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Review Article

Self-reported level of physical activity in schoolchildren who participate in physical education: a systematic review

Nível de atividade física auto-informado em escolares que realizam educação física: uma revisão sistemática

Nivel de actividad física autoinformado en escolares que realizan educación física: una revisión sistemática

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Abstract

Introduction: The lack of physical activity, together with inadequate food consumption, has been one of the most present topics in research on mortality and chronic non-communicable diseases. Therefore, knowing the level of physical activity in schoolchildren is of great importance, since actions could be deployed to reduce the alarming levels of sedentary life, especially from the subject of Physical Education. **Objective:** To systematically examine the level of self-reported physical activity in schoolchildren not exempt from participation in Physical Education sessions. **Method:** A systematic review of cross-sectional studies that determined the level of self-reported PAQ-C questionnaire. **Results:** Twenty-three articles were identified by searching five different databases between 2014 and 2019. For the selection of the articles, it was necessary to consider the type of study and location, the age phase analyzed, as well as the non-participation in the Physical Education sessions. **Conclusion:** Most of the studies analyzed indicate insufficient levels of physical activity; however, it is necessary to carry out more research related to the level of self-reported physical activity, enabling to diagnose with greater precision the reality of school-age children.

Keywords: Life Style, Sedentary Behavior, Education, Education; Primary and Secondary, Surveys and Questionnaires.

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Resumo

Introdução: A falta de atividade física, junto com o consumo inadequado de alimentos, tem sido um dos tópicos mais presentes em investigações sobre mortalidade e doenças crônicas não transmissíveis. Por isso, conhecer o nível de atividade física em escolares ostenta grande importância, posto que é possível empregar ações para diminuir os níveis alarmantes de sedentarismo, especialmente nas aulas de Educação Física. **Objetivo:** Examinar sistematicamente o nível de atividade física auto-informado em crianças em idade escolar não isentos da participação em sessões de Educação Física. **Método:** Revisão sistemática de estudos transversais que determinam o nível de atividade física auto-informado mediante o questionário PAQ-C. **Resultados:** Identificou-se 23 artigos mediante a busca em cinco bases de dados distintas, entre 2014 e 2019. Para seleção dos artigos foi considerado o tipo de estudo e o lugar de realização, faixa etária analisada, assim como os não participantes de Educação Física. **Conclusão:** A maioria dos estudos analisados mostraram níveis insuficientes de atividade física, não obstante, é necessário levar em consideração a realização de novas investigações relacionadas com o nível de atividade física auto-informado, para diagnosticar com maior precisão a realidade de crianças em idade escolar.

Palavras-chave: Estilo de Vida, Comportamento Sedentário, Educação, Ensino Fundamental e Médio, Inquéritos e Questionários.

Resumen

Introducción: La falta de actividad física, junto con el consumo inadecuado de alimentos, ha sido uno de los tópicos más presentes en la investigación sobre mortalidad y las enfermedades crónicas no transmisibles. Por ello, conocer el nivel de actividad física en escolares ostenta gran importancia, puesto que podrían desplegarse acciones para disminuir los alarmantes niveles de sedentarismo, especialmente desde la asignatura de Educación Física. **Objetivo:** Examinar sistemáticamente el nivel de actividad física autoinformado en escolares no exentos de la participación en las sesiones de Educación Física. **Método:** Revisión sistemática de estudios transversales que determinaron el nivel de AF autoinformado a través del cuestionario PAQ-C. **Resultados**: Se identificaron 23 artículos mediante la búsqueda en cinco bases de datos distintas, entre 2014 y 2019. Para la selección de los artículos, fue preciso considerar el tipo de estudio y lugar de realización, la fase etaria analizada, así como la no participación en las sesiones de Educación Física. **Conclusion:** La mayoría de estudios analizados señalan unos niveles insuficientes de la misma; no obstante, resulta necesario llevar a cabo más investigaciones relacionadas con el nivel de actividad física autoinformado, para diagnosticar con mayor precisión la realidad de los niños en edad escolar.

Palabras-clave: Estilo de Vida, Conducta Sedentaria, Educación, Educación Primaria y Secundaria, Encuestas y Cuestionarios.

1 Introduction

Responsible for 16 million premature deaths, non-communicable diseases (NCDs) represent 68% of the deaths registered in 2012 (Organización Mundial de la Salud, 2014). The contemporary lifestyle induces children and adolescents to a more sedentary life, and to develop harmful eating habits, generating huge economic losses (Ding et al., 2016). To have an idea, the cost of chronic noncommunicable diseases worldwide is estimated to be 67.5 billion dollars (Organización Mundial de la Salud, 2014).

Scientific research massively shows the benefits with the practice of routine physical activities, highlighting that the elimination of sedentary lifestyle to adopt a physically active lifestyle is an essential factor in increasing health (NCD Risk Factor Collaboration, 2017; Ding et al., 2016; Llewellyn et al., 2016; The GBD 2015 Obesity Collaborators, 2017). However, research also shows how cautious the transition from childhood to adolescence should be since at this stage, the volume of activities decreases (Instituto Brasileiro de Geografia e Estatística, 2015; James, 2008).

On the other hand, the Organización Mundial de la Salud (2010) recommends that children and adolescents between 5 and 17 years old practice 60 minutes of moderate to vigorous physical activity every day, making a total of 300 minutes or more during the week. However, the HBSC study (Health Behavior in School Aged Children) conducted in 48 countries of North America and Europe found that 71% of boys and 86% of girls do not meet the minimum physical activity recommendations (Roberts et al., 2009). Also, the ERICA study (meaning in English Study of Cardiovascular Risk in Adolescents) conducted in Brazilian adolescents, revealed that 38% of boys and 70.7% of girls do not comply with the recommendations of 300 minutes per week (Cureau et al., 2016). Likewise, a survey carried out in 10 European countries with a high HDI (Germany, Austria, Belgium, France, Greece, Hungary, Italy, and Sweden) found a high percentage of female adolescents (80.1%) and male adolescents (46.3%) who do not perform the minimum of 60 minutes of daily physical activity (Ruiz et al., 2011). Lastly, during a survey carried out in Spain with children between 9 and 12 years old, 62% of the girls and 39% of the boys were not sufficiently active, and adolescents aged 13 to 17 had a less physical activity than expected for 86% of girls and 50% of boys (Ruiz et al., 2006).

As we noticed, several investigations have indicated unsatisfactory levels of PA during childhood and adolescence; therefore, immediate intervention is necessary. Thus, starting from the premise that school attendance is a daily and compulsory action for an important part of children and adolescents, exploring this space is an intelligent way to stimulate the practice of PA, reducing the number of overweight and obesity while increasing the level of PA (Beets et al., 2009; Gonzalez-Suarez et al., 2009).

Performing a valid evaluation to determine the relationship between health and PA is a great challenge since certain existing measures do not have solid psychometric characteristics for an accurate assessment in children (Sallis et al., 1993), and the most valid techniques are often not practical (Kowalski et al., 1997). However, self-reported PA may be the most practical method of evaluating populations on a large scale, but there are no standard measures (Sallis et al., 1993). Thus, the Physical Activity Questionnaire for Children (PAQ-C) was created (Kowalski et al., 1997) since

improving the evaluation of PA in children is the first step to evaluate the relationship between activity and health, and the determinants of PA in childhood and changes in activity levels (Janz, 1994).

Knowing the level of self-reported PA of schoolchildren can be very useful; especially when establishing comprehensive school PA programs that support and enable all children and youth to comply with the PA recommendations, through a wide range of strategic interventions (for example, active breaks options, breaks to perform PA, mandatory Physical Education) (Aubert et al., 2018). Thus, we have not yet found any previous literature review in recent years that compiled self-reported PA studies through the PAQ-C worldwide, and there is a gap in information.

Therefore, the objective of this review was to systematically examine the level of self-reported PA in primary school students, or in children who are in this educational stage, that is, from 6 to 12 years old; as long as they were not exempt from Physical Education practice.

2 Methodology

We carried out a systematic review on cross-sectional studies around the world, which by the PAQ-C questionnaire, we evaluated the level of self-reported PA in primary school students or ages included in the same age group (6 to 12 years); not exempt from the participation in Physical Education classes. This review was prepared according to the principles of the PRISMA statement (Moher et al., 2009).

The PAQ-C questionnaire was developed to determine the level of self-reported PA, whose validation study revealed internal consistency values between 0.79 and 0.89 and test-retest values between 0.75 and 0.82 (Kowalski et al., 1997). This instrument estimates the moderate and intense PA of children and adolescents in the seven days before completing the questionnaire. It has nine items about the practice of sports and games, PA in school, and in leisure time, including the weekend. Each question has a value from one to five, and the final score is obtained by the average of the questions. The scores are represented by very sedentary (one point), sedentary (two points), moderately active (three points), active (four points), and very active (five points) (Romero et al., 2010; Silva & Malina, 2000).

2.1 Search strategy

We searched within the main databases in the health and Physical Education areas: Medline, Scopus, Web of Science, SciELO Citation Index, and Google Scholar. We included the articles published in the last five years, from January 2014 to May 2019 to obtain an updated reality approach. This time reference (last five years) was selected to know more precisely the current reality, around the levels of self-reported PA in the school population. The strategic search used the following descriptors in health sciences (DeCS): physical activity, questionnaire, and children in Spanish, English, and Portuguese (Table 1).

Table 1. Search strategy.

DATABASE USED	KEYWORDS
Medline	Physical activity AND Questionnaire AND Children AND Primary Education.
SCOPUS	Physical activity AND Questionnaire AND Children AND Primary Education.
Web of Science	Physical activity AND Questionnaire AND Children AND Primary Education.
Scielo Citation Index	Physical activity AND Questionnaire AND Children AND Primary Education. Actividad física AND Cuestionario AND Niños AND Educación Primaria. Atividade física AND Questionário AND Crianças AND Ensino Fundamental.
Google Scholar	"Physical Activity"; "Questionnaire"; "Children"; "Primary Education" "Actividad física"; "Cuestionario"; "Niños"; "Educación Primaria" "Atividade física"; "Questionário"; "Crianças"; "Ensino Fundamental".

First, we independently analyzed the titles and abstracts of all the articles by two of the three authors of this research work, using the search strategy. Similarly, the reviewers independently assessed the full articles; proceeding later to their selection based on the inclusion and exclusion criteria, determined in advance. The authors resolved the disagreements between the reviewers for the inclusion or exclusion of the review.

On the other hand, we used the references in the selected studies to obtain additional papers not to exclude relevant information through the procedure in use. Also, some important information was requested directly from the authors. Finally, a thorough analysis of the articles was carried out to establish their aggregation or rejection in this review.

2.2 Inclusion criteria

The inclusion criteria were: 1) cross-sectional studies that determined the level of physical activity through the PAQ-C questionnaire; 2) studies carried out on children and adolescents, providing the information for ages 6 to 12; 3) studies carried out in primary schools; 4) studies with schoolchildren not exempt from the Physical Education practice.

2.3 Exclusion criteria

The exclusion criteria were: 1) studies only on schoolchildren with some specific disease or pathology; 2) doctoral thesis research papers, final degree or master papers, and opinion articles.

2.4 Assessment of risk of bias

Two of the authors used the Cochrane risk of bias tool risk to assess the risk of bias independently (Higgins & Green, 2011). The risk of bias was assessed by selection bias, performance bias, detection bias, attrition bias, and information bias. A third reviewer resolved any discrepancies in the bias coding. Also, studies were not excluded based on the risk of bias.

2.5 Information management

The articles included in this review were located and specified in the following categories: author and year of publication, city (country), sample size (gender); and the type of stratification used, results, and general PA status.

3 Results

3.1 Studies selection

Figure 1 shows the complete process of the systematic review. A total of 17,744 articles (100.0%) were located during the identification phase. During the review phase, 17,563 articles (98.98%) were excluded by presenting a title unrelated to the subject of study. Subsequently, in the eligibility phase, 163 articles were rejected (0.92%); 119 of them (0.67%) because they focus on schoolchildren with a specific disease/pathology, and 44 studies (0.25%) because they were final degree projects, masters, etc. Finally, in the inclusion phase, we selected a total of 23 articles (0.13%); 18 articles (0.10%) after reading the *resumen*/abstract/*resumo* and five studies (0.03%) found externally.

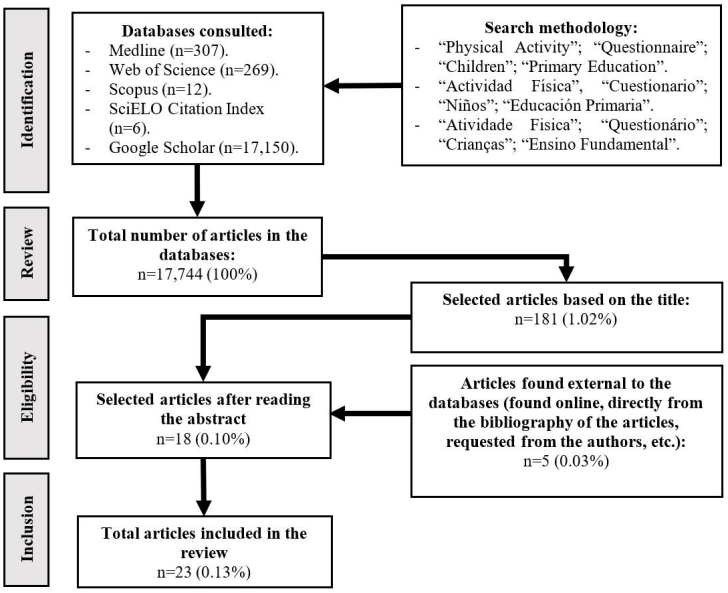

Figure 1. Flow diagram of the article selection process.

3.2 Risk of individual bias in the studies

The 23 articles included in this systematic review were subjected to the risk of the bias assessment process. Table 2 shows this process for each included study.

Table 2. Individual assessment of the risk of bias in the included studies.

Author (Year)	Randomization procedure	Adequate description of the study sample (number of participants, average age and gender)	Evaluation/presentation of the results	Evaluation of the possible benefit (validity/reliability of the reported outcome measure and/or appropriately described measurement procedure)	Adjustment for confounding variables	Total score /5
Firouzi et al. (2014)	0	1	1	1	1	4
Voss et al. (2014)	0	1	1	1	1	4
Arriscado et al. (2015)	1	1	1	1	1	5
Ferland et al. (2015)	0	0	0	1	1	2
García-Cervantes et al. (2016)	0	0	0	1	1	2
Jan Mohamed et al. (2015)	0	1	1	1	1	4
Khan et al. (2015)	0	1	1	1	1	4
Khodaverdi & Bahram (2015)	0	1	0	1	0	2
Thien et al. (2015)	0	1	1	1	1	4
Benítez-Porres et al. (2016a)	1	0	1	1	0	3
Benítez-Porres et al. (2016b)	1	0	1	1	0	3
Keykhaei et al. (2016)	0	1	1	1	1	4
Noonan et al. (2016)	0	1	1	1	1	4
Silva & Cavalcante Neto (2017)	0	1	1	1	0	3
Guo & Wang (2017)	0	1	1	1	0	3
Jarvis et al. (2018)	0	1	1	1	0	3
Rostami-Moez et al. (2017)	0	1	0	1	0	2
Schmidt et al. (2017)	0	1	1	1	1	4
Brown et al. (2018)	0	1	1	1	0	3
Bundhun et al. (2018)	0	1	1	1	1	4
Reyes Ortiz et al. (2018)	0	1	1	1	0	3
Sandercock & Cohen (2019)	0	1	1	1	1	4
Chan et al. (2019)	1	1	1	1	1	5

3.3 Characteristics of the studies.

Table 3 shows the characteristics of the studies found during the searching, including author/s, year of publication, sample size and age, and the results on the level of self-reported PA; both globally, and stratified by gender or body status, whenever possible.

Table 3. Characteristics of the studies included in the review (n=23).

Author (Year)	Place	Sample (Gender)	Age
Firouzi et al. (2014)	Malaysia	164 (90♂ y 74♀)	6-12
Voss et al. (2014)	East of England Region	1,003 (510♂ y 493♀)	10
	British Columbia (Canada)	627 (310♂ y 317♀)	10
Arriscado et al. (2015)	La Rioja (Spain)	318 (160 ♂ y 158 ♀)	11-12
Ferland et al. (2015)	Alberta (Canada)	2,328 (S/E)*	10-11
García-Cervantes et al. (2016)	Cádiz (Spain)	821 (S/E)*	8-12
Jan Mohamed et al. (2015)	Malaysia	2,065 (856♂ y 1.209♀)	6-12
Khan et al. (2015)	Nova Scotia (Canada)	5,560 (2,669♂ y 2,891♀)	10
Khodaverdi & Bahram (2015)	Zahedan (Iran)	352 (352♀)	8-9
Thien et al. (2015)	Malaysia	1,736 (823♂ y 913♀)	7-12
Benítez-Porres et al. (2016a)	Malaga, Jaén and Galicia (Spain)	83 (46♂ y 37♀)	10.98±1.17
Benítez-Porres et al. (2016b)	Malaga and Jaén (Spain)	146 (83♂ y 63♀)	10.8±1.3
Keykhaei et al. (2016)	Zahedan (Iran)	585 (293♂ y 292♀)	7-11
Noonan et al. (2016)	Liverpool (England)	194 (87♂ y 104♀)	9-10
Silva & Cavalcante Neto (2017)	Jacobina (Brazil)	55 (22♂ y 33♀)	8-10
Guo & Wang (2017)	China	10,832 (5,664♂ y 5,168♀)	8-12
Jarvis et al. (2018)	Southeast Wales	553 (294♂ y 259♀)	9-12
Rostami-Moez et al. (2017)	Hamadan (Iran)	496 (496♀)	10-12
Schmidt et al. (2017)	Bern (Switzerland)	236 (112♂ y 124♀)	10-12
Brown et al. (2018)	Hawaii (USA)	56 (31♂ y 25♀)	8-9
Bundhun et al. (2018)	Mauritius	336 (165♂ y 171♀)	6-12
Reyes Ortiz et al. (2018)	León (Nicaragua)	649 (319♂ y 330♀)	9-12
Sandercock & Cohen (2019)	Chelmsford (England)	306 (157♂ y 149♀)	10-11
Chan et al. (2019)	Hong Kong (China)	764 (290♂ y 474♀)	6-12

*S/E = Without specifying gender. ♂ = Boys; ♀ = Girls.

In total, we included 23 studies in the review: eight in Europe (four from Spain, three from England and one from Switzerland) (Arriscado et al., 2015; Benítez-Porres et al., 2016a, 2016b; García-Cervantes et al., 2016; Sandercock & Cohen, 2019; Schmidt et al., 2017; Voss et al., 2014); eight in Asia (three in Iran, three in Malaysia and two in China) (Chan et al., 2019; Firouzi et al., 2014; Guo & Wang, 2017; Jan Mohamed et al., 2015; Keykhaei et al., 2016; Khodaverdi & Bahram, 2015; Rostami-Moez et al., 2017; Thien et al., 2015); six in America (three in Canada, one in the US, one in Brazil and one in Nicaragua) (Brown et al., 2018; Silva & Cavalcante Neto, 2017; Ferland et al., 2015; Khan et al., 2015; Reyes Ortiz et al., 2018; Voss et al., 2014); and one in Africa (Mauritius) (Bundhun et al., 2018). However, the cross-cultural study by Voss et al. (2014) was carried out in both America (Canada) and Europe (England); including the results of two samples in the same research work. All the studies analyzed were cross-sectional (inclusion criteria) and the samples ranged from 56 participants to 10,832. Regarding gender, 21 of the 23 studies investigated both genders (male and female); while only two studies investigated only girls (Khodaverdi & Bahram, 2015; Rostami-Moez et al., 2017) (Table 2).

Regarding the level of self-reported PA in schoolchildren, 14 studies stratified the results by gender; 5, presented global data; 3 of them classified according to the level of PA (Bundhun et al., 2018; Silva & Cavalcante Neto, 2017; Jan Mohamed et al., 2015); and another study categorized on body weight status (normal weight or overweight) (Firouzi et al., 2014). However, besides the categorization according to gender, Noonan et al. (2016) also did so based on deficiencies (high or moderate). Regarding the age, two studies (Guo & Wang, 2017; Reyes Ortiz et al., 2018) offered results for every one of the ages included in the research (Table 2).

4 Results of the studies

Table 4 shows the different scores by the PAQ-C questionnaire in the 23 studies included in this review. PAQ-C scores can be categorized by very sedentary, sedentary, moderately active, active, and very active. However, for the analysis of associations, the status on the level of self-reported PA was divided into two groups: sedentary (very sedentary and sedentary) (<3 points) and active (moderately active, active and very active) (≥3 points) (Romero et al., 2010; Silva & Cavalcante Neto, 2017). Thus, considering the 23 studies included in the review, 52.2% of them indicated that the samples of schoolchildren included in these investigations are considered sedentary; and 48.2% considered them as active.

Table 4. Results for the level of PA in the studies included in the review (n=23).

Author (Year)	Stratification	PAQ-C	Status*
Firouzi et al. (2014)	Normal weight	2.3±0.5	Sedentary
	Overweight	2.4±0.6	
Voss et al. (2014)	♂	3.28±0.7	Actives
	♀	3.08±0.6	
	♂	3.26±0.6	
	♀	2.99±0.6	
Arriscado et al. (2015)	♂	3.2±0.6	Actives
	♀	2.8±0.5	
	Total	3.0±0.6	

Table 4. Continued…

Author (Year)	Stratification		PAQ-C	Status*
Ferland et al. (2015)	Total		3.33	Actives
García-Cervantes et al. (2016)	Total		2.8±0.6	Sedentary
Jan Mohamed et al. (2015)	Low PA (between 1.00-2.33)		25.60%	Sedentary
	Moderate PA (2.34-3.66)		64%	
	High PA (>3.66)		10.30%	
Khan et al. (2015)	Total		3.3±0.7	Actives
Khodaverdi & Bahram (2015)	♀		3.31±0.88	Actives
Thien et al. (2015)	♂		2.59±0.04	Sedentary
	♀		2.33±0.04	
	Total		2.52±0.02	
Benítez-Porres et al. (2016a)	♂		3.22±0.70	Actives
	♀		3.26±0.56	
	Total		3.24±0.64	
Benítez-Porres et al. (2016b)	♂		3.11±0.60	Actives
	♀		3.07±0.66	
	Total		3.09±0.64	
Keykhaei et al. (2016)	♂		2.51±0.51	Sedentary
	♀		2.29±0.47	
	Total		2.4±0.50	
Noonan et al. (2016)	High deficiencies	♂	3.45±0.70	Actives
		♀	3.44±0.71	
		Total	3.45±0.70	
	Low deficiencies	♂	3.46±0.70	
		♀	3.68±0.70	
		Total	3.26±0.65	
Silva & Cavalcante Neto (2017)	Active (3-5 points)		20%	Sedentary
	Sedentary (1-2 points)		80%	
Guo & Wang (2017)	8 years old	♂	2.55±0.71	Sedentary
		♀	2.47±0.64	
	9 years old	♂	2.52±0.69	
		♀	2.54±0.64	
	10 years old	♂	2.55±0.70	
		♀	2.46±0.65	
	11 years old	♂	2.60±0.72	
		♀	2.46±0.66	
	12 years old	♂	2.63±0.73	
		♀	2.34±0.66	
Jarvis et al. (2018)	♂		3.44±0.65	Actives
	♀		3.22±0.65	
Rostami-Moez et al. (2017)	♀		2.70±0.60	Sedentary
Schmidt et al. (2017)	♂		3.32±1.86	Actives
	♀		2.86±1.38	
	Total		3.08±1.64	
Brown et al. (2018)	♂		1.45±0.50	Sedentary
	♀		1.32±0.67	

Table 4. Continued…

Author (Year)	Stratification		PAQ-C	Status*
Bundhun et al. (2018)	Low PA	♂	13.10%	Sedentary
	(up to 1 point)	♀	20.40%	
	Moderate PA	♂	29.46%	
	(2-3)	♀	23.21%	
	High PA	♂	6.55%	
	(>3 points)	♀	7.44%	
Reyes Ortiz et al. (2018)	9 years old	♂	3.20±0.85	Actives
		♀	3.6±0.64	
	10 years old	♂	3.40±0.73	
		♀	3.20±0.72	
	11 years old	♂	3.20±0.79	
		♀	3.10±0.72	
	12 years old	♂	3.30±0.74	
		♀	3.10±0.76	
Sandercock & Cohen (2019)	♂		2.77±0.72	Sedentary
	♀		2.65±0.60	
Chan et al. (2019)	Total		2.67±0.70	Sedentary

*Physical activity status according to Silva & Malina (2000). PA = Physical activity.

On the other hand, depending on the continent analyzed, most studies with their means of levels considered sedentary were found in Asia, with this fact observed in seven of the eight studies found (87.5%) (Chan et al., 2019; Firouzi et al., 2014; Guo & Wang, 2017; Jan Mohamed et al., 2015; Keykhaei et al., 2016; Rostami-Moez et al., 2017; Thien et al., 2015). In America, it was similar in two of the six studies (33.3%); one in North America (Brown et al., 2018) and another in South America (Silva & Cavalcante Neto, 2017). In Europe, it was similar in two of the eight studies (25.0%) (García-Cervantes et al., 2016; Sandercock & Cohen, 2019); and also in the only study found on the African continent (100%) (Bundhun et al., 2018).

5 Discussion

This study aimed to systematically examine the level of self-reported PA in primary school students, or in those who will be the age covered by this educational stage, that is, from 6 to 12 years old. Thus, 52.2% of the 23 studies included in the review reported mean values of participants classified as sedentary.

Thus, in Europe, we observed a great disparity in the results, in which only the studies by García-Cervantes et al. (2016) and Sandercock & Cohen (2019) in Spain (Cádiz) and England (Chelmsford) found low levels of self-reported PA. These differences between studies could be due to the great differences that exist for the practice of PA between genders, between rural and urban areas, and depending on socioeconomic levels (Guthold et al., 2018; Organización Mundial de la Salud, 2017). Also, the scientific literature has indicated that certain favorable behaviors towards the practice of PA (e.g., active transport) could be influenced by economic growth and human development, and maybe more attributable to these factors than a freely chosen

PA practice (Aubert et al., 2018). Thus, in developing countries, active transport may be driven by necessity (i.e., lack of access to public or family/personal motorized transport) rather than personal choice, despite urban insecurity or having to travel a long distance (Sarmiento et al., 2015). However, the study by Noonan et al. (2016) found no significant differences in the level of PA when comparing the groups based on inequality (in terms of deprivation/precariousness).

Regarding America, studies found in Canada and Nicaragua indicated that schoolchildren from 6 to 12 years old are physically active (Ferland et al., 2015; Khan et al., 2015; Reyes Ortiz et al., 2018; Voss et al., 2014). Nicaragua has been listed as one of the countries with the lowest human development index in the world (Programa de las Naciones Unidas para el Desarrollo, 2019), so these high levels could also be related to the aspects discussed in the paragraph above by the economic and human development factors. Because in Canada all the studies found reported higher levels of PA, we could relate it to the rich history of production and promotion of guidelines to promote the health that this country possesses; both to promote the practice of PA and to reduce sedentary behavior (Tremblay et al., 2016). On the other hand, both Silva & Cavalcante Neto (2017) and Brown et al. (2018) indicated sedentary levels in Brazilian and Hawaiian children. Particularly in Hawaii, the alarming prevalence found for overweight and obesity in children and adolescents in the southern islands of the Pacific Ocean could influence these low levels of PA; being the highest in the world (NCD Risk Factor Collaboration, 2017). Similarly, in the only study found in Africa, the results by Bundhun et al. (2018) for Mauritian schoolchildren seem to point in the same direction. Along these lines, it could be useful to apply national policies that promote the use of non-motorized means of transportation, such as walking and cycling; as well as the promotion and participation in recreational and sports activities in free time (Guthold et al., 2018).

Most studies in Asian countries indicated a sedentary lifestyle in schoolchildren found in seven of the eight studies (Chan et al., 2019; Firouzi et al., 2014; Guo & Wang, 2017; Jan Mohamed et al., 2015; Keykhaei et al., 2016; Rostami-Moez et al., 2017; Thien et al., 2015). This trend of lower levels of PA in the Asian continent (especially in the South) has been previously reported in the scientific literature (Guthold et al., 2018). Although more than 70% of Asian countries present a PA operational policy, the scale and scope of its implementation have not yet had a noticeable impact at the national level (Organización Mundial de la Salud, 2018; Sallis et al., 2016). Also, specifically in China, the high level of air pollution represents a major threat to the promotion of PA (Lü et al., 2015), being able to notably influence the reported results.

As observed in all the studies included in this systematic review, there is a great variety in the practice of self-reported PA within different continents and countries, and between them. This fact has also been reported in the Global Matrix initiative, which indicates that this disparity for the practice of PA shows that each country faces unique challenges; being able to learn from the successes or difficulties experienced by others (Aubert et al., 2018). However, and due to the numerous factors influencing the results, their comparison between continents and/or countries should be interpreted with caution.

5.1 Educational limitations and implications

This research had some limitations such as the impossibility of establishing a cause-effect relationship between the samples analyzed in the studies included in this review and the level of PA in schoolchildren, by the inclusion of cross-sectional studies. Since most of the studies had samples of an intentional type, biases may exist as it is not possible to represent the study population. However, it is possible to increase the information on the sample to be analyzed, being very useful.

On the other hand, we need a greater number of studies to know the magnitude of the level of PA in schoolchildren and, above all, to know if they provide uniform data regarding the categorization of the participants in the study. This is because another limitation found was that we needed to categorize the mean scores of the PAQ-C into two dichotomous variables (<3 points = sedentary; ≥3 points = active) as Silva & Malina (2000) to be able to offer a global situation of the analyzed studies. Therefore, it would be convenient to establish unanimous categories, so that the studies can be replicated.

Obtaining accurate measurements of physical activity is challenging, particularly in schoolchildren (Sirard & Pate, 2001). The PAQ-C questionnaire is a convenient and cost-effective method, but it has some limitations for its precision because children tend to report excessively (Sirard & Pate, 2001). However, it is useful to determine these levels so that the Physical Education teacher can establish guidelines to increase the level of PA during their classes. It could also offer valuable feedback to parents/legal guardians alerting when low levels of PA are noticed.

6 Conclusions

According to the results, most of the studies on the level of self-reported PA in schoolchildren indicated insufficient levels of it; both globally and stratified according to the different continents.

Also, we need to carry out more research related to the level of self-reported PA, allowing the comparison of the results with those that already exist, as well as to diagnose the reality of school-age children more accurately.

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Author's Contributions

José Francisco López-Gil: systematic review and tabulation. Cristiano Israel Caetano: literature review for the introduction. Rafael Gomes Sentone: discussion and conclusion of the results. Fernando Renato Cavichiolli: Discussion and conclusion of sources. Juan Luis Yuste Lucas: systematic review and tabulation. Textual review. All authors approved the final version of the text.

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