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ORIGINAL

HEALTH ASPECTS OF PHYSICAL EDUCATION IN THE COMMUNITY OF MADRID (SPAIN)

ASPECTOS DE SALUD EN EDUCACIÓN FÍSICA EN LA COMUNIDAD DE MADRID (ESPAÑA)

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ABSTRACT

Objective. The aim of this paper is to analyze the health status of physical education students of the Community of Madrid (Spain).

Material and methods. The study was carried out at 25 centers in secondary school, participating in it a total of 686 students. There has been an elected non-probability sampling and data were collected through questionnaires and observation sheets.

Results and discussion. The results of this study, note that almost 50 % of students claim to have a chronic disease, vision problems are the most predominant. On the other hand, we can see that the physical development is suited to the average population; cardiovascular adaptation of students is not bad but should be better. In addition, school physical activity is insufficient, the

assessment of the physical condition is inadequate and in public schools, school sports facilities are clearly deficient from the point of view of health. Finally, it is noted that none of the schools, the teachers had collected this data before making this research, except specific curricular adaptations requested by the student. It is necessary that teachers look for new work methods that comply with health criteria and that are coordinated with health services.

KEY WORDS: physical education, physical education teacher, health promotion, health related fitness, physical fitness, physical fitness test.

RESUMEN

Objetivo. Se tratan de analizar aspectos de salud en Educación Física en Centros de la Comunidad de Madrid (España).

Material y métodos. El estudio se ha desarrollado en 25 centros, con un total de 686 alumnos. El muestreo ha sido no probabilístico por elección y los datos se han recogido mediante cuestionarios y hojas de observación.

Resultados y Discusión. Casi el 50% del alumnado tiene alguna enfermedad crónica. El desarrollo corporal es normal, la adaptación cardiovascular no es mala pero mejorable. La actividad física resulta insuficiente, la valoración de la condición física es inadecuada. Las instalaciones deportivas escolares en los centros públicos son claramente deficientes desde el punto de vista de la salud. Por último, en ninguno de los centros, el profesorado había recogido estos datos antes de la elaboración de esta investigación, salvo adaptaciones curriculares concretas pedidas por el alumnado. Es necesario buscar nuevas metodologías que estén ajustadas a criterios de salud y coordinadas con los servicios de salud.

PALABRAS CLAVE: Educación física, profesorado de Educación física, promoción de la salud, condición física relacionada con la salud, condición física, test de condición física.

INTRODUCTION

This research aims to inform, develop and promote those tasks of the teacher related to healthy physical activity. This requires that teachers consider the following⁽¹⁻⁸⁾:

- Being familiar with the characteristics of their students.
- Help students understand their own capabilities and limitations.
- Develop appropriate curricular adaptations.

- Assess the activities carried out from the point of view of health.
- Analyze damages that might arise from different activities.
- Being familiar with the injuries that affect students and diseases caused by the practice or lack of physical activity.
- Preventing accidents and evaluate the environment in which the activities (school sports facilities) are performed.

Objective data that serve as indicators for the type of physical activity related to health that is taking place in educational centers of Madrid, its consequences and the ability to positively change teaching performances are presented in this paper.

According to Thorburn et al.⁽⁹⁾, Physical Education can contribute to improve health and welfare and this aspect should be reflected in the curriculum. Horrell et al.⁽¹⁰⁾, consider that the excellence of the Scottish curriculum can be caused by a physical education that provides health and wellness.

Concerning policies to achieve wellness schools (according to the authors that might prevent obesity) it is proposed to carry out agreements, monitoring and implementing policies toward physical activity, nutrition and health by all people involved in order to achieve wellness centers⁽¹¹⁾.

Demetriou and Honer⁽¹²⁾ make a review of 129 studies on the effectiveness of school-based interventions for physical activity by measuring the "health and fitness" (BMI and engine performance), "physical activity" and "psychological determinants" (knowledge of the effects of physical activity, self-concept and attitudes toward physical activity), finding that different studies find positive effects in all three areas. It is significant the presence of studies examining motor performance, physical activity and knowledge of physical activity achieved (69.7%, 56.8% and 87.5%, respectively). To a lesser degree studies assessing the effects on self-concept and attitudes (30% and 43.8% of the studies, respectively) were found. There are only a few studies that examine BMI (2.7%), physical activity (6.8%), and attitudes toward physical activity (12.5%) and they show negative effects, being the best results for the control group. The effects of the intervention were influenced by the age of the students, the type of intervention and the frequency of interventions. Self-efficacy turned out to measure the relationship between the program and the physical activity of students. They said more research was needed to clarify the mediating effects of psychological variables in physical activity and health and increase knowledge about the underlying mechanisms in the behavior change regarding physical activity.

It seems that the studies about physical condition related to health based their conclusions on their influence on BMI. It is noteworthy that when the authors of this study speak about health they only collect height and weight variables to prepare the body mass index.

When talking about the knowledge of the students, the health state regarding their illnesses^(8, 13-15), their cardiovascular fitness⁽¹⁶⁾, their declared physical activity, physical condition⁽¹⁷⁾, body development or psycho-social health⁽¹⁸⁾ are included.

When conducting a review of the existing Ordinance on minimum contents of Spanish Secondary Education, it focuses on the "physical condition in relation to health" and "physical" health⁽¹⁹⁾. It was found an essay⁽²⁰⁾ that values the perception of children from 5th and 6th grade on their own physical condition by using the FITNESSGRAM test in order to measure their own fitness and health; the results showed that the children enjoyed self-assessing and relating the results to their health.

Naranjo attributes the 2% drop in deaths from cardiovascular disease to the increase in sport practice, but on the contrary, a decrease is not observed in the prevalence of diseases linked to a sedentary lifestyle⁽²¹⁾.

MATERIAL AND METHODS

The study was conducted with 686 students spread across 25 centers in the Community of Madrid (Spain), a non-probability, purposive sample of 1st of ESO; there is "lost data" in the investigation since not all students answered all tests. The average age of students was 13 years and approximately half of them were adolescent males and females. We refer to sexual phenotype since it has not been proven biological sex and is only declarative.

The following instruments were used: A questionnaire on the state of health from which we obtained all the data related to health: disease of students and their specific pathologies; PAQ-A questionnaire to measure the sporting habits. The Physical Activity Questionnaire (PAQ) that was used is a standardized questionnaire whose confidence index test-retest in boys was $r = 0.75$ and $r = 0.82$ for girls⁽²²⁾; The weight and height data provided by the students helped us calculate the Body Mass Index (BMI); The Ruffier test from which pulsations were obtained, the Ruffier index (RI) and Ruffier-Dickson index (DRI); Observation sheets for physical fitness tests and assessment records for installations.

It is a non-experimental, descriptive study on students in 1st of E.S.O.

From an ethical point of view, all the rules regarding studies on students were respected and determined by the law of the Spanish State on Data Protection throughout the entire collection and use of these studies.

RESULTS

The presentation of the results is carried out in order of the years (2005, 2007 and 2013) of collection to observe the evolution.

First the data related to the health of students (Table 1) is presented.

TABLE I. Health data, students with chronic illnesses

	1º ESO 2005	%	1º ESO 2007	%	1º ESO 2013	%
Total	769	100%	583	100%	358	100%
- Total Men	409	53%	306	52,48%	151	42,18%
- Total Women	360	47%	277	47.51 %	166	46,37%
Healthy people	335	43,56%	268	45,97%	147	41,06%
- Healthy men	194	25,22%	153	26,24%	67	18,71%
- Healthy women	141	18,34%	115	19,72%	80	22,35%
Ill People	368	47,86%	315	55,03%	153	42,74%
- Ill men	182	23,67%	153	26,24%	79	22,07%
- Ill women	186	24,19%	162	27,79%	74	20,67%*
not know/not respond	66	8,58%	15	2,57%	41	11,45 %*
Polypathia	125	16,25%	125	21,44%	46	12,85 %*
- Men with polypathia	61	7,93%	66	11,32%	26	7,27%
- Women with polypathia	64	8,32%	59	10,12%	20	5,58 %*
Monopathy	243	31,61%	190	32,59%	102	28,49%
- Men with monopathy	126	16,38%	87	14,92%	48	13,41 %*
- Women with monopathy	117	15,23%	103	17,67%	54	15,08%

Table II shows the different types of pathologies found in the population that has been part of this study. Hypokinetic diseases or those whose evolution and / or symptoms may improve with physical exercise, have been marked with an asterisk.

TABLE II. Pathologies reported by students

Pathologies (sorted by frequency in 2005)	1º ESO 2007	%	1º ESO 2013	%
Visual disorders / diseases of the eye and adnexa	176	34,11%	84	33,87%
Myopia,	112	21,28%	23	9,2%*
Astigmatism,	40	7,60%	12	4,80%
Farsightedness,	10	1,90%	16	6,4%*
Strabismus,	5	0,95%	3	1,21%
Other ocular diseases with 1 subject,	4	0,76%	1	0,40%
Nonspecific,	5	0,95%	29	
Allergy	86	16,67%	63	25,40%*
Celiac disease	2	0,38%	3	1,21%*
Developmental disorders and eruption of teeth (dental malposition)	63	12, 21%	13	5,24%*
Asthma * ,	46	8,91%	30	12,10%*
Scoliosis or kyphoscoliosis * ,	28	5,43%	5	2,02%*
Kyphosis *	1	0,19%		
Flatfoot *	19	3,68%	2	0,81%*
Ligamentous laxity (articular) * ,	8	1,55%	3	1,21%
Foot dig * ,	6	1,16%	1	0,40%*
Dysmetria * ,	6	1,16%	1	0,40%*
Ear problems,	6	1,16%	2	0,81%*
hearing loss	2	0,38%	1	0,40%
Other diseases of the ear with a subject,	4	0,76%	1	0,40%
Migraine,	5	0,97%	4	1,60%
Epilepsy,			2	0,81%
Hypercholesterolemia *	4	0,77%		
Hypothyroidism,	4	0,77%		
Hyperthyroidism,			1	0,40%
Foot valgus * ,	4	0,77%	2	0,81%
Shortened Achilles tendon * ,	3	0,58%	1	0,40%
Nonspecific alterations of the ankle,			2	0,81%
Nonspecific kidney and urologic disorders	3	0,58%	2	0,81%
Nonspecific cardiac abnormalities,	3	0,58%	3	1,21%
Aortic coarctation,			1	0,40%
Nonspecific alterations of growth *	3	0,58%	4	1,60%
Obesity *	3	0,58%	2	0,81%

Unspecified back disorders *,	3	0,58%	2	0,81%
Unspecified anemia,	3	0,58%	1	0,40%
Thalassemia,			1	0,40%
Psychological disorders,	2	0,39%	1	0,40%
Diabetes I *,	2	0,39%	1	0,40%
Congenital adrenal hyperplasia,	2	0,39%		
Osgood Slater *	2	0,39%	2	0,81%
Perthes disease			1	0,40%
Gastritis and gastroesophageal reflux	2	0,39%	1	0,40%
Hyperactivity *	1	0,19%	5	2,02%*
hypotension	1	0,19%	2	0,81%
Other pathologies with 1 illness	21	3,99%	3	1,20%
TOTAL	516	100%	248	100%

Table III shows the pulses measured in the Ruffier test, Ruffier rates (IR) and Ruffier-Dickson rates (IRD), weight, height and body mass index (BMI) and Physical-sportive Activity performed, measured by PARQ-A.

Table III. Statistical-descriptive; P1, resting pulse, P2, pulse at the end of exercise, P3, pulse 1 minute after exercise, IR, Ruffier index, IRD, index Ruffier-Dickson, BMI, body mass index; PAQ-A index of physical activity practice.

		P1	P2	P3	IR	IRD	Weigh t	Heigh t	BMI	PAQ- A
N	Valid	652	653	653	652	652	434	423	416	455
	Lost	34	33	33	34	34	252	263	270	231
	Boys	334	335	335	334	334	226	225	221	239
	Girls	310	310	310	310	310	205	195	192	214
Average			75,77	131,4 1	91,9	9,91	9,37	45,17	1,5	18,81
	Boys		79	103	90,73	9,89	9,08	45,21	1,55	18,84
	Girls		76,29	131,9	93,47	10,02	9,83	45,03	1,55	18,79
Median			76	131,6 1	88	9,6	9	45	1,55	18,59
Mode			80	120	80	11,2	9	40	1,5	17,58 ^a
Standard deviation			15,98	25,28	21,21	4,95	5,01	7,46	0,078	2,547
Variance			255,4 3	639,1 7	449,8 7	24,51	25,07	55,66	0,01	6,49
Asymmetry			0,51	0,03	0,40	0,17	0,38	0,65	-0,01	0,48
Asymmetry typical error			0,10	0,10	0,10	0,10	0,10	0,117	0,119	0,12
Kurtosis			1,02	-0,28	-0,23	0,39	0,286	0,2	0,15	0,02
Kurtosis typical error.			0,19	0,19	0,19	0,19	0,19	0,23	0,24	0,24

a. There are several modes. The smallest value is shown. Source: own.

The Analysis of the Physical Fitness test was conducted in 17 centers. Three of

them said that they did not perform physical fitness tests (Table IV).

TABLE IV. Physical Tests

Centers	1	2	3	4	5	6	7	8	9	10	11	12	13	14	T
Tests															
20 m.l.				X	X										2
30 m.l.									X						1
40 m.l.		X										X			2
50 m.l.	X		X				X		X		X	X	X		7
100 m.l.				X											1
1000 m.l.	X									X					2
Race 8'												X			1
Cooper Test			X	X	X			X	X		X		X		7
Course Navette		X		X		X	X						X	X	6
Race time														X	1
Crunches30" - 1 min.	X				X			X		X		X	X		6
Horizontal Jump	X	X			X		X	X	X	X	X	X	X		10
Vertical Jump				X					X		X				3
Medicine ball toss	X		X	X	X		X	X		X		X	X		9
Sit and reach	X		X	X	X	X	X					X			7
Body deep flexibility								X	X			X		X	4
Agility Figure-8 Circuit							X								1
TOTAL	6	3	4	7	6	2	6	5	6	4	4	8	6	3	

From the point of view of the facilities, we have analyzed 12 centers, 6 public centers and 8 subsidized-private ones. Private centers obtained an average score of 237 points and public schools obtained 203; there is one among them that does not reach 100 points. If we translate the values that Cabra⁽⁷⁾ proposes in terms of "health medals", these are: 1 medal (1-90 points), 2 medals (91-170 points), 3 medals (171-240), 4 medals (241-300 points) and 5 medals (301- 352).

DISCUSSION OF RESULTS

Knowing the status of students has three primary functions.

1. To know the initial health status of each student.

1. To adapt the process of teaching and learning to students with some pathology.

1. To contribute to physical activity in those pathologies that depend on it to halt its decline, improve health or reduce your symptoms.

It is found that the trend regarding health data of each year continues. Half of the students are diagnosed chronically ill. No significant differences between sexual phenotypes, nor between public or private schools. It is noteworthy the lower percentage of students with polypathias in 2013.

The pathologies have been analyzed in 220 students from 16 schools. Visual disturbances are the most common chronic diseases and they present similar rates in comparison to the data collected in 2007, although it can be observed how the declared type of ocular pathologies has changed. Allergies are second. There is a very significant increase of (8.73%); and then asthma whose prevalence values (12.10%) are above the average of the Community of Madrid (9.5%)⁽²³⁾. The following would be dental malpositions (5.24%), which is decreasing. The rest of the diseases listed in 2013 did not exceed 3%, therefore they are rare, though perhaps the latter are the most likely to make individual curricular adaptations without discarding any adjustments to the previous pathologies⁽²⁴⁾; It is important to note that, statistically, to bring a case of a specific pathology, and not a rare case, the required percentage would be 3%, and we can say that there are few diseases that reach that rank⁽²⁵⁾.

Other pathologies suitable for an intervention process related to physical activity would essentially be those of the musculoskeletal system, or those for which physical activity (29.85%) is recommended, mainly those of the musculoskeletal system or those for which physical activity is necessary as it can change their state, ie intervening directly on them (Table 2).

Regarding the Physical-Sports activity performed, measured by the PARQ-A (Table 3) on a scale of 1-5, it is found that moderate physical activity is performed (=2,87), more boys (=2,95) than girls (=2,78), but in almost equal proportion.

It can be considered positively the lack of significant differences in participation by gender, but do not forget that from this age on the sport participation breach⁽²⁶⁾ starts to get bigger so the teacher should facilitate, encourage, educate and counsel to create permanent habits and control that significant differences do not arise⁽²⁷⁾. According to Serra et al.⁽²⁸⁾, boys and students of primary school are the subjects that mostly are within the state of physical activity frequency higher than 6 months. According to Ramos et al.⁽²⁹⁾, adolescents characterized by their high level of physical activity and low rate of inactivity are the ones that really show a high score on biopsychosocial health. The data collected by Demetriou and Höner⁽¹²⁾ shows that the kids who live in Canada, England, Ireland, Lithuania and USA show high levels of physical activity, while Belgium, Estonia, France, Italy, Norway and Portugal have very low levels, with reference to 60 min per day including 30 min at school, being boys more active than girls, and showing that physical activity decreases with age.

It is observed in the Ruffier test that the average resting heart pulse is between 76

and 79 ppm, with a mode of 80 ppm, which represents a normal pulse at rest, although it would be desirable to be able to reduce the average to 70 ppm; therefore endurance workout is recommended in a long term to achieve this adaptation.

However, the average pulse during exercise in boys (103 ppm) is low for this period and shows good adaptation to the effort; the average for girls is 132 ppm which indicates that the cardiovascular cost for this exercise is normal without showing neither adaptation nor maladaptation to this effort⁽²⁸⁾. Significant difference between boys and girls is observed with this figure.

The mode stands at 120 ppm which is a very appropriate and normal pulse for this exercise. After one minute recovery is between 91 and 94 ppm, which indicates a normal recovery, and reaching a mode of 80 ppm which indicates that the majority of students recover very well (according to the mode: P1=80, P2=120 and P3=80). Considering the Ruffier index, valuations, in terms of averages, lie between good for boys (9.89) and mediocre for girls (10.02) and also poor for the majority of students (mode 11.20).

According to the Ruffier-Dickson index, values are mean (boys 9,08; girls 9,83, mode 9)⁽¹⁶⁾¹⁶. Any value is attributed to the indices when comparing them to the wealth of data obtained directly from the pulses. In short, there is a need to work and improve cardiovascular endurance of students, not with the aim of producing the heart of an athlete but to improve cardiac reserve, get a lower pulse at rest, have better cardiovascular adaptation to exercise and have better cardiovascular recovery, which ultimately would put the students in a range of good cardiovascular health. Especially, if we focus on those students who are outside the normal parameters.

It is observed that size and weight correspond to tweens, with little difference between boys and girls, with an average height of 1.55 m and an average weight of 45 kg with a body mass index (BMI) of 18.20, which fits within the 50th percentile of the Spanish population⁽³⁰⁾. It should be highlighted that the BMI is an inadequate indicator to assess adolescents and athletes; the former because the weight or height predominate at certain times and distort the index value and the latter because the hypertrophied muscle mass increases the weight and value of the index. There are few cases of obesity (BMI over 30) and underweight (BMI less than 19). So far they have normal development before the pubertal phase that is about to begin.

For the fitness tests, there are not two centers that match the type of tests performed, therefore and therefore there is no uniform criterion. It is noted that the tests are passed from the point of view of performance. That is, the evaluation is punitive because it is conditioned by the performance improvement or the mark achieved. It seems that teachers think that students should improve at all costs and in order to have better physical condition suffering is necessary because the

student must achieve new and better physiological adaptations. There is no criterion for choosing the tests; there are schools that even apply different tests that measure the same.

Teachers traditionally relate Fitness to health by assuming that the higher the fitness, the higher the level of health and that fitness is health itself. In fact, "fitness" classes are the only ones that receive a rating of perceived intensity above 5 points in the PCERT (pictorial Children's Effort Rating Table)⁽³¹⁾, both among boys and among girls. Even so, it should be noted that only 55.7% of participants in the classes of "fitness" provide scores > 5. In this sense Borrás et al.⁽³²⁾ state that the quality of life related to health (HRQOL) in children from 11 to 12 years correlates with cardiorespiratory fitness and screen time but not with physical activity. They suggest that physical fitness in children is the most important predictor. Our group disagrees on how to program and raise this kind of work. The stated goal is to establish habits to maintain physical fitness throughout life in order to avoid a sedentary lifestyle, giving students tools to enable self-evaluation. According to Ruiz, teaching how to maintain fitness to generate attitudes and values⁽³¹⁾ is important. Therefore, tests should be self-administered and obtaining the maximum score is as not necessary as passing a minimum. It is also important that these tests can be carried throughout life and have application in everyday life. Fitness tests are tests that measure physical health but we also can and should incorporate psychosocial aspects. On the one hand making the students responsible to measure their own condition and promoting cooperation in the group. That is, not only the quantitative data of the result can be incorporate into the tests but also qualitative assessment on what were the feelings, how has evolved the development of this capacity, what the personal circumstances at the time and day were, knowing the implications for health. The aim is to encourage personal reflection and no competition for achieving a certain score, and of course, teachers should not evaluate the students based on that mark.

Regarding facilities, you can see that private centers are in better state than public facilities. It is necessary to compare the situation of each center every year and improving each year is essential to obtain at least 3 health medals. Those centers that are below the three medals are considered not to be able to develop a healthy physical activity due to the risk to practitioners. It is therefore evident that the environment of private centers is healthier and less risky, but nevertheless both the number of students with diseases and the physical activity performed by students from different schools do not differ significantly.

Given the above, it is recommended that teachers of Schools are familiar with the previous health status of students, the physical activity normally carried out, the cardiovascular fitness level, the analysis of their activities regarding health, the assessment of health conditions of the Center facilities. It is also proposed that teachers revise and adapt fitness tests regarding health. On the contrary, it is indicated that none of the centers that participated in this study provided this information except for specific curricular adaptations requested by students.

In short, it seems necessary to investigate and try to relate the physical activity performed to the epidemiology of diseases amenable to improvement through physical activity and physical fitness of students, besides adapting the physical activities so that they are in line with health and can be practiced by everyone. It is essential to evaluate the performance of teachers and modify the approach and development of teaching to focus it toward physical activity under the paradigm of health, without being inconsistent with other views.

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