa Visual Basic para la V de Aiken. *Anales de Psicología*, *25*(1), 169-171.

Moreno, J. A., y Conte, L. (1998). ¿Cuáles son los estilos de enseñanza más utilizados en educación física? (poster). En *Actas del II Congreso Internacional La enseñanza de la educación física y el deporte escolar* (pp. 531). Almería: Instituto Andaluz del Deporte.

Moreno-Murcia, J. A., Conde, C., y Sáenz-López, P. (2012). Importancia del apoyo de autonomía en la figura del docente de Educación Física. *Tándem: Didáctica de la Educación Física, 40*, 18-27.

Mosston, M., y Ashworth, S. (1993). *La enseñanza de la Educación Física. La reforma de los estilos de enseñanza.* Barcelona: Hispano Europea.

Mulaik, S. A., James, L. R., Van Astine, J., Bennett, N., Lind, S., y Stilwell, C.D. (1989). Evaluation of goodness of fit indices for structural equation models. *Phychological Bulletin, 105*, 430-445. https://doi.org/10.1037/0033-2909.105.3.430

Osterlind, S.J. (1989). *Constructing test items.* Boston: Kluwer. https://doi.org/10.1007/978-94-009-1071-3

Papaioannous, A. (1994). Development of a Questionnaire to measure achievement orientation in physical education, *Research Quarterly for Exercise and Sport*, *65*(1), 11-20. https://doi.org/10.1080/02701367.1994.10762203

Sáenz-López, P., Sicilia-Camacho, A., y Manzano-Moreno, J. I. (2010). La opinión del profesorado sobre la enseñanza de la educación física en función del género. *Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte, 10*(37), 167-180.

Sicilia-Camacho, A., y Brown, D. H. K. (2008). Revising the paradigm shift from the "versus" to the "non-versus" notion of Mosston´s Spectrum of teaching styles in physical education pedagogy: a critical pedagogical perspective. *Physical Education and Sport Pedagogy*, *13*(1), 85-108. https://doi.org/10.1080/17408980701345626

Sicilia-Camacho, A., y Delgado (2002). *Educación física y estilos de enseñanza*. Barcelona: Inde.

Som, A., Muros, J. J., Pascual, J. M., y Medina, J. (2008). Utilización que hacen los profesores de educación física de enseñanza secundaria obligatoria y bachillerato de los estilos de enseñanza en Granada. *Habilidad Motriz*, *30,* 54-64.

Syrmpas, I., y Digelidis, N. (2014). Physical education student teacher´s experiences with and perceptiones of teaching styles. *Journal of Physical Education and Sport, 14*(1), 52-59.

Vincent, J. W. (1995). *Statistics in kinesiology.* Champaign, IL: Human Kinetics.