Approaches and methods to assess sedentary behavior in Brazil: a systematic review

Abordagens e métodos para avaliar o comportamento sedentário no Brasil: uma revisão sistemática

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ABSTRACT

Our aim was to characterize the Brazilian studies that evaluated sedentary behavior, describing the main characteristics of the studies and identifying the used instruments. Using the PRISMA methodology, the search occurred on 25 August 2019 and was updated on 17 October 2020 in the following databases: PUBMED, LILACS, and SCIELO. Studies in English, Spanish, and Portuguese were included. The inclusion criteria were studies performed with a sample of Brazilians, and that used an instrument to evaluate sedentary behavior. In total, 229 articles were selected. The majority of the studies evaluated children and adolescents. Only 33 studies used device-derived measures and there was a great variability in the questionnaires used. Only 83/198 studies presented quality criteria for the instrument used. Most studies considered the screen time in a typical week plus weekend to characterize sedentary behavior. Therefore, sedentary behavior in Brazil has mostly been evaluated by different questionnaires, and few have been appropriately validated. These findings emphasize the importance of standardization and methodological rigor for assessing sedentary behavior in the Brazilian context.

Keywords: Healthy lifestyle; Sedentary lifestyle; South America.

RESUMO

Nosso objetivo foi caracterizar os estudos brasileiros que avaliaram o comportamento sedentário, descrevendo as principais características dos estudos e identificando os instrumentos utilizados. Utilizando a metodologia PRISMA, a busca ocorreu em 25 de agosto de 2019 e foi atualizada em 17 de outubro de 2020 nas seguintes bases de dados: PUBMED, LILACS e SCIELO. Estudos em inglês, espanhol e português foram incluídos. Os critérios de inclusão foram estudos realizados com uma amostra de brasileiros e que utilizassem um instrumento para avaliar o comportamento sedentário. No total, foram selecionados 229 artigos. A maioria dos estudos avaliou crianças e adolescentes. Apenas 33 estudos usaram medidas derivadas de dispositivos e houve uma grande variabilidade nos questionários usados. Apenas 83/198 estudos apresentaram critérios de qualidade para o instrumento utilizado. A maioria dos estudos considerou o tempo de tela em uma semana típica mais o fim de semana para caracterizar o comportamento sedentário. Portanto, o comportamento sedentário no Brasil tem sido avaliado em grande parte por diferentes questionários, e poucos foram devidamente validados. Esses achados enfatizam a importância da padronização e do rigor metodológico para avaliação do comportamento sedentário no contexto brasileiro.

Palavras-chave: Estilo de vida saudável; Estilo de vida sedentário; América do Sul.

Introduction

Sedentary behavior (SB) is characterized as a waking behavior with an energy expenditure of up to 1.5 METs (metabolic equivalent of task), in the sitting, lying, or reclining positions[1], manifested in different domains of the day (e.g., leisure, work-study, trave-ling, at home), context (e.g., screen time, talking with friends, studying), and patterns (duration of bouts and number of breaks)[2]. Emerging studies also have pointed out SB as a major public health issue, as the excess of SB is associated with a higher probability of cardiovascular and metabolic diseases and death from all cau-

ses[3–5]. Therefore, several studies have been developed to understand the relationship between this behavior and health outcomes[6], identifying methods capable of reliably measuring these manifestations can help guide more assertive recommendations for populations.

Some countries have developed public health guidelines that include recommendations about SB[7–11]. These guidelines are generally based on epidemiological studies, which evaluate SB using device-derived (accelerometry and devices that detect postural changes) and subjective methods (questionnaires)[12]. Device-derived methods, with the use of accelerometers and inclinometers, are used more frequently in studies from developed countries. These types of measurements are more accurate than subjective methods[13], such as questionnaires and diaries/logs[14], as they can perform evaluations according to body acceleration or the postural transitions, besides eliminating the memory bias of the individual[15]. Although self-reports have the advantage of determining the context and type of activity performed[13], individuals tend to underestimate sedentary behavior with the use of subjective methods, compared to device-derived methods[16].

On the other hand, middle-income countries, such as Brazil, have differences in context and available resources for research development. It can make it difficult to access and use device-derived methods to measure SB in research. Besides that, it is not known how the instruments for obtaining information on SB are being used, for example, whether they present quality indicators, which domain they assess, or what period of time they include when they are applied (e.g., the previous 7 days, habitual behavior, or the previous week). Identifying the most frequently used methods in Brazil could help to disseminate more reliable methods, increasing the standardization and comparability between studies; to show the quality of information available, and to reflect on the need for new methods/tools for reliably monitoring SB. Thus, the aim of this systematic review was to characterize the Brazilian studies that evaluated SB to verify the frequently used methods, the main characteristics, and whether the studies present indicators of psychometric quality of these methods.

Methods

The methodology for conducting the study followed the PRISMA guidelines for systematic reviews and meta-analyses[17] and the protocol was registered with PROSPERO under the number CRD42020147361.

The search occurred on 25 August 2019 and was updated on 17 October 2020, in the following databases: PUBMED, LILACS, and SCIELO. The search terms used in PUBMED were: (Sedentary OR "sedentary lifestyle" OR "sedentary behavior" OR "sedentary behaviour" OR "screen time" OR screen-view* OR "TV view*" OR "TV watch*" OR "video game" OR "computer use" OR "sitting time" OR sitting OR smartphone OR "mobile phone") AND (Brazil OR Brasil), with the "humans" filter applied. In the LILACS and SCIELO databases, the terms were ("sedentary behavior" OR "sedentary behaviour" OR "screen time" OR "sitting time" OR "TV viewing" OR "TV watching" OR "computer use" OR video-game OR videogame) AND (Brazil OR Brasil).

Original articles published in English, Spanish, and Portuguese, without time restriction were eligible for inclusion. Additionally, we considered: 1) studies performed with a sample of Brazilians and 2) which used an instrument for the evaluation of SB. We excluded studies that were systematic reviews, meta-analyses, study protocols, or performed with animals or in other areas of knowledge. There were no criteria regarding the type of study (cross-sectional, longitudinal, case studies), age range, or sample size.

The identification and screening steps were carried out using the StArt software (State of the Art through Systematic Review, UFSCAR, version 3.4 beta), by two independent reviewers (Barboza LLS; Silva ECM), who resolved the disagreements in a consensual agreement. After identification and exclusion of duplicate articles, the reviewers evaluated the articles by title and abstract. Potential eligible articles were evaluated posteriorly based on a complete reading of the methodology. Finally, the articles included had the data extracted by the same two reviewers, with the data checked by two other reviewers (Oliveira DN e Gandarela L). The data extracted, organized into an Excel worksheet, were: author, year, region, city-state or only state, sample size, sample characteristics and the cut-off point for SB, for all studies; days of use, minimum hours of use, valid minimum days, epochs and device model, for studies that used device-derived methods; questionnaire used, if show quality indicator, SB indicator, and time reference, for studies that used subjective methods. In this step, among studies that presented data from the same sample, only the oldest study (by the date of publication) was accepted, while the others

were excluded. In our study, in relation to the subjective methods, studies that explicitly presented in the text or that cited any study with a quality indicator, such as reproducibility or validity of the instrument, were considered to have a positive quality indicator.

Results

Initially, 2553 articles were found. Of these, 288 were excluded as they were duplicated, and another 1814 because they did not meet the inclusion criteria for the review, so 229 were selected (Figure 1). The first studies were from 1998. The years that presented the highest number of publications were 2017 (n = 29), 2018 (n = 31), and 2019 (n = 27). The regions of Brazil that presented more studies with samples from their states were the Southeast, South, and Northeast, with, respectively, 80, 70, and 43 publications. Considering all selected studies, the evaluated sample ranged from 12 to 410,684 individuals, with the majority being children and adolescents (n = 146), of which 124 were preschoolers or students. The adults or the elderly comprised the sample of the other 83 studies, 15 of which included a special health condition. 31 studies used only device-derived measures; another 2 used both device-derived and subjective measures, and the majority used only questionnaires (n = 196). All information extracted from the selected studies is presented in the supplementary material, divided into studies that used device-derived measurement instruments to assess SB (supplementary table 1), studies that used subjective measurement instruments to assess SB in children or adolescents (supplementary table 2) and studies that used subjective measurement instruments to assess SB in adults and the elderly (supplementary Table 3).

Among the 33 studies that used device-derived measures, with accelerometers or other motion sensors (Table 1), the first is from 2014, with the majority being published in 2018 (n = 9) using a sample from the Southeast region (n = 14), and being performed in adults or elderly (19). The most widely used device in 25 studies was the ActiGraph accelerometer, models GT3X, GT3X+, GT3X Plus, 7164, GT1M, GT9X, or WGT3X-BT. Most studies followed the protocol for use of seven consecutive days (n = 22 studies), considering at least 10 hours for a valid day (n = 16) and a minimum of four days of use (n = 10). The majority adopted 60-second epochs (n = 11) and rated SB below the range of 100 counts per minute or 25 counts per 15 seconds (n = 18).
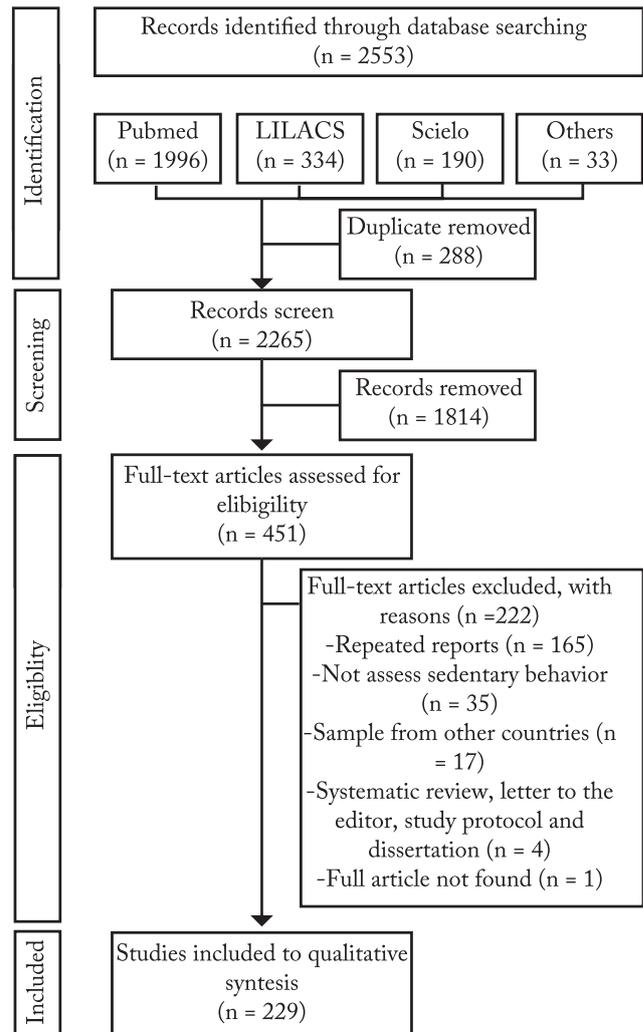

Figure 1 – Flow-chart of search results.

Of the studies that used questionnaires (Table 2), 104 specified the instrument used, and only 83 presented quality indicators, such as validity or reproducibility, indicated in the study itself or previous studies; another 94 studies did not specify the questionnaire and 115 did not present quality indicators of the SB measure. The most frequently used questionnaire, cited in 27 studies, was the International Physical Activity Questionnaire (IPAQ), followed by Global school-based student health questionnaire (GSHS) cited in 11 studies, PAQ-C and VIGITEL, cited in 9 studies each; COMPAC appeared in 6 studies each; ASAQ and Baecke Questionnaire, used in 5 studies each. Regarding the contexts of the measure, 96 studies evaluated only screen time (television, computer, video game, and/or other electronic devices) for SB characterization, while 36 others considered only sitting time and 40 only TV watching. 70 studies did not specify the

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Sedentary behavior evaluation in Brazil

Table 1 – Main characteristics of studies that assessed sedentary behavior using device-derived methods, according to the sample.

Characteristics of the studies	Number of studies	
	Children or adolescents (n = 14)	Adults or elderly (n = 19)
Year of publication		
2014 - 2016	4	3
2017 - 2020	10	16
Region		
Brazil or more than one region	0	3
Northeast	2	2
South	6	6
Southeast	6	8
Sample size		
<100	4	10
100 - 499	8	5
500 - 999	2	2
1000 - 5000	0	2
Days of use		
<7 days	5	3
7 days	8	14
>7 days	1	1
N/I	0	1
Minimum hours of use		
<10 hours	5	1
10 hours	5	11
>10 hours	0	3
N/I	4	4
Cut-off points		
<100 cpm	6	12
Others	7	4
N/I	1	3
Valid minimum days		
1 - 3 days	7	3
4 days	4	6
>4 days	2	5
N/I	1	5
Epochs		
1 - 10 seconds	2	4
15 seconds	5	0
60 seconds	4	7
N/I	3	8
Device model		
ActiGraph	11	14
Others (GENEActiv, Actical, Actiheart, SenseWear armband, DynaPort and Sit-stand table)	3	5

Note: N/I = not informed; cpm = counts per minute.

period of time to which the measure referred, although 58 considered a weekday plus a weekend day, being typical or not, for evaluation of the measure. The cut-off points for SB characterization varied according to the instrument used and to the reference domains. The most commonly used being screen time, TV watching, or sitting time from 2h/day (n = 60). Another 42 studies did not specify the cut-off point.

Regarding questionnaires used in children or adolescents (n = 134), the first studies were from 1998 and the years with the most publications were 2015, 2016, and 2018 with 16 studies each. The sample size ranged from 12 to 109,104 individuals and the sample was composed mainly of students (n = 115) from the South, Southeast, and Northeast regions, with 45, 43, and 29 studies, respectively. Regarding the instruments used, 74 studies did not specify the questionnaire used, but of the most cited, 11 studies used the GSHS questionnaire. Only 49 studies presented quality indicators, specified in the study itself or in previous studies. For this age group, most of the studies considered only screen time as a measure of SB (n = 86), taking as a reference a weekday plus one weekend day (n = 35) and 2 hours as a cut-off point for SB characterization (n = 61).

The 64 studies that evaluated SB in adults and/or the elderly subjectively, appeared in the year 2001, with most publications in the year 2017 (n = 11). In 24 studies, the sample was from the Southeast region, followed by 14 studies conducted in the South region. In 14 studies, it was composed only of the elderly. The most used questionnaire was the IPAQ (n = 23) and in 34 studies a quality indicator was presented for the instruments (either in the text itself or in previous studies). Concerning the measures, for this age group, only sitting time was most used to characterize SB (n = 29), with one weekday plus one weekend day being considered as a time reference (n = 23), typical or not, as a basis to record the measure. Finally, in relation to the cut-off point for SB, the majority of studies did not specify a cut-off (n = 15 studies), with the other 11 studies considering ≥ 3 h/day for TV Watching.

Discussion
In this first systematic review of studies that evaluated SB in Brazil, we verified a predominance of subjective methods for measuring SB. Besides that, a diversity in the methods of identifying the SB manifestations also was demonstrated. As of 2013, the increase in the number of studies that evaluated SB in Brazil reveals a

Table 2 - Main characteristics of studies that assessed sedentary behavior using subjective methods according to the sample.

Characteristics of the studies	Number of studies	
	Children or adolescents (n = 134)	Adults or elderly (n = 64)
Year		
1998 - 2005	3	1
2006 - 2010	24	4
2011 - 2015	46	21
2016 - 2020	61	38
Region		
Brazil or more than one region	8	12
Midwest	6	2
North	3	2
Northeast	29	10
South	45	14
Southeast	43	24
Sample size		
<100	5	5
100 - 499	40	19
500 - 999	34	11
1000 - 4999	46	18
5000 - 9999	5	0
10000 or more	4	11
Questionnaire		
GSHS	11	0
PAQ-C	9	0
COMPAC	6	0
ASAQ	5	0
Baecke Questionnaire	5	0
IPAQ	4	23
VIGITEL	0	9
Others	20	12
N/I	74	20
Quality indicator		
Yes	49	34
No	85	30
SB indicator		
Screen time	86	10
Sitting time	7	29
TV watching	21	19
Sitting time + Screen time	10	2
Sitting time + TV watching	2	2
Others	8	2
Time reference		
Last week	9	2
Typical day	11	7
Typical weekday and weekend day	15	18
Weekday and weekend day	20	5
Others	28	13
N/I	51	19
Cut-off point		
Screen time ≥ 2 h/day	45	3
Screen time ≥ 3 h/day	8	2
Screen time ≥ 4 h/day	11	0
Sitting time 2 - 4 h/day	1	4
Sitting time 5 - 6 h/day	0	3
Sitting time > 7 h/day	0	7
TV watching ≥ 2 h/day	5	2
TV watching ≥ 3 h/day	7	11
TV watching ≥ 4 h/day	3	2
Others	27	15
N/I	27	15

Note: N/I = not informed; h = hours; TV = television; GSHS = Global School-based Student Health Survey; PAQ-C = Physical Activity Questionnaire for Children; COMPAC = "Comportamentos dos adolescentes catarinenses"; ASAQ = Adolescent sedentary activity questionnaire; IPAQ = International Physical Activity Questionnaire; VIGITEL = "*Vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico*".

growth in interest in this variable. In fact, in spite of the research in previous years in other countries, the first consensus on the term SB was only reached in 2012[18]. The South and Southeast regions presented the highest number of studies, corroborating the data of Ramires et al.[19], that demonstrated that research on physical activity and SB in Brazil was concentrated in the South and Southeast regions, with growth in the Northeast region. Most of the Brazilian studies that evaluated SB used a sample composed of students. As in other countries, there is interest in researching this population because it is during the school phase that levels of physical activity begin to decrease[20] and games are replaced by sedentary activities. In addition, in Brazil, the rate of attendance of children and adolescents at school, from 7 to 14 years old, is approximately 96%[21], which facilitates the access of researchers to students.

The majority of Brazilian studies (approximately 86%) have used subjective measures to evaluate SB through self-reported questionnaires or interviews, which may compromise the quality of the measure, as these methods present less accuracy and poor correlation

with device-derived measures[22]. Chastin et al.[15] compared several subjective instruments of SB measurement with a device-derived measurement instrument and found that the first present great bias, low precision, and low correlation with the second, besides not presenting standardization between the domains and time reference that they aim to measure. Another point is that although accelerometers have been used in several studies to evaluate SB, the technology of most of the models used does not allow differentiation of postural changes, considering stationary behavior as synonymous with SB, overestimating the measurement, which should only be considered in the sitting, reclined, or lying down positions[1].

On the other hand, subjective measures through questionnaires present as their main positive point the possibility of measuring different domains of sedentary behavior. In this sense, several studies conducted in different age groups have evaluated different domains of sedentary behavior and different risk indicators, such as all-cause mortality, with which only TV watching was associated, to the detriment of driving time and using the computer[23]. Besides that, mentally active activities do not necessarily represent a risk for some health indicators. For example, the time spent on mentally active behaviors (such as work, meetings, reading, etc.) seems not to be associated with depressive symptoms or even protection for them. In contrast, mentally passive sedentary behaviors (such as watching television, listening to music, etc.) are risk factors for depressive symptoms[24,25].

Among adults, the most used questionnaire for the evaluation of SB was the IPAQ, specifically considering the final two questions about sitting time during the week and weekend. Despite the popularity and ease of access to the instrument, it was developed and is internationally recognized to assess the level of physical activity, considering SB in this context as a variable of secondary interest. Among children and adolescents, GSHS questionnaire was the most used, in agreement with other international studies, which facilitates comparisons of prevalence in this population. One question with respect to studies that use questionnaires would be the inclusion of psychometric indicators of validity and reproducibility, which are often not mentioned within the study itself, making it difficult to evaluate the quality of the instrument. In this sense, the importance of properly displaying the quality indicators and more specific SB issues is emphasized[26].

Regarding the type of SB measurement, the most used was screen time, considering television, comput-ers, and video games. In other countries screen time has also been widely researched as a measure of SB[26], however, it reflects only one manifestation domain of SB, and it is necessary to specify other domains, such as hours sitting at school or work, so that the measure can be better recorded. For children and adolescents, the American Academy of Pediatrics established a cut-off point of 2 hours of screen time in 2001[27]. This recommendation does not include other SBs and considers other psycho-social aspects that go beyond physical sitting time. Even so, this cut-off point has been used in the majority of Brazilian studies, including those which did not only use screen time, although it is known that there is still no consensus in the literature about the amount of time spent on SB that is harmful to health[28].

Also, regarding subjective measures, there is great variability in relation to the reference time of the question involving the SB measurement, which makes it difficult to compare the studies for epidemiological surveys that could determine the prevalence of SB in the Brazilian population. However, it is still unclear in the literature how best to measure subjective SB. Depending on the purpose of the research, whether for surveillance or epidemiological surveys, in all domains or specific domains, the manner used to ask the question or the reference time can vary greatly[15].

The diversity of instruments for SB evaluation found in Brazilian studies can also be observed in populations from other countries. A systematic review, conducted by Dall et al.[29] with studies worldwide, found 141 different questions to assess SB, totaling 32 instruments, and this only for the adult and elderly population. After the review, the authors proposed a taxonomy to help in choosing the most appropriate tool, according to the domain and period of time that the measure intended to evaluate.

To the best of our knowledge, the present review is the first to survey Brazilian studies that evaluated SB and demonstrate the main characteristics of these studies, having as a strong point many articles included, which provided a lot of data on the form of evaluation of SB in Brazil. For example, although inclinometers are considered the best instruments for SB evaluation, because of their precision regarding postural transitions[30], no Brazilian study has used this tool. The novelty and high cost of these devices are still a barrier to the use in research from middle-income countries such as Brazil.

On the other hand, as the main limitation, we considered many studies where the focus was not the eval-

uation of SB, but rather the level of physical activity, which made it difficult to analyze the quality criteria of the instruments in relation to SB alone. Therefore, the majority of Brazilian studies that evaluated SB used subjective measurement instruments, such as questionnaires, without presenting explicit quality indicators such as reproducibility and validity. In addition, different types of questionnaires, different cut-off points, and different time references were found for SB estimation. In this way, public policies that aim to reduce SB should consider the available studies with caution, considering possible biases due to the instruments used.

Conflict of interest

The authors declare no conflict of interest.

Author's contributions

Barboza LLS participated in the conception, design, analysis, data interpretation, and writing of the article; Silva ECM, Thuany M, Araujo RHO, and Werneck AO participated in the analysis, data interpretation, article writing, and relevant critical review of the intellectual content; Oliveira DN and Gandarela L participated in the analysis, data interpretation and relevant critical review of the intellectual content; Silva DRP participated in the conception, design, analysis, data interpretation, and relevant critical review of intellectual content. All authors approved the final version to be published.

Acknowledgements

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Supplementary Table 1 – Main characteristics of studies that assessed sedentary behavior using device-derived methods.

Author (year)	Region	City-State or State	n	Sample	Days of use	Minimum hours of use	Cut-off points	Valid minimum days	Epochs	Device model
Ferrari et al. (2020)[1]	Brazil	Brazil	524	Adults 18 - 65 y	7	10	<100 cpm	5 week days and 1 weekend day	60s	ActiGraph GT3X+
Barbieri et al. (2017)[2]	Brazil	Brazil	24	Office workers ± 41.3 y	60	x	x	x	x	Sit-stand table
Sasaki et al. (2018)[3]	Brazil	Brazil	42	Elderly 65 - 75 ys	7	10	<100 cpm and <200 cpm	7	60s	ActiGraph wGT3X-BT
Mendonça et al. (2018)[4]	Northeast	João Pessoa, Paraíba	656	Students 10 - 14 y	7	8	<100 cpm	3	60s	Actigraph GT3X+
Santos et al. (2019)[5]	Northeast	Natal, Rio Grande do Norte	17	Obese Adults ± 30.2 y	7	10	<100 cpm	4 week days and 1 weekend day	60s	ActiGraph GT9X
Gerage et al. (2015)[6]	Northeast	Recife, Pernambuco	87	Hypertensive patients > 40 y	7	10	<100 cpm	4	60s	ActiGraph GT3X and GT3X+
Melo et al. (2018)[7]	Northeast	Sergipe State	100	Children and adolescents patients with SCA	7	10	<100 cpm	7	60s	ActiGraph wGT3X-BT
Gonçalves et al. (2017)[8]	South	Curitiba, Paraná	305	Adults 20 - 65 y	7	10	<100 cpm	5	60s	ActiGraph 7164 and GT1M
Bacil et al. (2018)[9]	South	Curitiba, Paraná	117	Students 9 - 15 y	7	8	<100 cpm	4	10s	ActiGraph GT3X
Santos et al. (2018)[10]	South	Florianópolis, Santa Catarina	425	Elderly ≥ 63 y	7	10 week days and 8 weekend days	<100 cpm	4	6s	ActiGraph GT3X and GT3X+
Costa et al. (2017)[11]	South	Florianópolis, Santa Catarina	571	Students 7 - 12 y	2	x	<100 cpm	1	15s	Actigraph GT3X+
Martins et al. (2019)[12]	South	Florianópolis, Santa Catarina	64	Children and adolescents infected with HIV 8 - 15 y	7	10	<100 cpm	4	x	ActiGraph GT3X-Plus
Furlanetto et al. (2017)[13]	South	Londrina, Paraná	101	Patients with COPD 59 - 74 y	2	12	<1.5 MET and <2 MET	2	x	SenseWear armband and Triaxial DynaPort activity monitor
Barbosa et al. (2016)[14]	South	Londrina, Paraná	370	Preschoolers 4 - 6 y	5	2	Sirard et al. for children 4 - 5 y and Van Cauwenbrghe et al. for children 6 y	3	1s	ActiGraph GT3X
Ramos et al. (2018)[15]	South	Londrina, Paraná	394	Students	7	8	180 counts/15s	4	15s	ActiGraph GT3X and GT3X-Plus
Silva et al. (2014)[16]	South	Londrina, Paraná	79	Students 10 - 15 y	1	x	<100 cpm and <1.5 MET	1	60s	Acelerometry by Actical and indirect calorimetry by Cosmed Model K4b2
Mielke et al. (2018)[17]	South	Pelotas, Rio Grande do Sul	4106	Adults 18 y	7	24	<12.7 hours/day	2	5s	GENEActiv
Barbosa Porcellis da Silva, Marques and Reichert (2018)[18]	South	Pelotas, Rio Grande do Sul	90	Adults with visual impairment 18 - 95 y	7	8	<100 cpm	3	5s	ActiGraph wGT3xþ

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Continuation of **Supplementary Table 1** – Main characteristics of studies that assessed sedentary behavior using device-derived methods.

Author (year)	Region	City-State or State	n	Sample	Days of use	Minimum hours of use	Cut-off points	Valid minimum days	Epochs	Device model
Horta et al. (2015)[19]	South	Pelotas, Rio Grande do Sul	1241	Adults	7	10	<50 milligrams	4	5s	GENEActiv
Faria et al. (2020)[20]	Southeast	Ituiutaba, Minas Gerais	217	Students 15 - 18 y	8	10	75th percentile	6 week days and 1 weekend day	15s	ActiGraph GT3X
Gomes et al. (2015)[21]	Southeast	Juiz de Fora, Minas Gerais	19	Patients on hemodialysis 18 - 65 y	4	12	<5.000 steps/day	x	x	DynaPortMiniMod
Lima-Junior et al. (2019)[22]	Southeast	Minas Gerais State	153	Students 10 - 12 y	3	x	<1.6 MET	3	x	Actiheart developed by MiniMitter
Paravidino et al. (2017)[23]	Southeast	Niterói, Rio de Janeiro	24	Overweight boys 11 - 13 y	7	10	x	x	x	Actical
Crisp et al. (2018)[24]	Southeast	Piracicaba, São Paulo	42	Female candidates for bariatric surgery 20 - 40 y	7	10	<100 cpm	x	x	ActiGraph GT3X+
Diniz et al. (2017)[25]	Southeast	Presidente Prudente, São Paulo	49	Postmenopausal women > 50 y	7	10	<100 cpm	5	60s	ActiGraph GT3X
Moura et al. (2019)[26]	Southeast	Rio Pomba, Minas Gerais	84	Students 14 - 18 y	7	8	391.8 min·day−1	3	15s	Actigraph GT3X+
Sperandio et al. (2017)[27]	Southeast	Santos, São Paulo	553	Adults ≥ 20 y	7	10	<100 cpm	4	x	Actigraph GT3X+
Ferrari et al. (2015)[28]	Southeast	São Caetano do Sul, São Paulo	485	Students 9 - 11 y	7	10	≤25 counts/15s	4	15s	Actigraph GT3X+
Lauria et al. (2017)[29]	Southeast	São Paulo State	66	Smoking and non-smoking adults	7	x	x	x	x	ActiGraph GT3X
Gerage et al. (2019)[30]	Southeast	São Paulo, São Paulo	174	Peripheral Artery Disease Patients ± 66,7 y	7	10	<100 cpm	4	60s	ActiGraph GT3X+
Xavier et al. (2019)[31]	Southeast	São Paulo, São Paulo	152	Pacients adults and elderly with COPD	6	x	x	6	x	ActiGraph GT3X+
Moreno et al. (2019)[32]	Southeast	São Paulo, São Paulo	68	Hospitalised patients 60 y	x	x	<100 cpm	x	x	ActiGraph GT3X
Caetano et al. (2016)[33]	Southeast	Viçosa, Minas Gerais	101	Students 10 y	3	x	<150 cpm	3	60s	ActiGraph GT3X

Note: y = years; SCA = sickle cell disease; HIV = human immunodeficiency virus; COPD = chronic obstructive pulmonary disease; cpm = counts per minute; MET = metabolic equivalente task.

Supplementary Table 2 – Main characteristics of studies that assessed sedentary behavior using subjective methods in adults or elderly.

Author (year)	Region	City-State or State	n	Sample	Questionnaire used	Quality Indicator?	SB indicator	Time reference	Cut-off point
Fares et al. (2012)[34]	Brazil	Antônio Carlos, Santa Catarina and Lafaiete Coutinho, Bahia	659	Elderly ≥ 60 y	IPAQ	Yes	Sitting time	Typical weekday and weekend day	≥ 6h/day
Schuch et al. (2020)[35]	Brazil	Brazil	937	Adults ≥ 18 y	x	No	Sitting time	Since self-isolating	≥ 10h/day
Alves et al. (2017)[36]	Brazil	Brazil	423	Shift workers 18 - 60 y	IPAQ	Yes	Sitting time	Typical weekday and weekend day	x
Azevedo Barros et al. (2016)[37]	Brazil	Brazil	49025	Adults 20 - 59 y	PNS	No	TV watching	x	≥ 5h/day
Malta et al. (2020)[38]	Brazil	Brazil	45161	Adults ≥ 18 y	ConVid Behavior Survey	No	Screen time	Before the pandemic and during the pandemic	Average point of TV time
Vega, Poblacion and Taddei (2015)[39]	Brazil	Brazil	2881	Women 15 - 49 y	"Pesquisa Nacional de Demografia e Saúde da Criança e da Mulher"	No	TV watching	x	Every day and almost every day
Mielke et al. (2014)[40]	Brazil	Brazil	371271	Adults ≥ 18 y	VIGITEL	No	TV watching	Typical day	> 3h/day
Garcia et al. (2014)[41]	Brazil	Brazil	47477	Workers	x	Yes	TV watching and sedentary activities in work and transport	Typical weekday	≥ 4h/day
Cortes et al. (2013)[42]	Brazil	Brazil	13262	Adult women 18 - 49 y	Demographic Health Survey	No	TV watching	Typical week	≥ 5 times/ week
Knuth et al. (2011)[43]	Brazil	Brazil	292553	Adolescents and adults ≥ 14 y	PNAD	No	TV watching	x	≥ 3h/day
Epifânio et al. (2020)[44]	Brazil	Brazil	410684	Adults > 18 y	VIGITEL	No	TV watching	x	> 3h/day
Pitanga et al. (2018)[45]	Brazil	Salvador, Vitória, Belo Horizonte, Rio de Janeiro, São Paulo and Porto Alegre	13765	Active or retired civil servants 35 - 74 y	x	No	Sitting time	x	≥ 8h/day
Cassia Spanhol and Bucalen-Ferrari (2016)[46]	Midwest	Barra das Garças, Mato Grosso	305	Adults	x	No	Screen time	x	x
Santos et al. (2019)[47]	Midwest	Brasília, Distrito Federal	35	Male 18 - 40 y	IPAQ	Yes	Sitting time	typical week	x
Mielke et al. (2015)[48]	North	North region	104168	Adults ≥ 18 y	VIGITEL	No	TV watching	Typical day	≥ 3h/day
Moretti et al. (2014)[49]	North	Rio Branco, Acre	1104	College students	x	No	Screen time	Typical weekday	Watch TV every day
Silva et al. (2018)[50]	Northeast	Alcobaça, Bahia	457	Elderly ≥ 60 y	IPAQ	Yes	Sitting time	Typical weekday and weekend day	males: > 495 min/ day; female: > 536 min/ day
Silva et al. (2012)[51]	Northeast	Aracaju, Sergipe	298	Women ≥ 50 y	IPAQ	Yes	Sitting time	Typical weekday and weekend day	x
Smith-Menezes et al. (2012)[52]	Northeast	Aracaju, Sergipe	758	Military 18 y	x	No	Screen time	x	≥ 2h/day

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Continuation of **Supplementary Table 2 –** Main characteristics of studies that assessed sedentary behavior using subjective methods in adults or elderly.

Author (year)	Region	City-State or State	n	Sample	Questionnaire used	Quality Indicator?	SB indicator	Time reference	Cut-off point
Lourenço et al. (2016)[53]	Northeast	Bahia State	1243	College students 17 - 54 y	ISAQ-A	Yes	Screen time	Typical weekday	≥ 2h/day
Gonçalves et al. (2019)[54]	Northeast	Caruaru, Pernambuco	318	Parents and their respective children 3 - 5 y	Instrument developed by He et al.	Yes	Screen time	Typical weekday and weekend day	≥ 3h/day
Silva et al. (2017)[55]	Northeast	Ibicuí, Bahia	310	Elderly ≥ 60 y	IPAQ	No	Sitting time	Typical weekday and weekend day	> 414 min/day
Toscano et al. (2016)[56]	Northeast	Maceió, Alagoas	156	Public Servers ± 39,8 y	x	Yes	Sitting time and TV watching	x	TV >2h/day; Sitting at work ≥ 5,6h/day
Tassitano et al. (2015)[57]	Northeast	Northeast region	141309	Adults ≥ 18 y	VIGITEL	No	TV watching	Typical day	≥ 3h/day
Farah et al. (2013)[58]	Northeast	Pernambuco State	1910	Industry workers > 18 y	"Estilo de Vida e Hábitos de Lazer dos Trabalhadores da Indústria" Questionnaire	Yes	TV watching	Weekdays and weekend days	> 2h/day
Mussi et al. (2017)[59]	Northeast	Salvador, Bahia	137	Women nursing students ≥ 18 y	x	No	Sitting time	Typical weekday and weekend day	≥ 8h/day
Marchesan et al. (2017)[60]	South	Cruz Alta, Rio Grande do Sul	18	Patients on hemodialysis > 18 y	x	No	Sitting time	x	x
Gonçalves et al. (2017)[61]	South	Curitiba, Paraná	1411	Adults 18 - 65 y	IPAQ	Yes	Sitting time	Typical weekday and weekend day	≥ 4h/day
Felden et al. (2015)[62]	South	Florianópolis, Santa Catarina	239	College students ± 20,9 y	IPAQ	Yes	Sitting time	Typical weekday	> 480 min/sem
Fronza et al. (2017)[63]	South	Florianópolis, Santa Catarina	623	Public Servers 20 - 69 y	x	No	Sitting time and screen time	x	≥ 3h/day
Gutierre Filho et al. (2014)[64]	South	Florianópolis, Santa Catarina	55	Elderly with disabilities ≥ 60 y	IPAQ	Yes	Sitting time	x	x
Coledam (2019)[65]	South	Londrina, Paraná	534	Adults	x	Yes	Screen time	Typical day	≥ 2h/day
Souza et al. (2017)[66]	South	Londrina, Paraná	959	School teachers	x	No	TV watching	Workdays and weekends	≥ 2h/day
Oliveira et al. (2020)[67]	South	Maringá, Paraná	79	Elderly	IPAQ	No	Sitting time	Weekdays and weekend days	x
Ribeiro et al. (2018)[68]	South	Paraná State	820	Elderly ≥ 60 y	IPAQ	Yes	Sitting time	Typical weekday and weekend day	> 4h/day
Mielke et al. (2014)[69]	South	Pelotas, Rio Grande do Sul	2927	Adults ≥ 20 y	x	Yes	Sitting time and screen time	Typical weekday	> 4,5h/day
Bueno et al. (2017)[70]	South	Porto Alegre, Rio Grande do Sul	34	Patients on hemodialysis > 18 y	IPAQ	No	Sitting time	Typical weekday and weekend day	x
Leão et al. (2020)[71]	South	Rio Grande, Rio Grande do Sul	1131	Elderly	Measure of Older Adult's Sedentary Time Questionnaire	Yes	Sitting time and TV watching	Last week	Sitting time: 8h/day; TV time: 5h/day

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Continuation of **Supplementary Table 2 –** Main characteristics of studies that assessed sedentary behavior using subjective methods in adults or elderly.

Author (year)	Region	City-State or State	n	Sample	Questionnaire used	Quality Indicator?	SB indicator	Time reference	Cut-off point
Cafruni et al. (2019)[72]	South	São Leopoldo, Rio Grande do Sul	1079	Women 20 - 69 y	x	Yes	Sitting time	Any day of the week and weekend	Transport-related: 17 min/day; leisure time: 163 min/day
Rech et al. (2015)[73]	South	South region	41156	Adults ≥ 18 y	VIGITEL	No	TV watching	Typical day	≥ 3h/day
Leite et al. (2019)[74]	Southeast	Baependi, Minas Gerais	2027	Adults ≥ 18 y	IPAQ	Yes	Sitting time	Typical weekday and weekend day	x
Genebra et al. (2017)[75]	Southeast	Bauru, São Paulo	600	Adults > 20 y	x	No	Screen time	Typical week and typical day	> 3h/day
Turi et al. (2018)[76]	Southeast	Bauru, São Paulo	970	Adults ≥ 50 y	Baecke Questionnaire	Yes	TV watching	x	Often and very often
Machado et al. (2018)[77]	Southeast	Belo Horizonte, Minas Gerais	378	Community-dwelling ≥ 65 y	x	No	Sitting time	x	x
Moreira et al. (2017)[78]	Southeast	Belo Horizonte, Minas Gerais	305	Adults	VIGITEL	Yes	TV watching	x	≥ 3h/day
Duarte et al. (2013)[79]	Southeast	Belo Horizonte, Minas Gerais	2016	Adults ≥ 18 y	VIGITEL	No	TV watching	Typical day	≥ 3h/day
Carvalho et al. (2010)[80]	Southeast	Campinas, São Paulo	271	Elderly women	IPAQ	Yes	Sitting time	Last week	x
Atalla et al. (2019)[81]	Southeast	Jaguariúna, São Paulo	1424	Adults > 18 y	VIGITEL	Yes	TV watching	x	> 3h/day
Meneguci et al. (2015)[82]	Southeast	Minas Gerais State	3296	Elderly ≥ 60 y	IPAQ	Yes	Sitting time	Typical weekday and weekend day	x
Ribeiro et al. (2018)[83]	Southeast	Presidente Prudente, São Paulo	102	Women breast cancer survivors	x	No	Screen time	Typical weekday and weekend day	≥ 8h/day
Oliveira et al. (2018)[84]	Southeast	Presidente Prudente, São Paulo	160	Patients with nonspecific low back pain 18 - 60 y	x	No	General indicator of SB	Typical weekday	x
Fernandes et al. (2010)[85]	Southeast	Presidente Prudente, São Paulo	1986	Adults ≥ 30 y	Baecke Questionnaire	Yes	TV watching	x	High frequency
Fernandes et al. (2019)[86]	Southeast	Presidente Prudente, São Paulo	118	Adults 40 - 65 y	x	No	Sitting time at work	x	x
Bertolini et al. (2016)[87]	Southeast	Presidente Prudente, São Paulo	375	Elderly ≥ 60 y	Baecke Questionnaire	Yes	TV watching	x	Always watching TV
Moraes et al. (2013)[88]	Southeast	Ribeirão Preto, São Paulo	1133	Adults ≥ 30 y	IPAQ	Yes	Sitting time	Typical weekday and weekend day	> 308,6 min/day
Suzuki, Moraes and Freitas (2010)[89]	Southeast	Ribeirão Preto, São Paulo	2197	Adults ≥ 30 y	IPAQ	Yes	Sitting time	Typical week	x
Gomes, Siqueira and Sichieri (2001)[90]	Southeast	Rio de Janeiro, Rio de Janeiro	4331	Adolescents and adults ≥ 12 y	x	No	Screen time	x	≥ 5h/day
Monfort-Pires et al. (2014)[91]	Southeast	São Paulo State	193	Pre-diabetics Adults 18 - 79 y	IPAQ	Yes	TV watching	Typical weekday and weekend day	> 3h/day

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Continuation of **Supplementary Table 2 –** Main characteristics of studies that assessed sedentary behavior using subjective methods in adults or elderly.

Author (year)	Region	City-State or State	n	Sample	Questionnaire used	Quality Indicator?	SB indicator	Time reference	Cut-off point
Monteiro et al. (2008)[92]	Southeast	São Paulo, São Paulo	2024	Adults ≥ 18 y	VIGITEL	Yes	TV watching	Typical day	≥ 3h/day
Rocha et al. (2019)[93]	Southeast	São Paulo, São Paulo	2512	Adults 20 - 65 y	IPAQ	Yes	Sitting time	Typical weekday and weekend day	> 2h/day
Santos et al. (2017)[94]	Southeast	Uberaba, Minas Gerais	622	Elderly 60 - 96 y	IPAQ	Yes	Sitting time	Typical weekday and weekend day	75th percentile
Silva et al. (2020)[95]	Southeast	Uberaba, Minas Gerais	374	Elderly ≥ 60 y	IPAQ	Yes	Sitting time	Weekdays and weekend days	≥ 7h/day
Ferreira et al. (2019)[96]	Southeast	Viçosa, Minas Gerais	854	Adults 20 - 59 y	IPAQ	No	Sitting time	Weekdays	> 5h/day
Martinho et al. (2013)[97]	Southeast	Viçosa, Minas Gerais	402	Elderly ≥ 60 y	IPAQ	Yes	Sitting time	Typical weekday and weekend day	> 2h/day

Note: y = years; IPAQ = International Physical Activity Questionnaire ; PNS = "*Pesquisa Nacional de Saúde*" ; VIGITEL = "*Vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico*"; PNAD = "*Pesquisa Nacional por Amostra de Domicílios*"; ISAQ-A = Health Indicators and Quality of Life in Academics; GPAQ = Global Physical Activity Questionnaire; SB = sedentary behavior; TV = television; h = hours.

Supplementary Table 3 – Main characteristics of studies that assessed sedentary behavior using subjective methods in children or adolescents.

Author (year)	Region	City-State or State	n	Sample	Questionnaire used	Quality indicator?	SB indicator	Time reference	Cut-off point
Costa et al. (2018)[98]	Brazil	Brazil	102072	Students 9th grade	GSHS (version used in PeNSE)	No	Sitting time and screen time	Typical weekday	> 2h/day
Oliveira et al. (2016)[99]	Brazil	Brazil	74589	Students 12 - 17 y	x	No	Screen time	Typical weekday	> 2h/day
Rezende et al. (2014)[100]	Brazil	Brazil	109104	Students 9th grade	GSHS (version used in PeNSE)	No	Sitting time and screen time	Typical weekday	≥ 2h/day
Hallal et al. (2010)[101]	Brazil	Brazil	60973	Students 13 - 15 y	GSHS (version used in PeNSE)	Yes	TV watching	Typical weekday	≥ 2h/day
Nogueira and Macedo (2009)[102]	Brazil	Brazil	326	Physically active 11 - 15 y	x	No	Screen time	Weekdays and weekend days	x
Machado et al. (2016)[103]	Brazil	Brazil	1190	Male adolescents 10 - 12 y	ENERGY Project Questionnaire	No	Screen time	x	> 2h/day
Silva et al. (2019)[104]	Brazil	Porto Alegre, Rio de Janeiro, Brasília and Fortaleza	1152	Students 12 - 17 y	x	No	Screen time	Typica weekday	> 2h/day
Hardman et al. (2014)[105]	Brazil	Recife, Pernambuco and Florianópolis, Santa Catarina	2155	Students 15 - 24 y	"Saúde na boa" Questionnaire	Yes	Screen time	Typical weekday and weekend day	≥ 2h/day
Hackenhaar et al. (2013)[106]	Midwest	Cuiabá, Mato Grosso	1716	Adolescents 10 - 17 y	x	No	Screen time	Typical weekday	≥ 4h/day
Alexandre et al. (2016)[107]	Midwest	Cuiabá, Mato Grosso	399	Adolescents 12 - 19 y	GSHS	Yes	Sitting time and screen time	Typical day	> 2h/day
Rauber et al. (2018)[108]	Midwest	Distrito Federal	12	Overweight or obese children 9 - 11 y	Questionnaire proposed by Militão et al.	Yes	General indicator of SB	Last week	x
Militão et al. (2013)[109]	Midwest	Distrito Federal	112	Students 10 - 13 y	"Avaliação do nível de atividade física e comportamento sedentário para adolescentes com faixa etária 10-13 anos" Questionnaire	Yes	Screen time	Last week	x
Santos et al. (2018)[110]	Midwest	Dourados, Mato Grosso do Sul	274	Students 12 - 18 y	x	No	Screen time	Typical week on weekdays and on weekends	> 2h/day
Giugliano and Carneiro (2004)[111]	Midwest	Taguatinga, Distrito Federal	100	Students 6 - 10 y	Sallis et al.	No	Sitting time	x	x
Gomes et al. (2020)[112]	North	Manaus, Amazonas	376	Students 12 y	x	No	Screen time	Typical weekday	≥ 4h/day
Pinheiro et al. (2017)[113]	North	Manaus, Amazonas	304	Students 8 - 11 y	"Dia Típico de Alimentação e AF"	Yes	Passive transfer to school	x	x
Bezerra et al. (2016)[114]	North	Manaus, Amazonas	864	Students 15 - 19 y	"Lifestyle of the Manauara Adolescent" Questionnaire	No	Sitting time and screen time	x	> 2h/day
Gordia et al. (2016)[115]	Northeast	Amargosa, Bahia	1044	Students 6 - 18 y	PAQ-C	Yes	TV watching	Typical day	≥ 3h/day
Silva and Santos Silva (2015)[116]	Northeast	Aracaju, Sergipe	2243	Students 13 - 18 y	PAQ-C	No	Sitting time	Last week	x

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Continuation of **Supplementary Table 3 –** Main characteristics of studies that assessed sedentary behavior using subjective methods in children or adolescents.

Author (year)	Region	City-State or State	n	Sample	Questionnaire used	Quality indicator?	SB indicator	Time reference	Cut-off point
Silva et al. (2009)[117]	Northeast	Aracaju, Sergipe	1028	Students	PAQ-C	No	TV watching	Last week	x
Pitanga et al. (2016)[118]	Northeast	Camaçari, Bahia	613	Adolescents 15 - 18 y	x	No	Screen time	Typical weekday and weekend day	≥ 4h/day
Nunes, Figueiroa and Alves (2007)[119]	Northeast	Campina Grande, Paraíba	588	Students 10 - 19 y	x	No	TV watching	x	≥ 3h/day
Costa et al. (2017)[120]	Northeast	Campina Grande, Paraíba	576	Students 15 - 19 y	x	No	Screen time	x	≥ 2h/day
Aros et al. (2017)[121]	Northeast	Caruaru, Pernambuco	600 - 715	Students 15 - 20 y	COMPAC	Yes	Screen time	Weekdays and weekend days	≥ 3h/day
Petribú et al. (2011)[122]	Northeast	Caruaru, Pernambuco	600	Students 15 - 20 y	COMPAC	Yes	TV watching	x	> 3h/day
Martins et al. (2015)[123]	Northeast	Fortaleza, Ceará	964	Students ≥ 14 y	x	No	Screen time	Typical weekday	≥ 3h/day
Bandeira et al.(2018)[124]	Northeast	Fortaleza, Ceará	1085	Students 7th - 9th grade	YRBS	Yes	Screen time	x	≥ 2h/day
Munaro et al. (2016)[125]	Northeast	Jequié, Bahia	1163	Students 14 - 20 y	COMPAC	Yes	Screen time	x	≥ 2h/day
Guedes et al. (2012)[126]	Northeast	João Pessoa, Paraíba	1268	Students 15 - 18 y	IPAQ	No	Sitting time	Typical weekday and weekend day	x
Farias Júnior et al. (2012)[127]	Northeast	João Pessoa, Paraíba	2874	Students 14 - 19 y	x	No	Screen time	Weekdays and weekend days	> 2h/day
Silva, Lopes and Silva (2007)[128]	Northeast	João Pessoa, Paraíba	1570	Students 7 - 12 y	x	Yes	Screen time	x	x
Rivera et al. (2010)[129]	Northeast	Maceió, Alogoas	1253	Students 7 - 17 y	PAQ-C	Yes	TV watching	x	≥ 3h/day
Siqueira, Alves and Figueiroa (2009)[130]	Northeast	Olinda, Pernambuco	86	Children 5 - 9 y	PAQ-C	No	TV watching	Last week	≥ 3h/day
Santos et al. (2017)[131]	Northeast	Olinda, Pernambuco	253	Preschoolers 24 - 59 months	x	No	TV watching	x	> 2h/day
Oliveira et al. (2018)[132]	Northeast	Pernambuco State	6264	Students 14 - 19 y	GSHS	Yes	Sitting time and screen time	Typical week separately for weekdays and weekends	> 4h/day
Tassitano et al. (2009)[133]	Northeast	Pernambuco State	4210	Students 14 - 19 y	GSHS	Yes	TV watching	Weekdays and weekend days	≥ 3h/day
Lippo et al. (2010)[134]	Northeast	Recife, Pernambuco	597	Students 15 - 19 y	x	No	Screen time	Typical school day	≥ 1h/day
Oliveira et al. (2011)[135]	Northeast	Recife, Pernambuco	65	Students 3 - 6 y	x	Yes	TV watching	Typical weekday and weekend day	> 2h/day
Barbosa et al. (2019)[136]	Northeast	Recife, Pernambuco	225	Adolescents 10 - 19 y	x	No	Screen time	x	> 2h/day
Brito Beck da Silva et al. (2019)[137]	Northeast	Salvador, Bahia	895	Students 7th - 9th grade	GSHS (version used in PeNSE)	Yes	Screen time	Typical weekday	≥ 2h/day
Alves et al. (2012)[138]	Northeast	Salvador, Bahia	803	Students 10 - 14 y	x	No	Screen time	Daily, weekly and on weekends	≥ 3,3h/day

Continue…

Continuation of **Supplementary Table 3 –** Main characteristics of studies that assessed sedentary behavior using subjective methods in children or adolescents.

Author (year)	Region	City-State or State	n	Sample	Questionnaire used	Quality indicator?	SB indicator	Time reference	Cut-off point
Oliveira et al. (2010)[139]	Northeast	São Luiz, Maranhão	592	Students 9 - 16 y	"Inquérito de Atividade Física Recordatório de 24h" adapted from Self Administered Physical Activity Checklist	Yes	Screen time	x	> 3,5h/day
Simões et al. (2020)[140]	Northeast	São Luiz, Maranhão	2515	Adolescents 18 - 19 y	x	No	Screen time	x	≥ 5 h/days
Silva et al. (2014)[141]	Northeast	Sergipe State	2259	Students 13 - 18 y	PAQ-C	Yes	TV watching	Last week	> 2h/day
Menezes and Duarte (2015)[142]	Northeast	Sergipe State	3992	Students 14 - 19 y	GSHS	Yes	Sitting time and screen time	Typical day	> 2h/day
Santos et al. (2019)[143]	Northeast	Sergipe State	3617	Students 14 - 19 y	GSHS	No	General indicator of SB	Typical day	≥ 2h/day
Geremia et al. (2015)[144]	South	Bento Gonçalves, Rio Grande do Sul	590	Students 9 - 18 y	x	No	Screen time	x	x
Suñé et al. (2007)[145]	South	Capão da Canoa, Rio Grande do Sul	719	Students 11 - 13 y	x	No	Screen time	x	4,5h/day
Vasques and Lopes (2009)[146]	South	Caxias do Sul, Rio Grande do Sul	1675	Students 11 - 17 y	x	Yes	Screen time	Typical week	> 2h/day
Silva et al. (2018)[147]	South	Criciúma, Santa Catarina	583	Students 11 - 17 y	PAQ-C	Yes	Sitting time	Last week	Remained seating
Azambuja et al. (2012)[148]	South	Cruzeiro do Oeste, Paraná	1074	Students 6 - 10 y	x	No	TV watching	x	> 4h/day
Ulbricht et al. (2018)[149]	South	Curitiba, Paraná	675	Students 11 - 18 y	IPAQ	Yes	Sitting time	Weekdays and weekend days	> 2h/day
Prado et al. (2017)[150]	South	Curitiba, Paraná	1081	Students 11 - 18 y	x	No	Screen time	Typical weekday	≥ 2h/day
Alberico et al. (2017)[151]	South	Curitiba, Paraná	381	Students 12 - 17 y	x	No	Sitting time	Weekdays and weekend days	Over 60% of this time
Machado-Rodrigues et al. (2015)[152]	South	Curitiba, Paraná	262	Female students 14–17 y	Bouchard et al.; Machado-Rodrigues et al.	Yes	TV watching	x	x
Barbosa Filho et al. (2012)[153]	South	Curitiba, Paraná	1628	Students 6th - 2th grade	YRBS	Yes	TV watching	Weekdays and weekend days	≥ 3h/day
Bacil et al. (2018)[9]	South	Curitiba, Paraná	117	Students 9 - 15 y	ASAQ	Yes	General indicator of SB	typical week and weekend	x
Guimarães et al. (2013)[154]	South	Curitiba, Paraná	572	Students 12 - 17 y	ASAQ	Yes	General indicator of SB	Weekdays and weekend days	x
Silva et al. (2019)[155]	South	Curitiba, Paraná	893	Students 11 - 17 y	ASAQ	Yes	Screen time	x	x
Schwertner et al. (2020)[156]	South	Florianópolis, Santa Catarina	330	Students 15 - 18 y	x	No	Screen time	Typical day	≥ 2h/day
Lobo et al. (2019)[157]	South	Florianópolis, Santa Catarina	5364	Students 7 - 12 y	Web-CAAFE	Yes	Screen time	Previous day (24-h recall)	Third tertile
Berria et al. (2018)[158]	South	Florianópolis, Santa Catarina	210	Students 6th - 9th grade	x	No	Screen time	During the week and on weekends	x

Continue…

Continuation of **Supplementary Table 3** – Main characteristics of studies that assessed sedentary behavior using subjective methods in children or adolescents.

Author (year)	Region	City-State or State	n	Sample	Questionnaire used	Quality indicator?	SB indicator	Time reference	Cut-off point
Pelegrini and Petroski (2007)[159]	South	Florianópolis, Santa Catarina	653	Students 14 - 18 y	x	No	Screen time	x	> 4h/day
Pinho et al. (2017)[160]	South	Florianópolis, Santa Catarina	963	Students 11 - 14 y	x	No	Screen time	Typical weekday and weekend day	> 2h/day
Christofoletti et al. (2016)[161]	South	Florianópolis, Santa Catarina	1831	Students 7 - 10 y	Web-CAAFE	Yes	General indicator of SB	Last week	1 SB
Costa and Assis (2011)[162]	South	Florianópolis, Santa Catarina	2936	Students 7 - 10 y	x	No	Screen time	Typical weekday and weekend day	≥ 4h/day
Oliveira and Guedes (2019)[163]	South	Jacarezinho, Paraná	1035	Students 12 - 20 y	x	No	Screen time	Typical week and weekend	> 2h/day
Silva et al. (2010)[164]	South	Jacarezinho, Paraná	114	Students 6 - 14 y	x	No	Screen time	Specific days on the last week	> 2h/day
Werneck et al. (2018)[165]	South	Londrina, Paraná	1209	Students 10 - 17 y and parents	x	Yes	Screen time	Typical weekday and weekend day	x
Greca et al. (2016)[166]	South	Londrina, Paraná	480	Students 8 - 17 y	x	No	Screen time	x	≥ 2h/day
Silva et al. (2016)[167]	South	Londrina, Paraná	1321	Students 10 - 16 y	x	Yes	TV watching	Weekdays and weekend days	> 4h/day
Christofaro et al. (2015)[168]	South	Londrina, Paraná	1231	Students 14 - 17 y	x	No	Screen time	x	≥ 2h/day
Coledam et al. (2014)[169]	South	Londrina, Paraná	738	Students 10 - 17 y	x	Yes	Screen time	Weekdays	> 2h/day
Felden et al. (2016)[170]	South	Maravilha, Santa Catarina	516	Students 10 - 19 y	IPAQ	Yes	Sitting time	Typical weekday	x
Moraes et al. (2009)[171]	South	Maringá, Paraná	991	Students 14 - 18 y	x	Yes	Screen time	x	≥ 4h/day
Guimarães et al. (2013)[172]	South	Paraná State	122	Students 12 - 17 y	ASAQ	Yes	General indicator of SB	Weekdays and weekend days	x
Oliveira et al. (2020)[173]	South	Paranavaí, Paraná	2764	Students 10 - 18 y	x	Yes	Screen time	x	> 2h/day
Ferreira et al. (2016)[174]	South	Pelotas, Rio Grande do Sul	8661	Students 5th - 12th grade	"HELENA" instrument	Yes	Sitting time and screen time	Weekdays and weekend days	> 2h/day
Hallal et al. (2006)[175]	South	Pelotas, Rio Grande do Sul	4452	Students 10 - 12 y	x	No	Screen time	x	≥ 1h/day
Xavier et al. (2014)[176]	South	Pelotas, Rio Grande do Sul	372	Students 14 - 19 y	x	No	TV watching	x	≥ 2h/day
Bacil et al. (2013)[177]	South	Ponta Grossa, Paraná	1129	Students 14 - 18 y	x	No	Screen time	x	≥ 5h/day
Lopes et al. (2014)[178]	South	Santa Catarina State	6529	Students 15 - 19 y	COMPAC	No	Screen time	Weekdays and weekend days	≥ 4h/day
Corso et al. (2012)[179]	South	Santa Catarina State	4964	Students 1st - 4th grade	x	No	Screen time	Weekdays and weekend days	> 2h/day
Silva et al. (2008)[180]	South	Santa Catarina State	5028	Students 15 - 19 y	COMPAC	Yes	Screen time	Weekdays	≥ 2h/day
Spohr et al. (2012)[181]	South	Santa Maria, Rio Grande do Sul	273	Students 1st elementar grade	x	No	Screen time	x	≥ 5h/day

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Continuation of **Supplementary Table 3** – Main characteristics of studies that assessed sedentary behavior using subjective methods in children or adolescents.

Author (year)	Region	City-State or State	n	Sample	Questionnaire used	Quality indicator?	SB indicator	Time reference	Cut-off point
Faria et al. (2015)[182]	South	Santo Antônio da Platina, Paraná	72	Students 9 - 12 y	x	No	Screen time	Typical weekday and weekend day	x
Piola et al. (2019)[183]	South	São José dos Pinhais, Paraná	786	High school students	ASAQ	Yes	Screen time	Typical weekday and weekend day	≥ 2h/day
Gonçalves and Silva (2016)[184]	South	São José, Florianópolis, Santa Catarina	879	Students 14 - 19 y	YRBS	Yes	Screen time	Weekdays and weekend days	≥ 2h/day
Weber et al. (2015)[185]	South	São Leopoldo, Rio Grande do Sul	813	Students 6 y	National Health and Nutrition Examination Survey (NHANES)	Yes	Screen time	Typical day	> 2h/day
Beck et al. (2014)[186]	South	Três de Maio, Rio Grande do Sul	660	Students 14 - 19 y	x	No	Screen time	Weekdays and weekend days	x
Silva et al. (2015)[187]	South	Uruguaiana, Rio Grande do Sul	1455	Students 10 - 17 y	x	No	Screen time	x	> 3h/day
Bordon et al. (2019)[188]	Southeast	Americana, São Paulo	703	Students 9 - 10 y	x	No	Screen time	x	> 2h/day
Araujo et al. (2018)[189]	Southeast	Bauru, São Paulo	270	Children and adolescents 7 - 12 y	PAQ-C	No	Screen time	Last week	≥ 2h/day
Vitta et al. (2011)[190]	Southeast	Bauru, São Paulo	1236	Students 5th - 8th grade	x	No	Screen time	Typical school week and school day	> 2h/day and 2 times
Vitta et al. (2013)[191]	Southeast	Bauru, São Paulo	524	Students 10 - 14 y	x	No	Screen time	Typical week	≥ 3h/day
Mondini et al. (2007)[192]	Southeast	Cajamar, São Paulo	1014	Students 1st grade	x	No	TV watching	x	≥ 4h/day
Braz et al. (2019)[193]	Southeast	Campinas, São Paulo	924	Adolescents 10 - 19 y	x	No	Screen time	x	> 3h/day
Andrade Neto et al. (2014)[194]	Southeast	Espírito Santo State	1770	Students 7 - 10 y	Questionnaire for children applied in the SAUDES study	Yes	Screen time	x	> 2h/day
Souza et al. (2016)[195]	Southeast	Guaxupé, Minas Gerais	91	Students ± 9 y	x	No	Sitting time and TV watching	x	x
Victo et al. (2017)[196]	Southeast	Ilhabela, São Paulo	181	Adolescents 11 - 18 y	IPAQ and Diet and Lifestyle Questionnaire	Yes	Sitting time and TV watching	Typical weekday and weekend day for sitting time and typical school day for Tv watching	≥ 2h/day
Lima-Junior et al. (2019)[22]	Southeast	Minas Gerais State	153	Students 10 - 12 y	x	No	TV watching	Typical day	x
Vasconcellos et al. (2013)[197]	Southeast	Niterói, Rio de Janeiro	328	Students 10 - 18 y	Daily activity semi-structured questionnaire adapted from Barros and Nahas	No	Screen time	Weekdays and weekend days	x
Silva and Malina (2000)[198]	Southeast	Niterói, Rio de Janeiro	325	Students 10 - 15 y	PAQ-C	Yes	TV watching	x	x

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Continuation of **Supplementary Table 3 –** Main characteristics of studies that assessed sedentary behavior using subjective methods in children or adolescents.

Author (year)	Region	City-State or State	n	Sample	Questionnaire used	Quality indicator?	SB indicator	Time reference	Cut-off point
Fonseca, Sichieri and Veiga (1998)[199]	Southeast	Niterói, Rio de Janeiro	391	Students 15 - 17 y	x	No	Screen time	x	> 3h/day
Rodrigues et al. (2020)[200]	Southeast	Niterói, Rio de Janeiro	437	Students 10 - 16 y	x	No	Screen time	typical day	≥ 5h/day
Fernandes et al. (2015)[201]	Southeast	Ourinhos, São Paulo	1461	Students 10 - 14 y	x	No	Screen time	Typical school week and school day	2 h/day and 2 times/week
Caixeta and Amato (2020)[202]	Southeast	Patos de Minas, Minas Gerais	486	Students 6 - 8 y	x	No	Screen time	Typical day	≥ 85 percentile
Enes, Pegolo and Silva (2009)[203]	Southeast	Piedade, São Paulo	105	Students 10 - 14 y	x	No	Screen time	x	> 2h/day
Enes and Slater (2013)[204]	Southeast	Piracicaba, São Paulo	431	Students 10 - 15 y	x	No	Screen time	Weekdays and weekend days	x
Romero et al. (2015)[205]	Southeast	Piracicaba, São Paulo	454	Students 10 - 14 y	Questionnaire for Adolescents Computerized Version	Yes	Screen time	12 months prior	x
Werneck et al. (2018)[206]	Southeast	Presidente Prudente, São Paulo	280	Adolescents 11 - 18 y	Baecke Questionnaire	No	TV watching	x	Very often
Tebar et al. (2018)[207]	Southeast	Presidente Prudente, São Paulo	1011	Students 10 - 17 y	x	No	Screen time	Week	≥ 22h/week
Fernandes et al. (2008)[208]	Southeast	Presidente Prudente, São Paulo	1752	Students	Baecke Questionnaire	No	TV watching	x	High frequency
Christofoletti et al. (2020)[209]	Southeast	Rio Claro, São Paulo	482	Students elementary education 6th - 9th grade and high school 1st - 3rd grade	Sedentary Behavior Questionnaire	No	Sitting time and screen time	x	≥ 2h/day
Straatmann et al. (2016)[210]	Southeast	Rio de Janeiro State	526	Students 10 - 19 y	x	No	Screen time	Typical day	> 4h/day
Tavares et al. (2014)[211]	Southeast	Rio de Janeiro, Rio de Janeiro	174	Students 13 - 17 y	GSHS (version used in PeNSE)	Yes	Screen time	Typical weekday	≥ 2h/day
Meziat Filho et al. (2015)[212]	Southeast	Rio de Janeiro, Rio de Janeiro	1102	High school students	GSHS (version used in PeNSE)	Yes	Screen time	Typical day	≥ 2h/day
Castro et al. (2008)[213]	Southeast	Rio de Janeiro, Rio de Janeiro	1684	Students 8th grade	x	No	Screen time	Typical weekday	≥ 4h/day
Lima et al. (2015)[214]	Southeast	Santa Rita do Sapucaí, Minas Gerais	175	Students 6 - 17 y	x	No	General indicator of SB	x	x
Melzer et al. (2015)[215]	Southeast	Santos, São Paulo	357	Children 3 - 10 y	Youth questionnaire of the CELAFICS	No	Screen time	x	> 2h/day
Nobre et al. (2016)[216]	Southeast	São Paulo, São Paulo	255	Preschoolers 3 - 5 y	x	No	Screen time	x	> 2h/day
Leme and Philippi (2015)[217]	Southeast	São Paulo, São Paulo	253	Female Adolescents	x	No	Screen time	Weekdays and weekend days	> 2h/day
Lancarotte et al. (2010)[218]	Southeast	São Paulo, São Paulo	2125	Students 5th - 8th grade	x	No	Screen time	x	> 2h/day

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Continuation of **Supplementary Table 3 –** Main characteristics of studies that assessed sedentary behavior using subjective methods in children or adolescents.

Author (year)	Region	City-State or State	n	Sample	Questionnaire used	Quality indicator?	SB indicator	Time reference	Cut-off point
Zapata et al. (2006)[219]	Southeast	São Paulo, São Paulo	833	Students	x	No	Screen time	Weekdays and weekend days	≥ 2h/day
Mazaro et al. (2011)[220]	Southeast	Sorocaba, São Paulo	680	Students 7 - 11 y	x	No	Screen time	x	> 2h/day
Silva et al. (2018)[221]	Southeast	Uberaba, Minas Gerais	1125	Students 5 - 18 y	x	No	Screen time	x	≥ 5h/day
Lourenço et al. (2017)[222]	Southeast	Uberaba, Minas Gerais	1009	Students 14 - 19 y	COMPAC	Yes	Screen time	x	≥ 2h/day
Andaki et al. (2018)[223]	Southeast	Uberaba, Minas Gerais	1480	Students 6 - 10 y	x	No	Screen time	Weekdays and weekend days	≥ 2h/day
Santos et al. (2013)[224]	Southeast	Uberaba, Minas Gerais	649	Students 9 - 12 y	"Hábitos de Vida" Questionnaire	No	Screen time	Typical weekday and weekend day	≥ 2h/day
Andreoli et al. (2019)[225]	Southeast	Viçosa, Minas Gerais	152	Children 4 - 7 y	x	No	Sitting time and screen time	x	screen time: ≥ 3h/day; sedentary activities: ≥ 4h/day
Morais, Miranda and Priori (2018)[226]	Southeast	Viçosa, Minas Gerais	274	Female adolescent 14 - 19 y	"Avaliação do Tempo de Tela" from Barros and Navas	No	Screen time	Weekdays	> 2h/day
Prado Junior et al. (2015)[227]	Southeast	Viçosa, Minas Gerais	676	Adolescents 10 - 19 y	x	No	Screen time	Typical week	> 2h/day
Milagres et al. (2017)[228]	Southeast	Viçosa, Minas Gerais	366	Students 8 - 9 y	x	No	Sitting time and screen time	x	> 2h/day
Molina et al. (2010)[229]	Southeast	Vitória-ES	1282	Students 7 - 10 y	x	No	Screen time	x	≥ 4h/day

Note: y = years; GSHS = Global School-based Student Health Survey; PeNSE = "*Pesquisa Nacional de Saúde do Escolar*"; PAQ-C = Physical Activity Questionnaire for Children; COMPAC = "*Comportamentos dos adolescentes catarinenses*"; YRBS = Youth Risk Behavior Survey; IPAQ = International Physical Activity Questionnaire; ASAQ = Adolescent sedentary activity questionnaire; Web-CAAFE = "*Consumo Alimentar e Atividade Física de Escolares*"; HELENA = Healthy Lifestyle in Europe by Nutrition in Adolescence; SB = sedentary behavior; TV = television; h = hours.

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