

Systematic review of the prevalence of active transportation to school among children and adolescents: update of the Report Card Brazil

Revisão sistemática da prevalência do transporte ativo para a escola entre crianças e adolescentes: atualização do Boletim Informativo Brasil

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Abstract – The objective of this study was to update previous systematic reviews, based on publications carried out in the period from 2020 to 2024, revealing the use of active transportation in Brazil and presenting differences according to sex. The studies were extracted from LILACS, SCIELO and MEDLINE. The searches were carried out between January 2020 and December 2024 and conducted by means of the advanced search tools of each database, using description chains in Portuguese, English and Spanish. These included original studies that validated the active transport and explicitly describe the measurement method used, including Brazilian participants between the ages of 0 and 19, of both sexes, without specific clinical conditions, without diagnosis of diseases and who were not athletes. The review included 5 articles, covering different regions of the country and contemplating most samples between 12 and 20 years old. Active transportation was predominantly measured by self-reported questionnaires. The prevalence of active transportation varied from 37% to 53% for local samples and reached 44.4% in the national analysis. A trend of greater participation in boys was identified, with prevalences of 53% to 55.8%, while girls varied between 44% and 47%. Differently from what was observed in previous reviews, active transportation was less prevalent in relation to passive transportation, which makes it fundamental the implementation of public policies aimed at creating safer and more favorable environments to favor this behavior.

Key words: Brazil; Children; Adolescents; Active travel; Active transport; Motor activity; Sedentary lifestyle.

Resumo – O objetivo deste estudo foi atualizar revisões sistemáticas anteriores, com base em publicações realizadas no período de 2020 a 2024, que revelassem o uso do transporte ativo no Brasil e apresentassem diferenças segundo o sexo. Os estudos foram extraídos das bases de dados LILACS, SCIELO e MEDLINE. As buscas foram feitas entre janeiro de 2020 e dezembro de 2024 e conduzidas por meio das ferramentas de busca avançada de cada base de dados, utilizando cadeias descritivas em português, inglês e espanhol. Foram incluídos estudos originais que validassem o transporte ativo e descrevessem explicitamente o método de mensuração utilizado, incluindo participantes brasileiros entre 0 e 19 anos, de ambos os sexos, sem condições clínicas específicas, sem diagnóstico de doenças e que não fossem atletas. A revisão incluiu 5 artigos, abrangendo diferentes regiões do país e contemplando a maioria das amostras entre 12 e 20 anos. O transporte ativo foi predominantemente mensurado por questionários de autorrelato. A prevalência do transporte ativo variou de 37% a 53% para amostras locais e atingiu 44,4% na análise nacional. Identificou-se uma tendência de maior participação entre os meninos, com prevalências de 53% a 55,8%, enquanto as meninas variaram entre 44% e 47%. Diferentemente do observado em revisões anteriores, o transporte ativo foi menos prevalente em relação ao transporte passivo, o que torna fundamental a implementação de políticas públicas voltadas à criação de ambientes mais seguros e favoráveis a esse comportamento.

Palavras-chave: Brasil; Crianças; Adolescentes; Mobilidade ativa; Transporte ativo; Atividade motora; Sedentarismo.

INTRODUCTION

Physical activity can be defined in four domains: leisure, home, work or study, and commuting. Active displacement, or active transportation, involves movements including foot, bicycle, roller skates, skateboard, or other non-motorized vehicles¹. This practice can be integrated into daily routines, such as commuting to school, which represents one of the main opportunities for accumulating physical activity among children and adolescents and may substantially contribute to total physical activity levels and the achievement of minimum health recommendations associated with cardiorespiratory and metabolic fitness².

In European countries, such as Germany, Spain, Norway, Scotland and Wales, active transport rates remain stable or show a slight decline between 2006 and 2018, after decades of decline³⁻⁵. Similarly, a study that assessed the trend of active displacement in 28 countries in Africa, the Americas and Asia, between 2004 and 2017, identified heterogeneous patterns, with stability in 16 countries and decline in 7, with significant differences between girls and boys⁶.

Several factors influence the choice of active transportation, such as distance from school, socioeconomic level, age and sex. Barriers such as traffic insecurity, inadequate infrastructure, increased travel times and parental concerns have also been consistently reported⁷. Additionally, social support from countries and friends can also be an important factor associated with active transportation.

Despite the global recognition of the benefits of active transport for the health of children and adolescents, important gaps persist, especially in developing countries, such as Brazil. The existing literature concentrates mainly on developed countries, with scarce representative data from more diverse national and regional contexts. Furthermore, it is observed that there is wide heterogeneity in definitions and measurement methods, which makes comparisons between countries and regions difficult.⁸ There is still a lack of studies that thoroughly examine the relationship of variables such as sex, age, socioeconomic level, urban/rural environment and infrastructure such as active transportation, as well as longitudinal analyzes or interventions that evaluate changes over time or the effectiveness of public policies⁸.

In Brazil, systematic reviews that compiled studies published between 2007 and 2019 identified striking variations between regions, reflecting demographic, cultural, socioeconomic, and human development index differences, as well as contrasts between urban and rural areas^{9,10}.

Currently, the country has initiatives focused on the active and safe mobility of schoolchildren, including the requalification of urban spaces, neighborhood plans, school routes, public transportation, and educational actions on mobility. Many of these initiatives prioritize road safety, especially in vulnerable communities, and seek to involve schoolchildren in the policy formulation process¹¹. However, considering Brazil's continental size, its cultural diversity, and the pronounced socioeconomic inequality, it is necessary to have comprehensive and regional information to support federal and state governments in identifying inequalities and directing interventions that encourage the use of active transportation.

Likewise, the objective of this study was to update the previous systematic reviews^{9,10} based on publications carried out in the period from 2020 to 2024, disclosing the use of active transport in Brazil and presenting differences according to sex.

METHODS

This systematic review is part of the research project Report Card Brazil: Health indicators for children and adolescents (4th edition). The macro-project protocol is registered on an open access platform and can be accessed at¹². This study was conducted and reported in accordance with the methodological guidelines for systematic reviews of observational studies.

The review was carried out between the months of May and August 2025 by authors ERV, TKFF and GF. The search strategies were applied to the main health databases: Latin American and Caribbean Literature in Health Sciences (LILACS), Scientific Electronic Library Online (SCIELO) and Medical Literature Analysis and Retrieval System Online (MEDLINE).

The searches were conducted using the advanced search tools of each database, utilizing chains of descriptors constructed by the authors based on controlled vocabulary and keywords. The terms were inserted in Portuguese, English and Spanish, organized in two thematic blocks. The first group was a group of terms related to active transportation, including: “physical activity”; “transportation”; “commute”; “travel”; “use of time”; “active travel”; “active transportation”; “active commute”; “mobility”; “walk”; “biking”; “bike”; “bicycle”; “pedestrian”; “origin and destination”; “lifestyle.” The second section comprised descriptors related to the target population, such as: “child”, “children”, “adolescent”, “adolescents”, “early childhood education student”, and “early childhood education students”.

The search chains were structured as a Boolean operator “OR” between the descriptors of the same block, and “AND” to combine the thematic blocks with each other. Additionally, the specific filters available for each base were applied. The results of each search were exported individually and organized in EndNote® X9 software, which was also used to identify and eliminate duplicate records and to manage studies by source .

For the purposes of this review, active transportation was defined as commuting involving non-motorized movement (e.g., walking, cycling, skateboarding, or roller skating), as specified in the included studies. For study eligibility, the following inclusion criteria were considered: original studies published in indexed scientific journals that evaluated active transport and explicitly described the measurement method used; included Brazilian participants aged between 0 and 19 years (or average age within that range), of both sexes, without specific clinical conditions, without a diagnosis of diseases, and who were not athletes.

The screening process was carried out in three stages by three independent reviewers (TKFF and ERdV): (1) reading the titles; (2) reading the abstracts of potentially eligible studies; and (3) analyzing the full texts to verify the inclusion criteria. Studies derived from the same cohort or database were analyzed for originality, while the primary publication was retained. Additionally, the reference lists of the included articles were manually examined to identify relevant additional studies.

The methodological quality and risk of bias of the included studies were independently assessed by three authors (TKFF, ERdV, and GLMF) using the tool developed by the National Heart, Lung, and Blood Institute for observational studies (cross-sectional and cohort), composed of 14 criteria. This instrument evaluates aspects such as internal validity, selection bias, information bias, measurement bias, and control of confounding factors. A binary score was assigned to each item (0 = “no” and 1 = “yes”). Items that were not applicable or had insufficient information were excluded from the final score calculation.

Based on a consensus assessment by the authors, the studies were classified into three categories: high methodological quality/low risk of bias (score ≥ 0.70), moderate methodological quality/moderate risk of bias (score < 0.70 and ≥ 0.50), and low methodological quality/high risk of bias (score < 0.50). Any disagreements between the reviewers were resolved by consensus after discussion.

Thus, only manuscripts published and/or indexed in the respective databases between January 1, 2020 and December 31, 2024 were considered for the update; records outside this time frame were not included.

RESULTS

This systematic review identified articles on active transportation to school among Brazilian children and adolescents, published between January 1, 2020 and December 31, 2024. Searches in the databases, using the defined word blocks, resulted in 375 records. Next, the triage process by reading titles and abstracts reduced this number to 21 articles. After a complete reading of the manuscripts and the exclusion of those that presented omissions of information related to the topic, the present study included 5 articles in the review (Figure 1).

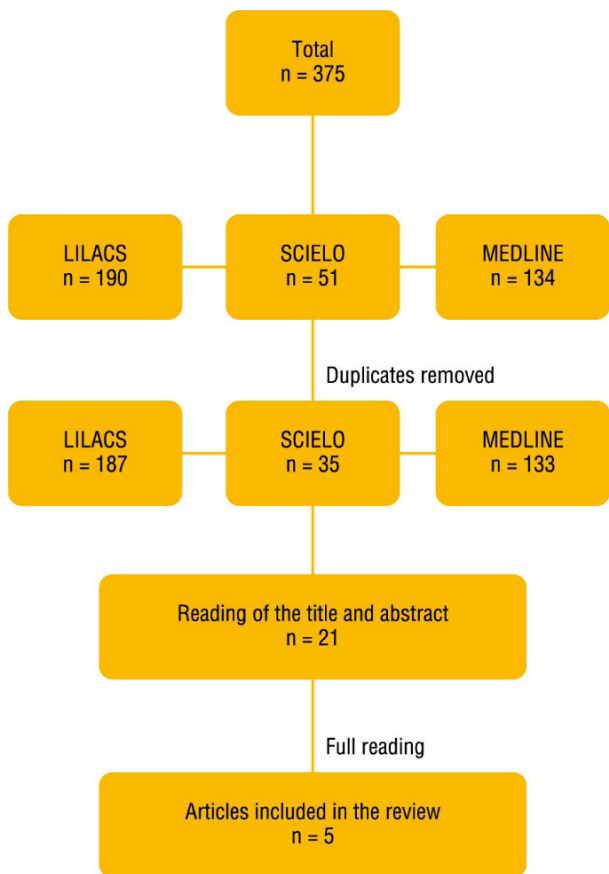


Figure 1. Search results for the data and criteria used in the selection of studies aimed at investigating active transportation for children and adolescents in Brazil.

Brazilian publications on the use of active transportation among adolescents were identified for the period 2020 to 2024, covering different regions of the country and including samples of adolescents aged between 12 and 20 years.

In total, the included studies involved representative population samples and local studies, with sizes ranging from approximately 493 to over 99,000 participants. Active transportation was predominantly assessed through self-administered questionnaires, considering commuting to and from school (on foot or by bicycle) (Table 1).

Active transportation was defined heterogeneously across the included studies: Silva et al. classified students as active if they reported active commuting at least once per week (≥ 1 day/week), whereas Tuany et al. required active commuting to and from school on at least 5 days/week. In addition, some studies classified active transportation solely based on commuting mode (e.g., walking/cycling/skateboarding) and did not report a minimum weekly frequency (days/week) cut-off; therefore, prevalence estimates should be interpreted with caution due to differences in operational definitions. The prevalence of active transportation among adolescents varied considerably between studies, ranging from 37% to 53% for most local samples and reaching 44.4% in the national analysis. In general, passive transport was more frequent, exceeding 55% in some regions (Table 1).

When analyzing the differences according to sex, a trend of greater participation of boys in active transportation was identified. In studies that presented the stratification, the proportions of boys who commuted actively reached 53% to 55.8%, while among girls they varied between 44% and 47%, indicating a consistent pattern of greater male engagement (Table 1).

DISCUSSION

This systematic review updates the evidence on the use of active transportation among Brazilian schoolchildren, incorporating studies published in the period from 2020 to 2024. The work is a continuity of previous systematic reviews, which considered the periods from 2007 to 2017⁹ and from 2018 to 2019¹⁰.

In contrast to previous reviews, this update identified lower prevalence of active transportation in comparison to passive transportation among schoolchildren in all studies included. Although the update selected studies published and/or indexed between 2020 and 2024, it is important to note that all included studies were conducted before the COVID-19 pandemic (2013–2018) and therefore the observed differences should not be interpreted as direct evidence of a pandemic effect. The prevalence of active transport varied between 30.2% and 44.4%, values substantially lower than those reported in previous reviews, as the prevalence varied from 34.3% to 75.7%⁹ and from 18.7% to 70.6%¹⁰. Considering exclusively the studies with national coverage, the prevalence observed in the present review (44.4%) was also lower than those previously reported (47.5% and 58%)^{9,10}. Overall, these findings suggest a possible trend of reduced use of active transportation among schoolchildren in Brazil.

Studies examining trends in active transportation use in recent years have shown mixed results. A German study observed a reduction in the prevalence of active transport use from 84.4% to 78.3%, between 2003 and 2017⁵. On the other hand, in Spain, it was observed that between 2010 and 2017 the prevalence of active commuting to school remained stable, with an approximate rate of 60%³.

Table 1. Cross-sectional studies with data from active transportation in Brazilian children and adolescents between 2020 and 2024.

Author (year of publication)	Year of study	Age range (years)	Location	Active transportation			Instrument / questions	Active transportation criterion (cut-off)
				Sample (n)	Total (%)	Boys (%)	Girls (%)	
Silva et al. (2020) ¹³	2013-2014	12-17	Curitiba - PR	493	38.0	53.0	47.0	In a normal school week, how many days and how much time per day do you use the following modes of commuting (to and from school)? (active modes considered: walking, bicycle, or skateboard) Active = walking/cycling/skateboarding to go and/or return; dichotomized as No (0 times/week) vs Yes (≥1 time/week).
Tuany et al. (2021) ¹⁴	2015	13-17	Brazil	99,697	44.4	-	-	Self-report of: (1) frequency of walking/cycling to and from school ("no days" to "5 days + Saturday and Sunday") Active = walking/cycling on both trips (to + from) on ≥5 days/week; Passive = <5 days/week.
Camargo et al. (2020) ¹⁵	2018	13-17	Curitiba - PR	1,984	37.7	16.2	21.5	"In a normal school week, how many days and how much time per day do you use the following modes?" (walking, bicycle, skateboard, bus, school transport, car). Active = walking/cycling/skateboarding to go and return; Passive = motorized modes (bus/van/car). Mode-based (usual commuting mode); no frequency (days/week) cut-off reported.
Camargo et al. (2020) ¹⁶	2018	15-17	Curitiba - PR	2,509	37.7	-	-	"In a normal school week, how many days and how much time per day do you use the following modes?" (walking, bicycle, skateboard, bus, school transport, car). Active = walking/cycling/skateboarding to go and return; Passive = motorized modes (bus/van/car). Mode-based (usual commuting mode); no frequency (days/week) cut-off reported.
Dias et al. (2021) ¹⁷	2017	14-20	Porto Alegre – RS	1,130	30.2	55.8	44.2	"How do you usually get to and from school?" Options: on foot, by bicycle, by bus, by car, other Active = on foot or by bicycle; Passive = by bus or by car; "other" categorized case-by-case according to the reported mode. Mode-based (usual commuting mode); no frequency (days/week) cut-off reported.

In another study, using data from the Health Behavior in School-Aged Children (HBSC), stable patterns of active transportation to school were observed in Norway, Scotland, and Wales between 2006 and 2018, while in the Czech Republic there was a decline in the period from 2006 to 2010, followed by stabilization between 2010 and 2018⁴. Additionally, a study using data from 28 countries distributed in five geographical regions defined by the World Health Organization showed that 16 countries maintained active transportation standards, while seven showed a reduction and five increased in this behavior between 2004 and 2017⁶. Thus, the decrease in active transportation observed in this study compared to previous updates aligns with the trend observed in Brazil and worldwide regarding the overall decrease in physical activity^{18,19}.

Active transportation is an important strategy for accumulating time spent physically active and, consequently, reducing sedentary behavior^{20,21}. Evidence has shown that active transportation can positively influence the physical and mental health of children and adolescents²², in addition to being positively associated with school performance and enjoyment of school²³. However, social, cultural, and environmental aspects can impose significant barriers to the use of active transportation specific to certain regions²². Promoting suitable environments and conditions is necessary to increase the prevalence of active transportation among schoolchildren and, consequently, increase the levels of physical activity in this population²⁴. However, it is important to highlight that in low- and middle-income countries, marked by high social inequality, active transportation to school may reflect necessity rather than choice, often driven by limited access to motorized transport. In such contexts, this behavior can coexist with precarious commuting conditions, including long distances, unsafe environments, and inadequate infrastructure, which may expose children and adolescents to additional risks and potential adverse consequences.

The results presented by sex indicated a higher prevalence of active transportation among boys in two studies and among girls in one study, while the others did not present specific analyses by sex. This heterogeneity is consistent with findings from previous reviews and suggests the absence of a clear pattern in sex differences^{9,10}. These results may reflect contextual and sociocultural influences, such as perceived safety of the school route and characteristics of the urban environment. Other studies have also not observed defined trends in active commuting between girls and boys^{5,6}. Furthermore, the limited availability of studies with analyses stratified by sex reinforces the need for future investigations that consider these differences more systematically.

Despite the use of self-reported questionnaires to obtain the data, methodological differences were observed in the assessment and classification of active transportation among the included studies. Silva et al.²⁵ adopted a more inclusive criterion by classifying students as active if they reported active commuting at least once per week (≥ 1 day/week). In contrast, Camargo et al. classified active transportation based on the reported commuting mode (walking/cycling/skateboarding) to and from school, without specifying a minimum weekly frequency. Tuany et al. applied a more restrictive criterion, classifying adolescents as active only when commuting actively to and from school on at least 5 days per week. Dias et al. similarly classified active transportation based on commuting mode (on foot or by bicycle vs by bus or by car). These methodological differences may lead to under- or overestimation of the prevalence of active transportation.

Standardization of classification criteria could contribute to greater comparability between future studies. Furthermore, the assessment of commuting time was included in some studies (e.g., Tuany et al.²⁶) but not in others. The systematic incorporation of information on commuting time and specific modes of active transportation, such as skateboarding, could improve the quality and comparability of the available evidence.

In this update, in addition to the nationwide study, only data from the Southern region of Brazil were included. In contrast, previous reviews presented evidence from different Brazilian regions, in addition to the Southern region^{9,10}. Consistently between this and previous reviews, there is a scarcity of data on active school transportation in the Central-West region of the country, while the Southern region remains the most frequently investigated. This scenario reinforces the need for new studies in other Brazilian regions, especially the Central-West region, to broaden the representativeness and understanding of the phenomenon at the national level.

This systematic review presents some limitations that should be considered: (i) the number of included studies was small; (ii) with the exception of one nationwide study, the selected investigations were conducted with samples from the Southern region of Brazil, which limits the extrapolation of findings to other regional contexts and to the national scenario; (iii) the lack of standardization in the measurement and classification of active transportation makes direct comparison between studies difficult and may contribute to the heterogeneity of the results; (iv) some of the included studies did not present analyses stratified by sex, restricting the understanding of possible differences between boys and girls. These limitations should be considered in the interpretation of the results and reinforce the need for future studies with greater regional representativeness, larger samples, and standardized methods for assessing active transportation among Brazilian schoolchildren.

CONCLUSIONS

It is concluded that the use of active transportation is less prevalent than passive transportation among Brazilian children and adolescents. This update highlights a change in the scenario of school commuting in Brazil, indicating that, unlike what was observed in previous reviews, active transportation has become less prevalent than passive transportation. Given this context, the development and implementation of public policies aimed at creating safer and more favorable environments for active commuting becomes fundamental, encouraging physical activity during school transportation and contributing to the reduction of sedentary behavior.

Compliance with ethical standards

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Data Availability Statement

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

Ethical approval

This research is in accordance with the standards set by the Declaration of Helsinki.

Conflict of interest statement

The authors have no conflict of interests to declare.

Author Contributions

Conceptualization: TKFF, ERV, GF. Data curation: TKFF, ERV, GF. Formal analysis: TKFF, ERV, GF. Funding acquisition: TKFF, ERV, GF. Investigation: TKFF, ERV, GF. Methodology: TKFF, ERV, GF. Project administration: TKFF, ERV, GF. Resources: TKFF, ERV, GF. Supervision: TKFF, ERV, GF. Validation: TKFF, ERV, GF. Visualization: TKFF, ERV, GF. Writing – original draft: TKFF. Writing – review & editing: ERV, PFH, DRS, RACS, LAN, GF. All authors have reviewed and approved the final version of the manuscript.

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