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School physical activity and mental health in school-aged Brazilian adolescents: a systematic review

Atividade física e saúde mental em adolescentes brasileiros escolarizados: uma revisão sistemática

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Abstract – The aim of this study was to identify evidence regarding associations between School Physical Activity (PA) and Mental Health (MH) in Brazilian school-aged adolescents. This is a systematic review study. Studies were selected in Portuguese and English and identified by a systematic search in six electronic databases: PubMed, Web of Science, SPORTDiscus / Ebsco, ScIELO, ERIC, and LILACS, which comprised publications until 2019. Inclusion criteria were: studies with cohort, descriptive, cross-sectional or qualitative design; performed with children and adolescents; studies that analyzed the relationship between PA and MH; studies that investigated adolescents who practiced PA in schools; studies carried out in Brazil; and studies that reached minimum of 60% of methodological quality criteria according to STROBE. Physical education, as curricular activity in basic education, has protective effect on MH in the school setting. In addition, more than 300 min/week of PA was positively associated with MH; while associations between PA and excessive TV time; social isolation; and body weight dissatisfaction were negatively associated. School PA is positively associated with MH as it promotes physical and psychological well-being, impacting on the reduction of insomnia rates, attenuating loneliness and improving physical appearance.

Key words: Physical activity; Mental health; Adolescents; School; Brazil.

Resumo – *Objetivou-se identificar a evidência quanto às associações entre atividade física (AF) e saúde mental (SM) em adolescentes escolarizados brasileiros. Trata-se de um estudo de Revisão Sistemática. Os estudos foram selecionados em português e inglês e identificados por meio de uma busca sistemática em seis bases de dados eletrônicas: PubMed, Web of Science, SPORTDiscus/Ebsco, ScIELO, ERIC, e LILACS, que compreendeu publicações até o final de 2019. Os critérios de inclusão foram: estudos com um desenho de coorte, descritivo de caráter exploratório, transversal, ou qualitativos; realizados com crianças e adolescentes; estudos que analisaram a relação entre AF e SM; estudos que investigaram adolescentes que praticavam AF nas escolas; estudos realizados no Brasil e os que obtiveram a pontuação mínima estabelecida de 60% conforme os critérios da qualidade metodológica do instrumento STROBE. A Educação Física oferecida no currículo da educação básica tem um efeito protetor sobre a SM no ambiente escolar. Além disso, mais de 300 min/semana de AF foi associado positivamente com a SM. Algumas associações foram negativas entre a AF e a SM, tais como: tempo excessivo de TV; isolamento social; insatisfação com o peso corporal. A AF escolar está associada positivamente à SM por promover bem-estar físico e psicológico, impactando na redução dos índices de problema de insônia, atenuando a solidão e melhorando a aparência física.*

Palavras-chave: *Atividade física; Saúde mental; Adolescentes; Escola; Brasil.*

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INTRODUCTION

The World Health Organization (WHO) estimates that 10% to 20% of adolescents in the world experience some type of problem related to mental health[1]. All these adversities directly impact the mental health of individuals. In Brazil, there are problems that involve sociodemographic issues, whereas the worse the social conditions, the greater the number of reported psychiatric complications and hospitalizations[2]. Considering that every adolescent has the right to the promotion and protection of mental health so that these problems are alleviated or avoided, there must be intervention strategies and policy guidelines to help children and adolescents maintain their mental health[3].

Worldwide, depression is one of the main causes of diseases and disability among adolescents. Suicide is the third leading cause of death among adolescents aged 15-19 years[4]. In addition to these poor mental health indicators mentioned above, several other mental health disorders adversely affect school performance[5]. Nevertheless, children and adolescents with mental health problems, such as academic stress, are at greater risk of developing depression and other determinants that can lead to problems in the lives of these individuals[6].

Studies have shown that there is improvement in the mental health status of children and adolescents with the practice of several types of physical activities[7,8]. Thus, physical activity is an alternative to control and prevent mental health problems in school-aged children and adolescents[9]. The practice of sports, physical education at school and leisure-time physical activity, even without reaching the current recommendation, are related to the good mental health among young people[9].

Furthermore, in a Brazilian sample, a study concluded that health care programs should be carried out with actions that favor the practice of physical activities, considering the contribution of active behavior in improving mental health[10]. However, despite the aforementioned and contextualized studies, in Brazil, it is not clear in literature whether there are associations between physical activity and mental health problems within the school environment in children and adolescents. Therefore, a systematic review is needed to gather information from studies that indirectly deal about the theme so that mental health indicators in Brazilian school children and adolescents can be exposed and debated.

Therefore, the aim of this systematic review was to identify evidence regarding associations between school physical activity and mental health in Brazilian school-aged adolescents.

METHODS

Search strategy

This is a systematic literature review study that first selected the respective descriptors for later consultation in databases. The selection of descriptors was performed by consulting Health Sciences Descriptors (DeCS) and Medical Subject Headings (MeSH), considering their concepts, taxonomy and possible synonyms. Thus, the search used: Child, Child Behavior, Child Health, Adolescent Behavior, Adolescent Health, Adolescent, Body Image, Anthropometry, Exercise,

Sports, Motor Activity, Physical Education, Sedentary Behavior, Mental Health, Affective Disorders, Anxiety, Depression, Stress Psychological, Sadness, Social Isolation, Suicidal Ideation. Studies were selected in Portuguese and English and identified through a systematic search in six electronic databases: PubMed, Web of Science, SPORTDiscus/Ebsco, ScIELO, ERIC, and LILACS, which contain several important journals.

The following search strings were used, according to each database:

a) **PUBMED**: (Brazil*) AND ("Child" OR "Child Behavior" OR "Adolescent" OR "Child Health" OR "adolescent health" OR "adolescent behavior" OR "teen*") AND ("school" OR "school-age" OR "school children") AND ("Exercise" OR "Sports" OR "Physical Education" OR "Physical Activity" OR "Motor Activity" OR "Sedentary Behavior") AND ("Mental Health" OR "Affective Disorders" OR "Anxiety" OR "Depression" OR "Stress Psychological" OR "sadness" OR "body image" OR "anthropometry" OR "suicid* ideation" OR "social isolation");

b) **Web of Science:** (BRAZIL*(Child*OR Adolescent* OR Teen* OR youth* OR Pubert* OR boy* OR girl* OR childhood OR school-age) AND ("Mental Health" OR "Mental Hygiene" OR "Self Concept*" OR "self-perception*" OR "Self-esteem*" OR "Self esteem*" OR "Body Image*" OR "anthropometry" OR "Body representation*" OR "Body Schema" OR "Self Efficacy" OR "Self-efficacy" OR "Happiness*" OR "Positive Affect*" "Negative affect*" OR "Mood*" OR "Optimism" OR "Anxiet*" OR "Hypervigilance" OR "Nervousness" OR "Depression*" OR "Depressive symptom*" OR "Emotional depression*" OR "Pessimism" OR "Psychological stress*" OR "Life stress*" OR "Psychologic stress") AND (Exercis* OR "physical exercis*" OR "Aerobic exercis*" OR Sport* OR athletic* OR "Motor Activity" OR "Motor activit*" OR "Physical activit*" OR "Locomotor activit*" OR "Physical Education and Training" OR "Physical education" OR "Moderate physical activity" OR "Vigorous physical activity" OR "Moderate-to-vigorous physical activity" OR "Sedentary Lifestyle*" OR "Sedentary time" OR Sedentary OR "Sedentary behavior*" OR Inactivity OR "suicid* ideation" OR "social isolation"));

c) **SPORTDiscus/Ebsco:** "Child" OR "Child Behavior" OR "Adolescent" OR "Child Health" OR "adolescent health" OR "adolescent behavior" OR "teen*") AND ("school" OR "school-age" OR "school children") AND ("Exercise" OR "Sports" OR "Physical Education" OR "Physical Activity" OR "Motor Activity" OR "Sedentary Behavior") AND ("Mental Health" OR "Affective Disorders" OR "Anxiety" OR "Depression" OR "Stress Psychological" OR "sadness" OR "body image" OR "anthropometry" OR "suicid* ideation" OR "social isolation") AND (Brazil*);

d) **ScIELO:** (child) OR (Child Behavior) OR (Child Health) OR (Adolescent) AND (Brasil) OR (Brazil) AND (Physical (child) OR (Child Behavior) OR (Child Health) OR (Adolescent) AND (Brasil) OR (Brazil) AND (Physical Education) OR (Sedentary behavior) OR (Sports) AND (Mental Health) OR (Affective Disorders) OR (Anxiety) OR (Depression) OR (Stress Psychological) OR (Suicide ideation) OR (Social isolation) (Anxiety) OR (Depression) OR (Stress Psychological) OR (Suicide ideation) OR (Social isolation);

e) **ERIC:** Child OR Child Behavior OR Adolescent OR Child Health OR adolescent health OR adolescent behavior OR teen* AND school OR school-age OR school children AND Exercise OR Sports OR Physical Education

OR Physical Activity OR Motor Activity OR Sedentary Behavior AND Mental Health OR Affective Disorders OR Anxiety OR Depression OR Stress Psychological OR sadness OR body image OR anthropometry OR suicid* ideation OR social isolation AND Brazil;

f) **LILACS:** (tw:(Child)) OR (tw:(Child Behavior)) OR (tw:(Child Health)) OR (tw:(Adolescent)) AND (tw:(Brazil)) AND (tw:(Exercise)) OR (tw:(Sports)) OR (tw:(Motor Activity)) OR (tw:(Physical Education)) OR (tw:(Sedentary Behavior)) AND (tw:(Mental Health)) OR (tw:(Affective Disorders)) OR (tw:(Anxiety)) OR (tw:(Depression)) OR (tw:(Stress Psychological).

Selection of studies

Considering the possible influence of the SARS-CoV-2 (COVID-19) pandemic on the results of studies for the topic addressed by this work, a time limit was established, which comprised articles published until December 2019. Searches were carried out between the period from August and September, 2020.

At this stage, after searching databases, studies were exported to the Mendeley software for organization and verification of duplicates. The selection of studies took place using the Start software and was performed by three different evaluators, initially focusing on the evaluation of titles and abstracts. Conflicts in this selection phase were resolved through further discussion and consensus. Inclusion criteria for studies were: 1) cohort, descriptive, exploratory, cross-sectional and qualitative studies; 2) studies including children and adolescents; 3) studies that analyzed the relationship between physical activity and mental health; 4) studies that investigated adolescents who practiced physical activity in schools and 5) studies carried out in Brazil.

Exclusion criteria were: 1) theses, dissertations, monographs, abstracts, book chapters, points of view and review - narrative studies, systematic or meta-analysis; 2) studies performed with animals; 3) those that did not allow for different age groups by the form of data presentation; 4) those that did not show sufficient methodological quality (i.e., > 60% STROBE); and 5) articles published after 2019.

Quality assessment of studies

The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) was used to assess the methodological quality of studies[11]. STROBE is an instrument composed of 22 items with guidelines on what should be included in the writing of an article and what could fully contemplate the methodological quality of observational studies. After reading each article, it was possible to assess whether the study meets the 22 items required by STROBE. If the article reached the total score, it received grade of 100%. The cutoff score for being in the present study was to obtain at least grade of 60% in this instrument, thus, they were considered eligible for the final stage.

Data extraction

Three independent reviewers screened titles and abstracts to identify potentially eligible studies. The same reviewers evaluated full texts considering

the inclusion and exclusion criteria of this review. Subsequently, they extracted data from the included studies using a standardized form. Data were entered into an Excel spreadsheet containing the following information: "author", "year of publication", "region of study", "type of study", "sample size", "population of interest", "study quality analysis score", "diagnosis/main variables", "prevalence", "diagnostic tool/criteria", "other variables" and "main results".

RESULTS

Search and selection results

In principle, the bibliographic search resulted in 1793 articles and all were identified by searching the previously presented databases. From the search for descriptors in title or abstract, 36 studies were identified. Of these, 24 were selected by reading the title and abstract and 44 articles were excluded for being literature reviews or studies arising from repeated databases. Of the remaining 36 studies, 12 were excluded for not meeting the inclusion criteria (2 were excluded for not being within the predefined age group, 7 were not in accordance with the theme/objective of the review and 3 were excluded for not having been carried out within the school environment). For the final analysis, 12 studies were qualitatively evaluated, 2 of which were excluded for not reaching the desired quality score. Thus, 10 articles were included in this review (Figure 1).

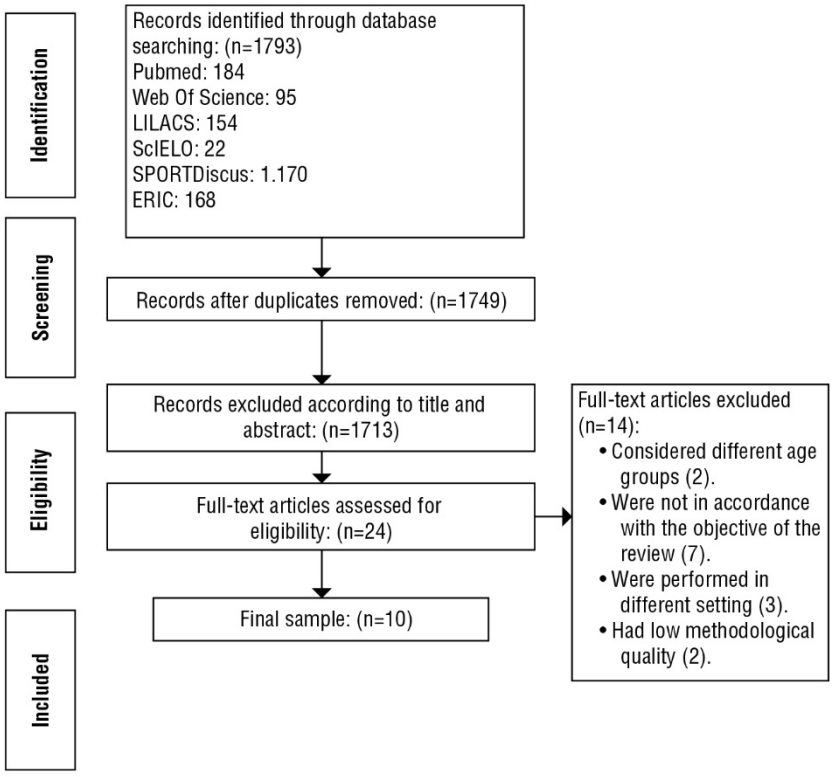

Figure 1. Flowchart representing the selection of articles for this review.

Characteristics of included studies

Table 1 presents the characteristics of the selected studies that investigated the prevalence of mental health disorders in Brazilian schoolchildren and adolescents, highlighting the year of publication, the region of Brazil where it was carried out, the type of study and sample, and the score obtained from the STROBE.

The most frequent study design was cross-sectional (n = 6)[7,12-16], followed by descriptive exploratory character (n = 2)[8,17]. One study had cohort/longitudinal design [18] and another in qualitative design[19]. The school was the main place where studies were carried out (n = 10), but one study used interviews to collect information[19].

The number of participants ranged from 96 to 102,301. Only one study used sample smaller than 100 participants[19]. Six studies were carried out with elementary school students; 3 studies with high school students; 1 study with elementary and high school students. Studies evaluated children and adolescents with pre-established scripts, questionnaires and scales (n=9). One study interviewed children or adolescents themselves (n = 1)[19].

Regarding the methodological quality of articles, assessed using the STROBE, the minimum score established was 60%. The maximum score was 81.25%, obtained in one study[7].

Table 1. Characteristics of studies that investigated the prevalence of mental health disorders among school children and adolescents

Authors	Year of publication	Region where the study was carried out	Type of study	Sample size (n)	Population of interest	Study quality analysis score (STROBE)
Straatmann et al.[18]	2016	Southeastern	Cohort/ Longitudinal	526	Elementary school. Children and Adolescents (Age at start: 10 - 15 years) and a high school cohort (Age at start: 13.5 to 19 -years).	71.87%
Silva et al.[19]	2014	Southeastern	Qualitative	96	Elementary school	80%
Levandoski and Luiz Cardoso[17]	2013	Southern	Descriptive of exploratory character	337	Elementary school 6th grade Adolescents aged 13-19 years	65.62%
Matias et al.[8]	2010	Southern	Descriptive of exploratory character	316	13 - 19 years.	62.06%
Werneck et al.[7]	2019	Northern, Northeastern, Midwestern, Southeastern and Southern	Cross-sectional	100.839	Elementary school 9th grade	81.25%
Gonzaga et al.[12]*	2021	Southern	Cross-sectional	938	Adolescents and young people aged 15-19 years	72%
Cruzeiro et al.[14]	2008	Southern	Cross-sectional	1.145	11-15 years.	65.62%
Santos et al.[16]	2015	Northeastern	Cross-sectional	4.207	High school 14-19 years	65.62%
Triaca et al.[15]	2019	Northern, Northeastern, Midwestern, Southeastern and Southern	Cross-sectional	102.301	Elementary school 9th grade 13-17 years.	71.87%
de Almeida Silva and Menezes[13]	2018	Northeastern	Cross-sectional	3.992	High school 14-19 years	65.62%

*The Study by Gonzaga et al.12 was originally published in the E-Pub on November 11, 2019, however, the version in the journal was released in 2021, with a new bibliographic indication.

The most frequent disorders found, respectively, were: feeling of loneliness, body weight dissatisfaction, insomnia, conduct disorders, bullying, stress, social isolation and inadequate psychological well-being. Other indicators were: body image, teasing and lack of social support. Regarding the association of physical activity with the mental health of children and adolescents, results showed that school physical activity is associated with body satisfaction; in this case, active adolescents are more satisfied. More than 300 min/week of physical activity was sufficient to eliminate the association of excessive TV time and sitting time with social isolation markers in boys, and 73% of female adolescents who are physically active are dissatisfied with their body weight. In male adolescents, these values drop to 32.2%.

Prevalence values for mental health variables varied among studies: Loneliness[13]: 50.3%; body weight dissatisfaction[8]: 45.6%; insomnia[13]: 45.7%; conduct disorders[14]: 29.2%; stress[13]: 20.1%, social isolation[16]: 17.6%; inadequate psychological well-being[18]: 10.4%. Regarding Physical Activity[12,18], there was variation in prevalence between 64.5% and 70.09%. In addition, indirect indicators that had average prevalence results were: body image[12,17]: 48.05%; teasing[12]: 72.9%.

In addition, several factors that could be related to physical activity, sedentary behavior and mental health in Brazilian children and adolescents were identified. Factors such as daily screen time spent on TV, physical exercise, sedentary lifestyle, sedentary behavior, body image perception scales, anxiety, depression, loneliness, body image dissatisfaction, sleep and environmental factors such as violence and stressful life events were also very important investigated. Behavioral factors were associated with mental disorders in only two studies (Table 2). Physical education offered in the basic education curriculum has protective effect on the mental health of school-aged children[15]. Furthermore, more than 300 min/week of physical activity was positively associated with mental health[7]. Some associations were negative between physical activity and mental health, such as: 1) excessive TV time[18], 2) social isolation[7,16] and 3) body weight dissatisfaction[8,12,17,19].

Table 2. Characteristics of studies that investigated the prevalence of mental.

Authors	Diagnostic/ Main prevalence variables	Prevalence	Instrument/Diagnostic criterion	Other variables	Main results
Straatmann et al.[18]	Physical activity Sedentary behavior Psychological well-being	70.90% 42.70% 10.40%	10.4% IPAQ, psychological domain by KIDSCREEN 27	Screen time with daily time spent in front of the TV	Significant inverse association between "psychological well-being" and screen minutes per day at T2 (r(2) = 0.049/β = -3.81 (95% CI -7.0, -0.9)), association between psychological well-being and onset of screen time recommended in categorical analyses (crude RR: 1.3; 95% CI 1, 1, 1.7; Adjusted RR: 1.3; 95% CI 1.0, 1.6). For males, association between psychological well-being and insufficient onset of activity 2 years later (crude RR: 1.3; 95% CI 1.2, 1.4; Adjusted RR: 1.2; 95% CI 1.1, 1.4)

IPAQ: International Physical Activity Questionnaire; RR: Relative Risk; CI: Confidence Interval; OR: Odds Ratio.

Table 2. Continued...

Authors	Diagnostic/ Main prevalence variables	Prevalence	Instrument/Diagnostic criterion	Other variables	Main results
Silva et al.[19]	Body image	Not informed	Pre-established script containing topics that supported the debate	Physical exercise practice	The influence of the media on body image showed the difficulty of achieving the perfect body and is viewed with suspicion in the face of beauty transmission standards; the importance of a healthy body was noted as standards of beauty and good appearance were closely linked to good physical condition and result from having healthy body; the relationship between the standard of beauty and prejudice, as people who are not considered attractive, with minor physical imperfections, are discriminated against and can be rejected or even excluded from society
Levandoski and Luiz Cardoso[17]	Bullying, Body image Social status	28.30% 65.40% Not informed	Study of violence among peers, sociometric examination, body image perception scale and social status scale at school		The incidence was 28.3% of students involved in bullying, with 14.1, 4.3 and 9.8% being victims (V), aggressors/victims (AV) and aggressors (A)
Matias et al.[8]	Physical activity, Body weight satisfaction	64.50% 45.60%	Habitual physical activities (QAFH), behavioral change stages questionnaire for physical activity (EMCAF)	Self-assessment of lifestyle and self-efficacy	Physical activity is associated with body satisfaction, in this case, active adolescents seem to be more satisfied. The opposite is true and there is a tendency for sedentary adolescents to be dissatisfied with their bodies, especially girls. It was concluded that the practice of physical activity in adolescence is an important mediator in the formation of positive concepts about the body
Werneck et al.[7]	Social isolation Physical activity Sedentary behavior	Not informed	Cross-sectional analyses of PeNSE 2015	Chronological age, race and type of city (capital or other)	Longer sitting time was associated with greater probability of social isolation, and it was low (<1 h / d) [boys: OR: 1.54 (95% CI: 1.33-1.77); girls: OR: 1.31 (95% CI: 1.17 to 1.48] and long TV time (≥8 h / d) [boys: OR: 1.75 (95% CI: 1.47 to 2.09)]; girls: OR: 1.58 (95% CI: 1.37 to 1.82)]. More than 300 min/week of physical activity was enough to eliminate the association of excessive TV time and sitting time with social isolation markers in boys
Gonzaga et al.[12]	Body image Physical activity Teasing Social support	30.70% 73.10% 72.90% 27.30%	Body Dissatisfaction Scale for Adolescents- EEICA	Demographics, body image, physical activity, teasing, and perceived social support	There was no difference in body image dissatisfaction between adolescents who practiced and did not practice physical activity, but among the former, those who had been provoked had greater body dissatisfaction. In addition, adolescents who had a relative or friend to talk to, in addition to giving and receiving affection, were more likely to have lower body image dissatisfaction. Stratifying the sample by sex, the results were similar in females, but not significant in males

IPAQ: International Physical Activity Questionnaire; RR: Relative Risk; CI: Confidence Interval; OR: Odds Ratio.

Table 2. Continued...

Authors	Diagnostic/ Main prevalence variables	Prevalence	Instrument/Diagnostic criterion	Other variables	Main results
Cruzeiro et al.[14]	Conduct disorder	29.20%	Mini International Neuropsychiatric Interview (MINI)	Behavioral factors, Socioeconomic level; use of alcoholic beverages; use/ abuse of illicit drugs; bullying; sedentary lifestyle.	It is estimated that 29.2% of adolescents have conduct disorder. In males, the chance of having conduct disorder increased by 2.04. Suffering bullying remained associated with 2.02, lower socioeconomic class 1.65, drug use in the last month increased by 3 times the chance of conduct disorder 2.28, sedentary lifestyle 1.44, alcoholic beverage 2.64, that is, all these factors were associated with greater number of behaviors related to conduct disorder
Santos et al.[16]	Social isolation (feeling loneliness and having few friends)	17.60%	Global School-based Student Health Survey (GSHS) Questionnaire	Social isolation (feeling loneliness and having few friends)	Regarding the social isolation indicator, it is estimated that 15.8% of participants reported feeling loneliness and 19.5% reported having few friends. The female gender was highlighted, as both the feeling of loneliness and having few friends were significantly higher (p=0.001). Participation in physical education classes was identified as a factor associated with 24% lower chance of having few friends
Triaca et al.[15]	. Loneliness Sleep problems	Not informed	Loneliness, sleep problems, physical activity	Physical activity	Results showed that school physical education has negative effect, reducing the probability of reporting insomnia and loneliness problems among students who attend the discipline. Physical education offered in the basic education curriculum has protective effect on the mental health of school-aged children.
de Almeida Silva and Menezes[13]	Stress perception Feeling of loneliness Difficulty sleeping	20.10% - 50.30% 45.70%	Self-applied questionnaire	Sedentary behavior; Physical activity; consumption of fruits and vegetables, soft drinks, alcohol and drugs; smoking	High prevalence of sedentary behavior; sedentary behavior positively associated with low levels of physical activity, soft drink consumption, negative stress perception, feeling of loneliness and difficulty sleeping, alcohol consumption inversely associated with sedentary behavior

IPAQ: International Physical Activity Questionnaire; RR: Relative Risk; CI: Confidence Interval; OR: Odds Ratio.

DISCUSSION

The main finding of this systematic review was that the practice of physical activity in schools is associated with mental health. In addition, active participation in physical education classes provides a beneficial effect on both physical and emotional development of students. It also works to improve psychological well-being, as well as reducing the likelihood of reports of insomnia, stress and loneliness. Thus, it prevents body image dissatisfaction, as losing weight has a significant impact on appearance and body perception among adolescents.

The results presented in studies related to body image[8,17,19] indicate that adolescents who have less participation in physical activities in the school environment showed greater body dissatisfaction. In addition, students who feel teased or embarrassed during physical education classes due to their physical appearance, poor motor skills, nicknames related to body size or weight, significantly reduced participation in physical education classes[12], which is worrisome because physical activity is linked to several benefits for mental and physical health during adolescence[8]. Despite the negative impact of the feeling of being teased, students who had the highest levels of social support had healthier levels of body esteem, reducing the effects of teasing in class[12]. In this way, the participation of family and school in the lives of children and adolescents play such an important role, which is to protect and promote physical and psychological well-being[20].

Another relevant aspect that can be considered is the perception of stress associated with low levels of physical activity and other health risk behaviors such as inadequate consumption of fruits, vegetables, soft drinks, exposure to alcohol, drugs, and smoking[13]. In addition, other mental health indicators such as the feeling of loneliness and difficulty sleeping are potential risk factors for the mental and physical health of children and adolescents.

It is important to note that among the 10 studies included in this systematic review, only one article aimed at estimating the prevalence of behavioral disorders[14], the study reports that male adolescents are more likely of developing "conduct disorder" derived from "alcohol abuse" and "drug use", while the other articles presented mental health indicators such as loneliness, stress, insomnia, low self-esteem, social isolation, inadequate psychological well-being. This situation may indicate the need for a better classification of the elements that characterize aspects of mental health in adolescents in the school environment.

Through the selected studies, it is clear that all questionnaires were applied with parents or teachers. This wide use is due to the ease of application and lower cost in relation to more sophisticated methods when compared to the use of electronic devices that allow to objectively quantify the frequency, duration and intensity of physical activity[21].

Another aspect observed in the review, which should be mentioned for a better understanding of results and construction of future studies, refers to the instruments used to estimate the mental health status of children and adolescents in large samples. When the instrument to assess the chosen variable is specific and validated for the variable mentioned in studies, the greater the chances of results being reliable[22,23]. However, among the 10 studies, only two used questionnaires that are validated to verify the psychometric properties of children and adolescents[14,18].

This work showed greater number of publications in the year of 2019[7,12,13,15], which indicates the recent interest in the topic of physical activity and mental health. In addition, there was larger concentration of research in the southern region of Brazil[8,12,14,17], and a variety of instruments used for data collection that, depending on the local sociocultural context, may represent a limitation related to the generalization of results due to the different sociocultural characteristics regarding the adaptation of research instruments aimed at certain populations.

CONCLUSION

It was concluded that school physical activity is positively associated with mental health as it promotes physical and psychological well-being and reduces stress levels, impacting on the reduction of insomnia and social isolation problems, attenuating the feeling of loneliness and improving body image perception, considering that the performance of physical activities is one of the essential requirements for the adequate development of children and adolescents.

COMPLIANCE WITH ETHICAL STANDARDS

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Ethical approval

This study was written in accordance with the standards set by the Declaration of Helsinki.

Conflict of interest statement

There is no conflict of interests to declare about this article.

Author Contributions

Conception, planning, analysis, interpretation and writing of the work: VTS, VMSN, DPMO; Analysis, interpretation and writing of the work: RACS, MCSR, RJSS.

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