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The prevalence of global physical activity among young people: a systematic review for the Report Card Brazil 2018

A prevalência de atividade física global entre jovens: uma revisão sistemática para o Report Card Brazil 2018

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Abstract – The aim of this study was to summarize data on the prevalence of global physical activity (PA) among children and adolescents in Brazil. This systematic review included an electronic search in 8 databases (PubMed, Scopus, Web of Science, LILACS, SPORTDiscus, BIREME, Scielo, and Google Scholar) and a manual search in the references of retrieved studies. Observational studies that assessed global PA among Brazilian children and adolescents were included. A narrative approach toward results was adopted. An initial database search reached 3276 potentially relevant titles (2534 titles after duplicate analysis); 92 (62 different studies) met all inclusion criteria. Studies were carried out between 2001 and 2015; most studies were conducted in Southern and Northeastern Brazil. Three were nationwide surveys (4.8%), but no studies included children aged 0-5 years. Eighteen different instruments for PA measurement were used; only two studies used objectively-measured PA. The most used definition was ≥ 300 minutes/week of moderate-to-vigorous PA. The overall proportion of young people who were physically active ranged from 6.5% to 92.3%. Fourteen studies (22.6%) found a prevalence of ≥ 50%. Three nationwide surveys reported the prevalence of physically active students ranging from 29.0% to 66.0%. A wide variability of PA estimates were found. Important research gaps (e.g., studies with objectively-measured PA, children aged up to 6 years-old and in Northern Brazil) should be considered to develop new research studies in Brazil.

Key words: Adolescent; Adolescent health; Brazil; Exercise; Public health.

Resumo – *Objetivou-se sumarizar dados sobre a prevalência de atividade física global (AF) entre crianças e adolescentes no Brasil. Esta revisão sistemática incluiu uma busca eletrônica em 8 bases de dados (PubMed, Scopus, Web of Science, LILACS, SPORTDiscus, BIREME, Scielo e Google Scholar) e uma busca manual nas referências de estudos recuperados. Estudos observacionais que avaliaram a AF global entre crianças e adolescentes brasileiros foram incluídos. Uma abordagem narrativa em relação aos resultados foi adotada. Uma pesquisa de banco de dados inicial atingiu 3276 títulos potencialmente relevantes (2534 títulos após análise duplicada); 92 (62 estudos diferentes) preencheram todos os critérios de inclusão. Os estudos foram realizados entre 2001 e 2015; a maioria dos estudos foi realizada no sul e nordeste do Brasil. Três foram pesquisas nacionais (4,8%), mas nenhum estudo incluiu crianças de 0 a 5 anos. Dezoito instrumentos diferentes para medida de PA foram utilizados; apenas dois estudos usaram PA medida objetivamente. A definição mais utilizada foi ≥ 300 minutos / semana de AF moderada a vigorosa. A proporção geral de jovens que eram fisicamente ativos variou de 6,5% a 92,3%. Quatorze estudos (22,6%) encontraram uma prevalência de ≥ 50%. Três pesquisas nacionais relataram a prevalência de estudantes fisicamente ativos variando de 29,0% a 66,0%. Uma ampla variabilidade de estimativas de PA foi encontrada. Lacunas importantes de pesquisa (por exemplo, estudos com PA medida objetivamente, crianças de até 6 anos de idade e no norte do Brasil) devem ser consideradas para o desenvolvimento de novas pesquisas no Brasil.*

Palavras-chave: *Adolescente; Brasil; Exercício; Saúde do adolescente; Saúde pública.*

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INTRODUCTION

Physical activity is strongly associated with development, health, and quality of life among children and adolescents[1]. Despite this, only two out of ten adolescents meet physical activity guidelines (60 or more minutes per day of moderate-to-vigorous physical activity) worldwide[2]. Nationwide data show a similar trend in Brazilian adolescents[3]. Thus, policies and programs for physical activity promotion are urgent, and monitoring how and whether intervention strategies can improve physical activity practices among young populations is an important component of public health action.

In 2014, researchers, health professionals, and stakeholders built *The Active Healthy Kids Global Alliance*, a network focused on advancing physical activity among children and adolescents from around the world. For this, physical activity indicators (e.g., meeting physical activity guidelines, active transportation, and others) have been monitored and described in a document called a "Report Card", in order to be a useful tool for the advocacy of physical activity[4] among young people. In 2016, data from 38 countries were included, including Brazil. A grade of C- (prevalence rates from 40% to 46%) was given for global physical activity levels based on data from studies with Brazilian adolescents – this was one of the lowest grades for Brazil's 2016 Report Card[5].

The present study aimed to systematically summarize the literature on the prevalence of global physical activity (based on international physical activity guidelines) among Brazilian children and adolescents. The summarized data were used to define the grade and recommendations for Brazil's 2018 Report Card for the global physical activity indicator.

METHODOLOGICAL PROCEDURES

Measured Outcome

In this systematic review, physical activity outcome was defined as any bodily movement produced by skeletal muscles that require energy expenditure[6]. Studies were considered whether they measured global physical activity (e.g., different domains combined (leisure, transportation, home and/or school combined), in order to follow the global physical activity guidelines[7].

Study Search Strategies

A systematic search was conducted in electronic databases Medline (PubMed), Scopus, Web of Science (Web of Knowledge), LILACS (*Literatura Latino-Americana em Ciências da Saúde*), SPORTDiscus, BIREME (Biblioteca Regional de Medicina), Scielo, and Google Scholar in February 2018. The search strategy included four groups of descriptors: outcome (physical activity), physical activity evaluation methods, population (young people) and country (see Supplementary Material). The Boolean operator "OR" was used for intragroup combinations, and the "AND" operator was used for intergroup combinations. The truncation symbols ($, * or "")

specific to each database were also used to increase the range of searches for the descriptor variations. Searches were conducted with the descriptors in English and Portuguese, when required. The search of the electronic databases was supplemented by a screening of the reference list of retrieved articles in order to find potentially relevant titles and the personal library.

Identification of Eligible Studies

- **Selection Process**

The initial analysis was performed based on the reading of the manuscripts titles and, when there was doubt regarding the inclusion of the study, a reading of the abstract was carried out. After this analysis, articles were obtained in full text version and subsequently analyzed according to established selection criteria. Subsequently, the screening of the reference list was carried out. All the process was conducted by independent peers (RC/MK or BO/CS), and a third author (KS or VB) helped with disagreements.

- **Selection Criteria**

To be eligible for inclusion in this review, studies had to be: (I) articles published in peer-reviewed journals that were original research; (II) samples with Brazilian children and adolescents aged 0-18 years (or a mean age within these ranges, or separated data for individuals at this age range) (III) observational studies showing the prevalence of at least one of global physical activity (e.g., % of children and adolescents who accumulate a combined total of at least 60 minutes of daily moderate- to vigorous-intensity physical activity), regardless of whether the study dealt with this behavior as an exposure or an outcome; (IV) studies using different methods for PA assessment (e.g., self-report, structured interviews, objectively-measured PA, and steps per day); (V) a school- or population-based survey with information about the methodological procedures of representation of the target population (e.g., random sampling).

- **Data Extraction and Synthesis**

Information of each study was extracted by independent peers (RC/MK and BO/CS) and a third author (VB or KS) helped with disagreements. Extracted information included: authors and year of publication, local of the study, year of data collect, age range, sample type, sample size, percentage of girls, instrument description, instruments characteristics and mode of administration, and physical activity cut-off definitions. A narrative approach for the results was adopted because the heterogeneity of the study's data (no meta-analyze was performed).

Also, the proportion of young people that were considered physically active (based on the physical activity definition in each study), as well as the proportion of this outcome for boys and girls separately, when presented.

Results of the studies were presented in alphabetical and chronological order by first author name and year of publication, respectively. The results were organized in order to present methodological aspects (Table 1) and the prevalence of global physical activity (Table 2) of the included studies.

RESULTS

The initial database search identified a total of 3276 potential studies (2534 titles after duplicate analysis). Another 15 references were included based on the search in the reference lists of studies. After the title and abstract screening, 2284 references were excluded, and 265 references were taken forward to the full-text screening. In the full-text analysis, 147 references were excluded (exclusion reasons detailed in Figure 1), and 92 met the inclusion criteria (which included data from 62 different studies).

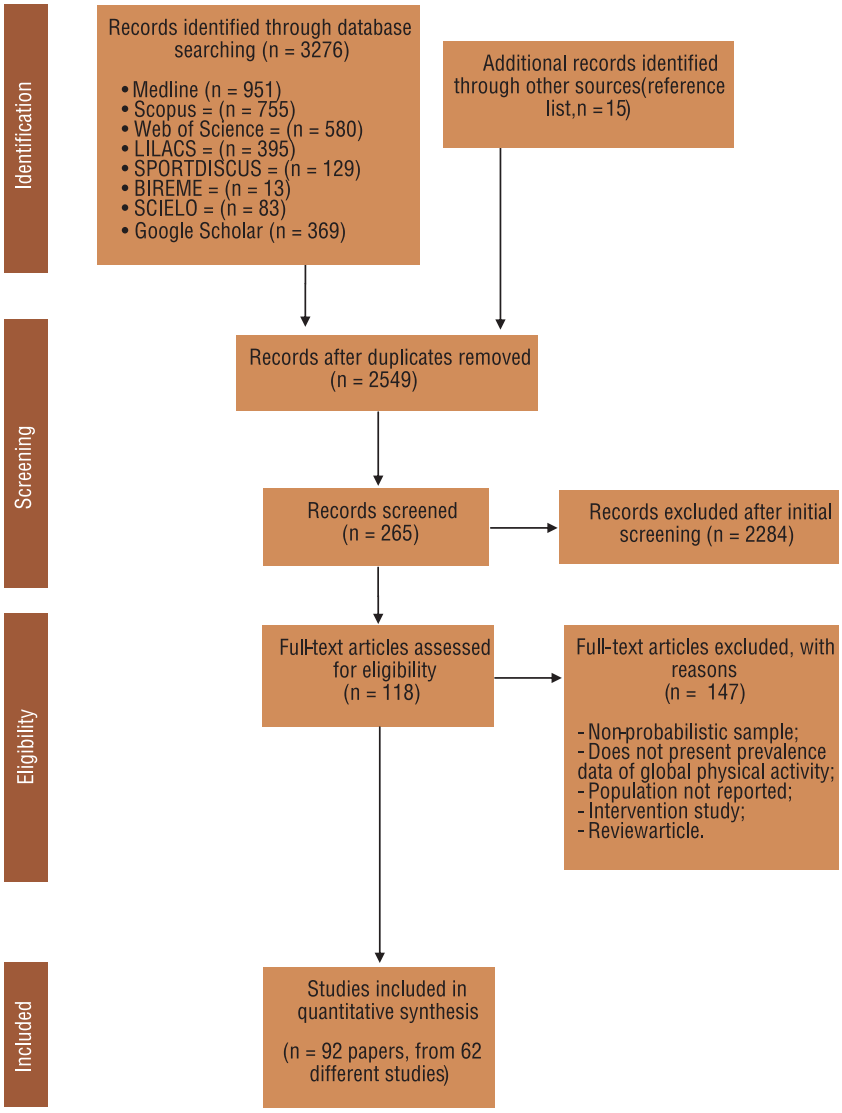

Figure 1: Search process results according PRISMA flow diagram

Included studies were carried out between 2001[8–14] and 2015[15]; most of them were performed in 2011 (12 studies)[16,17,26–31,18–25]. Twenty studies were performed between 2011 and 2015[15,16,25–34,17,35–43,18–24]. Most of included studies were located in the South and Northeast regions of Brazil: 22 (35.5%)[8,9,40–49,10,50–59,11,60–65,14,16,17,26,27,37] and 19 (30.6%)[9,12,29,31,38,39,66–71,13,72–

[80,18–21,23,25,28] studies, respectively. Fifteen studies (24.2%) were performed in the Southeast region, and three studies (4.8%)[22,24,81] were conducted in the Center-West region. No included reference was from the Northern region of Brazil. Three included studies were national surveys (4.8%); one provided data from 17 capitals and the Federal District[82] and the other two studies provided data from all of the 26 Brazilian capitals and the Federal District (National Survey of School Health)[32–34,83,84] (see Table 1).

Almost all studies (n = 59) were school-based surveys[8, 9 , 18–27, 10, 28, 29, 31–37, 39, 11, 40–43, 45–47, 49–51, 12, 52–60, 62, 13, 63–72, 14, 73–81, 83, 15, 84–93, 16, 94–101, 17]. Three [61, 82, 102] were population-based studies. In terms of age, three (4.9%) studies included 6-10 year-old children[29, 85, 86], 52 (85.2%) studies included 10-19 year-old adolescents[8, 9, 21, 22, 24–31, 10, 32–34, 36–42, 11, 43, 45–47, 49–54, 14, 55–64, 16, 65–74, 17, 75, 76, 78–84, 87, 18, 88, 90–94, 96–99, 19, 101, 102, 20], and six (9.8%) studies included individuals from both age groups[12, 13, 23, 35, 77, 89, 95].

Included studies presented 18 different instruments for physical activity measurement. Nineteen studies did not report the instruments used, and from these, only six studies reported information that the used instruments were validated[10,19,47,63,71,76,78,86]. The most used instruments were: the International Physical Activity Questionnaire (IPAQ, 12 studies)[22,36,88,99,102,55,59,60,64,65,76,77,82], the Global School-Health Survey instrument (GSHS, 8 studies)[11,21,66–68,79,84,96,24,25,29,32,37,41,42,56], and the Physical Activity Questionnaire for Older Children and Adolescents (PAQ-C and PAQ-A, 10 studies)[12,13,97,101,16–18,31,39,58,72,92]. Finally, one study used pedometer-measured physical activity[23] and one study used accelerometer-measured physical activity[61] (Table 1).

The physical activity level was defined differently among the studies. The most used definition was based on the global recommendations for physical activity and health: the cut-off point of ≥ 300 minutes/week of moderate-to-vigorous physical activity was used in 26 studies[8, 10, 45, 47, 55, 57, 59, 60, 63, 64, 69, 70, 11, 71–73, 76, 79–81, 83, 84, 86, 22, 88, 89, 91, 93–95, 97, 98, 26, 27, 29, 36–38], and 17 studies[20, 21, 39–43, 49–53, 24, 54, 56, 58, 61, 65–68, 74, 75, 25, 85, 96, 28, 31–35] used the cut-off point of ≥ 60 minutes/day of moderate-to-vigorous physical activity (Table 1).

Table 1. Description of the studies on the global physical activity among Brazilian children and adolescents.

Reference	Local	Sample type	Sample (% of girls)	Age (years)	Instrument	Mode of administration; recall time
Abreu and Caiaffa[82]	National	Population-based	7169 (54.2)	15-24	IPAQ	Self-reported; PR-W
Alves Júnior et al.[a 40]	São José, SC	School-based	820 (56.0)	14-17	Undefined Questionnaire	Uninformed; PR-W
Andaki et al.[85]	Viçosa, MG	School-based	187 (56.7)	9.9	Undefined Questionnaire	Self-reported; PR-W
Andrade Neto et al.[86]	Santa Maria de Jetibá, ES Vitória, ES	School-based	1770 (55.1)	7-10.	Undefined Questionnaire (V)	Not Described
Arruda and Lopes[87]	Lages, SC	School-based	1024 (0)	10-17	Bouchard diary adapted	Self-reported
Barros et al.[66]	Recife, PE	School-based	3764 (59.5)	14–19	GSHS	Self-reported; PR-W

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Reference	Local	Sample type	Sample (% of girls)	Age (years)	Instrument	Mode of administration; recall time
Bastos, Araújo and Hallal[63]	Pelotas, RS	School-based	857 (52)	10-19	Undefined Questionnaire (V)	Not Described
Beck et al.[45]	Três de Maio, RS	School-based	660 (52)	14-19	Undefined Questionnaire	Not Described
Bergmann et al.[b 16]	Uruguaiana, RS	School-based	1455 (50.9)	10-17	PAQ-C and PAQ-A	Self-reported; PR-W
Campos et al.[46]	Curitiba, PR	School-based	497 (47.6)	14-19	Undefined Questionnaire	Self-reported; HA-W
Carvalho et al.[77]	Nordeste	School-based	421 (59.6)	9-19	IPAQ	Self-reported; PR-W
Cavalcanti et al.[c 67]	Recife, PE	School-based	4138 (59.8)	14-19	GSHS	Not Described
Ceschini, Andrade and Figueira Júnior[36]	São Paulo, SP	School-based	1844 (46.5)	15-20	IPAQ	Self-reported; PR-W
Ceschini et al.[88]	São Paulo, SP	School-based	3845 (52.6)	14-19	IPAQ	Self-reported; PR-W
Coelho et al.[89]	OuroPreto, MG	School-based	661 (47.8)	10-14	Undefined Questionnaire	Not Described
Cureau et al.[26]	Santa Maria, RS	School-based	1132 (53.9)	14-19	Undefined Questionnaire	Not Described
Dambros, Lopes and Santos[47]	Santa Maria, RS	School-based	450 (45.3)	14-18	Undefined Questionnaire (V)	Not Described
Dumith et al.[20]	Caracol, PI	School-based	1112 (53.3)	13-19	Undefined Questionnaire	Self-reported; HA-W
Farias Júnior[14]	Florianópolis, SC	School-based	1949 (50.6)	12-18	Bouchard diary adapted	Self-reported; 3 days
FariasJúnior[78]	João Pessoa, PB	School-based	2566 (55.9)	14- 18	Undefined Questionnaire (V)	Self-reported; PR-W
Farias Júnior et al.[e 11]	Santa Catarina	School-based	5028 (59.3)	15-19	GSHS	Self-reported; HA-W
Farias Júnior et al.[g 79]	João Pessoa, PB	School-based	2874 (57.8)	14-19	GSHS	Self-reported; PR-W
Farias Júnior et al.[g 69]	João Pessoa, PB	School-based	2874 (57.8)	14-19	Undefined Questionnaire	Not Described
FariasJúnior et al.[g 73]	João Pessoa, PB	School-based	2859 (57.8)	14-19	PACE and QAFA	Self-reported; PR-W
Farias Júnior, Reis and Hallal[g 70]	João Pessoa, PB	School-based	2859 (57.8)	16,5	Undefined Questionnaire	Self-reported; PR-D
Fermino et al.[h 49]	Curitiba, PR	School-based	1518 (59.2)	14-18	Undefined Questionnaire	Self-reported; HA-W
Freire et al.[90]	Montes Claros, MG	School-based	763 (48.2)	15-19	Undefined Questionnaire	Self-reported
Guilherme et al.[37]	Paranavaí, PR	School-based	566 (49.3)	10-14	GSHS	Not Described
Hallal et al.[d 84]	National	School-based	60.973	13-15	GSHS	Self-reported; PR-W
Leão et al.[f 19]	Aracajú, SE	School-based	2030 (63.2)	13-18	Undefined Questionnaire (V)	Not Described
Legnani et al.[56]	Foz do Iguacu, PR	School-based	453 (59)	15-18	GSHS	Not Described
Leites, Bastos and Bastos[57]	Porto Alegre, RS	School-based	967 (49.6)	10-19	Undefined Questionnaire	Not Described
Lima et al.[h 64]	Curitiba, PR	School-based	1474 (59)	14-18	Undefined Questionnaire	Not Described
Lima and Silva[a 41]	São José, SC	School-based	1103 (54.5)	14-19	GSHS	Self-reported; PR-W
Loch[e 10]	Santa Catarina	School-based	5083 (59.4)	15-19	Undefined Questionnaire (V)	Not Described
Lucena et al.[g 71]	João Pessoa, PB	School-based	2874 (57.8)	14-19	Undefined Questionnaire (V)	Self-reported; PR-W
Malta et al.[d 83]	National	School-based	60.973 (53.3)	13-14	Undefined Questionnaire	Not Described
Malta et al.[i 32]	National	School-based	109.104 (52.1)	13-16	GSHS	Not Described

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Reference	Local	Sample type	Sample (% of girls)	Age (years)	Instrument	Mode of administration; recall time
Martins, Lima and Silva[a 42]	São José, SC	School-based	1132 (54.2)	14-19	GSHS	Self-reported; HA-W
Matsudo et al.[102]	São Paulo	Population-based	2001 (52.4)	14-77	IPAQ	Self-reported; PR-W
Meireles et al.[91]	Belo Horizonte, MG	School-based	1042 (47.2)	11-17	Undefined Questionnaire	Uninformed
Mendonça and Farias Júnior[g 72]	João Pessoa, PB	School-based	2859 (57.8)	14-19	PAQ-A	Self-reported; PR-D
Mendonça et al.[g 80]	João Pessoa, PB	School-based	2874 (57.8)	14-19	Undefined Questionnaire	Self-reported; PR-D
Menezes and Duarte[21]	Sergipe	School-based	3992 (63.1)	14-19	GSHS	Not Described
Moraes et al.[j 59]	Maringá, PR	School-based	991 (54.5)	14-18	IPAQ	Self-reported; PR-W
Moraes and Falcão[58]	Maringá, PR	School-based	991 (54.5)	14-18	PAQ-A	Not Described
Nakamura et al.[92]	Rio Claro, SP	School-based	467 (54)	14-17	PAQ-C	Self-reported; PR-W
Nascente et al.[22]	Goiânia, GO	School-based	862 (52.8)	14-18	IPAQ	Self-reported; PR-W
Nascimento-Ferreira et al.[103]	Imperatriz, MA	School-based	869 (53.4)	14-19	PAQ-A	Self-reported; PR-D
Nunes et al.[a 43]	São José, SC	School-based	916 (55.4)	14-19	YRBSS	Self-reported; PR-W
Pelegrini and Petroski[k 60]	Florianópolis, SC	School-based	595 (67.1)	14-18	IPAQ	Self-reported; PR-W
Pereira, Bergmann and Bergmann[b 17]	Uruguaiana, RS	School-based	1455 (50.9)	10-17	PAQ-C and PAQ-A	Self-reported; PR-D e PR-W
Peres et al.[l 93]	Piracicaba, SP	School-based	269 (56.1)	10-14	QAFA	Self-reported; HA-M
Petribú et al.[m 74]	Caruaru, PE	School-based	600 (62.5)	15-20	COMCAP	Not Described
Prado et al.[h 53]	Curitiba, PR	School-based	1469 (59.2)	14-18	YRBSS	Self-reported; PR-W
Quadros et al.[23]	Amargosa, BA	. School-based	1139 (55.6)	6-18	Pedometer	Monitoramento; PR-W
Raizel et al.[24]	Cuiabá, MT	School-based	364 (59)	12-19	GSHS	Not Described
Regis et al.[n 25]	Pernambuco	School-based	6234 (59.7)	14-19	GSHS	Not Described
Reichert et al.[61]	Pelotas, RS	Population-based	457 (47.9)	12-14	Accelerometer	Monitoramento; PR-W
Reis et al.[h 54]	Curitiba, PR	School-based	1650 (59.6)	14-18	Undefined Questionnaire	Self-reported; PR-W
Rezende et al.[i 33]	National	School-based	109.104 (57)	14-15	Undefined Questionnaire	Self-reported; HA-W
Rivera et al.[o 12]	Maceió, AL	School-based	1253 (56.3)	7-17	PAQ-C	Self-reported; PR-W
Rodrigues et al.[81]	Cuiabá, MT	School-based	1139 (55.6)	14-19	Undefined Questionnaire	Not Described
Romanzini et al.[55]	Londrina, PR	School-based	644 (61.6)	16,4,0	IPAQ	Self-reported; PR-W
Romero et al.[l 94]	Piracicaba, SP	School-based	328 (54.3)	10-15	QAFA	Self-reported; PR-W e PR-Y
Salvador, Kitoko and Gambardella[95]	Vitória, ES	School-based	400 (47.3)	8-17	Undefined Questionnaire	Self-reported; PR-Y
Santos et al.[h 51]	Curitiba, PR	School-based	1615 (59.69)	14-18	Undefined Questionnaire	Not Described
Santos et al.[35]	Uberaba, MG	School-based	649 (52.1)	9-12	LAF	Self-reported; PR-D
Santos et al.[n 96]	Pernambuco	School-based	6264 (59.7)	14-19	GSHS	Not Described
Santos et al.[c 31]	Pernambuco	School-based	4207 (59.8)	14-19	PAQ-C*	Self-reported; PR-W
Silva (2015)[i 34]	National	School-based	109.104 (52.2)	13-15	Undefined Questionnaire	Self-reported; PR-W
Silva and Silva[p 28]	Aracajú, SE	School-based	2057 (62.7)	13-18	YRBSS	Self-reported; PR-W
Silva et al.[o 13]	Maceió, AL	School-based	706 (56.3)	7-17	PAQ	Self-reported; PR-W

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Reference	Local	Sample type	Sample (% of girls)	Age (years)	Instrument	Mode of administration; recall time
Silva et al.[e 8]	Santa Catarina	School-based	5028 (59.3)	15-19	COMPAC	Self-reported; HA-W
Silva et al.[97]	Aracajú, SE	School-based	1028 (56.7).	13-16	PAQ-C	Self-reported; PR-W
Silva et al.[e 9]	Santa Catarina	School-based	5028 (59.3)	15-19	COMPAC	Self-reported; HA-W
Silva et al.[p 18]	Aracajú, SE	School-based	2105 (63.0)	13-18	YRBSS	Self-reported; PR-W
Silva et al.[27]	Santa Catarina	School-based	6529 (53.9)	15-19	COMPAC	Self-reported; HA-W
Silva et al.[64]	Ponta Grossa, PR	School-based	653 (57,9)	14-19	IPAQ	Self-reported; PR-W
Silva et al.[k 65]	Florianópolis, SC	School-based	696 (62.1)	15-18	IPAQ	Self-reported; PR-W
Silva et al.[15]	Arapiraca, SE	School-based	571 (52.7)	8-10	QUAFDA	Self-reported; PR-D
Silva, Silva and Oliveira[f 18]	Aracajú, SE	School-based	2259 (62.3)	13-18	PAQ-C	Self-reported; PR-W
Silva, Smith-Menezes and Duarte[29]	Sergipe	School-based	3992 (61.3)	14-19	GSHS	Not Described
Souza[98]	Canoas, RS	School-based	293 (66.9)	17	IPAQ	Self-reported; PR-W
Souza et al.[76]	Salvador, BA	School-based	694 (52.7)	10-14	Undefined Questionnaire (V)	Not Described
Souza et al.[h 52]	Curitiba, PR	School-based	1698 (59.4)	14-18	Undefined Questionnaire	Self-reported; HA-W
Straatmann e Veiga[99]	Niterói, RJ	School-based	.697 (59.6)	12-19	IPAQ	Self-reported; PR-W
Suñe et al.[62]	Capão da Canoa, RS	School-based	719 (50.2)	11-13	Questionnaire on habitual physical activities (Russell R. Pate)	Not Described
Tassitano et al.[m 75]	Caruaru, PE	School-based	600 (62.5)	15-20	COMCAP	Not Described
Tenório et al.[c 68]	Pernambuco	School-based	4210 (59.8)	14-19	GSHS	Not Described
Vieira et al.[100]	Natal, RN	School-based	347 (72)	12-18	Undefined Questionnaire	Not Described
Vitta et al.[101]	Bauru, SP	School-based	524 (46.9)	10-14	PAQ-C	Self-reported; PR-W

Note. Superscript equal letters over author's name refer to distinct articles from the same study; Undefined Questionnaire: Original instrument not identified by the authors, but questions were reported; (V): Questionnaire presented criterion, content and/or construct validity; States of Brazil: AL: Alagoas; BA: Bahia; DF: Distrito Federal; ES: Espírito Santo; GO: Goiás; MA: Maranhão; MG: Minas Gerais; MT: Mato Grosso; PB: Paraíba; PE: Pernambuco; PI: Piauí; PR: Paraná; RJ: Rio de Janeiro; RN: Rio Grande do Norte; RS: Rio Grande do Sul; SC: Santa Catarina; SE: Sergipe; SP: São Paulo. (PAQ-C): Physical Activity Questionnaire for Older Children; (PAQ-A): Physical Activity Questionnaire for Adolescents; (PAQ-C*): Activity Questionnaire for Children and Adolescents; (GSHS): Global School-based Student Health Survey; (YRBSS): Youth Risk Behavior Surveillance; (Saúde na Boa): Good Health Questionnaire; (QAFA): Physical Activity Questionnaire for Adolescents; (LAF): List of Physical Activities; (PAQ): Physical Activity Questionaire; (COMCAP): Risk Behaviors in Catarinese Adolescents; (QUAFDA): Previous Day Physical Activity Questionnaire; (IPAQ): International Physical Activity Questionnaire; (COMPAC): Behaviors of Catarinense Adolescents; (PeNSE 2012): National School Health Survey. a - Brazilian Guide for Evaluation of Health-Related Physical Fitness and Life Habits - Stage I; b - Estudo em Uruguaiana/RS – protocol do Comitê de Ética em Pesquisa: 042/2010; c - Estilos de Vida e Comportamentos de Risco à Saúde em Estudantes do Ensino Médio no Estado de Pernambuco; d – Pesquisa Nacional de Saúde do Escolar, edição 2009 – PeNSE 2009; e – Estilo de Vida e Comportamentos de Risco dos Jovens Catarinenses, edição 2001 – COMPAC 2001; f – Estudo em Sergipe – protocolo do Comitê de Ética em Pesquisa da Universidade Federal de Sergipe (CEP/UFS): 5724.0.000.107-10.; g - Physical activity level and associated factors among high school adolescents in João Pessoa, city, - PB: an ecological approach.; h - Determinantes da Atividade Física e Obesidade em Escolares do Ensino Médio da Rede Pública da Cidade de Curitiba, Paraná, Brasil.; i - Pesquisa Nacional de Saúde do Escolar, edição 2012 – PeNSE 2012; j – Estudo em Maringá/PR – Aprovado pelo Comitê de Ética em Pesquisa com Seres Humanos do Centro Universitário de Maringá.; k – Níveis de atividade física, aptidão física e comportamento social relacionados à saúde em escolares de Florianópolis, SC.; l - Consumo dietético e AF como determinantes das mudanças do IMC de uma coorte de adolescentes matriculados da rede pública de ensino da cidade de Piracicaba/SP.; m – Estudo em Caruaru/PE – protocolo do Comitê de Ética em Pesquisa com Seres Humanos da Faculdades ASCES: 44/2007.; n – Physical activity practice and health risk behaviors in high school students in the State of Pernambuco: a temporal trend study.; o – Estudo em Maceió-AL – Aprovado pelo Comitê de Ética do Hospital Universitário da Universidade Federal de Alagoas.; p – Estudo em Aracajú/SE – Aprovado pelo Ethics Committee on Human Research of the Federal University of Sergipe.

The overall proportion of young people who were physically active ranged from 6.5%[12] to 92.3%[64]. Considering the estimate of 41 studies[8, 9, 25, 27–29, 31–34, 36, 37, 10, 45–47, 49–55, 11, 56–61, 63, 65–67, 14, 68–76, 78, 18, 79, 80, 83–86, 88, 92–94, 19, 96, 97, 99, 101–103, 20, 21, 24] that provided gender-stratified data, the prevalence of being

physically active ranged from 0.3%[9] to 84.6%[86] in girls, and from 2.0%[9] to 93.1%[93] in boys. Fourteen studies (22.6%) demonstrated a proportion of active individuals ≥ 50%[8, 9, 65, 69–75, 77, 79, 10, 80, 82, 87, 89, 95, 11, 35, 38, 55, 60, 61, 64]. Among the three nationwide surveys included in this review, the proportions of physically active young people were 66.0% (Cancer National Institute - 2002/2003)[82], 43.1% (National Survey of School Health-2009)[84] and 29.0% (National Survey of School Health-2012)[33] (Table 2).

Considering the results of adolescents according to age groups, the proportion of physically active children (up to 6-10 year-olds exclusively) ranged from 10.9%[15] to 29.2%[89]. Studies with adolescents exclusively (10 years or older) presented proportions that ranged from 8.3%[17] to 92.3%[64] (Table 2).

Included studies that used the cutoff point of ≥ 300 minutes/week of moderate-to vigorous physical activity presented proportions of physically active individuals that ranged from 18.4%[86] to 92.3%[64]. Studies using the cutoff point of ≥ 60 minutes/day moderate-to vigorous physical activity presented proportions of physically active individuals that ranged from 12.6%[20] to 68.2%[65]. Studies using the cut-off score for PAQ-C/PAQ-A scores presented proportions ranging from 6.5%[12] to 23.5%[101]. Studies that used the cutoff point of the IPAQ short presented proportions varying from 66.0%[82] to 69.8%[77].

Regarding objective measurements of PA, the population-based study that used accelerometers[61] was conducted in South Brazil with 457 adolescents who were 12-14 years old. This study found overall prevalence of physically active of 61.3%[61]. A school-based study with 1139 6-8-year-old students from Northeastern Brazil the used pedometer-measured physical activity found an overall prevalence of 35.7% physically active individuals[23] (Table 2).

Trends in the prevalence of physical activity were observed in three studies, which presented two waves of data collection. The National School Health Survey (2009 and 2012) described percentages of physically active students of 43.1% in 2009[83,84] to 29.0% in 2012[33]. However, the number of questions used to define physical activity level was different between these surveys. The Health Risk Behaviors Project (COMPAC study, a study in Santa Catarina state) showed a prevalence of physically active boys and girls of 72.1% and 71.2% in 2001[9], and 39.3% and 23.7% in 2011, respectively[27]. A statewide survey in Pernambuco state presented the prevalence of physically active students of 34.9% in 2006[31,68] and 35.1% in 2011[96].

Table 2. Description of prevalence of physical activity (%) in studies including Brazilian children and adolescents.

Reference	Local	Definition	Prevalence of Physical Activity		
			All	Boys	Girls
Abreu and Caiaffa[82]	National	IPAQ version 8 definition.	66.0%	n.a.	n.a.
Alves Júnior et al.[a 40]	São José, SC	≥60 min./day of MVPA	22.9%	n.a.	n.a.
Andaki et al.[85]	Viçosa, MG	≥60 min./day of MVPA	n.a.	68.1%	36.7%
Andrade Neto et al.[86]	Santa Maria de Jetibá, ES Vitória, ES	≥300 min./weekof MVPA	18.4%	Urban area: 75.5% Rural area: 90.8%	Urban area: 69.2% Rural area: 84.6%

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Reference	Local	Definition	Prevalence of Physical Activity		
			All	Boys	Girls
Arruda and Lopes [87]	Lages, SC	>39,9 kcal/kg/day	58.8%	n.a.	n.a.
Barros et al.[#66]	Recife, PE	≥60 min./day of MVPA	34.0%	40.1%	29.8%
Bastos, Araújo and Hallal[#63]	Pelotas, RS	≥300 min./week of MVPA	30.2%	43.5%	17.9%
Beck et al.[#45]	Três de Maio, RS	≥300 min./weekof MVPA	38.8%	47.6%	30.6%
Bergmann et al.[b$16]	Uruguaiana, RS	PAQ-C / PAQ-A: (4 and 5 points)	08.3%	n.a.	n.a.
Campos et al.[#46]	Curitiba, PR	≥37 kcal/kg/dia	n.a.	82.7%	77.4%
Carvalho et al.[#77]	Northeast	IPAQ short version; definition.	69.8%	n.a.	n.a.
Cavalcanti et al.[c67]	Recife, PE	≥60 min./day of MVPA	5.3%	4.1%	6.5%
Ceschini, Andrade and Figueira Júnior[36]	São Paulo, SP	≥300 min./week of MVPA	36.1%	39.4%	32.2%
Ceschini et al.[#88]	São Paulo, SP	≥300 min./week of MVPA	37.5%	50.3%	25.9%
Coelho et al.[89]	Ouro Preto, MG	≥300 min./week of MVPA	29.2% (6-9 years old). 70.8% (10-14 years old)	n.a.	n.a.
Cureau et al.[#26]	Santa Maria, RS	≥300 min./week of MVPA	46.5%	n.a.	n.a.
Dambros, Lopes and Santos[#47]	Santa Maria, RS	≥300 min./week of MVPA	n.a.	75.0%	60.0%
Dumith et al.[20]	Caracol, PI	≥60 min./day of MVPA	12.6%	20.2%	05.9%
Farias Júnior[#14]	Florianópolis, SC	≥37 kcal/kg/day	37.4%	48.6%	26.5%
Farias Júnior[#78]	João Pessoa, PB	≥37 kcal/kg/day	n.a.	54.5%	35.8%
Farias Júnior et al.[e#11]	Santa Catarina	≥300 min./week of MVPA	63.5%	73.9%	56.3%
Farias Júnior et al.[g79]	João Pessoa, PB	≥300 min./week of MVPA	50.2%	66.3%	38.5%
Farias Júnior et al.[g69]	João Pessoa, PB	≥300 min./week of MVPA	50.2%	66.3%	38.5%
Farias Júnior et al.[g73]	João Pessoa, PB	≥300 min./week of MVPA	20.1% (simplified) 50.2% (detailed)	28.3% (simplified); 66.3% (detailed)	14.1% (simplified); 38.5% (detailed)
Farias Júnior, Reis and Hallal[g70]	João Pessoa, PB	≥300 min./week of MVPA	n.a.	66.3%	38.5%
Fermino et al.[h49]	Curitiba, PR	≥60 min./day of MVPA	14.5%	22.3%	09.1%
Freire et al.[90]	Montes Claros, MG	Frequency of physical activity practice ("always"/"frequently").	45.2%	n.a.	n.a.
Guilherme et al.[#37]	Paranavaí, PR	≥300 min./week of MVPA	n.a.	46.9%	53.1%
Hallal et al.[d84]	National	≥300 min./week of MVPA	43.1%	56.2%	31.3%
Leão et al.[f19]	Aracajú, SE	PAQ-C / PAQ-A: (4 and 5 points)	10.6%	n.a.	n.a.
Legnani et al.[#56]	Foz do Iguaçú, PR	≥60 min./day of MVPA	n.a.	21.7%[&]	22.1%[&]
Leites, Bastos and Bastos[#57]	Porto Alegre, RS	≥300 min./week of MVPA	n.a.	Boys 10-12 years old: 44.0% 13-15 years old: 45.6% 16 -19 years old: 33.5%	Girls 10-12 years old: 20.3% 13-15 years old: 20.8% 16 -19 years old: 14.2%

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Reference	Local	Definition	Prevalence of Physical Activity		
			All	Boys	Girls
Lima et al.[h 64]	Curitiba, PR	≥60 min./day of MVPA	14.3%	21.7%	09.2%
Lima and Silva[a 41]	São José, SC	≥60 min./day of MVPA	22.8%	27.6%	18.8%
Loch[e# 10]	Santa Catarina	≥300 min./week of MVPA	70.0%	79.0%	63.1%
Lucena et al.[g 71]	João Pessoa, PB	≥300 min./week of MVPA	50.2%	66.3%	38.5%
Malta et al.[d 83]	National	≥300 min./week of MVPA	43.1%	56,2%	31,3%
Malta et al.[i 32]	National	≥60 min./day of MVPA	Actives: White (20.5%); Black (20.5%); Yellow (20.1%); Brown (19.6%); Indigenous (22.5%)	n.a.	n.a.
Martins, Lima and Silva[a 42]	São José, SC	≥60 min./day of MVPA	% Actives: Poor Self-rated health (34.2%) . Good Self-rated health (51.4%).	n.a.	n.a.
Matsudo et al.[$ 102]	São Paulo	IPAQ definition	n.a.	61.4%	50.5%
Meireles et al.[91]	Belo Horizonte, MG	≥300 min./week of MVPA	49.4%	n.a.	n.a.
Mendonça and Farias Júnior[g 72]	João Pessoa, PB	≥300 min./week of MVPA	50.2%	66.3%	38.5%
Mendonça et al.[g 80]	João Pessoa, PB	≥300 min./week of MVPA	50.2%	66.3%	38.5%
Menezes and Duarte[# 21]	Sergipe	≥60 min./day of MVPA	22.5%	29.0%	14.0%
Moraes et al.[j# 59]	Maringá, PR	≥300 min./week of MVPA	43.1%	44.3%	42.1%
Moraes and Falcão[# 58]	Maringá, PR	≥60 min./day of MVPA	n.a.	44.0%	42.1%
Nakamura et al.[92]	Rio Claro, SP	PAQ-C / PAQ-A: (4 and 5 points)	17.4%	26.8%	09.4%
Nascente et al.[22]	Goiânia, GO	≥300 min./week of MVPA	33.2%	n.a.	n.a.
Nascimento-Ferreira et al.[103]	Imperatriz, MA	≥60 min./day of MVPA	45.6%	42.7%	69.2%
Nunes et al.[a 43]	São José, SC	≥60 min./day of MVPA	22.7%	27.7%	18.7%
Pelegrini and Petroski[k 60]	Florianópolis, SC	≥300 min./week of MVPA	n.a.	Actives: 14 years = 78.6%; 15 years = 67.3%; 16 years = 84.8%; 17 years = 77.2%; 18 years = 90.0%	Ativas: 14 years = 57.1%; 15 years = 76.4%; 16 years = 76.2%; 17 years = 71.6%; 18 years = 59.1%.
Pereira, Bergmann and Bergmann[b$ 17]	Uruguaiana, RS	PAQ-C / PAQ-A: (4 and 5 points)	08.3%	n.a.	n.a.
Peres et al.[l 93]	Piracicaba, SP	≥300 min./week of MVPA	n.a.	Overweight: 92.5%; Eutrophic: 93.1%	Overweight: 78,9%; Eutrophic: 84,1%
Petribú et al.[m 74]	Caruaru, PE	≥60 min./day of MVPA	Overweight individuals: 15.6% Obese individuals: 3.8%	n.a.	n.a.
Prado et al.[h 53]	Curitiba, PR	≥60 min./day of MVPA	14.5%	22.2%	09.2%
Quadros et al.[# 23]	Amargosa, BA	16,000 and 13,000 steps/day for boys and girls (respectively).	35.7%	n.a.	n.a.
Raizel et al.[# 24]	Cuiabá, MT	≥60 min./day of MVPA	18.0%	31.0%*	09.0%*

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Reference	Local	Definition	Prevalence of Physical Activity		
			All	Boys	Girls
Regis et al.[n 25]	Pernambuco	≥60 min./day of MVPA	Urban area: 34.5% Rural area: 37.3%	n.a.	n.a.
Reichert et al.[61]	Pelotas, RS	≥60 min./day of MVPA	61.3%	69.8%	52.1%
Reis et al.[h 54]	Curitiba, PR	≥60 min./day of MVPA	n.a.	21.7%	09.1%
Rezende et al.[i 33]	Nacional	≥60 min./day of MVPA	29.0%	38.6%	20.1%
Rivera et al.[o* 12]	Maceió, AL	≥60 min./day of MVPA	06.5%	n.a.	n.a.
Rodrigues et al.[81]	Cuiabá, MT	≥300 min./week of MVPA	40.5%	n.a.	n.a.
Romanzini et al.[# 55]	Londrina, PR	≥300 min./week of MVPA	60.8%	66.7%	57.2%
Romero et al.[l 94]	Piracicaba, SP	≥300 min./week of MVPA	45.1%[#]	n.a.	n.a.
Salvador, Kitoko and Gambardella[95]	Vitória, ES	5+ hours per week of PA	Normal weight: 79.2%; overweight: 20.8%	n.a.	n.a.
Santos et al.[h 51]	Curitiba, PR	≥60 min./day of MVPA	n.a.	22.0%	09.1%
Santos et al.[35]	Uberaba, MG	≥60 min./day of MVPA	55.1%	n.a.	n.a.
Santos et al.[n 96]	Pernambuco	≥60 min./day of MVPA	35.1%	43.9%	29.2%
Santos et al.[c 31]	Pernambuco	≥60 min./day of MVPA	34.9%[#]	42.3%	29.8%
Silva[i 34]	National	≥60 min./day of MVPA	n.a.	27.9%	13.1%
Silva and Silva[p 28]	Aracajú, SE	≥60 min./day of MVPA	18.1%	26.8%	12.9%
Silva et al.[o# 13]	Maceió, AL	PAQ-C / PAQ-A: (3 to 5 points)	06.5%	n.a.	n.a.
Silva et al.[e# 8]	Santa Catarina	≥300 min./week of MVPA	n.a.	78.9%	63.0%
Silva et al.[97]	Aracajú, SE	PAQ-C / PAQ-A: (4 and 5 points)	n.a.	2.0%	0.3%
Silva et al.[e 9]	Santa Catarina	≥300 min./week of MVPA	71.5%	72.1%[#]	71.2%[#]
Silva et al.[p 18]	Aracajú, SE	≥60 min./day of MVPA	n.a.	27.2%	12.6%
Silva et al.[# 27]	Santa Catarina	≥300 min./week of MVPA	n.a.	39.3%	23.7%
Silva et al.[64]	Ponta Grossa, PR	≥300 min./week of MVPA	92.3%	n.a.	n.a.
Silva et al.[k 65]	Florianópolis, SC	≥300 min./week of MVPA	68.2%	79.6%	71.6%
Silva et al.[$ 15]	Arapiraca, SE	37 or more points in the instrument score.	10.9%[#]	n.a.	n.a.
Silva, Silva and Oliveira[f 18]	Aracajú, SE	PAQ-C / PAQ-A: (3 to 5 points)	n.a.	20.6%	04.8%
Silva, Smith-Menezes and Duarte[29]	Sergipe	≥300 min./week of MVPA	22.5%	18.4%	29.0%
Souza[98]	Canoas, RS	≥300 min./week of MVPA	47.7%	n.a.	n.a.
Souza et al.[# 76]	Salvador, BA	≥300 min./week of MVPA	n.a.	72.0%	50.0%
Souza et al.[h 52]	Curitiba, PR	≥60 min./day of MVPA	14.5%	21.6%	09.6%
Straatmann and Veiga[99]	Niterói, RJ	IPAQ short version: active= very active and active	n.a.	69.1%	54.7%
Suñé et al.[$ 62]	Capão da Canoa, RS	6 or more points in instrument score.	21.2%	n.a.	n.a.
Tassitano et al.[m# 75]	Caruaru, PE	≥60 min./day of MVPA	58.3%	77.2%	46.9%
Tenório et al.[c# 68]	Pernambuco	≥60 min./day of MVPA	34.9%	42.3%	29.8%
Vieira et al.[100]	Natal, RN	≥300 min./week of MVPA	Normal weight: 46.9%. overweight: 50.0%	n.a.	n.a.

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Reference	Local	Definition	Prevalence of Physical Activity		
			All	Boys	Girls
Vitta et al.[101]	Bauru, SP	PAQ-C / PAQ-A: (3 to 5 points)	23.5%	44.6%	18.7%

Note. States of Brazil: AL: Alagoas; BA: Bahia; DF: Distrito Federal; ES: Espírito Santo; GO: Goiás; MA: Maranhão; MG: Minas Gerais; MT: Mato Grosso; PB: Paraíba; PE: Pernambuco; PI: Piauí; PR: Paraná; RJ: Rio de Janeiro; RN: Rio Grande do Norte; RS: Rio Grande do Sul; SC: Santa Catarina; SE: Sergipe; SP: São Paulo n.a.: not avaliable. a - Brazilian Guide for Evaluation of Health-Related Physical Fitness and Life Habits - Stage I; b - Estudo em Uruguaiana/RS – protocol do Comitê de Ética em Pesquisa: 042/2010; c - Estilos de Vida e Comportamentos de Risco à Saúde em Estudantes do Ensino Médio no Estado de Pernambuco; d – Pesquisa Nacional de Saúde do Escolar, edição 2009 – PeNSE 2009; e – Estilo de Vida e Comportamentos de Risco dos Jovens Catarinenses, edição 2001 – COMPAC 2001; f – Estudo em Sergipe – protocolo do Comitê de Ética em Pesquisa da Universidade Federal de Sergipe (CEP/UFS): 5724.0.000.107-10.; g - Physical activity level and associated factors among high school adolescents in João Pessoa, city, - PB: an ecological approach.; h - Determinantes da Atividade Física e Obesidade em Escolares do Ensino Médio da Rede Pública da Cidade de Curitiba, Paraná, Brasil.; i - Pesquisa Nacional de Saúde do Escolar, edição 2012 – PeNSE 2012; j – Estudo em Maringá/PR – Aprovado pelo Comitê de Ética em Pesquisa com Seres Humanos do Centro Universitário de Maringá.; k – Níveis de atividade física, aptidão física e comportamento social relacionados à saúde em escolares de Florianópolis, SC.; l - Consumo dietético e AF como determinantes das mudanças do IMC de uma coorte de adolescentes matriculados da rede pública de ensino da cidade de Piracicaba/SP.; m – Estudo em Caruaru/PE – protocolo do Comitê de Ética em Pesquisa com Seres Humanos da Faculdades ASCES: 44/2007.; n – Physical activity practice and health risk behaviors in high school students in the State of Pernambuco: a temporal trend study.; o – Estudo em Maceió-AL – Aprovado pelo Comitê de Ética do Hospital Universitário da Universidade Federal de Alagoas.; p – Estudo em Aracajú/SE – Aprovado pelo Ethics Committee on Human Research of the Federal University of Sergipe. [$]%very active + %active; [#]Calculated prevalences of physical activity: 100% - % of physical inactivity (original information provided in the articles); [&]Data from brazilian adolecents; [*]Scores 3, 4 and 5 summed.

DISCUSSION

The objective of this systematic review was to synthesize the studies on the prevalence of physical activity in children and adolescents in Brazil. Our findings showed that there was a wide range between studies in the prevalence of physically active children and adolescents. However, thirty-five studies found a prevalence of physically active children and adolescents lower than 50%[12,13,23–31,36,14,40–43,45,49–53,16,54,56–59,62,63,66–68,17,81,90–92,96–98,101,18–22], including two National School Health Surveys[33,84]. Thus, it seems that increasing physical activity practices among Brazilian children and adolescents is a priority.

The large variability between studies in prevalence rates may be explained by the distinctions in the instruments/questionnaires used. Recording period, instrument structure, wording of questionnaires, physical activity domains included, and cutoff points were aspects that varied between surveys (Table 1). For example, Farias Júnior et al.[73] found that estimates of physically active adolescents using simplified and detailed instruments, can have a relative difference of 100% or higher. Subjective measures of physical activity are still predominantly used in epidemiological research in Brazil[104] and other low- and middle-income countries due to the context of where the data is recorded and the low operational costs involved[105]. However, it is important that future studies consider developing and using validated and reliable instruments for physical activity measurement in epidemiological surveys in Brazil.

Inversely, this systematic review included only two studies with objectively-measured physical activity[23,61]. In Brazil, the high cost of objective measures of physical activity can still be a barrier to their use in comprehensive survey studies. Another obstacle to be overcome for optimizing the use of objective instruments, in particular accelerometers, is the problematic comparability between different models and outputs[106]. Comprehensive

surveys using objectively-measured physical activity (e.g., accelerometers) are still on the rise in Brazil, and well-designed studies should be developed in order to reduce comparability issues of physical activity data.

Most of studies in Brazil highlighted physical activity distinctions for boys and girls, which was similar to the global estimate[107]. However, when considering age groups, no studies were found that investigated the prevalence of physically active preschool children (under 6 years old). An explanation for this result may be that the measurement of physical activity with subjective instruments is unreliable and most of questionnaires were not validated for younger children.

The results of this systematic review highlighted other trends in the research on physical activity prevalence in Brazil. Since 2001, there has been an increase in research on physical activity in children and adolescents with a concomitant evolution of the robustness of the studies developed in the Brazilian scientific community. This is also supported by two versions of the National Survey of School Health (2009 and 2012), which provided information for the Surveillance System for Risk Factors for Non-communicable Chronic Diseases [34,84]. These results reflect the emphasis on epidemiological surveys in the Brazilian physical activity research agenda during this period.

The results showed that most of the studies were carried out in South and Northeast regions of Brazil. Previous systematic reviews[104,108] found a large number of studies on physical activity and health in the South and Southeast regions of Brazil. Thus, a positive finding in the current review was the relevant number of included studies in Northeastern Brazil. This may be related to the number of research groups and graduate programs in Physical Education in this region of Brazil, which can stimulate new and well-designed research practices for studies in these areas. However, the development of studies in the Northern region of Brazil is urgent, because no studies of this region were included in the current review and physical activity promotion strategies for young populations in the Northern area need to consider context-specific needs and peculiarities. Research groups focused on physical activity and health should be stimulated and integrated with other multicenter studies to promote best research practice for studies on physical activity and health in this region.

This systematic review is important because research on the physical activity level of Brazilian children and adolescents was presented with new evidence in comparison to previous reviews of this topic[109]. Also, gaps and recommendations for studying physical activity were highlighted. However, a large variability in the measurement of physical activity between studies limited the possibilities of a quantitative synthesis (meta-analysis) of the physical activity prevalence rates from all studies and of a discussion of other relevant aspects of physical activity in Brazil, such as secular trends.

CONCLUSION

The current review found that there was great variability in the measure-

ment of physical activity and cut-off points among the studies with children and adolescents in Brazil. The large range of physical activity prevalence was something remarkable in this review. However, 35 studies found a prevalence of physically active children and adolescents lower than 50%. Thus, it seems that physical activity practices among Brazilian children and adolescents is still a challenge for the country. Important research gaps (e.g., studies with objectively-measured physical activity, children aged up to 6 years old and in Northern Brazil) should be considered when developing new research studies in Brazil.

COMPLIANCE WITH ETHICAL STANDARDS

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Conflict of interest statement

The authors have no conflict of interests to declare.

Author Contributions

VCBF participated in the methodological design, search and evaluation of studies, writing the text and approved the final version of the manuscript. RMC, MCTGK, BNO and CBA participated in the methodological design, study search and selection, data extraction and synthesis, writing the text and approved the final version of the manuscript. KSS participated in the methodological design, evaluation of studies, writing the text and approved the final version of the manuscript.

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SUPPLEMENTARY FILE

Example of descriptors used during the database search.

Number	Groups	Descriptors
#1	Physical activity (outcome)	("physical activity" [Text Word] OR "motor activity" [MeSH Terms] OR "physical exercise" [Text Word] OR exercise [MeSH Terms] OR "exercise program" [Text Word] OR sports [MeSH Terms] OR sport [Text Word] OR leisure activit* [Text Word] OR recreation [Text Word])
#2	Evaluation methods	(self-report OR checklist OR recall OR 24h OR interviews OR questionnaire OR diary OR assessment OR survey OR measurement OR Accelerometer* OR pedomet OR inclinomet OR (objectiv* AND measur*) OR (direct* AND measure*))
#3	Population (young people)	(youth [Text Word] OR teenage [Text Word] OR adolescent [MeSH Terms] OR adolescent [Text Word] OR adolescence [Text Word] OR students [MeSH Terms] OR student [Text Word] OR child [Text Word] OR children [Text Word] OR "young people" [Text Word])
#4	Context (country)	(Brazil* OR Brazilian)
Final search		#1 AND #2 AND #3 AND #4