

Evidence on sedentary behavior among children and adolescents in Brazil: a systematic synthesis for the Brazil's Report Card

Evidências sobre comportamento sedentário em crianças e adolescentes no Brasil: uma síntese sistemática para o Report Card Brasil

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Abstract – Sedentary behavior among children and adolescents represents a major public health challenge, particularly in the context of increasing mobile device use and shifts in leisure patterns. This systematic review synthesized 47 studies published between 2020 and 2024 that examined the prevalence and indicators of sedentary behavior in Brazil, aiming to inform the Brazil Report Card. Findings indicate that more than half of the studies reported prevalence rates equal to or exceeding 70% when applying the ≥ 2 hours per day cutoff, underscoring the magnitude of the problem across different age groups. The most frequently assessed indicators were total screen time and television viewing, although smartphone use emerged as a relevant component in nearly half of the investigations. Scientific production remained concentrated in the South and Northeast regions, with limited representation from the North and Central-West, and relied predominantly on self-reported measures, although accelerometers were employed in 21.3% of the studies. Considerable heterogeneity was also observed in the cutoff points applied, limiting comparability across studies. These results highlight the need to expand the geographic and temporal scope of research, incorporate objective measures, and harmonize assessment criteria to provide more reliable estimates. Collectively, the evidence underscores the urgency of implementing public policies and targeted interventions to reduce sedentary behavior and foster healthier environments for Brazilian children and adolescents.

Keywords: Adolescent behavior; Brazil; Prevalence; Sedentary lifestyle.

Resumo – O comportamento sedentário entre crianças e adolescentes é um dos principais desafios à saúde pública, especialmente diante da intensificação do uso de dispositivos móveis e das transformações nos padrões de lazer. Esta revisão sistemática reuniu 47 estudos publicados entre 2020 e 2024 que investigaram a prevalência e os indicadores de comportamento sedentário no Brasil, com vistas a subsidiar o Report Card Brasil. Os resultados apontam que mais da metade dos estudos relatou prevalências iguais ou superiores a 70% para o ponto de corte de ≥ 2 horas diárias, revelando a magnitude do problema em diferentes faixas etárias. Os indicadores mais utilizados foram tempo total de tela e televisão, ainda que o uso de smartphones tenha emergido como componente relevante em cerca de metade das investigações. A produção científica manteve-se concentrada nas regiões Sul e Nordeste, com baixa representatividade do Norte e Centro-Oeste, e baseou-se predominantemente em medidas autorrelatadas, embora acelerômetros tenham sido empregados em 21,3% dos estudos. Observou-se também grande heterogeneidade nos pontos de corte utilizados, dificultando comparações entre as pesquisas. Esses achados reforçam a necessidade de ampliar a cobertura geográfica e temporal das investigações, incorporar medidas objetivas e harmonizar critérios de avaliação, de modo a oferecer estimativas mais consistentes. Em conjunto, as evidências destacam a urgência de políticas públicas e intervenções direcionadas para reduzir o comportamento sedentário, promovendo um ambiente mais favorável à saúde de crianças e adolescentes brasileiros.

Palavras-chave: Comportamento do adolescente; Brasil; Prevalência; Estilo de vida sedentário.

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INTRODUCTION

Sedentary behavior, defined as waking activities characterized by low energy expenditure performed in a sitting, reclining, or lying posture, typically begins in childhood and adolescence and tends to persist into adulthood¹. Its main components include screen-based activities such as television viewing, computer use, video gaming, and, more recently, smartphones and tablets, as well as prolonged sitting during recreational activities²⁻⁵. This behavior results from the interaction of individual⁶, sociodemographic⁷, and environmental factors⁸ and has been linked to increased cardiometabolic risk⁹, general and abdominal obesity¹⁰, and depressive symptoms¹¹.

In recent years, technological advances and the widespread availability of mobile devices have expanded screen use among children and adolescents, thereby influencing their behavioral patterns¹¹. Globally, although sedentary behavior (≥ 2 hours/day) has remained relatively stable in this population, more than 60% continue to exceed the recommended daily screen-time limit¹². In Brazil, the 2018¹³ and 2021¹⁴ editions of the Report Card revealed that fewer than half of children and adolescents met the recommendation of ≤ 2 hours of screen time per day. However, the data used in those cycles were collected before 2018, limiting the ability to capture the effects of more recent technological transformations and highlighting the need for updated national estimates of sedentary behavior.

Given this scenario, it is necessary to gather and update national evidence on sedentary behavior among children and adolescents, considering the intensification of mobile device use and profound changes in leisure habits¹¹. In addition to the high prevalence reported in previous Report Card cycles, the temporal gap in epidemiological data constrains the understanding of the current situation and reinforces the need for new syntheses. Therefore, the aim of the present study was to synthesize the available scientific evidence on the prevalence and indicators of sedentary behavior in Brazilian children and adolescents to inform the Report Card Brazil 4.0.

METHODS

Outcome and selection criteria

The macro-project protocol is registered on an open access platform and can be accessed at <https://osf.io/y2q8z/>. Sedentary behavior, the focus of this review, is defined as activities performed while sitting, reclining, or lying down during waking hours, with an energy expenditure of ≤ 1.5 metabolic equivalents (METs)¹⁵. Following the criteria adopted in previous Brazilian Report Cards^{13,14}, both self-reported information (e.g., questionnaires assessing screen time, including television, video games, and computer use, as well as sitting time) and objectively measured data were included. To identify the most recent evidence published between 2020 and 2024, the following inclusion criteria were established: (I) original, peer-reviewed studies; (II) samples including Brazilian children and adolescents aged 0–19 years, either with a mean age within this range or presenting separate analyses for this age group; (III) population- or school-based studies providing information on sample representativeness (e.g., random sampling); (IV) observational studies employing any method

to assess sedentary behavior (e.g., self-report, structured interviews, objective measures of sedentary time, or daily step counts); (V) studies reporting prevalence or mean values for at least one sedentary behavior component (e.g., television viewing, computer and video game use, or sitting time); and (VI) studies in which data collection was conducted in 2017 or later.

Search strategy

This review followed the same search strategies as previous reviews, covering the following databases: Medline (PubMed), Scopus, Web of Science (Web of Knowledge), LILACS (Latin American and Caribbean Health Sciences Literature), SPORTDiscus, BIREME (Regional Library of Medicine), SciELO, and Google Scholar. The search was conducted in July 2025 and structured into four descriptor groups combined using the Boolean operator “AND,” with truncation symbols applied to maximize retrieval (Supplementary File 1). To ensure broader coverage, terms were used in both Portuguese and English when appropriate. An additional step included manual screening of reference lists from the identified articles to detect potentially relevant titles.

Selection process

Article selection was conducted in two stages. First, reviewers screened titles and abstracts to assess eligibility. Subsequently, full texts were evaluated against the inclusion criteria, and their reference lists were screened to identify additional studies (Supplementary File 2). The entire process was conducted independently by two pairs of reviewers (AP/KD or AJ/LS). In cases of disagreement, a senior reviewer (RC) provided adjudication.

Data extraction and analysis

Four reviewers underwent a calibration process prior to screening and extracted data from all eligible studies in pairs (AP/AJ and KD/AQ). Convergence checks were then performed to identify discrepancies. Extracted methodological characteristics included year of data collection, geographic region, study design, sampling strategy, sample size, age group, measurement type (Table 1), indicators, and cutoff points applied to sedentary behavior (Supplementary File 3). Subsequently, the prevalence of sedentary behavior was extracted according to the cutoff point defined in each article. To avoid duplication, articles originating from the same study were grouped. Specific information, such as cutoff points and stratifications, was described in the review with an indication that they represented distinct publications derived from the same study. Sedentary behavior prevalence was presented for the total sample and, when available, stratified by sex (Supplementary File 4).

RESULTS

The study selection process is summarized in Figure 1. The search identified 2,318 articles, of which 920 were excluded as duplicates, resulting in 1,398 unique records. After screening titles and abstracts, 151 articles, plus eight additional references retrieved from these articles, were selected. Following full-text review, 112 were excluded, and 47 articles met the eligibility criteria.

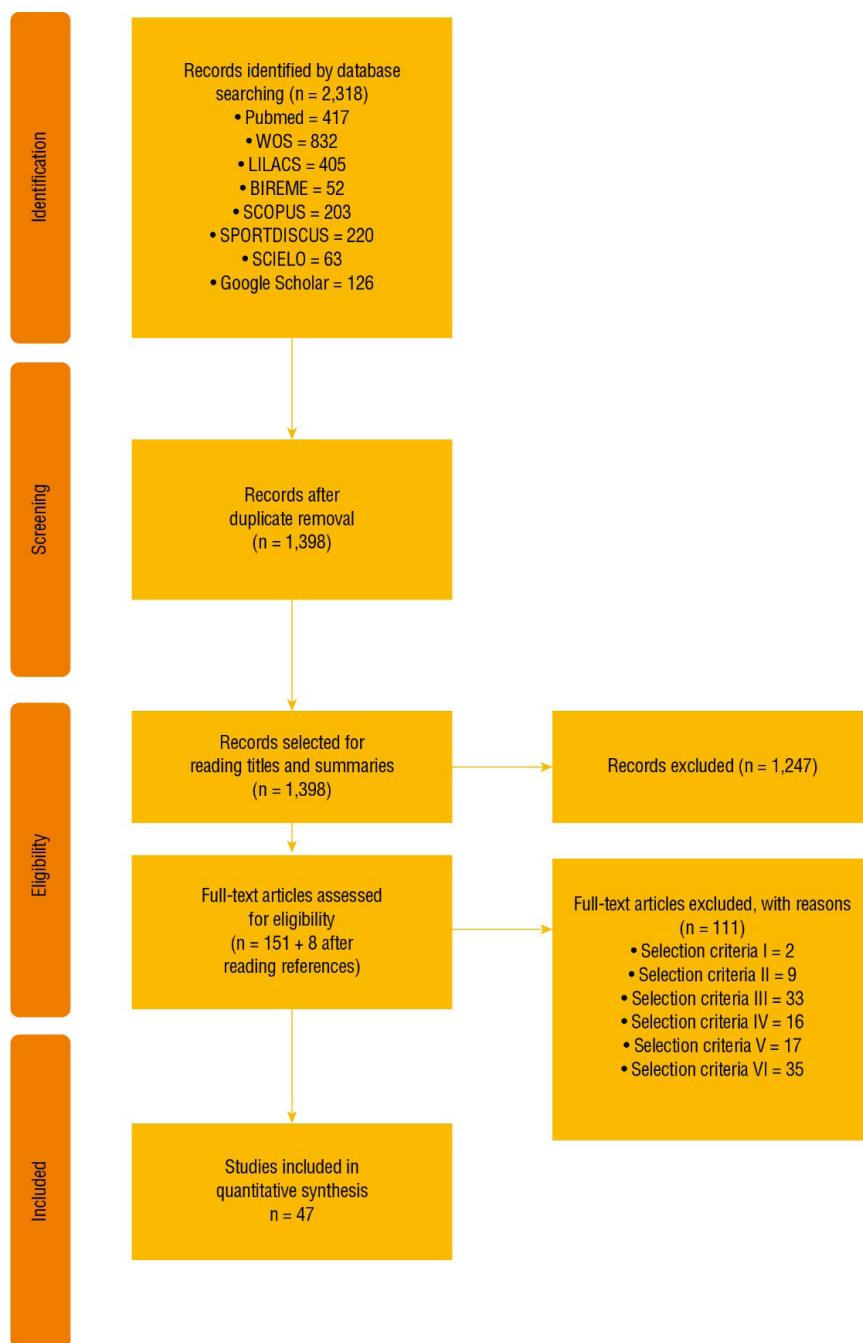


Figure 1. Flowchart of the studies through the phases of the systematic review.

The synthesis included 47 studies, with data collection concentrated in the biennia 2017–2018 (42.6%) and 2019–2020 (46.8%), whereas only 10.6% were conducted between 2021 and 2023. Regionally, most investigations were carried out in the South (34.0%)^{5,7,9,10,16–27}, followed by the Northeast (29.8%)^{28–41} and Southeast (19.2%)^{2,3,42–48}. Few studies were conducted in the North (2.1%)⁴⁹ and Central-West (4.3%)^{11,50}, while nationally representative studies were more frequent (10.6%)^{4,6,8,51,52}. The vast majority employed cross-sectional designs (97.9%)^{2–11,16–20,22–52}, were school-based (85.1%)^{3,5–11,16–18,20,22,35,37–43,46,48–52}, and had sample sizes of ≤1,000 participants (53.2%)^{2,3,9–11,16–18–20,28–30,32–35,37–41,43–48,50}. More than half of the studies included adolescents aged 15 years or older (51.1%)^{2–7,9,11,17,18,20–24,27,31,38,39,42,43,45,46,51,52}.

Sedentary behavior was assessed predominantly through self-report measures (78.7%)^{4,11-16,17,19-29,31,33,34,36,37,39,41,44,46-52}, whereas 21.3% of the studies employed objective devices such as accelerometers^{2,3,18,30,32,35,38,40,43,45} (Table 1).

Table 1. Methodological characteristics of the studies included in the evidence synthesis on sedentary behavior among Brazilian children and adolescents.

Methodological characteristics of the publications	Total	
	Studies = 47	
	n	%
Year (data collection)		
2017-2018	20	42.6
2019-2020	22	46.8
2021-2023	5	10.6
Region		
North	1	2.1
Northeast	14	29.8
Midwest	2	4.3
Southeast	9	19.2
South	16	34.0
Brazil	5	10.6
Study design		
Cross-sectional	46	97.9
Longitudinal	1	2.1
Sample type		
Population-based	7	14.9
School-based	40	85.1
Sample size		
< 500	15	31.9
501-1000	10	21.3
1001-1500	6	12.8
1501-2000	1	2.1
2000 or more	15	31.9
Age group*		
Up to 5 years	11	23.4
6-9 years	8	17.0
10-14 years	14	29.8
15 years or older	24	51.1
Type of sedentary behavior measurement		
Self-reported	37	78.7
Device-measured (e.g., accelerometer)	10	21.3

Note: *Percentages exceed 100% because some studies included more than one age group and were therefore counted in more than one category.

Figure 2 displays the distribution of sedentary behavior indicators across the included studies. The most frequently assessed indicators were total screen time (66.0%)^{2-10,16,19-22,25,26,29,31-34,36,37,43-47,49,50}, television viewing (61.7%)^{2,4-7,9,16-19,21-27,29,31-34,36,41,42,44,47,48,50}, video game use (55.3%)^{2,5-7,9,16,18,19,21,25,26,29,31-34,36,37,41,45,47}, and smartphone use (51.1%)^{2,4-6,9,16,19,21,22,28,29,32-34,36-38,41,43-47,50}. Computer use was reported in 46.8% of studies^{2,4-7,9,16,18,19,21,22,25,26,29,32,34,37,41,42,44-48,50}, whereas sitting time was the least frequently assessed, included in only 36.2% of studies^{2,3,5,6,8,11,16,17,30,33,35,40,42,43,45,51,52}. Consistent with previous findings, self-reported measures predominated over objective assessments, as only 21.3% of publications employed accelerometers^{2,3,18,30,32,35,38,40,43,45}.

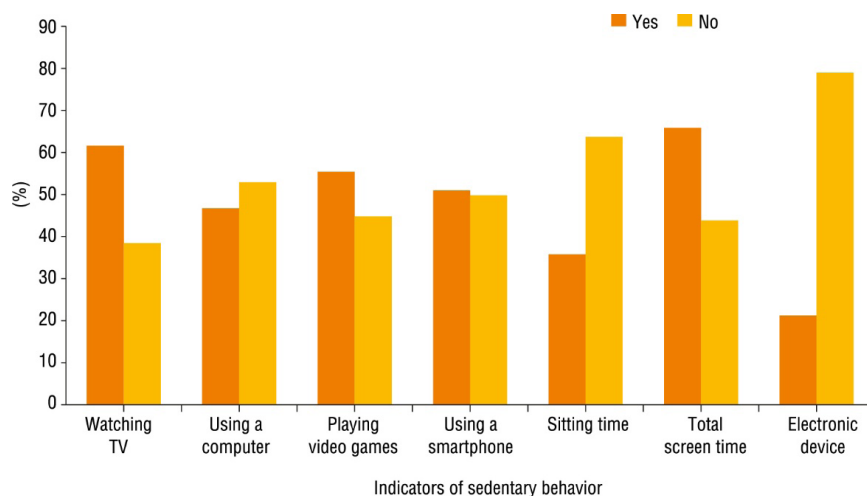


Figure 2. Proportion of sedentary behavior indicators reported in the studies (n = 47).

Figure 3 illustrates the considerable methodological variability in criteria used to assess sedentary behavior. Although the ≥ 2 hours/day cutoff was the most commonly applied (38.3%)^{2,3,5,8,11,16,17,19,22-24,31,32,34,37,43,47,50}, more restrictive thresholds (≥ 1 hour)^{29,33,36,44} and intermediate cutoffs (≥ 3 to ≥ 6 hours)^{4,20,21,38,48,51,52} were also employed. Additionally, 36.6% of studies adopted relative cutoffs (tertiles or medians) or parameters derived from accelerometer data^{6,7,9,10,18,25-27,30,35,39-42,45,46,49}, limiting direct comparability across investigations.

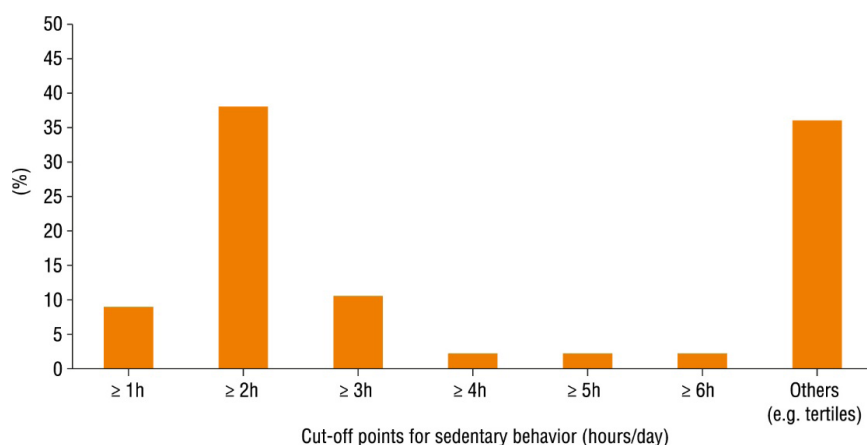


Figure 3. Proportion of different cut-off points used by the studies to classify sedentary behavior.

Figure 4 shows the distribution of sedentary behavior prevalence. Reported prevalence ranged widely, from 32.8%¹¹ to 97.7%³. In proportional terms, only 9.4% of studies reported prevalence between 30% and 39%^{4,11,37}, and 3.1% between 40% and 49%²⁴. The largest concentration of studies fell within the ranges of 60%–69% (18.8%)^{16,20,36,47,48,50} 80%–89% (18.8%)^{23,29,31,33,38}, and $\geq 90\%$ (18.8%)^{2,3,7,17,34,43}. More than half (55.6%) of studies applying the ≥ 2 hours/day cutoff identified sedentary behavior prevalence rates of $\geq 70\%$ ^{2,3,5-9,17,27,29,31-34,38,43,44}.

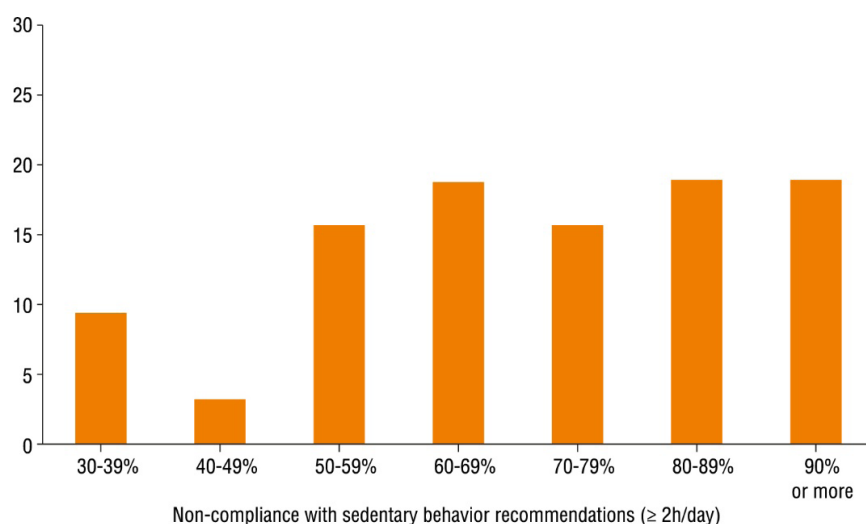


Figure 4. Prevalence of sedentary behavior (≥ 2 hours per day) among Brazilian children and adolescents according to the studies analyzed.

DISCUSSION

This systematic review compiled updated evidence on sedentary behavior among Brazilian children and adolescents, providing a critical appraisal of national scientific production and its gaps. The main findings were as follows: (i) research on sedentary behavior remains largely based on data collected prior to 2020, with a predominance of studies conducted in the South and Northeast regions and a paucity in the North and Midwest; (ii) the most frequently used indicators focused on screen-based activities, particularly total screen time and television viewing; (iii) there was substantial methodological variability in the cutoff points adopted to classify sedentary behavior; (iv) self-reported questionnaires continue to be the most widely used assessment tool; and (v) prevalence of sedentary behavior (≥ 2 hours/day) exceeded 70% in the majority of studies, underscoring a concerning scenario.

Geographic clustering of studies in the South and Northeast, with limited representation from the North and Midwest, was evident. This unequal distribution, previously noted in the *Report Card Brazil 4.0*¹⁴, compromises national representativeness and hinders the development of equitable public policies. In addition, most data collections occurred prior to 2020, reinforcing the need for updated investigations across all regions, particularly in the North⁴⁹ and Midwest¹³. Such updates are necessary given behavioral changes intensified by the COVID-19 pandemic, regional cultural differences, and the scarcity of objective measures, all of which demand more recent and regionally representative data¹⁹.

The most common indicators of sedentary behavior identified in the included studies were total screen time and television viewing, consistent with previous editions of the *Report Card Brazil*^{13,14}. While these remain predominant, changes in electronic device usage patterns, especially among children and adolescents¹⁴, were evident. This review confirmed that smartphone use has emerged as a relevant indicator, appearing in nearly half of the studies. These findings reveal a partial adaptation of research to the technological transformations experienced by young populations⁵⁰ but also highlight methodological lag in capturing emerging

devices and digital platforms. Continued emphasis on traditional indicators such as television may restrict understanding of contemporary nuances of sedentary behavior, particularly in mobile and interactive contexts⁴². Future investigations should update their assessment instruments, incorporating emerging technologies and evaluating not only screen time but also the contexts of use.

The synthesis revealed important heterogeneity in the cutoff points used to classify sedentary behavior, particularly screen time, reflecting the lack of consensus in the literature^{5,7,14}. This methodological variability represents a major obstacle to advancing the field, as different thresholds yield divergent prevalence estimates¹⁴. Although no universally accepted cutoff exists, national and international guidelines provide key reference points. The Brazilian Society of Pediatrics recommends up to two hours daily for children aged 6–10 years and up to three hours for adolescents aged 11–18 years⁵³, while the World Health Organization's 24-Hour Movement Guidelines recommend ≤ 1 hour for preschoolers up to 4 years and < 2 hours for children aged 5 years¹⁵. Evidence indicates that > 3 hours/day is associated with adverse health outcomes^{23,48}, whereas ≤ 2 hours/day is linked to better quality of life¹⁹ and reduced risk of anxiety and depression⁴. Further research is needed to evaluate different thresholds and establish more consistent cutoffs across future studies.

Self-reported questionnaires remain the most common tool for assessing sedentary behavior^{13,14}, largely due to their practicality, low cost, and ability to capture contextual and qualitative information¹¹. Instruments such as the IPAQ⁴ and QueST⁴⁵, validated for the Brazilian population, increase data reliability. Nonetheless, these tools present important limitations, including recall bias⁴⁵, social desirability bias⁴, over- or underestimation of sedentary time, and inability to objectively capture duration⁷. In this context, accelerometers provide greater precision and minimize bias, although cost and logistical demands limit their use in large-scale surveys¹⁴. In this review, 21.3% of studies employed accelerometers, underscoring the importance of these devices for more accurate estimates of sedentary behavior and physical activity among children and adolescents. A combined approach, using validated questionnaires alongside objective measures, is recommended to ensure greater precision, comparability, and reliability in assessing sedentary behavior.

This review also found that in more than half of the studies, prevalence of sedentary behavior (≥ 2 hours/day) exceeded 70%, surpassing figures reported in the *Report Card Brazil 4.0*¹⁴ and highlighting the magnitude of the issue. This suggests that the two-hour daily cutoff may be difficult to achieve in practice. For example, studies of Brazilian schoolchildren reported prevalence ranging from 52.5%⁵ to over 88% of adolescents exceeding this threshold³⁹. The 2019 National School Health Survey (*PeNSE*) indicated that only 20% of adolescents remained within two hours of screen time per day outside school hours⁸, while in some regions, average daily exposure exceeded 4–6 hours^{3,7}. Wide access to the internet, social media, online gaming, and streaming services contributes to surpassing this limit, and self-report measures may further underestimate actual sedentary time⁸. Taken together, these findings suggest that although the ≤ 2 hours/day cutoff is considered protective for health and quality of life^{19,23}, it represents a challenging benchmark for most children and adolescents¹⁴. Effective prevention and reduction strategies are therefore needed. Future studies should investigate individual, social, and environmental factors that hinder compliance with this limit to inform more targeted interventions.

This review has some limitations. Chief among them is the difficulty of comparing studies due to the high heterogeneity of sedentary behavior indicators investigated, as well as the diversity of instruments and cutoff points employed. Additionally, the lack of formal risk of bias assessment limited a more rigorous appraisal of the methodological quality of the included studies, which could have strengthened the reliability of the findings presented.

CONCLUSIONS

This review shows that sedentary behavior among Brazilian children and adolescents is both elevated and variable, with more than half of the studies reporting prevalence rates $\geq 70\%$ for ≥ 2 hours/day. The most commonly used indicators were total screen time and television viewing, while smartphone use is on the rise. Most studies relied on self-report, with few employing accelerometers, and there was wide heterogeneity in the cutoff points adopted. Scientific production was concentrated in the South and Northeast, with scarce representation from the North and Midwest, and much of the data predates 2020. Future research should expand geographic and temporal coverage and harmonize indicators by combining objective measures and self-report. Moreover, upcoming studies should assess the context and content of screen use, investigate its determinants, and test interventions and public policies.

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 complies with the ethical principles outlined in the Declaration of Helsinki.

Conflict of interest statement

The authors declare no conflicts of interest.

Author Contributions

AAP is the principal investigator and conceived the manuscript. RARSC made a substantial contribution to the study design. ACSJ, LGRS, KMD, and AMQ were operationally responsible for data extraction. All authors read and approved the final version of the manuscript.

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SUPPLEMENTARY MATERIAL

Supplementary material accompanies this paper.

Supplementary File 1: Free access in <https://osf.io/s2yem/>

Supplementary File 2: Free access in <https://osf.io/s2yem/>

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