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Community and environment for physical activity among young people: a systematic review of the Report Card Brazil 2018

Ambiente comunitário para atividade física de jovens: uma revisão sistemática do Report Card Brasil 2018

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Abstract – The aim of this study was to identify evidence about the prevalence of the community and environment indicators related to physical activity (PA) among young Brazilian people. A systematic review was carried out using eight databases (PubMed, Scopus, Web of Science, LILACS, SPORTDiscus, BIREME, Scielo, and Google Scholar) with descriptors in Portuguese and English. Community and environment Indicators included access, presence, proximity, quality, safety and pollution of/in spaces, facilities, programs available for PA among young people (up to 18 years-old), which may be measured subjectively and/or objectively. A total of 23 documents were included, representing 15 different studies. There were more studies in the South region (n=8), followed by the Northeast (n=3) and Southeast (n=3). Self-reported instruments were more frequently used (n=15). The studies reported prevalence of perception (positive and/or barrier) for access to facilities, programs and/or parks (n=13); presence of sidewalks and bicycle lanes (n=4); proximity to residence (n=5); quality (n=5); safety from crime and traffic (n=14) and pollution (n=6); number of spaces and/or facilities around the residence (n=1); and observation of adolescents using public spaces for PA (n=3). The prevalence rates showed high variability according to environmental indicator. No studies are available for the North and Midwest of the country. Distinct environmental measures were used in self-reported studies, impairing data comparability. To date, no studies have been identified that provide information about the prevalence of combined environmental measures (perceived and objective).

Key words: Adolescent; Built environment; Brazil; Motor activity.

Resumo – *Objetivou-se identificar evidências das prevalências de indicadores do ambiente comunitário relacionado a atividade física (AF) de jovens brasileiros. A revisão sistemática utilizou-se de oito bases de dados (PubMed, Scopus, Web of Science, LILACS, SPORTDiscus, BIREME, Scielo, and Google Scholar), com descritores em Português e Inglês. As variáveis de ambiente e comunidade incluem acesso, presença, proximidade, qualidade, segurança e poluição de/em espaços, estruturas, programas disponíveis para AF. Foram extraídos os dados de prevalência de jovens (maiores de 18 anos), que podem ser medidos subjetivamente e/ou objetivamente. No total, 23 documentos foram incluídos (n=2; relatórios nacionais), sendo 15 estudos diferentes. Houve mais estudos na região Sul (n=8), seguido do Nordeste (n=3) e Sudeste (n=3). O uso de instrumento auto relatado foi mais utilizado (n=15). Os estudos reportaram prevalências de percepção (positiva e/ou barreira) para acesso a estruturas, programas e/ou parques (n=13); presença de calçadas e ciclovias (n=4); proximidade com a residência (n=5); qualidade (n=5); segurança para crimes e trânsito (n=14) e poluição (n=6); quantidade de espaços e/ou estruturas no entorno da residência (n=1); e observação de adolescentes utilizando espaços públicos para AF (n=3). As taxas de prevalência apresentaram alta variabilidade de acordo com os indicadores do ambiente. Estudos na região Norte e Centro-oeste do país são inexistentes. As medidas de ambiente são distintas nos estudos com auto relato, o que dificulta a comparabilidade dos dados. Até o momento, não foi identificado estudos que forneçam informações sobre prevalências de medidas do ambiente utilizadas de maneira combinada (percebida e objetiva).*

Palavras-chave: *Adolescente; Atividade motora; Brasil; Planejamento ambiental.*

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INTRODUCTION

Increasing physical activity (PA) is a global health priority[1]. From an ecological perspective, multiple level factors (from individual to environmental aspects) may determine the levels of PA of the young population[2]. Thus, an attractive community environment provides benefits facilitating PA as well as a variety of additional benefits ranging from mental health to environmental sustainability and economics[3]. Consequently, identifying which community environment factors, being built or perceived, could support or suppress the engagement in PA and how they would do it is imperative in order to define health promoting strategies directed at the young population[4].

Studies investigating the perception of the PA environment by adolescents have used different indicators, such as presence of places available for PA in the community[5–8], as well as the quality, safety and cleanliness of these places[6,7,9], which may play a role as facilities or barriers regarding engagement in PA. Systematic reviews have demonstrated that the most common methods for collecting data on building environmental characteristics are self-reports or objective measures such as the Geographic Information System (GIS) and systematic observation[10,11].

Previous reviews have highlighted that most of the studies about the environment for PA with young people were conducted in high-income countries[11,12]. Also, studies from developing countries have similarly focused on the evaluation of macro (e.g. cities, rural/urban areas), meso (e.g. neighborhood) and micro (e.g. areas close to living places) environment scales, whereas studies measuring the meso environment are predominant in developed countries[11]. In Brazil, there is wide heterogeneity of culture, economy and natural environmental factors that could contribute to a distinct use or perception of the community environment for PA[6,7].

Given the presented contextualization, this study aimed to compile evidence on the prevalence of indicators (e.g., infrastructure, accountability for policy implementation) in the community environment that can influence the PA opportunities and participation of Brazilian children and adolescents.

METHODOLOGICAL PROCEDURES

Measured Outcome

In this review, the environment outcome was defined by environmental attributes that are associated with PA in the community. We considered: spaces, facilities for PA or programs available, quality of spaces, facilities of the neighborhood, security (from crimes or traffic) and pollution (climate conditions or scattered garbage)[13,14]. These indicators can be evaluated with perceived or objective measures. Social indicators (socioeconomic income, schooling level or neighborhood inequality indexes) or indicators of social support (perceiving people using the spaces, support from friends or rela-

tives for the use of spaces or seeing people of the same age performing PA) were not considered.

Study Search Strategies

A systematic search was conducted in the 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 three groups of descriptors: environment, PA and population (see Table 1 Supplementary Materials). The Boolean operator "AND" was used for combinations among descriptor groups. 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 with a screening of the reference list of retrieved articles in order to find potentially relevant titles and the personal library, as well as searches in web sites to identify possible reports such as:

- Ministry of Health: www.portal.ms.saude.gov.br;
- Ministry of Education: www.portal.mec.gov.br;
- Sport Ministry: www.esporte.gov.br;
- Brazilian Institute of Geography and Statistics: www.biblioteca.ibge.gov.br;
- National Health Survey: www.pns.icict.fiocruz.br;
- Virtual Health Library: www.bvsms.saude.gov.br;
- United Nations Development Program: www.br.undp.org

The systematic search was conducted by VB (author) and searches in web sites and screening of the references were conducted by SV, GM, MV and GM.

Identification of Eligible Studies

- **Selection Process**

The initial analysis was performed based on the reading of the manuscripts titles and, when there were doubts 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. The entire process was conducted by independent peers (SV/GM and MV/GM - authors), half of the references were read by each pair, and a third author (KS or VB) helped when there were disagreements.

- **Selection Criteria**

Studies were eligible for inclusion in this review when they: (I) were an original investigation published in a peer-reviewed journal; (II) included

Brazilian children or adolescents aged 0-18 years (or a mean age within these ranges); (III) were observational studies using different methods for the evaluation of community/municipality PA indicators (e.g., self-report, proxy-report, structured interviews, objectively measured environment). These community/municipality PA indicators were considered whether they were measured by perceived (e.g., % of children and parents who perceive that their community/municipality is doing a good job promoting PA as facilities, programs, parks, and playgrounds; number of parks and other environments), or built (presence of structures for PA, quality, distance of structures for PA from school) methods.

Data Extraction

Data extracted included: study name, location of the study, aim, study design, sample type, sample size, percentage of girls, age range, instrument description, type of environmental indicators, and prevalence of each indicator. Data for the whole sample were extracted for all subpopulations presented. This process was conducted by independent peers (SW/GM and MV/GM - authors) and a third author (KS or VB) helped when there were disagreements.

The studies investigated were arranged in alphabetical and chronological order by author's name and year of publication, respectively. The findings were grouped using the following indicators: facilities, programs or spaces available for PA; presence of sidewalks or bicycle lanes; proximity to the residence; quality and PA attributes of public open spaces; safety; traffic safety and cleanliness or pollution in the neighborhood. The results were divided into the following groups: study description (Table 1); prevalence of the perceptions (Table 2), and barriers (Table 3) of the built environment in the community context. Studies with objective measures (Table 4) were grouped into two categories: use of GIS and use of observational methods to evaluate public open spaces for PA in the community environment.

RESULTS

A total of 1,047 articles in databases and 21 in websites, contact authors, and reference lists were identified. About 376 duplicate references were found. The remaining 692 had titles and abstracts suitable for inclusion; 66 articles were further considered for full-text screening. Thus 21 full-text papers[5–9,15–30] and 2 national reports[31,32] were included in the systematic review, representing 15 different studies. Exclusion reasons are detailed in Figure 1.

Most studies (n=8) were conducted in Southern Brazil, especially in the states of Paraná (n=4)[5,6,9,15,16,21,23,26,26] and Rio Grande do Sul (n=4)[22,24,25,29]. Three studies were conducted in states in Northeastern Brazil: Pernambuco (n=2)[7,8,17,18,27] and Sergipe (n=1)[31] states, and three others in São Paulo state[19,20,30] (Southeastern Brazil).

The first included studies on the environment for PA among young people were started in 2006 in São Paulo[30] and Curitiba[6,9,21,26]. The most

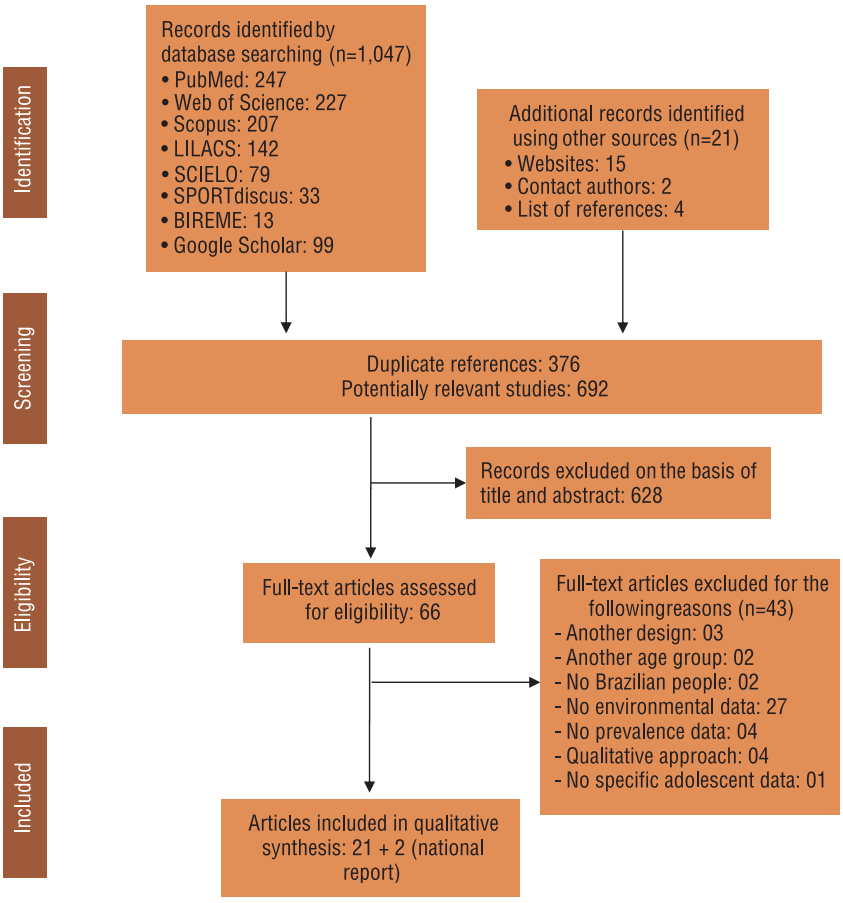

Figure 1. Search process results according to the PRISMA flow diagram

recent study was conducted in 2014[32]. However, the last evaluations of the subject's perception were conducted in 2012[5,15,16] (Table 1).

The sample design was defined as school-based (7 studies)[5–9,15–19,21,23,24,26,29,30] or population-based (8 studies)[20,22,25,27,28,31,32] surveys. The sample size ranged from 59 (focus group study)[23] to 3,845 subjects[30]. Four studies evaluated less than 500 adolescents[19,23–25], and one and two studies evaluated a sample size of 500-1,000[5,15,16] and 1,000-2,000[6,9,21,26,28], respectively. Three studies investigated more than 2,000 adolescents[7,8,17,18,22,30] and one study did not report the sample size[32]. Age range varied among studies, with six including only adolescents aged ≥14 years[6–9,17,18,21,23,24,26,30,32] and three including adolescents aged 10-19 years[5,15,16,25,29]. Sample size or age range were not described in four studies which used a direct observation approach, with the sample consisting of areas/facilities and not of adolescents[20,27,28,31], as expected (Table 1).

The instruments used to measure the environment for PA were self-reported questionnaires[5–9,15–19,21,24–26,29,30,32], objective measurement protocols[20,22,27,28,31] and interviews[23]. Questionnaires were applied in five and four studies to evaluate perceived environment indicators for PA[5–9,15–19,21,26,30] and perceived barriers for PA[24,25,29,32], respectively. Five of these nine studies did not identify the instruments containing the original questions[5,9,15,16,19,30,31]. One study analyzed perceived barriers for PA using a focus

group interview[23]. Four studies objectively evaluated built environments using observation protocols[20,27,28,31] and one by combining the use of GIS and an observation protocol[22] (Table 1).

Table 1. Description of the studies on the environment for physical activity (PA) among Brazilian adolescents (n=23).

First author	Location (survey year)	Aim of study	Sample type	Sample (% of girls)	Age (years)	Description of Instrument
Brazil[31] $*	Aracajú (SE)	To perform a compilation of assessments and characterization of PA network and major Brazilian programs.	Population-based	n.a.	n.a.	SOPARC Observation Protocol to evaluate recreational areas for PA.
Brazil[32] $	National (2014)	To obtain national results regarding sociodemographic, health related and other information necessary for the country.	Population-based	n.a.	15-17	Undefined Questionnaire: Question related to the barriers for sport participation
Ceschini[30]	São Paulo, SP (2006)	To describe the prevalence of physical inactivity and associated factors among high school students from state public schools in the city of São Paulo.	School-based	3,845 (52.6%)	14-19	Undefined Questionnaire: contains a question about knowing the program "Agita São Paulo".
Coledam[16] (a)	Londrina, PR (2012)	To analyze the agreement between two cut-off points for PA (300 and 420 minutes/week) and the associated factors among young subjects.	School-based	738 (53.4%)	10-17	Undefined Questionnaire (V): contains the question "have places to practice PA?".
Coledam[15] (a)	Londrina, PR (2012)	To analyze the associated with sports practice and participation in physical education classes of young subjects.	School-based	827 (54.4%)	10-17	Undefined Questionnaire (V): contains questions about places to practice PA in neighborhood and if adolescents use them.
Coledam[5] (a)	Londrina, PR (2012)	To analyze associated cardiorespiratory fitness factors of school children.	School-based	736 (50.1%)	10-18	Undefined Questionnaire (V): contains questions about places to practice PA in neighborhood.
Copetti[25]	Pelotas, RS (2007-2008)	To verify the prevalence of barriers to PA among adolescents living in urban areas in Pelotas city and the association between barriers and leisure sedentarism.	Population-based	399 (46.1%)	10-19	Reichert's Questionnaire (V)[36] about barriers for PA.
Onish[19]	São José do Rio Preto, SP (n.a.)	This article describes a survey conducted with teachers, principals and coordinators of public and private schools about the perception of these groups regarding the walking distance between the children's home and to school.	School-based	407 (86.5%)**	n.a.	Undefined Questionnaire: contains questions about the perception of managers on children's walk to school.
Silva[22]*	Pelotas, RS (2011-2012)	To examine the association between the built environment characteristics and PA among youth (18y) from the 1993 Pelotas (Brazil) birth cohort, as well as to evaluate interactions in the association of interest.	Population-based	3,379 (n.a)	18	Objectively measured with geocoding information systems (GIS) and an observation protocol (PARA).
Reverdito[20]*	Hortolândia, SP (n.a.)	To investigate Public Leisure Policies, specifically the spaces and equipment, it is possible to endorse conjectures that the child is far from being a priority when it comes to their right to play in urban policies.	Population-based	30 public leisure spaces (parks and squares)	n.a.	Minayo observation script[37] for environment use and description .
Dambros[24]	Santa Maria, RS (n.a.)	To analyze the perceived barriers and habits of PA.	School-based	424 (45.3%)	14-18	Questionnaire proposed by Martins and Petroski[38] (V) to measure perceived barriers for PA.
Farias Júnior[8] (b)	João Pessoa, PB (2009)	To analyze the association of PA with psychosocial and environmental factors among adolescents from the Brazilian Northwest.	School-based	2,859 (57.8%)	14-19	Questionnaire elaborated by Farias Júnior et al (V)[39]: Contains questions related to access, attractiveness, security and maintenance of areas for PA.

First author	Location (survey year)	Aim of study	Sample type	Sample (% of girls)	Age (years)	Description of Instrument
Farias Júnior[18] (b)	João Pessoa, PB (2009)	To examine the association of PA with psychosocial (attitude, self-efficacy, social support) and environmental characteristics (characteristics of the neighborhood) among adolescents from Northeastern Brazil.	School-based	2,361 (56.6%)	14-19	Questionnaire elaborated by Farias Júnior et al (V)[39]: Contains questions related to access, attractiveness, security and maintenance of areas for PA.
Farias Júnior[17] (b)	João Pessoa, PB (2009)	To evaluate the association between levels of PA and perception of the social and built environmental among adolescents from Northeastern Brazil.	School-based	2,874 (57.8%)	14-19	Questionnaire elaborated by Farias Júnior et al (V)[39]: Contains questions related to access, attractiveness, security and maintenance of areas for PA.
Lima[21] (c)	Curitiba PR (2006)	To determine the association between perceived distance to recreational facilities (parks, gyms, sports courts, and bike lanes) for PA and exercise among adolescents.	School-based	1,474 (49.0%)	14-18	Questions elaborated by the authors or from the NEWS-Y questionnaire (V): Contains questions related to the presence and distance from facilities for PA.
Lopes[6] (c)	Curitiba PR (2006)	To analyze the association between perceived neighborhood environment and PA among high school students.	School-based	1,611 (59.7%)	14-18	NEWS-Y questionnaire (V) to measure environment for PA.
Mendonça[7] (b)	João Pessoa, PB (2009)	To analyze the association between perceived neighborhood environmental characteristics and different types of physical activities in adolescents from Northeastern Brazil.	School-based	2,874 (57.8%)	14-19	Questionnaire elaborated by Farias Júnior et al (V)[39]. Contains questions related to access, attractiveness, security and maintenance of areas for PA.
Parra[27]*	Recife PE (2007)	To compare PA levels, park use, and park contextual characteristics at sites with and without the Academia da Cidade Program.	Population-based	5 areas with and 5 without Academia da Cidade Program	n.a.	SOPARC Observation Protocol used to evaluate recreational areas for PA.
Hino[28]*	Curitiba PR (2008)	To describe the characteristics of parks and squares users and to explore how these characteristics are associated with the practice of PA in these settings.	Population-based	4 parks and 4 squares	n.a.	SOPARC Observation Protocol used evaluate recreational areas for PA.
Reis[9] (c)	Curitiba PR (2007)	To evaluate the association between PA practice among adolescents and the perception of environmental features of public parks.	School-based	1,718 (59.6%)	14-18	Undefined Questionnaire (V): Questions used to evaluate perceived environmental features for PA.
Santos[23]	Curitiba PR (n.a.)	To identify barriers to PA among adolescents.	School-based	59 (50.8%)	15-18	Interview elaborated by the authors to be applied with a focus group technique.
Santos[26] (c)	Curitiba PR (2006)	To analyze the prevalence and association of barriers to PA among adolescents.	School-based	1,615 (59.7%)	14-18	Questionnaire elaborated by Santos et al (V)[23]: Contains questions related to the barriers for PA.
Silva[29]	Caxias do Sul RS (2007)	To describe the prevalence of active commuting to school and to identify barriers associated with the means of commuting to school.	School-based	1,622 (53.2%)	11-17	Question from CDC[40] related to the barriers for PA.

Note. Equal lowercase letters in parentheses at the right of the 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): Undefined questionnaire with description of criterion, content and/or construct validity; *Studies that objectively evaluated the use of public areas for PA, with the sample unit being observation areas and not subjects; $National reports (grey literature); **Sample consisting of school managers; n.a.: Not available; PARA: Physical Activity Resource Assessment; NEWS-Y: Neighborhood Environment Walkability Scale for Youth; SOPARC: System for Observing Play and Recreation in Communities; CDC: Centers for Disease Control.

Perception about facilities, programs, parks and playgrounds available for PA in the community (Table 2) was reported by four studies in

eight publications[5–7,15–18,30]. The total the prevalence ranged from 37.2%[6] to 71.9%[30]. According to sex, the prevalence ranged from 50.6%[5] to 81.4%[16] among boys and from 40.4%[17] to 77.7%[16] for girls.

Results about the presence of sidewalks or bicycle lanes were found in two studies conducted in the Southern[6] and Northeastern[7,17] region. In the Northeast, both indicators were perceived by more than 60.0% of the adolescent sample, with a lower prevalence of perceived bicycle lanes by girls (42.4%)[17]. In the Southern region, less than 50% perceived the presence of bicycle lanes (48.0%, boys)[6] (Table 2).

Perception of public open spaces or facilities for PA near the residence was reported in two studies of three publications[7,9,21]. Less than 50% of adolescents perceived some public open spaces for PA at a distance of up to 31 minutes from their home[7,9,21]. In the Southern region[21], the perceived distance to the leisure facilities was more prevalent regarding the distance of 21-30 minutes for gymnasiums or sports courts in general (50.5%) and according to sex (boys: 46.9%, girls: 53.0%)(Table 2).

Regarding the quality of public open spaces and PA attestations in the neighborhood, reported in two studies[6,7,17,18], more than 50% of the boys in the studied perceived the maintenance of the spaces as good (54.3%[6] and 69.8%[17]), whereas this prevalence was lower among girls (34.1%)[6] (Table 2).

The perceived safety of the neighborhoods for the practice of PA (Table 2) varied from 57.5%[6] in the South to 67.8% in the Northeast region among the boys[17]. In the South region[6], more than 90% of the boys perceived the environment as safe, with illuminated streets. In the Northeast region, less than 40% of the girls perceived the environment as safe walking or riding a bike (35.7%), and the prevalence among boys was lower (31.8% and 29.6%, respectively)[7]. The perception of traffic safety around the homes of adolescents ranged from 67.5%[17] to 79.8%[6]. Boys (82.6%) perceived greater safety in traffic than girls (77.9%)[6] (Table 2).

Perception of cleanliness or absence of pollution in the neighborhood was reported in only one study, conducted in the Northeast region, and mentioned in two publications[7,17]. More than 60% of the sufficiently active boys perceived the residences as unpolluted (38.7% girls)[17], while only 25.8% of the boys[7] of the general study sample reported this perception[7] (Table 2).

Environment barriers for PA among Brazilian adolescents were investigated by seven studies[9,19,23–26,29] (Table 3). Facilities, programs, parks and playgrounds available for PA in the community were reported in five studies[9,23–26] all conducted in the South region. The perception was more prevalent among girls, ranging from 35.8%[26] to 68.7%[9], than among boys (27.8%[25] to 64.8%[9]), among older adolescents (15-19 years: 43.6%) compared to younger ones (10-14 years: 24.1%)[25], and among adolescents attending state schools (11.2%) than those attending Federal (2.4%) and Private (9.4%)[24] schools.

Table 2. Results of the studies about positive perception of environment for physical activity (PA) among Brazilian adolescents (n=10).

First author, Region	Variables	Estimates (%) for each indicator by subgroup
Positive perception about facilities, programs, parks and playgrounds available for PA in the community		
Ceschini[30], Southeast	Do you know the Program Agita São Paulo	Total: 71.9% (n=2,766)
Coledam[16], South	≥1 places for the practice of PA	Boys: 81.4%; Girls: 77.7% 300 min MVPA: 48.1%; 420 min MVPA: 27.3%
Coledam[15], South		Total: 68.0%
Coledam[5], South		<14 years: 80.1% (n=358); ≥14 years: 78.6% (n=378)
Coledam[15], South	Places proper for PA are close to my home	Boys: 67.0%; Girls: 39.4%
Farias Júnior[17], Northeast	There are places for practicing PA (parks, squares, courts, fields, etc.)	Boys: 66.9%; Girls: 40.4%
	The neighborhood offers many opportunities for practicing PA	Boys: 70.0%; Girls: 41.2%
Farias Júnior[18], Northeast	Access to places for PA and their attractiveness (range 5–20)[a]	Boys: 18.6 (4.7); Girls: 17.9 (5.0)
Mendonça[7], Northeast	Places with opportunities to engage in PA	Boys: 50.6% (n=607); Girls: 42.3% (n=692)
	Has public places to engage in PA	Boys: 62.6% (n=749); Girls: 56.3% (n=909)
Mendonça[7], Northeast	Has places I like to go to	Boys: 69.5% (n=832); Girls: 63.7% (n=1,037)
Lopes[6], South		Total: 64.9% (n=1,045) Boys: 69.7% (n=453); Girls: 61.6% (n=592) 20min/ ≤1 time/week: Boys: 94.0% (n=426); Girls: 78.0% (n=462) 60mins/ 5 time/week: Boys: 23.2% (n=105); Girls: 9.5% (n=56)
Mendonça[7], Northeast	Seeing interesting things while walking	Boys: 61.0% (n=730); Girls: 57.9% (n=947)
Lopes[6], South		Total: 37.2% (n=600) Boys: 41.2% (n=268); Girls: 34.6% (n=332) 20min/ ≤1 time/week: Boys: 94.0% (n=252); Girls: 83.7% (n=278) 60min/ 5 time/week: Boys: 25.4% (n=68); Girls: 9.0% (n=30)
Positive perception about the presence of sidewalks or bicycle lanes		
Mendonça[7], Northeast	There are sidewalks on most streets	Boys: 74.8% (n=901); Girls: 71.8% (n=1184)
Farias Júnior[17], Northeast		Boys: 65.0%; Girls: 38.9% (physically active adolescents)
Lopes[6], South		Total: 63.4% (n=1.021) Boys: 66.5% (n=432); Girls: 61.3% (n=589) 20min/ ≤1 time/week: Boys: 90.7% (n=392); Girls: 78.8% (n=464) 60min/ 5 time/week: Boys: 27.7% (n=98); Girls: 8.8% (n=52)
Farias Júnior[17], Northeast	There are bicycle lanes or places where I can ride a bicycle	Boys: 65.4%; Girls: 42.4%
Mendonça[7], Northeast		Boys: 25.6% (n=306); Girls: 27.7% (n=451)
Lopes[6], South		Total: 43.8% (n=705) Boys: 48.0% (n=312); Girls: 40.9% (n=393) 20min/ ≤1 time/week: Boys: 92.6% (n=289); Girls: 75.6% (n=297) 60min/ 5 time/week: Boys: 23.4% (n=73); Girls: 10.2% (n=40)
Positive perception of OPS or facilities for PA near the residence		
Reis[9], South	Up to 30 min	Boys: 54.4%; Girls: 46.2%
	More than 30 min	Boys: 20.7%; Girls: 33.2%
Mendonça[7], Northeast	Places near home to engage in PA	Boys: 72.5% (n=869); Girls: 69.4% (n=1141)

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First author, Region	Variables	Estimates (%) for each indicator by subgroup
	1-2 leisure facilities near the residence	Total: 10.2% (n=150) Boys: 10.9% (n=66); Girls: 9.6% (n=84)
	≥ 3 leisure facilities near the residence	Total: 33.6% (n=496) Boys: 38.8% (n=234); Girls: 30.1% (n=262)
	[< 5 min] Distance from the parks	Total: 20.1% (n=296) Boys: 22.7% (n=137); Girls: 18.3% (n=159)
	[< 5 min] Distance to squares	Total: 20.8% (n=306) Boys: 27.4% (n=165); Girls: 16.2% (n=141)
	[< 5 min] Distance to the gyms	Total: 27.7% (n=409) Boys: 31.2% (n=188); Girls: 25.4% (n=221)
	[< 5 min] Distance gymnasiums or sports courts	Total: 11.4% (n=168); Boys: 13.4% (n=81); Girls: 10.0% (n=87)
	[< 5 min] Distance bike paths or walking trails	Total: 19.3% (n=284) Boys: 19.9% (n= 120); Girls: 18.8% (n=164)
	[6-10 min] Distance from the parks	Total: 22.9% (n=338) Boys: 23.9% (n=144); Girls: 22.3% (n=194)
	[6-10 min] Distance to squares	Total: 20.5% (n=302) Boys: 23.5% (n=142); Girls: 18.4% (n=160)
	[6-10 min] Distance to the gyms	Total: 16.9% (n=249) Boys: 17.1% (n=103); Girls: 16.8% (n=146)
	[6-10 min] Distance gymnasiums or sports courts	Total:14.8% (n=218) Boys: 15.8% (n=95); Girls: 14.1% (n=123)
	[6-10 min] Distance bike paths or walking trails	Total: 16.1% (n=237) Boys: 14.3% (n= 86); Girls: 17.3% (n=151)
	[11-20min] Distance from the parks	Total: 22.1% (n=326) Boys: 21.4% (n=129); Girls: 22.6% (n=197)
Lima[21], South	[11-20min] Distance to squares	Total: 18.6% (n=274) Boys: 18.2% (n=110); Girls: 18.8% (n=164)
	[11-20min] Distance to the gyms	Total: 13.4% (n=197) Boys: 14.4% (n=87); Girls: 12.6% (n=110);
	[11-20min] Distance gymnasiums or sports courts	Total: 13.1% (n=193) Boys o: 12.9% (n=78); Girls: 13.2% (n=115)
	[11-20min] Distance bike paths or walking trails	Total: 7.7% (n=114) Boys: 8.1% (n=49); Girls: 7.5% (n=65)
	[21-30min] Distance from the parks	Total: 12.2% (n=180) Boys: 11.1% (n=67); Girls: 13.0% (n=113)
	[21-30min] Distance to squares	Total: 11.4% (n=168) Boys: 12.4% (n=75); Girls: 10.7% (n=93)
	[21-30min] Distance to the gyms	Total: 7.5% (n=110) Boys: 7.8% (n= 47); Girls: 7.3% (n=63)
	[21-30min] Distance gymnasiums or sports courts	Total: 50.5% (n=745) Boys: 46.9% (n=283); Girls: 53.0% (n= 462)
	[21-30min] Distance bike paths or walking trails	Total: 23,3% (n=343) Boys: 18.9% (n=114); Girls: 26.3% (n=229)
	[≥31min] Distance from the parks	Total: 22.7% (n=334) Boys: 20.9% (n=126); Girls: 23.9% (n=208)
	[≥31min] Distance to squares	Total: 28.8% (n=424) Boys: 18.4% (n=111); Girls: 35.9% (n=313)
	[≥31min] Distance to the gyms	Total: 34.5% (n=509) Boys: 29.5% (n=178); Girls: 38.0% (n=331)
	[≥31min] Distance gymnasiums or sports courts	Total: 10.2% (n=150) Boys: 10.9% (n=66); Girls: 9.6% (n=84)
Lima[21], South	[≥31min] Distance bike paths or walking trails	Total: 33.6% (n=496) Boys: 38.8% (n=234); Girls: 30.1% (n=262)

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First author, Region	Variables	Estimates (%) for each indicator by subgroup
Positive perception about quality of the OPS and PA attributes in the neighborhood		
Farias Júnior[17], Northeast	Places where I can practice of PA are well maintained	Boys: 69.8%; Girls: 40.3%
Farias Júnior[18], Northeast	Structure and maintenance of the neighborhood (range 4–16)[a]	Boys: 11.3 (n=2.8); Girls: 11.3 (n=2.9)
Mendonça[7], Northeast	Well maintained venues to engage in PA	Boys: 46.0% (n=553); Girls: 44.4% (n=730)
Lopes[6], South	Overall perception of the environmental (good and very good)	Total: 47.3% (n=762) Boys: 54.3% (n=353); Girls 42.6% (n=409) 20min/ ≤1 time/week: Boys: 51.1% (n=332); Girls: 34.1% (n=328) 60min/ 5 time/week: Boys: 13.4% (n=87); Girls: 4.2% (n=40)
Positive perception of safety in the neighborhood		
Farias Júnior[17], Northeast	Places where I can practice PA are not safe[b]	Boys: 67.8%; Girls: 40.3%
	The neighborhood is violent, with a lot of muggings, crime, and drugs[b]	Boys: 65.6%; Girls: 39.8%
Farias Júnior[18], Northeast	Security for the practice of physical activity (range 3–12)[a]	Boys: 11.4 (3.2); Girls: 11.1 (3.2)
Mendonça[7], Northeast	It is safe for walking and running	Boys: 31.8%; Girls: 35.7%
	It is safe for riding a bike	Boys: 29.6%; Girls: 35.7%
Lopes[6], South	There's a lot of crime[c]	Total: 53.0% (n=854) Boys: 51.9% (n=337); Girls: 53.8% (n=517) 20min/ ≤1 time/week: Boys: 91.7% (n=309); Girls: 78.0% (n=403) 60min/ 5 time/week: Boys: 24.6% (n=83); Girls: 9.9% (n=51)
	It is safe	Total: 47.1% (n=759) Boys: 57.5% (n=374); Girls: 40.1% (n=385) 20min/ ≤1 time/week: Boys: 93.3% (n=349); Girls: 77.9% (n=300) 60min/ 5 time/week: Boys: 23.0% (n=86); Girls: 9.6% (n=37)
	There are streets lit	Total: 44.2% (n=712) Boys: 46.6% (n=303); Girls: 42.6% (n=409) 20min/ ≤1 time/week: Boys: 90.8% (n=275); Girls: 79.2% (n=324) 60min/ 5time/week: Boys: 22.8% (n=69); Girls: 9.5% (n=39)
Positive perception about traffic safety around the homes		
Farias Júnior[17], Northeast	Riding a bicycle in the streets around my house is not safe because of street traffic[a]	Boys: 67.8%; Girls: 40.1%
	Walking or jogging in the streets around my house is not safe because of street traffic[a]	Boys: 67.5%; Girls: 40.3%
Lopes[6], South	There's too much traffic[c]	Total: 79.8% (n=1,286) Boys: 82.6% (n=537); Girls: 77.9% (n=749) 20min/ ≤1 time/week: Boys: 92.4% (n=496); Girls: 77.7% (n=582) 60min/ 5 time/week: Boys: 22.2% (n=119); Girls: 8.9% (n=67)
Positive perception of cleanliness or not pollution in the neighborhood		
Farias Júnior[17], Northeast	The neighborhood is polluted, with open sewage, garbage and debris on the streets[c]	Boys: 65.4%; Girls: 38.7%
Mendonça[7], Northeast	It is not polluted	Boys: 25.8% (n=310); Girls: 25.5% (n=413)

Note. MVPA: moderate/vigorous physical activity; OPS: Open Public Spaces. Notes: aData are reported as mean (standard-deviation); bVariables with inverted response scales; c% refers to those who disagree with the question.

Far distance from public open spaces and facilities was investigated as a barrier for PA in two studies in the South region[23,29], and negative perception about the presence of sidewalks or bicycle lanes and quality of the neighborhood was investigated in another study[19] in the Southeast region. The prevalence of this barriers was low (highest: 16.7%)[29] (Table 3).

Low neighborhood and traffic safety as a barrier for PA (Table 3) was mostly reported in studies from the South region[9,23,24,29], except one[19]. Safety indicators such as poor lighting (62.0%) of the neighborhoods, perceived insecurity (59.5%) for PA and dangerous traffic (58.3%) was more prevalent among girls than boys (54.4%, 54.2%, 57.8%, respectively)[9]. In a study with adolescents who were active in commuting the perception of insecurity in traffic was perceived by 61.7% of the sample[29]. Furthermore, adolescents from state schools perceived a greater proportion of crimes in the community environment (5.1%)[24].

Information on cleanliness or pollution in the neighborhood as a PA barrier was reported by four studies[23,24,26,29], all carried out in the South region. This negative perception was frequently reported by girls (49.0%)[26], and by actively commuting adolescents (88.4%)[29] (Table 3).

The studies that investigated built environment indicators using different objective measures (Table 4) were conducted in the South[22,28], Southeast[20], and Northeast[27] regions. Only one study using GIS in more than 50% of the buffers around the residence of adolescents in Pelotas reported has some attributes for PA, with regular quality or public spaces[22].

Systematic observation studies using SOPARC showed a higher prevalence of sports equipment in parks (56.4%) and in squares (51.4%)[28]. The frequency of the use of these spaces varies by children and adolescents varied according to sex, the period of the day, week and/or weekend, and the intensity of PA practiced[28]. Health Promotion Programs (Academia da Cidade Program) with assistance to adolescents are present in only 13.0% of the cities of Brazil[27] (Table 4).

Table 3. Results of the studies about barriers (negative perception) of environment for physical activity among Brazilian adolescents (n=8).

First author, Region	Variables of the environment	Estimates (%) for each indicator by subgroup
Negative perception about facilities, programs, parks and playgrounds available for physical activity in the community		
Reis[9], South	Lack of space to be active	Boys: 65.9%; Girls 67.3%
	Lack of equipment	Boys: 57.6%; Girls 61.1%
	Too crowded	Boys: 51.9%; Girls 57.2%
	No activities to choose from	Boys: 60.2%; Girls 63.4%
	Hard to get to the park	Boys: 64.8%; Girls 68.7%
Copetti[25], South	There aren't suitable spaces	Total: 33.8%; Boys: 27.8%; Girls: 40.7%; 10 - 14 years: 24.1%; 15 - 19 years: 43.6%
Santos[23], South	Access	Boys: 4.0% (n=2)
	Closed spaces	Girls 5.2% (n=3)
Santos[26], South	Do not know the places well	Total: 22,2%; Boys: 29.0% (n=189); Girls: 35.8% (n=345)
Dambros[24], South	There aren't suitable facilities	Total: 9.9% (n=42); Federal: 2.4% (n=1); Estadual: 11.2% (n=31); Privada: 9.4% (n= 10)
Brazil[32] *$	Lack of equipment	Total: 8.7%
Negative perception about the presence of sidewalks or bicycle lanes		

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First author, Region	Variables of the environment	Estimates (%) for each indicator by subgroup
Onishi[19] (a), Southeast	Inadequate sidewalks	Privatad: 3.1%; Public: 3.3%
Negative perception of OPS or facilities for PA near the residence		
Santos[23], South	Far from home	Boys: 4.0% (n=2)
Silva[29] (b), South	Long distance	Total: 16.7% (n=247); Active commuting: 11.7%
Negative perception about quality of the neighborhood		
Onishi[19] (a), Southeast	Quality of school environmental	Poor quality: 7.1%; Good quality: 49.1%
Negative perception of safety in the neighborhood		
Reis[9], South	Poor lightning	Boys: 54.4%; Girls 62.0%
	Unsafe localtion	Boys: 54.2%; Girls 59.5%
Santos[23], South	Crime/Danger	Boys: 4.0% (n=2); Girls: 3.4% (n=2)
Silva[29] (b), South		Total: 7.4% (n=109); Active commuting: 38.5%
Dambros[24], South		Total: 4.2% (n=18); Federal: 0%; Estadual: 5.1% (n=14); Private: 3.8% (n=4)
Onishi[19] (a), Southeast		Privatad: 3.6%; Public: 3.8%
Negative perception about traffic safety around the homes		
Reis[9], South	Traffic nearby is dangerous	Boys: 57.8%; Girls 58.3%
Onishi[19] (a), Southeast	There isn't a pedestrian track	Privatad: 3.3%; Public: 3.4%
	Heavy traffic	Privatad: 4.6%; Public: 4.1%
	Cars travel at safe speed	Privatad: 2.5%; Public: 2.6%
Silva[29] (b), South	Traffic	Total: 7.8% (n=115); Active commuting: 61.7%
Negative perception of cleanliness or not pollution in the neighborhood		
Santos[23], South	Weather	Girls 5.2% (n=3)
Santos[26], South		Active: 25,2%; Boys: 28.6% (n=186); Girls: 49.0% (n=472)
Dambros[24], South		Total: 15.1% (n=64); Federal: 4.9% (n=2); Estadual: 16.3% (n=45); Privada: 16.0% (n=17)
Silva[29] (b), South		Total: 17.7% (n=262); Active commuting: 88.4%

Note. (a): perceptions of school managers; (b): only one barrier could be indicated by the adolescent. OPS: Open Public Spaces; PA: physical activity; *$National reports (grey literature). In studies that objectively evaluated the use of public areas for PA, the sample unit was observation areas and not subjects.

DISCUSSION

This systematic review revealed a lack of studies in two of five Brazilian regions for the last year of data collection, with diversity of indicators related to the positive and negative (barriers) perceptions of the environment for the practice of PA by adolescents. The instruments used to measure the environment for PA were self-reported questionnaires, objective measure-

Table 4. Results of the studies with using objective methods for the evaluation of the environment for physical activity (PA) with a sample of Brazilian adolescents (n=5).

First author, Region	Variables	Results
Use of Geographical Information Systems (GIS) to evaluate characteristics of the community environment		
Silva[22], South	Number of characteristics in the 500 meters circular buffer from the adolescent's residence[a]	Number of OPS (parks and boulevards): 86.3% (n=2,870)
		Number of OPS with at least one PA attribute regardless of quality: 75.9% (n=2,526)
		Number of OPS with at least one PA attribute considered of regular quality: 65.2% (n=2,170)
		Number of OPS with at least one PA attribute considered of good quality: 42.4% (n=1,411)
		Number of walking paths/trails: 26.6% (n=884)
		Number of football pitches: 58.9% (n=1,959)
		Number of cycle paths/lanes: 23.9% (n=806)
		Number of private gyms: 64.1% (n=2,165)
		Existence of beachfront: 1.2% (n=42)
		Number of PA attributes: 90.1% (n=2,997)
Use of observational methods to evaluate OPS for PA in community environment		
Hino[28] (b), South	Characteristics of the parks and squares (%)*	Sports: Parks (56.4%); Squares (51.4%)
		Strength/stretching exercise: Parks (7.7%); Squares (7.1%)
		Open area: Parks (7.7%); Squares (0%)
		Walking/running track: Parks (12.8%); Squares (5.7%)
		Others (skating, athletics, roller, others): Parks (0%); Squares (10.0%)
		Playground area: Parks (15.4%); Squares (25.7%)
	Users of parks and squares according to day of the week	Weekdays: children- Parks: Boys (5.6%); Girls (7.7%); Square: Boys (14.3%); Girls (14.0%). Adolescent- Parks: Boys (17.1%); Girls (5.9%); Square: Boys (38.6%); Girls (16.9%) Weekend: children- Parks: Boys (19.3%); Girls (19.4%); Square: Boys (17.6%); Girls (13.4%). Adolescent- Parks: Boys (18.5%); Girls (14.3%); Square: Boys (34.9%); Girls (19.3%)
	Users of parks and squares according to period of the day	7-8 AM/children: Parks: Boys (0.4%); Girls (0.0%); Square: Boys (0.0%); Girls (0.0%) 11-12 AM/children: Parks: Boys (21.5%); Girls (19.3%); Square: Boys (20.0%); Girls (19.2%) 5-6 PM/children: Parks: Boys (11.6%); Girls (16.0%); Square: Boys (16.3%); Girls (17.5%) 7-8 AM/ adolescent: Parks: Boys (2.7%); Girls (4.3%); Square: Boys (2.5%); Girls (1.1%) 11-12 AM/ adolescent: Parks: Boys (11.3%); Girls (7.7%); Square: Boys (27.8%); Girls (19.2%) 5-6 PM/c adolescent: Parks: Boys (28.4%); Girls (17.3%); Square: Boys (49.9%); Girls (26.7%)
Hino[28] (b), South	Users of parks and squares according to day of the week and period of the day by level of PA	Walking PA Weekdays: Parks: Boys (17.6%); Girls (20.4%); Square: Boys (26.9%); Girls (13.7%) Weekend: Parks: Boys (33.3%); Girls (39.7%); Square: Boys (28.8%); Girls (18.4%) 7-8 AM: Parks: Boys (11.7%); Girls (19.6%); Square: Boys (11.7%); Girls (12.4%) 11-12 AM: Parks: Boys (30.6%); Girls (31.4%); Square: Boys (23.3%); Girls (12.9%) 5-6 PM: Parks: Boys (28.8%); Girls (37.8%); Square: Boys (34.0%); Girls (19.9%) Vigorous PA Weekdays: Parks: Boys (57.9%); Girls (59.3%); Square: Boys (45.6%); Girls (58.8%) Weekend: Parks: Boys (40.3%); Girls (35.8%); Square: Boys (32.0%); Girls (33.4%) 7-8 AM: Parks: Boys (72.0%); Girls (67.0%); Square: Boys (76.1%); Girls (81.4%) 11-12 AM: Parks: Boys (41.4%); Girls (42.4%); Square: Boys (35.8%); Girls (40.3%) 5-6 PM: Parks: Boys (44.6%); Girls (39.3%); Square: Boys (31.3%); Girls (35.2%)
Parra[27] (b), Northeast	Park use patterns, by presence or absence of the ACP	Adolescents All Sites: 13.0% (n=4,294); ACP Sites: 13.3% (n=2,388); Non-ACP Sites: 12.7% (n=1,906)
	Accessible	All Sites: 97.0% (n=5,395); ACP Sites: 93.0% (n=2,664); Non-ACP Sites: 99.0% (n=2,731)
	Usable	All Sites: 96.0% (n=5,386); ACP Sites: 93.0% (n=2,655); Non-ACP Sites: 99.0% (n=2,731)
	Equipped	All Sites: 5.0% (n=262); ACP Sites: 9.0% (n=255); Non-ACP Sites: 0.2% (n=7)
	Supervised	All Sites: 66.0% (n=3,775); ACP Sites: 88.0% (n=2,512); Non-ACP Sites: 46.0% (n=1,263)

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First author, Region	Variables	Results
Reverdito[20] (c), Southeast	Number of OPS and facilities for PA observed	OPS observed: n=30
		Squares: n=12
		Parks: n=3
		PA attributes (open sports places, walking and cycle paths/trails, beachfront and gym): n=37
	Quality of OPS	OPS with poor quality: n=7
		OPS with good quality: n=7
	Traffic safety	OPS in the area with heavy traffic: n=10
	Use of the OPS by childrens or adolescents	Number of OPS where there 91 children using the facilities for PA: n=13
		Number of OPS where there 50 adolescents doing PA: n=9
		OPS within facilities for PA, but there were children and adolescents playing: n=4
Brazil[31 $]	Use of OPS	Adolescents: 17%; Childrens: 16%

Note. (a): Proportion of existence of at least one attribute by buffer; (b): SOPARC method, (c): Observational method not mentioned. OPS: Open public spaces; PA: physical activity; ACP: Academia da Cidade Program. *Target area type (%). $National reports (grey literature).

ment protocols, and interviews. The prevalence of indicators related to the environment varied according to sex, but few studies investigated subgroups such as age group or PA levels.

Among the studies that reported the year of data collection, the first studies with Brazilian adolescents were conducted in 2006 in the South[6,9,21,26] and Southeast[30] regions, and most recent ones were conducted in 2012 in the Southern region. The region more investigated was the South[5,6,9,15,16,21,23,26,28] followed by the Southeast[19,20,30] and Northeast[7,8,17,18,27,31]. The location of research groups or individual investigators that study the environment for the practice of PA may be one of the reasons explaining these results. Recent studies on environment perception for the practice of PA by adolescents may be in progress or are studies[19,20,23,24,31] that did not report this information or did not have this focus. Still, research groups and individual investigators of the subject may be focusing their studies on other age groups such adults and older adults. Anyway, this is an important gap of knowledge in view of the cultural and socioeconomic diversity of the regions.

The studies included in the review reported the prevalence of perception including facilities, programs, parks and playgrounds available for PA in the community[5–7,15–18,30] (barriers[9,23–26]), the presence of sidewalks or bicycle lanes[6,7,17] (barriers[19]), public open spaces or facilities for PA near the residence[7,9,21] (barriers[23,29]), quality of public open spaces and PA attestations in the neighborhood[6,7,17,18] (barriers[19]), safety of the neighborhoods for the practice of PA[6–8,17] (barriers[9,19,23,24,29]), traffic safety around the homes[6,17] (barriers[9,19,29]), and cleanliness or absence of pollution in the neighborhood[7,17] (barriers[23,24,26,29]). This diversity of indicators analyzed shows the complexity and variability of the built environment items that are necessary to understand the practice of PA. The survey of an indicator does not reveal the use of space or existence of the physical and perceived structure of PA in the community environment. Thus, methods for evaluating the environment need to be combined (subjective and objective measures) for

a better understanding of the complexity of the topic.

Even studies that investigated the environment for PA by self-reported questionnaires used a variety of indicators based on different instruments, and only a few mentioned validation criteria for adolescents[8,24–26]. A broad heterogeneity of the information collected was observed in some studies in which similar variables were questioned in different paths with various response options, thereby making it difficult to compare the data. Studies with objective measures of the environment were carried out only in the South and Southeast regions[20,22,27,28]. In the present review, no study was performed using objective and perceived measures for the built environment in combination, which makes it difficult to understand the analysis of the real environment with perceived and feasible use of space.

The perception of the presence of public open spaces and/or facilities for PA was the indicator more frequently investigated. Studies have shown that boys perceive a higher prevalence of the presence of some attribute for PA than girls[6,15,17,30]. Findings also indicate that boys accumulate more time in leisure PA than girls[15,33]. In general, perceiving the presence of spaces near one's home can facilitate engagement in PA[4,9]. In addition, studies have shown that low levels of PA may be influenced by the lack of opportunities for facilities close to the residence of Brazilian youth[17,29]. However, a community context with options for promotion of PA (i.e., security, maintenance, proximity, park features) may contribute to changes in the behavior of different age groups, as observed in high-income countries[13,14,34,35].

Some gaps were identified. Although some studies reported prevalence data about the perception of spaces, facilities, program, quality or safety, the data were insufficient to determine their use by adolescents for PA[6,8,16,17,30], except for one report[9]. A study carried out in Curitiba showed that more than 50% of the adolescents investigated did not attend the parks due to lack of equipment, very crowded conditions, and difficult access[9]. In this respect, it is important to investigate whether the fact that adolescents perceive an opportunity in the community causes it to be used for PA. In the studies using objective measures of the environment, the unit of analysis was the observed space or the quantity of these settings in a determined area or region. However, it is unknown if adolescents make use of these places by perceiving closeness to their residence, security, and quality or based on the facilities for PA[22,27,28]. Finally, it is also unknown whether the settings are frequented by adolescents for PA, when the indicators of the environment are perceived as non-barriers[25,26].

Future studies could propose the standardization of instruments and their application to each indicator of the environment, considering its scope and unit of measurement. For systematic observational studies of the environment it is important to combine information at the individual and contextual levels in order to understand PA indicators. In addition, it is important to combine perceived and objective measures in order to understand the use of spaces or attributes for PA in the neighborhood.

Possibly, a collaborative network of researchers in the area could promote investigations in two of the five regions of the country that do not yet have information on this topic, thus yielding relevant national data.

Several limitations in this review need to be considered. The screening step was performed independently by two uncalibrated pairs, who may have made different decisions regarding the inclusion of certain studies. The bias risk was not analyzed because of the heterogeneity of the observational studies that investigated this outcome in adolescents. In addition, the lack of studies in all regions of the country and regarding the coverage of the indicators, standardized instruments and the representativeness of the samples investigated limited the discussion of the prevalence found in this review.

The strengths identified were the broad search of the studies as well as electronic databases in national reports. The systematic survey of the prevalence of the perception of indicators of the built environment for PA by adolescents provides subsidies for the creation of public health policies for the implementation of programs, actions or interventions to make urban environments friendly to PA in this population. By surveying the scientific literature, the review identified important gaps that can be considered in future research on the topic.

Thus, the review identified that perceived environment indicators of PA by adolescents has been investigated in the South, Southeast and Northeast regions of the country. The instruments used to measure environmental perception varied within the same indicator, which made it difficult to compared studies. The indicators of a community environmental were mostly the presence of public open spaces and facilities for PA and their proximity to the homes of the adolescents. The surveyed studies revealed a higher prevalence of boys who perceive the community environment for PA than girls in all the regions investigated. To date, no studies with the combined use of perceived and objective measures of the built environment have been identified.

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Conflict of interest statement

The authors have no conflict of interests to declare.

Author Contributions

SWM, GM, MVVL and GTM 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 and VCBF participated in the methodological design, evaluation of studies, writing the text and approved the final version of the manuscript.

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