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Original Research

Activity preferences and key competence in physical education

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Abstract: The aim of this study was to analyze the relationship between the variables of activity preferences in physical education lessons and their power of prediction on the development of basic competences. Based on the contextual isomorphism of teaching and learning situations in physical education, a scale of practice preferences was designed and validated and grouped into families, according to their construct and consequential validity. To do so, we designed and validated a scale of activity preferences in physical education lessons. Two studies were carried out with students between the ages of 12 and 18. The first study was on a sample of 219 participants, where an activity preferences scale was designed and validated. The second study was carried out on a sample of 476 students, and measured activity preferences and the perception of basic competences. The results showed that the activity preferences scale was valid and reliable. When class activities coincided with the students' preferences it positively predicted basic competences.

Keywords: physical activity, motivation, didactic, interests

1. Introduction

The studies about the display of students' interest in physical educational lessons has become a focus of attention for improving the instructional process (Cecchini, González-Mesa, Méndez-Giménez & Fernández-Río 2011; Standage, Duda, & Ntoumanis,2005; Krijgsman et al., 2019; Ulstad, Halvari, Sørebø & Deci, 2016). Motivation plays an important role in determining persistence in or abandoning a physical activity, and therefore understanding motivation in physical education lessons could help teachers improve the quality of their interactions and provide positive experiences for students. According to the theory of self-determination (Deci & Ryan, 1985, 2012), commitment to doing sport is related to intrinsic motivation; that is to say, persistence in a physical activity would be a consequence of the free choice and the pleasure produced by doing a specific activity (Moreno-Murcia & Cervelló, 2010; Reeve & Cheon, 2021, Sheneider et al., 2020; Tilga, Kalajas-Tilga, Hein, Raudsepp & Koka, 2018). The achievement of a particular motivation requires an environment where students can bring their resources into play and develop strategies towards solving the problems they are faced with (González-Cutre, Sicilia & Moreno-Murcia, 2011; Cheon, Reeve, Hu & Jang, 2014). Consequently, improvement of the teaching process in

physical education occurs because students make a choice in class and their preferences are considered (Benita, Roth & Deci, 2014; Moreno-Murcia, Conde & Sáez-López, 2012, Trigueros-Ramos, Navarro-Gómez, Aguilar-Parra & León-Estrada, 2019) with the intention of acquiring basic competences.

Within the framework of the European Union, key competences have become the axis on which to articulate the curriculum (Valle & Manso, 2013), leading to the appearance of various initiatives to promote and establish models for their development, such as the KeyConet Project (2012-2014) whose main objective was to analyze proposals for the implementation of key competences in primary and secondary schools throughout Europe. The emerging concern about establishing a solid conceptual framework to develop an approach in physical education competences has materialized in several theoretical proposals about how to develop this teaching method (Blázquez & Sebastiani, 2009; Contreras, 2012; Contreras & Cuevas, 2011). However, there is little research which deals with a practical approach in general education and, in particular, in physical education, which requires further research to offer new proposals to improve its implementation in the classroom.

Competence learning has a dynamic and contextual nature, based on a complex knowledge of how to act, and the product of the mobilization and effective use of a variety of resources adapted to the requirements of viability and transferability of such learning to the context (Tardiff, 2008). According to Perrenaud (2012), three interrelated dimensions or variables are identified in a competence: performance, resources and situation, which have been studied in depth by the Trans-Contextual Model of motivation (Hagger and Chatzisarantis, 2012) and by the Hierarchical Model of Intrinsic and Extrinsic Motivation (Vallerand, 1997), finding reciprocal interactions between them (Nuñez & León, 2018). Therefore, if competence-based learning is conceptualized as applied knowledge or knowledge acquired through active participation in social practices, both in formal and non-formal educational contexts (Order ECD/65/2015), the product of a joint mobilization of practical skills, knowledge, motivation, values and attitudes that the student activates in a given situation (DeSeCo, 2005), the design of educational scenarios becomes an excellent mediator to promote the acquisition of competences with progressive autonomy. Various authors have supported the idea that the application of knowledge to new situations rests on the existing links between the teaching and learning situations designed and the reality in which they are to be applied (Álvarez & Monereo, 2010; Monereo, Sánchez-Busqués & Suñé, 2012; Bolívar, 2010; Sanmartí, 2021, among others). Consequently, the authenticity criteria followed for the design of teaching and learning situations can have a determining impact on the development of competences. In order to favor the design of authentic instructional situations, authors such as Tardiff (2006) or Bolívar (2010) appeal to the idea of a family of situations, in which a set of situations show common or isomorphic characteristics that identify them as belonging to the same category. In other words, they are contexts of interaction characterized by the application of similar actions although the transfer is not automatic, but requires activation on the part of the student, minimizing the design of decontextualized situations with little significance, as indicated in the PISA (OECD, 2017). Monereo (2009), argues that situated or authentic teaching consists of designing activities with high construct validity, reflecting the type of resources required in real life, as well as high consequential validity, emulating a high concordance with the real conditions of execution.

Beyond the complexity of the transfer process, some studies discuss the efficiency of transferring traditional teaching methods such as an explanatory class (Wittwer & Renkl, 2008) related to a controlling manner (Moreno-Murcia et al., 2012), and show that it is necessary to use innovating methods, such as case studies (Schwartz & Bransford, 1998; Schwartz & Martin, 2004; Kapur, 2012) partner discussion

(Schwartz & Bransford, 1998; Sampson & Clark, 2009) the use of global tasks (Merrill, 2007) the promotion of autonomy (Hagger, Chatzisarantis, Culverhouse & Biddle, 2003; Hagger & Chatzisarantis, 2012), which are closer to an independent teaching style (Moreno-Murcia, Conde & Sáez-López, 2012) On occasions, the absence of transfer is not due to a lack of procedural resources, but attitudinal variables (Hagger & Chatzisarantis, 2007). Hagger et al. (2003), which have shown that there is a correlation between autonomy support, intrinsic motivation and the transfer of competences in other contexts outside the classroom (Hagger & Chatzisarantis, 2012). Therefore, if the approach for competences is based on learning for life (Program for International Student Assessment, 2017 (PISA), the first step towards achieving transfer is through planned activities in physical education and students' motivations. To achieve this, it is expected that the design of instructional situations that consider the learners' preferences will promote improved acquisition of competences.

The aim of this research was to determine the influence of adolescent students' preferences for doing an activity on the development of basic competences in physical education lessons. Another objective was to design and validate a scale of activity preferences, which was expected to predict activity preferences in relation to basic competences.

2. Materials and Methods

1st Study

Participants - The sample consisted of 219 students from compulsory secondary education aged between 12 and 18 years old (M = 13.3, SD = 1.2). The percentage distribution by sex was 44% for girls (n = 122) and 56% for boys (n = 97).

Procedure - The creation of the scale followed an action-research process, which was structured in phases, and required the dialogue and participation of three agents: a selection of students from the center, teachers from the physical education department and three experts in the design and validation of measuring instruments. The development of the items was aimed at finding information on what physical activities attracted and aroused interest in students, both in class and in their free time. The first phase consisted of a comprehensive review of evaluations by students about the programming and teaching units carried out in the last two years. At the same time, teachers reviewed their class notebook and contributed information on the nature of the interactions that were generated in class in various teaching units conducted with students. This data was used to generate a first draft scale which was submitted for discussion by experts. This process led to the modification of formal and structural aspects of the scale: firstly, an adjustment of the format proposed by the experts' model; and secondly, the wording of some items and the sentence that preceded them were modified. The structured dimensions were also grouped in categories of items depending on their affinity, and there was a section left open to accommodate any suggestions raised by students. Once the design was completed, we used it on a small sample of students to understand whether new activities could be introduced in any of the established categories and to what extent. Afterwards, a second review of the design was made, and the final structures were established.

After obtaining permission from both the school´s headmaster and, as the participants were minors, their parents/guardians, a meeting was held with the physical education department to explain the procedure and define the period for using the questionnaires. It was agreed to use the questionnaires in physical education lessons on the days when the groups were in the gym. Before being given the questionnaires, the students were reminded of the importance of answering honestly and sincerely. The questionnaires were completed voluntarily and anonymously before the lesson and took about 15 minutes to do.

Measures–

Activity preferences in physical education classes - An instrument was

designed to record student' activity preferences in physical education lessons. The scale initially consisted of 17 items preceded by the statement "in P.E you would like to..." and divided into three hypothetical theory constructs with eight different items (e. g. "create my own play materials: 'indiacas', kites, thimbles and protection"), a space with three items (i.e. visit sport facilities, sport centers, gyms, 'trinquets' and do physical activities there) and six items for new technology (i.e. use my smartphone as a multimedia instrument, music, various applications, GPS). The score is given on a Likert scale from 1 (*I wouldn't like to*) to 5 (*I would like to a lot*).

Data analysis - To verify the factor structure of the scale, an exploratory analysis of the principal components with varimax rotation was made. The internal consistency of each factor was analyzed using Cronbach´s alpha coefficient. The SPSS 21.0 program was applied for the data analysis.

2nd Study

Participants - This study included 476 students in compulsory secondary education, aged between 12 and 18 years old (M = 14.4, SD = 1.6). The percentage distribution by sex was 54% for boys (n = 259) and 46% for girls (n = 217).

Measures–

Activity preferences in physical education classes - The range obtained in the first study was used, and an internal consistency of .62 for materials, .72 for spaces, .76 for new technologies was obtained.

Basic competences in physical education - To determine the core competencies, a Basic Competences Scale was used (Moreno-Murcia, Ruiz & Vera 2015). It consists of a single factor of nine items (e. g. "Make use of technology to solve real problems efficiently") headed by the statement "If I perform these activities in class I ... I think." Responses were given on a Likert-type scale from 1 (*Not at all*) to 7 (*Totally appropriate*). The internal consistency was .86. The confirmatory factor analysis provided some appropriate settings: $\chi2$ = 132.24; df = 26; p = 000; $\chi2$ / df = 5.08; CFI = .93; IFI = .93; TLI = .90; SRMR = .05.

Procedure - The same procedure as in the first study was carried out to collect information.

Data analysis - Descriptive statistics (means and standard deviations) and correlations of all variables were calculated. The internal consistency of each factor was analyzed using Cronbach's alpha coefficient. To confirm the construct validity of the *PPEF* level obtained in the first study, a confirmatory factor analysis was performed using the standard method of maximum likelihood (ML) with patches by Yuan-Bentler (MLR). The ML estimation method is used because in the social sciences it is usual for multivariate normality to deviate, and by using this method the value of $\chi2$ increases and underestimates the standard errors (Finney & DiStefano, 2006).

A number of goodness of fit indices was considered. So, based on inputs from different authors (McDonald & Marsh, 1990; Mulaik, James, Van Alstine, Bennett, Lind & Stilwell, 1989), the indices used to evaluate the goodness of the measurement model were: $\chi2$, $\chi2$/ df, RMSEA (Root Mean Square Error of approximation), RMSR (Root Mean Square Residual) and incremental indices (IFI, CFI and TLI). These fit indices are considered acceptable when the $\chi2$/df is less than 5, the incremental indices (IFI, CFI and TLI) are above .90 and error rates (RMSEA and RMSR) are less than .05 (Hu & Bentler, 1999). Structural regression analysis was performed to test the prediction of basic competences through activity preferences in lessons. For the data analysis Amos SPSS 21.0 21.0 statistical package was used.

3. Results

1st Study

An exploratory factor analysis of the principal components with varimax rotation was performed to test its construct validity. After the first analysis, some of the items did not saturate in the minimum set (.40, Stevens, 1992). The following three items (I.E. "Use of skates and skating", "Cycling", "Using music, dance and choreography") were excluded. The initial 17 items were revised again, and

the final scale consisted of 14 items grouped into three factors (Table 1) called materials (five items), spaces (three items) and technologies (six items). Values greater than 1.00 (3.91, 1.76, and 1.37, respectively) were obtained, explaining an overall variance of 50.39% (9.79%, 27.97% and 12.63%, respectively) (Table 1).

Reliability estimation - An internal consistency of .65 for materials, .72 for spaces and .75 for new technologies was obtained

Table 1. Exploratory Factor Analysis of 'Preferencias de práctica en educación física' (PPEF**)**

Items	Materials	Spaces	New technologies
1. Practicar juegos malabares: cariocas, bastones, pelotas y pompones	.719		
2. Crear mis propios materiales para jugar: indiacas, cometas, dedales	.719		
3. Andar con los zancos	.716		
4. Usar la brújula y otros instrumentos para la orientación	.532		
5. Usar hiperbalones (fitball), plataformas inestables (bosu) y gomas (bandas elásticas)	.407		
6. Realizar actividades en el medio natural: montaña y playa		.759	
7. Visitar instalaciones deportivas: polideportivos, gimnasios, trinquets, etc y realizar actividades allí		.815	
8. Utilizar otros escenarios de práctica		.721	
9. Usar mi smartphone como un instrumento multimedia: música, aplicaciones variadas, GPS			.665
10. Emplear Google Maps para diseñar mis rutas, registrarlas y compartirlas			.753
11. Utilizar el pulsómetro para realizar actividades físicas			.542
12. Utilizar la web: blogs, wikis, redes sociales y compartir información de clase con mis compañeros			.749
13. Intercambiar información mediante plataformas digitales: google drive, dropbox			.749
14. Usar cámara de vídeo y fotos en las clases			.543
% Variance	9.79%	27.97%	12.63%

Table 2. Average, Standard Deviation and Correlations

	M	*DT*	Materials	Spaces	New technologies	Basic competences
Materials	2.75	.83	-	.30**	.32**	.25**
Spaces	4.13	.82	-	-	.33**	.25**
New technologies	3.37	.89	-	-	-	.30**
Basic competences	4.04	1.29	-	-	-	-

2nd Study

Confirmatory factor analysis of the scale Activity preferences in physical education classes - A confirmatory factor analysis based on 14 observed measures and the three freely correlated latent constructs (Anderson & Gerbing, 1988) was performed. As the result of the multivariate Mardia coefficient of 22.15 indicated a lack of multivariate normality of data, the method of maximum likelihood estimation with bootstrapping procedure was used. Appropriate rate adjustments were obtained: $\chi 2$ / df = 210.64; CFI = .90; IFI = .90; TLI = .90; SRMR = .05.

Descriptive and bivariate correlation analysis - Students assigned a higher score to spaces followed by new technologies and materials. The core competencies had an average of 4.04. All variables positively and significantly correlated with each other (Table 2).

Structural regression analysis - A structural model that focused on the conceptual interactions between activity preferences and basic competences was tested. As seen in Figure 1, the dimensions of activity preferences appear as exogenous variables and basic competences as endogenous variables. Therefore, the model presented the dimensions of activity preferences as predictors of basic competences. The method of maximum likelihood estimation and the covariance matrix between items as input to data analysis was used. After analyzing the structural regression, adequate indices were presented: $\chi 2$ / df = 451.24; CFI = .92; IFI = .92; TLI = .91; SRMR = .04. Therefore, the dimensions of activity preferences (materials, spaces and new technologies) can be seen to positively predict basic competences (21% explained variance). (Figure 1)

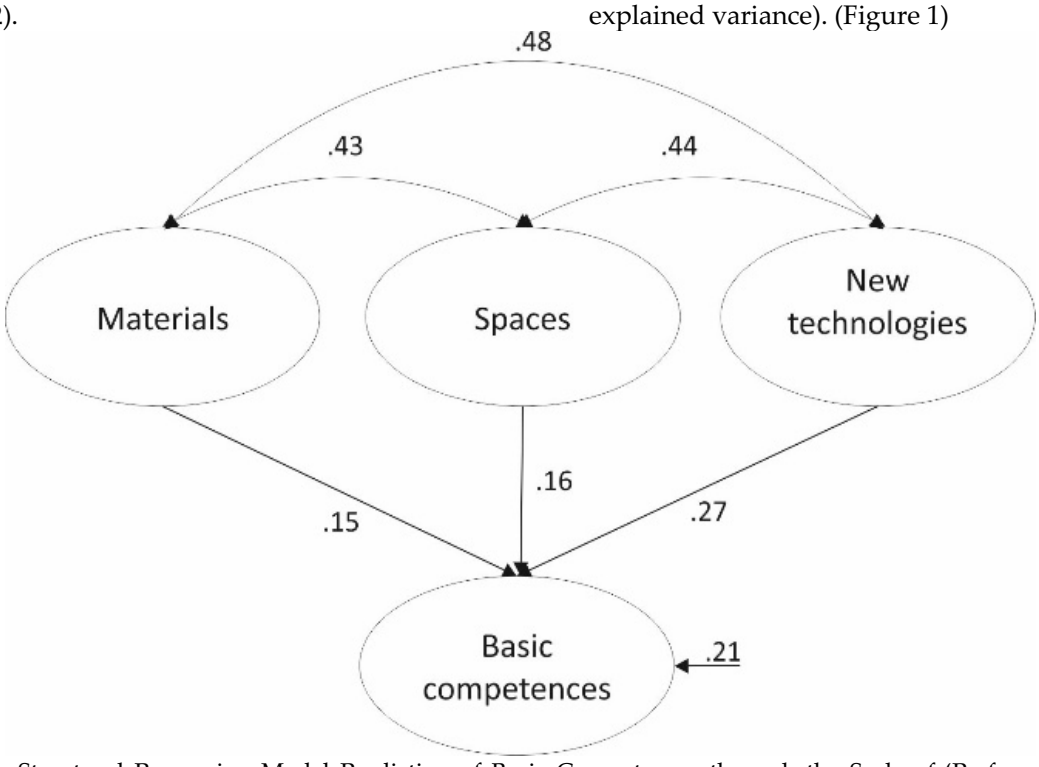

Figure 1. Structural Regression Model Prediction of Basic Competences through the Scale of 'Preferencias de práctica en educación física'. All parameters are standardized and are Significant at p <.05

4. Discussion

Studies have shown that considering students in the instruction process has an effect on motivation and learning (Reeve et al., 2004; Taylor, Ntoumanis & Smith, 2009; Taylor, Ntoumanis & Standage, 2008), but there are very few studies related to interests and their impact on the development of basic competences in physical education. Out of concern for this, this study analyzed the prediction that activity preferences had on the development of basic competences. To do so, the scale of activity preferences in physical education lessons was also validated. The hypothesis that activity

preferences would predict basic competences in students was confirmed.

The Activity preferences in physical education classes scale had adequate psychometric measures to measure the construct "activity preferences in physical education lessons". Construct validity indicated a good fit for the three-factor model consisting of fourteen items. The first called materials, was formed by associating various activity preferences in the material resources to be used for the development of activities and consisted of a total of five items. The second, called spaces, contained an activity preference structure of contexts from alternative facilities and equipment available on campus and consisted of three items. The third factor, called new technologies, integrated the use of technology and multimedia resources for the development of activities, and consisted of six items. The internal consistency of the scale was above the recommended Cronbach's alpha value of .70 (Nunnally & Bernstein, 1994) except in the material dimension, which was less consistent. This fact can be justified by the small number of items in the factors (Hair et al., 1998).

However, it would be advisable to conduct future studies with larger numbers of participants and different social demographic contexts to determine its actual usefulness. The Activity preferences in physical education classes level provides an instrument that can assess the interest shown by students from compulsory secondary school education in some activities developed in class. In this sense, this scale can be useful for programming competency and for physical education teachers to analyze how students' interests affect the development of basic competences.

The proposed model was valid because the materials, space and technology, dimensions were presented as exogenous to the development of basic competence variables, correlating positively with each other and obtaining a prediction of 21% over basic competences. Some studies have highlighted the importance of knowing students' interests when participating in physical education classes, since identifying their preferences and motives for doing these classes can make it more useful and attractive (Goudas & Hassandra, 2006). Experiences in the classroom are known to have a positive impact on interest in doing physical activities (Taylor et al., 2009), and therefore its usefulness and transfer to real life according to the aims proposed in PISA for the development of basic competences. In this line, some studies (Moreno-Murcia et al., 2015) have shown the predictive power of autonomy support (which considers the student's opinion) on the development of basic competences.

In this sense, the study has highlighted the need to incorporate students in the instructional process and has shown the value that the Activity preferences in physical education classes levels may have for physical education teachers when planning and programming competency. Considering activity preferences in physical education sessions could be the starting point for the study of basic competences in physical education, given the relationship that they must maintain with the everyday contexts of students and the management of their own resources (Sebastiani, Blázquez & Barrachina, 2009). However, activity preferences, although of great importance for the design of a competency-based approach need to be accompanied by the study of other variables in the instructional process. Studies have shown the importance of some classroom environment variables in the instructional process (Moreno & Cervelló, 2010) which can lead to students' valuing physical education (Moreno-Murcia & Llamas, 2007). The competence approach is becoming more consolidated among teachers (Barrachina & Blasco, 2012) and its development is being studied internationally by the Programme for International Student Assessment (PISA). Therefore, it is suggested that in the future experimental studies should be made in physical education, focusing on the instruction process of a competence based approach and covering large and heterogeneous samples.

One of the limitations of the study to be pointed out is that research is correlational in nature and cannot infer causal results. Therefore, both factors require an intervention that can endorse the influence of the first over the second, as well as an analysis of teaching strategies employed by teachers during instruction. It would be interesting to consider the need for longitudinal interventions in the future to endorse the hypotheses.

5. Practical Applications.

Both the scale designed and the data obtained in this study may be useful to teachers of physical education concerned with improving their own educational practices. It has become evident that a key factor to achieving basic competences is student involvement. This being the case, future research related to the development of basic competences may consider activity preferences as a support point from which to proceed with interventions in teaching practices.

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Conflicts of Interest:

The authors declare no conflict of interest.

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