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The prevalence of Active Play in Brazilian children and adolescents: a systematic review

Prevalência de Active Play em crianças e adolescentes brasileiros: uma revisão sistemática

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Abstract – A systematic review of the prevalence of *Active Play* in Brazilian children and adolescents was performed. Only fully available scientific papers that measured *Active Play* or leisure time physical activity independently from other types of physical activity in Brazilian children and/or adolescents were considered for inclusion. The search for potential articles was performed on the following electronic databases: Pubmed/Medline, Web of Science, Bireme, Scielo and Scopus. Initially, 63 papers met the eligibility criteria. However, after deeply analyzed, seven studies remained and were included in the present review. The overall prevalence of *Active Play* was 36%, in which varied from 27.2% to 79.3%. Boys presented a prevalence of 47%, ranging from 39,1% to 79.9%, while the prevalence in girls reached 26%, varying from 13.9% to 78.7%. Although the prevalence of *Active Play* in Brazil in not satisfactory, the potential to present a reliable data regarding this theme should be highlighted. In agreement with some other studies, boys presented a higher prevalence of physical activity than girls. Also, any socioeconomic pattern regarding the prevalence of *Active Play* in children and adolescents was observed when the results from this study were compared to other studies developed in other countries from several socioeconomic status. The *Active Play* should be further investigated individually, as a pivotal component of physical activity, as well as its impact on physical inactivity-related comorbidities.

Key words: Adolescents; Brazil; Children; Leisure activity.

Resumo – *Foi realizada Revisão sistemática acerca da prevalência de brincadeiras ativas em crianças e adolescentes brasileiros. Apenas trabalhos científicos totalmente disponíveis que mediram a atividade física praticada como brincadeira ou lazer em crianças e/ou adolescentes brasileiros foram considerados para inclusão. A busca por artigos foi realizada nas seguintes bases de dados eletrônicas: PubMed/Medline, Web of Science, Bireme, Scielo e Scopus. Inicialmente, 63 artigos preencheram os critérios de elegibilidade, e após análise minuciosa, sete estudos foram incluídos na presente revisão. A prevalência geral de brincadeiras ativas foi de 36%, variando de 27,2% a 79,3%. Os meninos apresentaram prevalência de 47%, variando de 39,1% a 79,9%, enquanto a prevalência nas meninas chegou a 26%, variando de 13,9% a78,7%. Embora no Brasil essa prevalência não seja satisfatória, destaca-se o potencial de apresentar dados relevantes sobre esta temática. Corroborando com outros estudos, os meninos apresentaram maior prevalência de atividade física como brincadeira ou lazer que as meninas. Além disso, não foi encontrado um padrão socioeconômico em relação à prevalência de brincadeiras ativas em crianças e adolescentes quando os resultados deste estudo foram comparados com outros estudos desenvolvidos em outros países de diferentes condições socioeconômicas. Portanto, brincadeiras ativas devem ser investigadas individualmente, como um componente essencial da atividade física, bem como seu impacto nas comorbidades relacionadas à inatividade física.*

Palavras-chave: *Adolescentes; Atividade de lazer; Brasil; Crianças.*

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INTRODUCTION

The importance of physical activity in the pediatric population and its benefits for health is well documented in the literature[1-3]. Insufficient physical activity is one of the leading risk factors of mortality worldwide, and a key risk factor for non-communicable diseases, such as cardiovascular diseases, cancer, diabetes, and obesity[4].

It is estimated that 80% of youth are insufficiently active worldwide[5]. Similar results were found in a study with a Brazilian sample of children and adolescents, in which a prevalence of physical inactivity of 80% for boys and 91% for girls was verified[6].

Taking into account this concerning scenario and considering that physical activity has been found to have a positive influence on both physical and psychological health[7], physical activity practice should be highly encouraged[8,9], regardless its domain (e.g., *Active Play,* active commuting, organized physical activity, domestic activities and work) and intensity[10].

One of the most important domain of physical activity that substantially affects physical inactivity is the *Active Play*[11-13]. Defined as a form of gross motor or total body movement in which young children exert energy in a freely chosen, fun, and unstructured manner[11]. *Active Play* has the potential to make a valuable contribution to children's overall physical activity[14].

It is already known that *Active Play* is considered imperative for the cognitive, physical and emotional development of children and youth[15-17]. Consequently, this new object of study is beginning to be deeply investigated by researches. However, the importance of *Active Play* is still uncertain and varies significantly among countries, between sexes and across ages[18]. In addition, there is a lack of studies regarding *Active Play* in Brazil, and its prevalence among Brazilian children and adolescents is still unknown[19]. Thus, the aim of the present systematic review was to verify the prevalence of *Active Play* in Brazilian children and adolescents.

METHODOLOGICAL PROCEDURES

Search strategy

The present systematic review was conducted strictly following the guidance from the PRISMA Statement[20]. Potential studies were searched in five electronic databases (e.g., Pubmed/Medline, Web of Science, Bireme, Scielo and Scopus). With the aim of covering all available references, and taking into account the difficult to find studies related to the theme, a periodof publication was not specified. The following terms were used in the studies search: 'Active Play', 'Active Behavior', 'Unstructured Physical Activity', 'Active Leisure', 'Active Free Time', 'Active Video Game', 'Exergames', 'Playground Activity', '*Lazer Ativo*', '*Brincar Ativo*', '*Comportamento Ativo*', '*Tempo Livre Ativo*', 'Children', 'Adolescents', 'Youth', '*Crianças*', '*Adolescentes*', '*Jovens*', '*Brasil*', and 'Brazil'. Searches were conducted independently by two authors (JCL and AAM), aiming to duplicate search and match results.

Study selection

Only observational studies were included (e.g., cross-sectional and longitudinal). As inclusion criteria, studies had to be performed with Brazilian children or adolescents (e.g., individuals until 19 years old), and to analyze the prevalence of active play individually, with no influence from other kinds of physical activity. Studies that mixed Brazilian and abroad individuals, such as studies that included structured or scholar physical activity together with active play, with no individual analysis, were excluded from the current systematic review. Papers in English and Portuguese were considered eligible for inclusion.

Potential titles and abstract screening, and further full text assessment were performed by two authors (JCL and RHB). In case of disagreement between the two reviewers, a third author (VHSM) made consensus. In addition, a manual search from the reference lists of the accepted articles was performed. Only full reported studies were considered for eligibility (e.g., short communications, editorials or comments were excluded). Potential articles were organized, assessed and further selected with the aid of the software EndNote X7®.

Data extraction

Relevant information from included articles was extracted independently by four reviewers (JCL, GHO, AMC and VHM) in an electronic spreadsheet. Data was organized in eight domains: author and year of publication, Brazilian region in which the study was developed, cut-off points for physical activity and inactivity, sample size, age range, percentage of female sex, study's goal, and prevalence of *Active Play*.

Active Play

To collect and further analyze data regarding *active play*, studies approaching any physical activity of any intensity since practiced in an unstructured and freely chosen way were considered. The term *active play* is still not consistently established in literature, and many studies use overall physical activity cut-off points to settle the presence of *Active Play*. Studies that used this strategy were also included, provided*active play* was analyzed individually and the cut-off point to verify the presence of active play reached the minimum of one hour of physical activity per day. We decided to include these studies due to the paucity of studies regarding only *active play*,analyzed separately from overall physical activity, since it is a new object of study and need to be further explored.

Quality assessment of selected studies

To verify the methodological quality of selected articles, the National Institutes of Health's Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies was applied in each accepted study individually[21]. This assessment tool is composed by 14 questions that fully contemplate the methodological quality of observational articles. The questions require

simple and direct answers (e.g., yes, no, not applicable, not reported and cannot determine). A score of one is assigned every time the answer "yes" is marked. The overall score ranges from zero to 14. Closer an article gets to reach a score of 14, greater its strength and quality. This assessment tool is useful to measure the strength of scientific evidence. However, due to the paucity of studies regarding the systematic review's theme, it was not used as an exclusion criterion (Box 1).

Box 1. Quality assessment of the included studies.

Criteria	Study ID						
	1	2	3	4	5	6	7
01. Was the research question or objective in this paper clearly stated?	Y	Y	Y	Y	Y	Y	Y
02. Was the study population clearly specified and defined?	Y	Y	Y	Y	Y	Y	Y
03. Was the participation rate of eligible persons at least 50%?	N	N	N	Y	N	Y	N
04. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study pre-specified and applied uniformly to all participants?	N	Y	Y	Y	Y	N	Y
05. Was a sample size justification, power description, or variance and effect estimates provided?	N	Y	N	Y	N	N	N
06. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?	N	N	N	N	N	N	Y
07. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?	N	N	N	N	N	N	Y
08. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g. categories of exposure, or exposure measured as continuous variable)?	Y	Y	NA	Y	Y	Y	Y
09. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	Y	Y	Y	N	Y	Y	Y
10. Was the exposure(s) assessed more than once over time?	N	N	N	N	Y	N	Y
11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	Y	Y	Y	N	Y	Y	Y
12. Were the outcome assessors blinded to the exposure status of participants?	N	N	N	N	N	N	N
13. Was loss to follow-up after baseline 20% or less?	N	N	N	N	Y	N	NR
14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?	N	Y	Y	Y	Y	Y	Y
Total score	05	08	06	07	09	07	10

Note. Y, yes; N, no; NA, not applicable; NR, not reported

RESULTS

Literature search

Searches on electronic databases initially retrieved 2,078 studies (e.g., 1,264 from Pubmed/Medline, 541 from Scopus, 162 from Web of Science, 82 from Bireme, and 29 from Scielo). After exclusion of duplicate records and reading of titles and abstracts, 63 papers met the eligibility criterion and were considered for inclusion in the present study. Of these, seven papers were selected to compose the present systematic review (Figure 1)[22-28].

Description of included studies

Apart from one study that included individuals from all Brazilian regions,

the studies were mostly developed in the Southern (n=4) and Northeastern (n=2) regions. The sample size of studies ranged from 374 to 74,589 individuals, in which the percentage of female sex was slightly higher in eight of nine studies. The age range varied from 10 to 19 years.

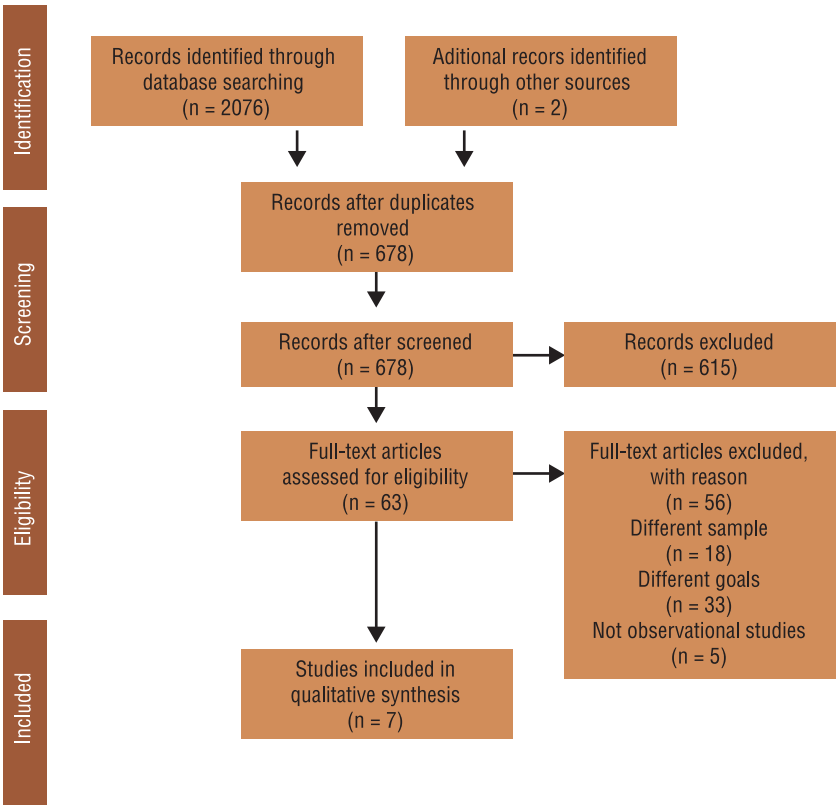

Figure 1. Flow chart of the systematic review.

The cut-off point for physical inactivity was <300 minutes per week in eight of nine studies. One study did not mentioned the cut-off point for inactivity. However, due to the paucity of data regarding the prevalence of *Active Play* in Brazil, the referent study was not excluded from the current systematic review.

Regarding the main goals of selected articles, none of them have the *Active Play* as the main outcome. Mainly, the articles focused on the overall physical activity prevalence and some associated factors that may influence physical activity in this specific population. The *Active Play* was analyzed secondarily, in order to identify types of physical activity that could mostly affected the prevalence of physical activity in children and adolescents.

Prevalence of Active Play

The overall prevalence of *Active Play* was 36% in which ranged from 27.2% to 79.3%. Considering only studies that analyzed *Active Play* according to sex (e.g., five out of seven studies), boys had a higher prevalence of *Active Play* than girls (e.g., 47% and 26%, respectively). The prevalence of *Active Play* in boys ranged from 39.1% to 79.7%.In girls, it varied from 13.9% to 78.8% (Table 1).

Table 1. Descriptive characteristics of included studies (n= 7).

Study	Region	Sample size	Age range (years)	Sex (% Female)	Cut-off point for physical inactivity	Main goal	Prevalence of Active Play
Collet al.[22]	Southern	1,600	10-19	52%	<300 minutes per week	To evaluate time trends in physical activity among adolescents aged 10 to 19 years living in Southern Brazil over a 7-year period	27.2%[µ]
Dumith et al.[23]	Southern	4,325	14-15	51%	<300 minutes per week	To estimate the prevalence of physical activity and identify its correlates among adolescents from Southern Brazil	38.2%
Mendonça et al.[24]	Northeastern	2,686	14-19	57.8%	<300 minutes per week	To examine the association between perceived neighborhood environmental characteristics and different types of physical activities in adolescents from Northeastern Brazil	35.3% (32.4% female; 39.1% male)
Alves et al. [25]	Northeastern	803	10-14	50.6%	<300 minutes per week	To investigate the associated factors of physical inactivity in adolescents from Salvador, Bahia	45.9% (13.9% female; 77.9% male)
Cureau et al. [26]	All regions	74,589	12-17	55%	<300 minutes per week	To assess the prevalence of leisure physical inactivity and its association with geographic and sociodemographic variables	45.7% (29.3% female; 62% male)
Azevedo et al. [27]	Southern	3,736	11-18	51.8%	<300 minutes per week	To analyze physical activity during adolescence in participants of the 1993 Pelotas Birth Cohort Study, Brazil	37.7% (25.6% female; 50.7 male)
Sales-Nobre et al. [28]	Southern	374	15-18	40.6%	NR	To identify leisure habits, physical activity level and health-related physical fitness of Brazilian adolescents from both sexes	79.3% (78.8 female; 79.7% male)

µPrevalence of active play is a mean of values from 2005 and 2012 (e.g., 26.3% and 27.2%).

Quality assessment of selected studies

Box 1 presents the criteria used to assess the methodological quality of the selected studies as well as its global ratings. The studies scored an average of seven out of 14. The individual scores varied from five to 10. All studies presented clear objectives, and the study population was rigorously specified and defined. In six out of seven studies, the outcome measures (e.g., dependent variables) were consistently defined, reliable and implemented across all sample. The confounding variables were measured and properly adjusted when necessary. Individuals from selected studies were from the same population, recruited at the same period, and the pre-specified inclusion and exclusion criteria were applied uniformly to all participants in five out of seven studies. Only two studies provided a sample size justification and mentioned their participation rate. No study has blinded assessors to the exposure status of participants.

The aforementioned assessment tool was developed and validated to embrace both cohort and cross-sectional studies. However, some questions are only applicable to cohort studies. The massive inclusion of cross-sectional studies (e.g., six out of seven) in the present systematic review

may explain some low scored achieved (e.g., instead of "no", "not applicable" or "nor reported" were assigned in some questions). It does not represent poor methodological quality, but particular strategies used by authors that differ from the criteria used in the assessment tool. Still, it was considered the best assessment protocol for the present systematic review.

DISCUSSION

The aim of the present systematic review was to verify the prevalence of *Active Play* in Brazilian children and adolescents. Based on seven studies that met the eligibility criteria, the prevalence of *Active Play* varied between 79.3% and 27.2% and, in which the average prevalence is 36%. When divided by sex, the prevalence was higher for boys than girls, reaching 47% and 26%, respectively.

This prevalence is not satisfactory when compared to studies from other countries. The Global Matrix 2.0 project aimed to elaborate a grading scheme regarding physical activity and its different domains, including *Active Play*, to most accurately compare the prevalence of physical activity among countries[18]. The grading scheme for each domain of physical activity starts with a benchmark of what a child need to achieve to get a sufficient amount of physical activity and goes from "A+" to "F", in which "A+" is the best grade possibly achieved and "F" the worst. Using the grading scheme aforementioned, Brazil would receive as grade the concept "D+", the same as Canada and Zimbabwe. It represents that Brazil is succeeding to promote *Active Play* with less than half but some children and adolescents (e.g., 36% of *Active Play* prevalence).

Countries like Ghana, Kenya and Netherlands received concept "A" as grade, representing a great prevalence of *Active Play*. This means that these countries have as *Active Play* prevalence an average that ranges from 67% to 73%. New Zealand also presented a high prevalence of *Active Play* that ranged between 60% and 66%, getting a "B" as grade. Countries like Belgium, Spain, Finland, Nigeria and Wales presented an acceptable prevalence of *Active Play*, in which the values varied from 53% to 59%, receiving as grade the concept "C". Some other countries (e.g., Portugal, Mozambique, Slovenia, China, Mexico and Thailand) presented a very unsatisfactory prevalence of *Active Play* of less than 30%. Taking into account that many countries could not even analyze the prevalence of *Active Play* due to the lack of studies regarding this theme[18], countries that have analyzed the prevalence of *Active Play*, even with a low grade, should not be disregarded because they've shown that this domain of physical activity is already being considered as an object of study in their country.

Many countries from different socioeconomic status presented data regarding the prevalence of *Active Play*. Although the study of Oyeyemi et al.[29] have found that among Nigeria children and youth, *Active Play* and leisure physical activity seems to be influenced by sex and socioeconomic status, it does not represent a global pattern. In their study, boys from

families with high socioeconomic status are more likely to engage in *Active Play* and leisure physical activities than their counterparts from low socioeconomic status[29]. Conflicting, children from high socioeconomic income appear to have a lower likelihood of achieving the physical activity recommendation[15]. However, considering the results from the study of Tremblay et al.[18], after analyzing several countries from different conditions, they conclude that there is not a clear pattern of socioeconomic features associated with high or low prevalences of *Active Play*. Therefore, the socioeconomic status do not seems to determine the prevalence of *Active Play*.

Another main issue that could influence the prevalence of *Active Play* is sex. It is well established in literature that sex is consistently identified as a determinant of physical activity in children and youth[30,31], in which boys are found to be more physically active than girls, and these differences tend to increase with age[32]. This evidence is in accordance with the results found in the present systematic review, since all included studies that verified the prevalence of *Active Play* stratifying sample by sex have found a higher prevalence of *Active Play* in boys. Apparently, regardless physical activity domains', boys seems to always present a higher prevalence of physical activity than girls. Therefore, it was observed a tendency on sex differences in physical activity prevalence considering different domains of physical activity (e.g., organized physical activity, active play, and active commuting)[22,23,27]. Moreover, organized physical activity may act as a gateway to *Active Play*, in which an association with organized sport participation and increased free *Active Play* participation was observed[33].

The current systematic review has some limitations. Firstly, due to the paucity of data concerning the prevalence of *Active Play* in Brazil, we considered as *Active Play* any physical activity performed during leisure time, preferably in a freely chosen way. However, studies that measured only leisure time physical activity without a more detailed description were not excluded from the study. In addition, there is not a well-established consensus on a definition of *Active Play* and how to properly measure it as well as a universally benchmark that allow this indicator to be assessed independently from other physical activities[11]. This lack of consensus made it difficult to select studies that better match with the present systematic review theme. Yet, considering that studies did not assess *Active Play* as an independent domain of leisure-time physical activity, we respected the consensual cut-off point for physical activity and inactivity used by studies to assess all kinds of physical activity (e.g. 300 minutes per week or more to be considered physically active).

Nonetheless, the study also has its strengths that need to be mentioned. To our knowledge, this is the first study that verified the prevalence of *Active Play* in Brazilian children and adolescents as a main goal. The present systematic review's theme is extremelyelevant, since stimulating *Active Play* is the best way to encourage children to be active, in order to tackle physical inactivity health-related comorbidities, such as childhood obesity[11]. Thus, with respect to *Active Play* and its benefits for children both development

and health, this should not be ignored[34,35]. Initiatives aiming to increase physical activity in an attempt to address physical inactivity-related comorbidities should include *Active Play* as a pivotal component[36]. This initiatives should take place not only in Brazil, but worldwide, considering that *Active Play* is a new domain of physical activity and the interest for this object of study is still spreading. It is from substantial importance to stimulate *Active Play*, in order to tackle many non-communicable diseases directly linked to physical inactivity, such as obesity.

CONCLUSION

This systematic review showed that the prevalence of *Active Play* in Brazilian children and adolescents was 36%, but it varied from 27.2% to 79.3%. It was not found a clear pattern in the association of socioeconomic status and higher prevalence of *Active* Play. In addition, it was observed that boys are more engaged in physical activities through *Active Play* than girls. However, due to the paucity of data regarding *Active Play* in Brazil as well as the lack of consensus on a definition and universal benchmark to assess this indicator independently from other physical activity domains, it is imperative to further investigate *Active Play* as an isolated domain of physical activity, verifying its contribution in order to tackle childhood physical inactivity and related comorbidities.

COMPLIANCE WITH ETHICAL STANDARDS

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Conflict of interest statement

The authors have no conflict of interests to declare.

Author Contributions

Conceived and designed the experiments: JCL, GHO, RHB, NNJ, and WAL. Performed the experiments: JCL, AAM, RHB, CFS, VHSM and AMCSM. Analyzed the data: GHO, JCL, NNJ, AAM, WAL, and RHB. Contributed reagents/materials/analysis tools: JCL, CFS, RHB, VHSM, AMCSM, and AAM. Wrote the paper: JCL, WAL, CFS, GHO, AAM, and NNJ.

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