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ORIGINAL

MOTOR SELF-EFFICACY, PHYSICAL EDUCATION AND PHYSICAL ACTIVITY IN BRAZILIAN AND SPANISH ADOLESCENTS

AUTO-EFICACIA MOTRIZ, EDUCACIÓN FÍSICA Y ACTIVIDAD FÍSICA EN ADOLESCENTES BRASILEÑOS Y ESPAÑOLES

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ABSTRACT

The research studies the relationship among frequency of physical activity, perceived motor self-efficacy and satisfaction with PE lessons and teachers in two cultures: Brazil and Spain. Four scales were applied to 2,017 Spanish and 1,119 Brazilian adolescents (age 14.22±1.73). Results show low frequency of physical activity and significant relationships among the studied variables (p<0.01). Motor self-efficacy is the factor with the highest explanatory power of frequent physical activity (R^2=0.223 for Brazil and R^2=0.226 for Spain). PE teachers could raise perceived self-efficacy if they applied a suitable approach.

KEY WORDS: Physical activity, motor self-efficacy, physical education, adolescents.

RESUMEN

La investigación estudia las relaciones entre la frecuencia de actividad física, la percepción de auto-eficacia motriz, y la satisfacción con la clase y con el profesorado de Educación Física, en dos culturas: Brasil y España. Se aplicaron cuatro escalas a 2.017 adolescentes españoles y 1.119 brasileños (edad 14.22±1.73). Los resultados muestran: baja frecuencia de actividad física; y relaciones significativas entre las variables estudiadas (p<0.01). La auto-eficacia motriz es el factor con mayor poder explicativo de la frecuencia de actividad física (R^2=0.223 para Brasil y R^2=0.226 para España). Los profesores de EF podrían mejorar la percepción de auto-eficacia aplicando adecuado *feedback*.

PALABRAS CLAVE: Actividad física, Auto-eficacia motriz, Educación Física, Adolescentes.

INTRODUCTION

Adolescents' sedentary life style has become a main cause of concern and attention, internationally, in health and education policies, because of its negative effects on health, since it increases overweight/obesity and related illnesses (hypertension, type 2 diabetes, hypercholesterolemia…) (Paho, 2010; Who, 2010; Currie *et al*., 2004; Duncan *et al.*, 2004; Sallis, Prochaska & Taylor, 2000).

Most studies come to the conclusion that a high percentage of youngsters do not take enough physical activity to get any benefits for their health. Over one third of adolescents can be classified as inactive population (Hernández *et al*., 2009; Duncan *et al*., 2004; Sallis, Prochaska & Taylor, 2000), which places them on the threshold of becoming a health risk group. Practise of physical activity has been tested in Brazil and Spain too, both in the adult population (García-Ferrando, 2006; Monteiro *et al.*, 2003), as well as in the school population (Hernández *et al.,* 2008; Velázquez *et al.,* 2003; Gomes, Siquiera & Sichieri, 2001; Da Silva & Malina, 2000; Mendoza, Sagrera and Batista, 1994). However, the lack of a unanimous method and the diversity of age baselines hinder the achievement of reliable findings on the levels of physical activity among the school population.

Research on the factors concerning the practise of physical activity has had a relevant impact in some countries (Lawman *et al.,* 2011; Gustafson & Rhodes, 2006). In most cases this kind of studies stand on theories like the Cognitive Social Theory by Bandura (1986, 1992, 1997), which has been useful for some authors, such as Pajares (2002), to have synthesise an explanatory model proposal in which human behaviour (and so the attitude towards practise of physical activities) interacts with personal and environmental factors.

One of those personal factors is the concept of self-efficacy and Bandura's contributions (1986, 1992, 1997). For himself perception and believes have an important influence on an individual's performance and motivation to become involved in certain activities. They turn into an indicator of the time and intensity with which he commits himself to achieve a goal (Bandura, 1986, 1992). In the domain of physical activity, some studies reveal that specific perceived self-efficacy can be a relevant mediator concerning adolescents physical activity practice (Peterson *et al*., 2013; Suton *et al*., 2013; Ashford, Edmunds & French, 2010; Luszczynska *et al*., 2010; Welk & Schaben, 2004). Moreover, some research has been carried out on how to boost perceived self-efficacy in regard to physical activity, but with no conclusive results (see review by Ashford, Edmunds & French, 2010). It is therefore and important aspect which deserves selective attention due to the expectations it brings up as a possible conditioning factor over frequency of physical activity.

With regard to environmental factors, it is relevant to learn the possible influence that satisfaction with PE classes and teachers may have on adolescents' physical activity. In spite of the paucity of references on adolescents' degree of satisfaction with PE, pupils' perception of classes and

teachers' behaviour has been highlighted due to its probable connections with their practice of sport and physical activity (Duda, 2001; Díaz, Hernández & Castejón, 2010).

In essence, this study seeks to through light on the relationship between adolescents' frequency of physical activity and some personal and environmental factors that may have an influence on the adoption of an active lifestyle (perceived motor self-efficacy and degree of satisfaction with PE classes and teachers). Also, comparing the grades achieved by Spanish and Brazilian teenagers will allow to analyse any convergences and divergences there might be between both populations, with regard to frequency of physical activity as with the influence that the studied variables may have on it. It is an important side of this research work which will help to understand the possible impact of the studied psychosocial factors on the adoption of active lifestyles in two countries with different culture, and then, on the possible transnational nature of the differences and similarities that both cultures may have in that respect.

AIMS

- To ratify the reliability of the Motor Self-Efficacy Scale (already validated with Spanish adolescents) as applied to Brazilian adolescents.
- To find out how often do Spanish and Brazilian adolescents take physical activity.
- To gain knowledge of perceived motor self-efficacy and degree of satisfaction that Spanish and Brazilian adolescents have with their PE classes and teachers.
- To ascertain any possible relationships between frequency of physical activity by Spanish and Brazilian teenagers and their perceived motor self-efficacy as well as their satisfaction with their PE classes and teachers.
- To ascertain the differences between Spanish and Brazilian populations with regard to the studied variables.

METHOD

• *Participants*

The study comprised 2017 Spanish students (1063 boys and 954 girls) aged 12-17 years old (14,0±1,706), who live in the Autonomous Communities of Andalucia, Asturias, Castille and Leon, La Rioja, Madrid and Valencia; and 1119 Brazilian students (541 boys and 578 girls) aged 12-17 years old (14,6±1,724) who live in the State of Parana (N=3.136).

For the variable of «age», tree groups were set up: 12-13 year olds (37,1% in Spain and 33,8% in Brazil); 14-15 year olds (34,7% in Spain and 28,1% in Brazil); and 16-17 year olds (28,2% in Spain and 38,1% in Brazil).

• *Tools*

Two scales to measure weekly frequency of physical activity have been used. One for spontaneous physical activity, and one for that carried out under planning and supervision by technical staff (it is clearly explained that both scales are concerned with after school physical activity). With data provided by both scales, an index of weekly “Frequency of Physical Activity” (FPA) was set up. It is based on the possibility of gaining health benefits out of the practice of physical activity: Level1=No FPA (0 times per week); Level2=Very Low FPA (1-2 times per week); Level 3=Moderate FPA (3 times per week); Level 4=Adequate FPA (4-5 times per week); and Level 5=High FPA (6 times per week and over).

To evaluate the level of satisfaction with PE classes and teachers two items were used. One of them asked about the general satisfaction with classes and the other one about satisfaction with teachers. Both of them offered an answer scale with a rate of 0-10 points (0= No satisfied... 10=Very satisfied).

Perceived motor self-efficacy was evaluated through the Motor Self-Efficacy Scale, which is an adaptation of the General Self-Efficacy Scale (Baessler & Schwarcer, 1996) to the specific domain of motor skills. It was drawn up, validated and applied on Spanish population in previous research (Hernández *et al*., 2008; Hernández *et al*., 2011), and it consists of ten items with four answer options per item (1=Strongly desagree; 2=Desagree; 3=Agree; 4=Strongly agree), which give a score of 10 to 40 points.

In the case of Brazil, the said tools underwent a prior pilot study (n=107), after being translated into Portuguese (double translation method) and their contents validated by experts.

- *Process and permits.*

Data collection was carried out after the relevant permits (schools' approval and parents' informed and signed consent) were obtained by members of the research team in the classroom of each student group. The procedure applied was the same in all cases.

RESULTS

a) *Motor Self-Efficacy Scale: reliability in different cultural contexts.*

The Motor Self-Efficacy Scale presents good reliability for Spanish and Brazilian populations (table 1), with some differences depending on the variables of age and gender. In the case of the Spaniards, a rise in age means a linear increase of reliability values, which does not happen with the Brazilians, for whom the highest reliability value belongs to the 14-15 year old group. On the other hand, the scale gives a slightly better Cronbach's Alpha value to the boys against the girls, and to the Spanish girls against the Brazilian girls.

Table 1. Motor Self-Efficay Scale: Reliability Values.

	Cronbach' Alpha		Spearman–Brown	
	Spain	Brazil	Spain	Brazil
Total	0.87	0.86	0.86	0.81
Boys	0.85	0.84	0.88	0.85
Girls	0.83	0.79	0.83	0.77
12-13 year olds	0.83	0.82	0.81	0.75
14-15 year olds	0.87	0.89	0.86	0.87
16-17 year olds	0.91	0.85	0.89	0.82

Since it is a scale with a reduced number of items, it is relevant to point out the good values obtained in the Spearman-Brown split-half correlation test.

b) *Physical activity practice*

Results obtained on weekly sport practice (table 2) indicate that only under 50% of Spanish and Brazilian adolescents (48.2% and 43.0% respectively) take up adequate/high frequency practice (the addition of both categories) to achieve the desirable heath benefits. If the variable of gender is considered, the percentage of boys in both countries who take up adequate/high physical activity practice goes well over 50% of the population, but the girls only reach 34.4% (Spain) and 28.7% (Brazil).

Table 2. Frequency of physical activity by Spanish and Brazilian adolescents (%)

	None		Very low		Moderate		Adequate		High	
	Spain	Brazil	Spain	Brazil	Spain	Brazil	Spain	Brazil	Spain	Brazil
Total	7.9	8.8	19.6	20.9	24.4	27.3	19.0	22.9	29.2	20.1
Boys	3.1	4.4	13.4	11.6	23.1	25.7	19.8	27.5	40.7	30.7
Girls	13.3	13.0	26.5	29.6	25.8	28.7	18.2	18.5	16.2	10.2
12-13 year olds	2.3	4.2	12.3	14.8	25.9	27.2	21.8	27.5	37.7	26.2
14-15 year olds	8.4	7.9	22.1	20.3	23.0	29.8	17.9	24.8	28.7	17.1
16-17 year olds	14.7	13.6	25.8	26.8	24.1	25.4	16.8	17.4	18.7	16.9

The analysis with regard to age indicates a gradual decline in frequency of practice in each group and population, so much so that in the group of 16-17 year olds the percentage of active population hardly goes over one third of the total, in both the Spaniards and the Brazilians. The interaction age*gender shows that only 19.6% of the Brazilian girls in the 16-17 group are active population, and that Spanish girls very slightly exceed that percentage (20.9%).

c) Degree of satisfaction with PE classes

The degree of satisfaction with PE classes (table 3) varies significantly depending on the population (F=427.58 p<0,001). In an 0-10 scale, the mean mark of Spanish teenagers comes close to very good (6.7±2.46), whereas the mean mark of the Brazilians does not reach a pass (4.7±2.6).

Table 3. Satisfaction with PE classes (mean and standard deviation)

	Spain	Brazil
Total	6.7 (2.46)	4.7 (2.6)
Boys	6.8 (2.49)	4.8 (2.73)
Girls	6.6 (2.41)	4.7 (2.47)
12-13 year olds	7.6 (2.36)	5.8 (2.79)
14-15 year olds	6.3 (2.46)	4.2 (2.15)
16-17 year olds	6.0 (2.26)	4.2 (2.44)

Results with regard to gender do not yield significant differences among the Brazilian population, but they do among the Spanish population, where the boys are somewhat more satisfied with the classes than the girls (F=5.096 p<0.05).

The analysis with regard to age reveals a general decrease in level of satisfaction with PE classes as teenagers grow up. The differences are particularly remarkable between 12-13 year olds and 14-15 year olds (ANOVA *Post-Hoc Schefee*). Differences were statistically significant in both populations (F=103.220 p<0.001 for Spanish adolescents; and F=67.530 p<0.001 for Brazilian adolescents). There are no significant differences between 14-15 and 16-17 groups in neither of the cultures.

d) Degree of satisfaction with PE teachers

Results in this case describe again a very different reality between both populations (table 4). Whereas Spanish adolescents come close to a very good degree of satisfaction with their PE teachers (6.5±2.73), Brazilians show a low degree of satisfaction (4.7±2.89).

Table 4. Satisfaction with PE teachers (mean and standard deviation)

	Spain	Brazil
Total	6.5 (2.73)	4.7 (2.89)
Boys	6.4 (2.78)	4.4 (2.82)
Girls	6.5 (2.65)	4.9 (2.94)
12-13 year olds	7.3 (2.63)	4.9 (3.19)
14-15 year olds	5.9 (2.79)	4.2 (2.44)
16-17 year olds	6.0 (2.49)	4.9 (2.89)

With regard to the gender variable, only Brazilian adolescents give significant differences, the girls being more satisfied with their PE teachers than the boys (F=8.737 p<0.001).

With regard to age, both populations show a common trend: a decline in the level of satisfaction with teachers between 12-13 year olds and 14-15 year olds, and an upturn of satisfaction between 14-15 year olds and 16-17 year olds. Both the Spaniards (F=86.092 p<0.001) and the Brazilians (F=8.662 p<0.01) yield significant differences between the 12-13 year-old group and the 14-15 year-old group. However, only the Brazilians yield significant differences between 14-15 year olds and 16-17 year olds (F=10.078 p<0.01).

e) Perceived Motor Self-Efficacy (PMSE)

Results on PMSE (table 5) show there is a perception difference between Spanish and Brazilian adolescents with regard to their efficacy to sort out situations belonging in the PE classes (10 to 40 score). The Spanish population has a higher PMSE than the Brazilian, and there are significant differences between both populations (F=427.580 p<0.001).

Table 5. Motor Self-Efficacy Scale (mean and standard deviation)

	Spain	Brazil
Total	28.0 (6.02)	25.8 (6.24)
Boys	29.6 (5.62)	28.3 (5.57)
Girls	26.3 (5.96)	23.4 (5.90)
12-13 year olds	29.4 (5.55)	25.9 (5.77)
14-15 year olds	27.5 (6.08)	25.5 (6.75)
16-17 year olds	26.8 (6.18)	25.8 (6.25)

The analysis with regard to gender reveals that boys hold a higher PMSE than girls, with significant differences between both populations (F=164.698 p<0.001 for the Spaniards; F=202.356 p<0.001 for the Brazilians).

Age also yields differences between both cultures. In the case of the Spaniards, an older age goes always together with a decrease in PMSE, giving significant differences between 12-13 year olds and 14-15 year olds (F=37.135 p<0.001) and also between 14-15 year olds and 16-17 year olds (F=4.072 p<0.05). Whereas in the case of Brazilian teenagers there are no significant differences, and there is more steadiness of PMSE among the different ages.

d) *Relationship among the studied variables*

Simple correlations (variable* variable) reveal the existence of significant relationships (p<0.01) among all the variables present in the study, as much in the case of Brazilian population, as in the Spanish one (table 6). In this regard, it is worth pointing out the the high correlation in both populations between frequency of physical activity (dependent variable) and PMSE.

Table 6. Pearson's correlation among the different variables

	Spain			Brazil		
	1	2	3	1	2	3
1.Frequency of physical activity	--			--		
2.Satisfaction with PE classes	0.194**	--		0.223**	--	
3.Satisfaction with PE teachers	0.118**	0.630**	--	0.160**	0.592**	--
4.Perceived Motor Self-Efficacy	0.402**	0.337**	0.258**	0.471**	0.214**	0.159**

**p<0.01

In an attempt to better interpret the predictive power of each independent variable over frequency of physical activity by adolescents a stepwise regression analysis was carried out.

Table 7. Stepwise regression analysis depending on origin, gender and age (R^2)

	Spain			Brazil		
			Total			
Perceived motor self-efficacy		0.226			0.223	
Satisfaction with PE classes		0.228			0.238	
Satisfaction with PE teachers		--			--	
			Gender			
	Boys	Girls		Boys	Girls	
Perceived motor self-efficacy	0.168	0.189		0.120	0.182	
Satisfaction with PE classes	0.171	0.193		0.147	0.195	
Satisfaction with PE teachers	--	--		--	--	
			Age			
	G-1	G-2	G-3	G-1	G-2	G-3
Perceived motor self-efficacy	0.138	0.238	0.243	0.174	0.330	0.207
Satisfaction with PE classes	--	--	--	0.193	--	--
Satisfaction with PE teachers	--	--	--	--	0.340	--

As it can be inferred from the results displayed on table 7, there are two predictive variables of frequency of physical activity, and they are the same in both cases, which confirms their explanatory power in different cultural contexts. Also in both cases the predictive capability of PMSE is far greater than the level of satisfaction with PE classes. In the case of Spanish teenagers it is apparent that both variables together can explain up to 22.8% of the dependent variable or frequency of Physical activity (R^2=0.228), whereas in the case of Brazilian teenagers both variables together can explain up to 23.8% of that variation (R^2=0.238).

The analysis with regard to gender makes it clear that, although Brazilian and Spanish boys show a higher PMSE than girls (see table 5), that variable has greater predictive power with regard to frequency of physical activity for the girls than for the boys, mostly in the Brazilian case. In other words, although PMSE itself is important for frequency of physical activity, it seems to be more so for the girls than for the boys.

With regard to the analysis depending on age, once again the PMSE factor

shows, by far, a greater predictive capability of frequency of physical activity, although there are differences in both populations. Whereas in the Spanish case the predictive power of PMSE increases remarkably and gradually with age to reach up to 24.3%, in the Brazilian case, that predictive capability rises considerably in the 14-15 year-old group, as compared to the other two age groups in the same population (only the PMSE factor rises to a value of R^2=0.330 in the Brazilian population of 14-15 year olds).

5. DISCUSSION AND CONCLUSIONS

The good reliability the Motor Self-Efficacy Scale proved to have in the study carried out in Spain (Hernández *et al.*, 2008), remains in the case of Brazil, and its reliability for the assessment of PMSE in Spanish and Brazilian adolescents is ascertained. Such reliability is greater than that found for the General Self-Efficacy Scale by Baessler & Schwarcer (1996), it meets the recommendations by Bandura (1997) and Zimmerman (1996) and provides a useful instrument to study factors related to motor skills.

With regard to frequency of physical activity, the results suggest that there are significant differences between Brazilian and Spanish adolescents, and also that, in both cases, only a small percentage of them take enough physical activity to get the health benefits it can provide.

In the case of Spain, rates of physical activity practice rank slightly below other European populations (Duncan *et al*., 2004) and they decline as age rises, which tallies with other national and regional studies (Mendoza *et al*., 1994; Roberts *et al*., 2004; Hernández and Martínez, 2007). .

As concerns Brazil, the situation is worse since the population defined as sedentary reaches four out of ten adolescents. This percentage worsens with age and is not satisfactory as compared to international standards. However, if previous studies are taken into consideration (Da Silva & Malina, 2000; Gomes, Siqueira & Sichieri, 2001), the data collected now reveal an important improvement as compared for instance to those collected almost fifteen years ago by Da Silva & Malina (2000) in other Brazilian towns (85% of boys and 94% of girls are defined as sedentary). Probably, some campaigns like "*Agita Brasil*" ("Shake up, Brazil"), launched after 1997 (Monteiro *et al*., 2003), are bringing positive results in the fight against sedentary lifestyles.

As the gender factor is concerned, it is worth underlining that Spanish and Brazilian girls take physical activity less often than boys, which makes their relative situation with regard to health and quality of life the more alarming (Sallis *et al.*, 2000; Schmitz *et al*., 2002). The results reveal also that the combination of gender*age variables shows that eight out of ten Spanish and Brazilian girls who are sixteen and over must be defined as inactive or sedentary population.

Regression and correlation analyses confirm significant relationships between the studied variables and the dependent variable. PMSE stands by far as the variable with more predictive power of physical activity frequency by Spanish and Brazilian adolescents, and so confirms other findings on the predictive value of self-efficacy (Peterson *et al*., 2013; Suton *et al*., 2013). The fact that in both cultures the level of satisfaction with PE classes has also some predictive value, however small, proves that this kind of variables have an influence when it comes to drawing up an explanatory model of the factors that can either encourage or inhibit physical activity practice.

The gradual decline of PMSE as age rises happens only to Spanish teenagers. These results match those on general self-efficacy by Carrasco and Del Barrio (2002) on Andalusian adolescents, and those by Hernández *et al*., (2008) on motor self-efficacy in adolescents in the Autonomous Community of Madrid. They also tally the expectations pointed out in that regard by Bandura (1997) and the conclusions in international studies (Bandura *et al*., 1996).

As concerns Brazilian teenagers, there is not any significant variation of PMSE among the different age groups. This aspect should be studied in order to find out in what way a different culture and probably a different maturing framework can prevent a decline of PMSE, at least in the studied age bracket (12-17 year olds).

Satisfaction with PE classes is also a predictive factor of physical activity frequency. However, the results of the regression analysis reveal that its predictive capability, as compared to PMSE, is substantially reduced in both populations. On the other hand, the predictive capability of satisfaction with PE classes is somewhat higher in the Brazilian case, probably because Brazilian teenagers are less satisfied with their PE classes and this may be bringing about less physical activity practice. At any rate, satisfaction with classes and PE teachers have been regarded as factors with an influence in physical activity practice by several authors (Chen, 2001; Duda, 2001), which should not be overlooked neither by PE teachers, nor by education policies in either country.

As a final thought, in line with the findings in this study, it is relevant to point out that public institutions, as much as families, schools and PE teachers, should take joint action to create a motivating environment in which teenagers feel the need to take up physical activity and find the help and oportunities to do it. Also, the privileged relationship between PMSE and physical activity frequency revealed by this study is a piece of knowledge which should lead initiatives and intervention programmes which hold improvement of PMSE as one of their main aims.

That improvement of PMSE may derive, at least, from two ways of action. On the one hand, by raising the quality and quantity of PE teaching processes, with the purpose of achieving a real and objective improvement of adolescents' motor skills. And on the other hand, not less important and in line with suggestions coming from the meta-analysis carried out by Ashford, Edmunds &

French, 2010, by making more “visible” for adolescents their own qualities (improvement of subjective perception of own reality), by means of using motivating language which boosts awareness of personal competence, and urges personal self-improvement through participating in healthy and engaging activities. Likewise, as it can be inferred from the study by Díaz, Hernández & Castejón (2010), preference should be given to teaching approaches based on comprehension, since they bring about a higher level of satisfaction among less skilful pupils, who become more involved in the activities, and create greater learning expectations, which can contribute to a better perception of their motor efficacy.

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