

Physical activity in Brazil: a systematic review

Atividade física no Brasil: uma revisão sistemática

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Abstract

The purpose of this study, based on a systematic literature review, was to describe the prevalence of physical activity (or inactivity) in the Brazilian population. The databases consulted were: LILACS, SciELO, MEDLINE, Web of Science, and the Google Scholar portal. The terms “physical activity”, “physical exercise”, “physical inactivity”, “sedentary” “Brazil”, and “Brazilian” were used in the search. Overall, 47 studies (all cross-sectional) with random samples were found, and in 26 studies physical activity was the main variable. Only two studies were published before the year 2000, as compared to 12 in 2008 alone. The studies were heavily concentrated in the South and Southeast of Brazil, and there were few studies on physical activity in children and adolescents. In all the studies, physical activity was measured subjectively, mainly with questionnaires, and the most widely studied domain was leisure time. The criteria for defining physical activity varied widely, as did prevalence. The study highlighted the need for standardization of instruments, criteria, and nomenclature in epidemiological studies on physical activity.

Motor Activity; Exercise; Review

Introduction

Research in the field of physical activity has grown significantly in recent years. A search in MEDLINE/PubMed for articles containing the term “physical activity” in the title and/or abstract showed that the number of articles published since 2000 (nearly 30 thousand) has exceeded the total published in the entire 20th century (approximately 20 thousand). Considering all articles launched in the respective databases (independently of subject), for every 200 articles published, one contains the term “physical activity” in the title and/or abstract (i.e., 5.3 per thousand). In Brazil, a recent review of the evolution in epidemiological research in physical activity also shows this same trend ¹.

Although the health benefits of physical activity are well established in the literature ², the World Health Organization (WHO) ³ estimates that some 17% of the world population practices no physical activity whatsoever, and approximately 60% fail to reach the minimum criterion (2.5 hours or 150 minutes per week) to be considered physically active. The most comprehensive study in the world on physical activity was conducted in 2002-2003, with 212,021 adults (18-69 years of age) from 51 countries (mostly low and medium income), including Brazil. The overall prevalence of physical inactivity (non-weighted mean for all the countries) was 18%, as compared

to 25% and 30%, respectively for Brazilian men and women ⁴.

There have been various studies on physical activity in Brazil, but mostly in specific populations, i.e., in a given location. In 2003, the National Cancer Institute (INCA), coordinated by the Ministry of Health, conducted the first national survey (which however included only 15 State capitals) containing information on physical activity in the population 15 to 69 years of age ⁵. In this survey, overall prevalence of insufficient physical activity was 37%, varying from 28% in Belém (Pará State) to 55% in João Pessoa (Paraíba State).

In 2005, the Brazilian Ministry of Health launched the program Surveillance of Risk Factors for Chronic Non-Communicable Diseases by Telephone Survey (VIGITEL). This nationwide survey has been conducted annually since 2006 in all the State capitals plus the Federal District. According to the most recent available data (for 2008), physical inactivity (defined as no leisure-time physical activity in the previous three months, absence of intense effort at work, inactive commuting to work, and no involvement in heavy housecleaning) reaches 26.3% of the Brazilian population (29.5% of men and 23.5% of women) ⁶. Additionally, only 16.4% (20.6% of men and 12.8% of women) met the criteria to be considered active during their leisure time (30 minutes of moderate activity at least 5 times a week or 20 minutes of vigorous activity at least 3 times a week). Comparing the surveys from 2006 ⁷ and 2007 ⁸, the prevalence of physical inactivity decreased slightly (a drop of 2.9 percentage points), while sufficient leisure-time activity increased slightly (by 1.5 percentage points), with this increase occurring mainly in males.

The main objective of the current study, based on a systematic literature review, was to describe the prevalence of physical activity (or inactivity) in Brazil. The article describes the studies based on the following characteristics: year of publication, place of data collection, origin and size of sample, age bracket, research instrument, target domain and behavior, and criteria used to define physical activity/inactivity.

Methodology

In order to achieve the study's objectives, a search was performed in the following electronic databases: LILACS (<http://www.bireme.br>), SciELO (<http://www.scielo.org>), MEDLINE (<http://www.pubmed.com>), and Web of Science (<http://www.isiknowledge.com>). The Google Scholar search portal (<http://www.scholar.google.com>) was also

accessed to detect other publications not indexed in the above-mentioned databases. The terms used to search scientific articles were (in Portuguese): "physical activity" or "physical exercise" or "physical inactivity" or "sedentary" combined with "Brazil" or "Brazilian". The terms were also searched in English. No limitations were set as to date, language, or sample size.

To be included in the present review, the studies needed to have some information on the prevalence of physical activity and/or physical inactivity in the Brazilian population, and the sample had to be representative of the target population, i.e., with random sampling. With the references retrieved from each database, a reading of the titles was performed. Among references selected as possibly eligible, the abstracts were read. Based on the selected abstracts, a search was conducted for each article's full text to assess whether it met the inclusion criteria. Among the selected articles, the references were examined to identify any other publication that met the study's entrance requirements. When there was more than one article with data from the same study, the one pertaining to the original publication was selected.

The reference searches were closed on January 1, 2009. Thus, articles that were published and/or indexed in the respective databases after this date were not included in this study. For the data analysis, the studies are described according to each target factor's absolute frequency.

Results

Forty-seven articles were found that met the inclusion criteria (see the *Methodology* section). In order to facilitate the description, articles were divided into two tables: physical activity was studied as the main variable (26 studies; Table 1); physical activity was studied jointly with other factors, or as a secondary variable (21 studies; Table 2). All the articles used a cross-sectional design, so the tables did not include this information.

The first Brazilian study that approached prevalence of physical activity was published in 1990 ⁹, and the second in 1993 ¹⁰. However, the first study with physical activity as the main variable was not published until 2000 ¹¹. Recent years have witnessed a clear growth in publications, as shown in Figure 1. In the year 2008 alone, the number of articles nearly doubled that of 2007, with an average of one article published per month.

As for place of data collection, one study included all the Brazilian State capitals ⁸ and two

Table 1

Studies in which prevalence of physical activity and/or inactivity was assessed as the principal variable (n = 26 studies), Brazil.

| Author/ Year | City/State | Sample type | N | Age bracket (years) | Instru- ment | Domain of physical activity | Study variable | Definition | Prevalence |
|--------------------------------------|--------------------------------------------|--------------------------------------|--------|---------------------------|----------------------------------------------------------------|----------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Mello et al. 11/2000 | São Paulo/ SP | Population | 1,000 | ≥ 20 | Own question- naire | Not mentioned | Regular physical activity | Not mentioned | Overall: 31.3% |
| Gomes et al. 52/2001 | Rio de Janeiro/RJ | Population | 4,331 | ≥ 12 | Own question- naire | Leisure, work, and commuting | Regular physical activity | Physical activity sometimes or always in previous month | Overall (men: 40.2%; women: 22.2%) Leisure-time (men: 36.7%; women: 19.2%) |
| Matsudo et al. 33/2002 | São Paulo/ SP | Population | 2,001 | 14-77 | IPAQ – short version | Leisure, work, household and commuting | Sedentary lifestyle Irregular physical activity Regular physical activity | No weekly physical activity Does not meet criteria for regular physical activity ≥ 150 minutes/week of moderate physical activity or ≥ 60 minutes/ week of vigorous physical activity | Overall: 8.8% (men: 9.7%; women: 8.0%) Overall: 37.6% (men: 35.9%; women: 39.3%) Overall: 53.5% (men: 44.5%; women: 52.7%) |
| Hallal et al. 34/2003 | Pelotas/RS | Population | 3,182 | ≥ 20 | IPAQ – short version | Leisure, work, household and commuting | Physical inactivity | < 150 minutes/week of moderate physical activity or < 60 minutes/ week of vigorous physical activity | Overall: 41.1% (men: 40.2%; women: 41.8%) |
| Monteiro et al. 12/2003 | Southeast and Northeast of Brazil | Population | 11,033 | ≥ 20 | Own question- naire | Leisure | Physical activity | 30 minutes at least 1 day/week 30 minutes at least 5 days/week | Overall: 13.0% (men: 18.2%; women: 8.2%) Overall: 3.3% (men: 3.5%; women: 3.2%) |
| Salles-Costa et al. 26/2003 | Rio de Janeiro/RJ | Workers (university employees) | 3,740 | 20-60 | Own question- naire | Leisure | Physical activity | Any physical activity in the previous 2 weeks | Overall: 45.9% (men: 52.2%; women: 40.8%) |
| Santos & Coelho 27/2003 | Joinville/SC | Workers (company employees) | 2,143 | 17-65 | Question- naire developed by Pate (1995) | Leisure, work, and commuting | Insufficient physical activity | Not mentioned | Overall: 47.1% (men: 33.0%; women: 62.0%) |
| Hallal et al. 35/2004 | Pelotas/RS | Population | 3,182 | ≥ 20 | IPAQ – short version | Leisure, work, household and commuting | Vigorous physical activity | ≥ 60 minutes/week of vigorous physical activity | Overall: 29.0% |
| Oehlschla- eger et al. 53/2004 | Pelotas/RS | Population | 962 | 15-18 | Own question- naire | Leisure and school | Sedentary lifestyle | Duration < 20 minutes/ day and frequency < 3 times/week | Overall: 39.0% (boys: 22.2%; girls: 24.5%) |
| Dias-da- Costa et al. 54/2005 | Pelotas/RS | Population | 2,177 | 20-69 | Own question- naire | Leisure | Physical inactivity | Energy expenditure in leisure-time physical activity < 1,000kcal/ week | Overall: 80.6% (men: 69.1%; women: 89.4%) |
| Masson et al. 14/2005 | São Leopoldo/ RS | Population (only women) | 1,026 | 20-60 | Own question- naire (adapted from Agita Brasil) | Leisure | Sedentary lifestyle Sufficient physical activity | No moderate or vigorous physical activity Moderate or vigorous physical activity > 3 times/week | Women: 37.0% Women: 3.6% |
| Pitanga & Lessa 55/2005 | Salvador/BA | Population | 2,292 | 20-90 | Own question- naire | Leisure | Sedentary lifestyle | No leisure-time physical activity in normal week | Overall: 72.5% (men: 60.4%; women: 82.7%) |
| Hallal et al. 42/2006 | Pelotas/RS | Population (1993 birth cohort) | 4,452 | 10-12 | Own question- naire | Leisure and commuting | Sedentary lifestyle Physical activity | < 300 minutes/week Some leisure-time physical activity | Overall: 58.2% (boys: 49.0%; girls: 67.0%) Overall: 85.4% (boys: 72.9%; girls: 79.0%) |

(continues)

Table 1 (continued)

| Author/ Year | City/State | Sample type | N | Age bracket (years) | Instru- ment | Domain of physical activity | Study variable | Definition | Prevalence |
|----------------------------------|-------------------------------------|-------------------------------------------------------------------|--------------------|---------------------------|------------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Arruda & Lopes 16/2007 | Lages/SC | Schoolchildren | 1,204 | 10-17 | Daily physical activity log (adapted from Bouchard et al., 1983) | All | Normal physical activity | Energy expenditure ≥ 37.0kcal/kg/day | Overall: 70.6% |
| Azevedo et al. 36/2007 | Pelotas/RS | Population | 3,100 | ≥ 20 | IPAQ – long version | Leisure | Physical activity | ≥ 150 minutes/week of moderate to vigorous physical activity The above criterion ≥ 5 days/week of moderate physical activity or 3 days/week of vigorous physical activity | Overall: 27.4% (men: 33.9%; women: 22.3%) Overall: 18.2% (men: 22.2%; women: 15.2%) |
| Baretta et al. 37/2007 | Joaçaba/SC | Population | 575 | 20-59 | IPAQ – short version | Leisure, work, household and commuting | Physical inactivity | Not mentioned | Overall: 57.4% (men: 55.8%; women: 58.7%) |
| Domingues & Barros 15/2007 | Pelotas/RS | Population (women that gave birth in 2004) | 4,470 | 12-46 | Own question- naire | Leisure | Physical activity | Not mentioned | Before pregnancy: 14.8%; during pregnancy: 12.9% |
| Dumith et al. 56/2007 | Pelotas/RS | Population | 3,136 | ≥ 20 | Own question- naire | Leisure | Regular physical activity | ≥ 20 minutes/day of moderate to vigorous physical activity ≥ 3 days/week | Overall: 29.2% (men: 33.6%; women: 25.8%) |
| Gonçalves et al. 43/2007 | Pelotas/RS | Population (birth cohort) | 4,452 | 10-12 | Own question- naire | Leisure | Sedentary lifestyle | < 300 minutes/week | Overall: 68.5% (boys: 59.0%; girls: 77.7%) |
| Zaitune et al. 31/2007 | Campinas/ SP | Population | 426 | ≥ 60 | Own question- naire | Leisure | Sedentary lifestyle | No weekly physical activity | Overall: 70.9% (men: 65.8%; women: 74.7%) |
| Bastos et al. 44/2008 | Pelotas/RS | Population | 857 | 10-19 | Own question- naire | Leisure and commuting | Insufficient physical activity | < 300 minutes/week | Overall: 69.8% (boys: 52.2%; girls: 81.6%) |
| Benedetti et al. 32/2008 | Florianó- polis/SC | Population | 875 | ≥ 60 | IPAQ – long version | Leisure, work, household and commuting | Sedentary lifestyle | < 150 minutes/week of moderate to vigorous physical activity | Overall: 40.7% (men: 36.4%; women: 45.0%) |
| Cunha et al. 38/2008 | Goiânia/GO | Population | 2,002 | ‡ 18 | Own question- naire (telephone interviews) | Leisure, work, household and commuting | Sedentary lifestyle | No leisure-time physical activity, light effort at work, no heavy domestic physical activity, and active commuting < 10 minutes/day | Overall: 50.3% (men: 42.0%; women: 55.5%) |
| Farias Júnior 17/2008 | João Pessoa/PB | Schoolchildren (secondary school) | 2,566 | 14-18 | Daily physical activity log | All | Physical inactivity | Energy expenditure < 37kcal/kg/day | Overall: 55.9% (boys: 45.5%; girls: 64.2%) |
| Rodrigues et al. 18/2008 | Gurupi/TO | Schoolchildren (university students) | 871 | 16-57 (mean = 25) | IPAQ – short version | Leisure, work, household and commuting | Sedentary lifestyle | Not mentioned | Overall: 29.9% |
| Siqueira et al. 13/2008 | South and Northeast of Brazil | Population (coverage areas for primary healthcare units) | 4,060 4,003 | 30-64 ≥ 65 | IPAQ – short version | Leisure, work, household and commuting | Sedentary lifestyle | < 150 minutes/week of moderate to vigorous physical activity | Adults (overall: 31.8%; men: 37.5%; women: 27.2%) Elderly (overall: 58.0%; men: 59.6%; women: 56.9%) |

States of Brazil: BA: Bahia; GO: Goiás; PB: Paraíba; RJ: Rio de Janeiro; RS: Rio Grande do Sul; SC: Santa Catarina; SP: São Paulo; TO: Tocantins.

IPAQ: *International Physical Activity Questionnaire*.

Table 2

Studies in which prevalence of physical activity and/or inactivity was assessed as a secondary variable (n = 21).

| Author/Year | City/State | Sample Type | N | Age bracket (years) | Instrument | Domain of physical activity | Study variable | Definition | Prevalence |
|----------------------------------|----------------------|-----------------------------------|--------|---------------------|------------------------------------------|------------------------------|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Rego et al. 9/1990 | São Paulo/SP | Population | 1,914 | 15-59 | Own questionnaire. | Not mentioned | Sedentary lifestyle | Not mentioned | Overall: 69.3% (men: 57.3%; women: 80.2%) |
| Duncan et al. 10/1993 | Porto Alegre/RS | Population | 1,240 | 15-64 | Own questionnaire | Leisure, work, and commuting | Sedentary lifestyle | Sedentary work and commuting < 30 minutes/day and leisure-time physical activity < 4 hours/week (moderate) or < 3 hours/week (vigorous) | Overall (men: 38.0%; women: 58.0%) Leisure (men: 69.0%; women: 82.0%) |
| Barreto et al. 57/2001 | BambuÍ/MG | Population | 2,284 | ≥ 15 | Own questionnaire | Not mentioned | Physical inactivity | No weekly physical activity | Overall: 26.7% |
| Barros & Nahas 28/2001 | Santa Catarina/SC | Workers (industrial) | 4,850 | 18-71 | IPAQ – long version | Leisure | Physical inactivity | No weekly physical activity | Overall: 46.2% (men: 34.8%; women: 67.0%) |
| | | | | | | | Insufficient physical activity | Energy expenditure in physical activity < 14,3kcal/kg/week | Overall: 21.4% (men: 24.2%; women: 16.4%) |
| Lima-Costa et al. 58/2001 | BambuÍ/MG | Population | 1,020 | 18-59 | Own questionnaire | Leisure | Physical inactivity | No day of physical activity (≥ 30 minutes) in previous month | Adults: 67.2%; elderly: 79.5% |
| | | | 1,606 | ≥ 60 | | | Sedentary lifestyle | Spends most of the day sitting and walks little | Adults: 28.0%; elderly: 47.7% |
| Gus et al. 59/2002 | Rio Grande do Sul/RS | Population | 1,066 | ≥ 20 | Own questionnaire | Leisure and work | Sedentary lifestyle | Light physical activity < 2 days/weeks | Overall: 71.3% |
| Matos & Ladeia 30/2003 | Ipecaetá/BA | Population (rural community) | 160 | ≥ 19 | Own questionnaire | Leisure and work | Physical inactivity | Physical activity < 2 days/week or low energy expenditure at week | Overall: 43.5% |
| Farias Júnior & Lopes 19/2004 | Florianópolis/SC | Schoolchildren (secondary school) | 1,107 | 15-18 | Own questionnaire | All | Insufficient physical activity | Energy expenditure < 37kcal/kg/day | Overall: 65.7% (boys: 52.1%; girls: 78.3%) |
| Lima-Costa 60/2004 | Belo Horizonte/MG | Population | 13,851 | ≥ 20 | Own questionnaire | Leisure | Physical activity | ≥ 20 minutes/day, daily or almost daily in the previous 3 months | Overall: 11.2% (adults: 10.8%; elderly: 14.0%) |
| Monteiro et al. 39/2005 | São Paulo/SP | Population | 2,122 | ≥ 18 | Own questionnaire (telephone interviews) | Leisure | Physical activity | None ≥ once/week ≥ 3 times/week ≥ 5 times/week | 47.0% 29.0% 16.5% 6.5% |
| Silva et al. 20/2005 | Maceió/AL | Schoolchildren | 1,253 | 7-17 | PAQ | Leisure and school | Sedentary lifestyle | Not mentioned (scores) | Overall: 93.5% (boys: 90.3%; girls: 96.0%) |
| Conceição et al. 29/2006 | João Pessoa/PB | Workers (university employees) | 704 | 40-72 | Own questionnaire | Not mentioned | Sedentary lifestyle | No physical activity | Overall: 48.4% (men: 45.4%; women: 53.0%) |
| | | | | | | | Regular physical activity | ≥ 30 minutes at least 4 days/week | Overall: 20.1% |
| Doro et al. 61/2006 | Bauru/SP | Japanese descendants | 1,330 | ≥ 30 | Own questionnaire | Leisure and work | Physical activity | Not defined | Men: 18.8%; women: 13.4% |
| Monego & Jardim 21/2006 | Goiania/GO | Schoolchildren | 3,169 | 7-14 | Own questionnaire | Leisure and school | Sedentary lifestyle | No physical activity most of the time | Overall: 37.8% (boys: 28.6%; girls: 47.3%) |

(continues)

Table 2 (continued)

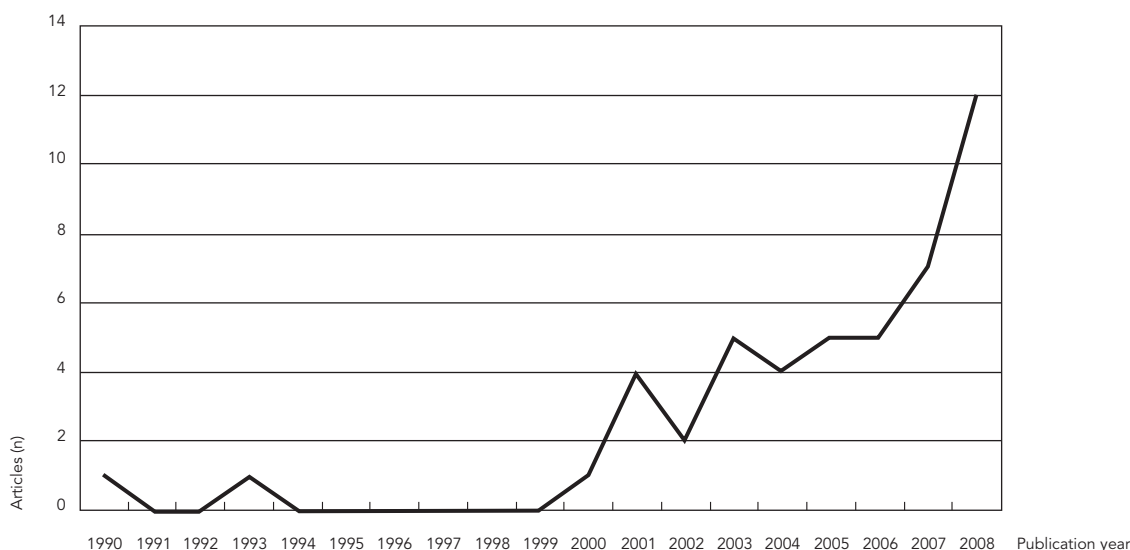
| Author/ Year | City/State | Sample type | N | Age bracket (years) | Instru- ment | Domain of physical activity | Study variable | Definition | Prevalence |
|------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------|--------|--------------------------------|-------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| Nobre et al. 22/2006 | São Paulo/ SP | Schoolchildren (5 th to 8 th grades, primary school) | 2,125 | Not defined | Adapted from question- naire used in "Carmen- Cindi" (1997) | Not mentioned | Sedentary lifestyle | Walks very little or spends most of the day sitting | Overall: 15.4% |
| Carvalhoes et al. 40/2008 | Botucatu/SP | Population | 1,410 | ≥ 18 | Own question- naire (telephone interviews) | Leisure and work | Sedentary lifestyle | No leisure-time physical activity and light effort at work | Overall: 57.9% (men: 43.1%; women: 58.2%) |
| | | | | | | | Leisure- time physical activity (1) | 30 minutes at least 1 day/week | Overall: 31.0% (men: 36.9%; women: 25.8%) |
| | | | | | | | Leisure- time physical activity (2) | 30 minutes at least 3 days/week | Overall: 26.6% (men: 22.2%; women: 19.3%) |
| | | | | | | | Leisure- time physical activity (3) | 30 minutes at least 5 days/week | Overall: 12.1% (men: 12.7%; women: 9.0%) |
| Castro et al. 23/2008 | Rio de Janeiro/RJ | Schoolchildren (8 th grade, primary school) | 1,684 | ≥ 13 (median = 15 years) | Own question- naire | Leisure and commuting | Physical inactivity | No physical activity | Overall: 9.7% (boys: 5.0%; girls: 11.9%) |
| | | | | | | | Physical activity 1 | 60 minutes 3 days/ week | Overall: 37.1% (boys: 55.6%; girls: 20.0%) |
| | | | | | | | Physical activity 2 | 60 minutes 5 days/ week | Overall: 18.7% (boys: 29.8%; girls: 8.3%) |
| | | | | | | | Physical activity 3 | 150 minutes/ week | Overall: 59.9% (boys: 73.6%; girls: 47.2%) |
| | | | | | | | Physical activity 4 | 300 minutes/ week | Overall: 40.1% (boys: 55.2%; girls: 26.1%) |
| Moura et al. 8/2008 | 26 State capitals + Federal District | Population | 54,369 | ≥ 18 | Not mentioned (telephone interviews) | Leisure, work, household and commuting | Sedentary lifestyle | No physical activity | Overall: 29.2% (men: 39.8%; women: 20.1%) |
| | | | | | | | Sufficient leisure- time physical activity | 30 minutes/day of moderate physical activity ≥ 5 times/week or 20 minutes/day of vigorous physical activity ≥ 3 times/week | Overall: 14.9% (men: 18.3%; women: 11.9%) |
| Peixoto et al. 41/2008 | Goiânia/GO | Population | 2,002 | ≥ 18 | Own question- naire (telephone interviews) | Leisure, work, household and commuting | Sedentary lifestyle | No leisure-time, commuting, or household physical activity and light effort at work | Overall: 29.7% (men: 34.8%; women: 36.6%) |
| Romanzini et al. 24/2008 | Londrina/PR | Schoolchildren (secondary school) | 644 | 14-19 | IPAQ – short version | Leisure, work, household and commuting | Physical inactivity | < 300 minutes/week of moderate to vigorous physical activity | Overall: 39.2% (boys: 33.3%; girls: 42.8%) |
| Silva et al. 25/2008 | Santa Catarina/SC | Schoolchildren (secondary school) | 5,024 | 15-19 | Own question- naire | Leisure, work, household and commuting | Limited activity | < 300 minutes/week of moderate to vigorous physical activity | Overall: 31.0% (boys: 21.0%; girls: 37.0%) |

States of Brazil: AL: Alagoas; BA: Bahia; GO: Goiás; MG: Minas Gerais; PB: Paraíba; PR: Paraná; RJ: Rio de Janeiro; RS: Rio Grande do Sul; SC: Santa Catarina; SP: São Paulo.

IPAQ: *International Physical Activity Questionnaire*; PAQ: *Physical Activity Questionnaire*.

Figure 1

Number of articles on prevalence of physical activity, by year of publication.



more included cities in more than one State or region^{12,13}. The South of Brazil had the most articles (22), followed by the Southeast (16), Northeast (8), Central-West (4), and North (2). The first study with data from the North of Brazil was only published in 2008.

The vast majority of the study samples were population-based (33), and two studies only included women^{14,15}. In ten studies, the sample was school-based^{16,17,18,19,20,21,22,23,24,25} and four included workers^{26,27,28,29}. The sample size ranged from 160 individuals³⁰ to 54,369⁸, while the majority of the studies (38) included more than a thousand subjects, and only two included fewer than five hundred^{30,31}.

As for age bracket, some two-thirds of the studies (32) included adults (18-59 years) and more than half (28) included elderly (≥ 60 years), while in two articles the study sample included only elderly individuals^{31,32}. In all, 20 studies included adolescents (10-17 years), of which ten included only this age bracket. Only two studies included children (7-9 years) in the sample^{20,21}, neither of which exclusively.

In all the studies, physical activity was measured subjectively, i.e., based on subjects' self-reported information. Questionnaires were the most widely used instrument (45 studies). Although the majority of the studies used their own questionnaires, ten used the *Inter-*

national Physical Activity Questionnaire (IPAQ)^{13,18,24,28,32,33,34,35,36,37}. In five studies the interviews were conducted by telephone^{8,38,39,40,41}. Two studies used daily logs to measure physical activity^{16,17}.

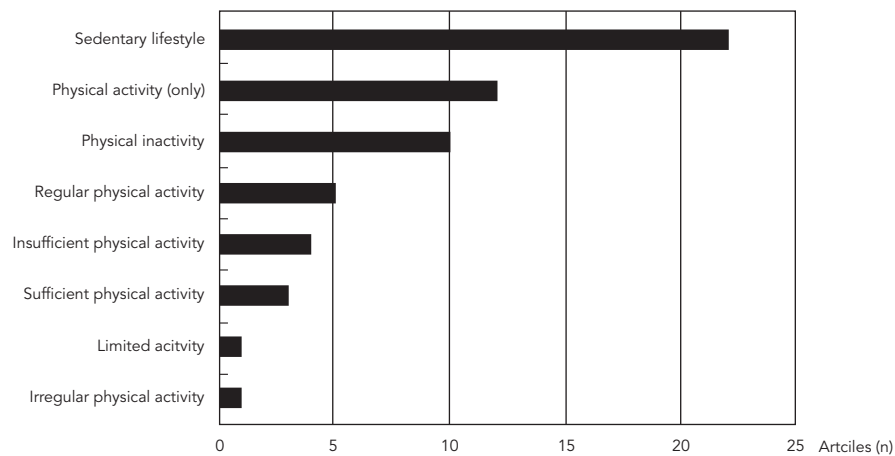
As for domain, 14 studies only investigated leisure-time physical activity, while 13 analyzed total physical activity, i.e., including leisure-time, work, commuting, and household. The most widely studied behavior was sedentary lifestyle (22 studies). Twenty articles assessed prevalence of physical activity, and 16 focused on physical inactivity with its variations (e.g., insufficient physical activity), not counting those that used the nomenclature "sedentary". Figure 2 summarizes the terminology used.

The widest diversity among the studies relates to the criteria for defining the target behaviors (physical activity, inactivity, sedentary lifestyle, and others). Still, as shown in Tables 1 and 2, the most common criterion used with adults and the elderly is 150 minutes per week of moderate to vigorous activity, found in eight studies^{8,12,13,32,33,34,36,40}. The most common criterion for active children and adolescents was at least 300 minutes of physical activity per week, found in six articles^{23,24,25,42,43,44}.

Finally, prevalence of physical activity also varied widely among the studies, from 3.3%¹² to 85.4%⁴², and was nearly always higher for men

Figure 2

Frequency of terms used to define the target behavior.



than women. Although not shown in the tables, there is an inverse association between level of physical activity and age, i.e., the older the individual, the lower the prevalence of physical activity.

Discussion

The current study aimed to systematically compile all the Brazilian studies containing data on prevalence of physical activity or inactivity in representative samples of the population. This is the first (and thus far the only) systematic review in Brazil with this approach, although two other articles have described the epidemiological studies on physical activity, but without approaching the results in terms of prevalence^{1,45}.

Like any other study, this one is also subject to some limitations. Although the literature search was conducted carefully, some article that met the inclusion criteria may not have been identified. This could have happened for two main reasons: (1) physical activity was a secondary variable, i.e., examined jointly with a set of other variables, and the article was not identified in the search and (2) the article is not indexed in any of the databases that were searched, nor does it appear in Google Scholar. However, even though some article may not have been included, it is believed that with the methodology used, the main studies related to the theme were identified.

The review only included studies with probabilistic samples, because convenience samples may not reflect a given behavior's occurrence and/or distribution in the target population. Thus, the review excluded all the studies with non-random samples. Importantly, however, no limit was set on sample size. For example, some studies had fewer than 500 individuals, although the vast majority included more than one thousand each.

Additionally, the literature search placed no restrictions as to date of publication or language. This allowed drawing a timeline for the articles, starting with the first in 1990 to the most recent in 2008. Year of publication was chosen rather than year of data collection, because most studies did not provide the latter information. In addition, studies published in English were included (both from Brazilian and foreign journals). Although publication of Brazilian articles in English is not common, it has increased in recent years, thereby expanding access by foreign researchers to studies conducted in Brazil. The review's main findings are highlighted in the following paragraphs.

First, there was a substantial increase in articles on physical activity in recent years. Of all the studies identified, only two were published before 2000, while 12 articles were published in 2008 alone. Except for three studies (one nationwide, one in the South and Northeast of Brazil, and one in the Southeast and Northeast), the others were conducted in a single State or city. There was a wide disparity of publications between the

geographic regions of Brazil. For example, the city of Pelotas alone (in Rio Grande do Sul State) had ten articles included in this review (some 20% of the total). There was a major concentration of studies in the South and Southeast regions, with the majority of the publications, and few in the Central-West, North, and Northeast. In the North, for example, no study had been published as of 2007.

Distribution by age bracket shows few studies including children (only two were identified). This may have been due to logistic difficulties in collecting data from this age group. There were also few studies done exclusively on the elderly, although several studies included this age group together with adults in general.

All the studies adopted a cross-sectional design. Although this design is appropriate for investigating a given event's occurrence in the population, oftentimes it does not allow establishing temporal relations in the target associations or changes over time. Therefore, cohort studies are needed to study trends in physical activity over time in a given group of individuals, as well as factors that determine variation in physical activity during different stages of life.

As for the instruments used to measure physical activity, the review showed a strong preference for questionnaires, probably for cost-benefit reasons. Nevertheless, the studies adopted a wide range of instruments. The vast majority of authors applied their own questionnaires and/or those adapted (but not validated) from others. This does not rule out the quality of such studies, but does hinder comparison of the results with those of other studies. The most widely used instrument was the IPAQ (short version), which investigates various domains of physical activity. This questionnaire's validity and reproducibility have been tested in 12 countries, including Brazil⁴⁶. The *Global Physical Activity Questionnaire* (GPAQ)⁴⁷, an adaptation of the IPAQ developed by the WHO, is another questionnaire that has been used at the international level to measure level of physical activity.

Only two studies used daily logs (both of which with adolescents). In the coming years, studies may emerge that measure physical activity objectively, especially using pedometers and accelerometers, although such instruments also have their limitations. This practice has been adopted in developed countries, including at the population level⁴⁸. Concerning domain of physical activity, while the first studies focused only on leisure time, more recent studies have emphasized physical activity in the different domains (leisure, work, commuting, and household).

The recall period for physical activity also varied between studies (the tables do not contain this information, since several authors failed to mention it). Among the articles that provided this information, there was a balance between recall during the previous week and during a normal week. An alternative used in international studies has been to collect both pieces of information and analyze the mean for the two (previous week and normal week)⁴⁹.

The current study clearly shows that besides a wide range of instruments, there is no consensus as to the terminology for either describing the target behavior (e.g., sedentary lifestyle, physical inactivity, insufficient physical activity) or the criteria adopted to define such behaviors. Thus, there are authors studying the same behavior but with different nomenclatures, as well as different behaviors with the same nomenclature. This emphasizes the urgent need to standardize the terminology as well as the criteria for defining each behavior. Meanwhile, especially in studies with physical activity as the main variable, there is a trend to study prevalence of physical activity rather than physical inactivity (or sedentary lifestyle), as was done preferentially in the older studies.

With regard to recommendations for physical activity, despite the lack of international consensus, the most widely adopted guidelines are those endorsed in 2007 by the American College of Sports Medicine (ACSM) and the American Heart Association (AHA). The two associations recommend that all healthy adults (18-65 years of age) practice a minimum of 30 minutes of moderate physical activity at least 5 days a week, or 20 minutes of vigorous activity at least 3 days a week, or a combination of the two⁵⁰. Such activities need not be continuous, but they should last a minimum of 10 minutes each, according to the guidelines. For children and adolescents, the same authors refer to a previous publication in which 850 articles were reviewed, reaching the conclusion that school-age youngsters (6-18 years) should practice at least 60 minutes of moderate to vigorous physical activity every day of the week⁵¹. However, some countries (e.g., Canada, England, and Australia) have specific agencies dealing with the subject, and the guidelines are not always consistent with those mentioned above, and can even vary within the same country. A recent example appears in the new guidelines published by the United States Department of Health and Human Services (USDHHS)² in 2008, recommending that individuals 18 years or older practice at least 150 minutes a week of moderate-intensity aerobic activity or 75 minutes a week of vigorous activity.

Thus, all these differences (instruments, recall, domains, terminology, and criteria) make it impossible to compare the different studies' results for prevalence of physical activity. However, an almost universal finding is that physical activity is more prevalent in males and tends to decrease with age (cross-sectional data).

In conclusion, despite the inability to compare the prevalence of physical activity (or inactivity) in Brazilian studies, the attempt was to present each study's results according to its main

methodological aspects. This approach allowed identifying certain limitations and gaps that need to be overcome or filled in future research. It is hoped that the current review will serve as a reference for students, professors, and researchers in the field of physical activity and health, not as a definitive position, but as a point of departure for subsequent work. The aim was also to contribute to the enhancement of this field of knowledge and encourage publication of new studies focusing on this important issue.

Resumo

O objetivo deste estudo foi descrever, por meio de uma revisão sistemática, a prevalência de atividade (ou inatividade) física no Brasil. As bases de dados consultadas foram: LILACS, SciELO, MEDLINE, Web of Science e o portal Google Acadêmico. Os termos de busca foram: "atividade física", "exercício físico", "inatividade física", "sedentarismo", "Brasil" e "brasileiros". Foram localizados 47 estudos (todos transversais) com dados sobre prevalência de atividade física em amostras aleatórias, sendo que em 26, esta foi a principal variável. Apenas dois estudos foram publicados antes de 2000, e 12 em 2008. Houve uma grande concentração de trabalhos nas regiões Sul e Sudeste, e poucos estudos com crianças. Em todos os trabalhos, a atividade física foi mensurada de forma subjetiva, principalmente por meio de questionários, e o domínio mais estudado foi o lazer. Os critérios para definir atividade física variaram amplamente, assim como a sua prevalência. Evidencia-se a necessidade de padronização dos instrumentos, critérios e nomenclatura nos estudos epidemiológicos sobre atividade física.

Atividade Motora; Exercício; Revisão

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