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Physical activity of parents and of their children: a systematic review of Brazilian sample studies – Report Card Brazil

Atividade física de pais e filhos: uma revisão sistemática de estudos com amostras brasileiras – Report Card Brazil

William R. Tebar[1]
Crystian B.S. Oliveira[2]
Fernanda C.S. Gil[2]
Bruna T.C. Saraiva[1]
Vinicius Y.B. Suetake[1]
Catarina C. Scarabottolo[1]
Leandro D. Delfino[2]
Romulo A. Fernandes[1,2]
Diego G.D. Christofaro[1,2]

Abstract – The aim of this study was systematically review the researches in regard the association of PA of parents and the PA of their children. A literature search was performed in five databases (Medline, Embase, Cinahl, Lilacs and SciELO) using combined terms about youth, PA and social support, with restriction to publications with Brazilian sample and to English and Portuguese language. Thirteen studies were included in this review and was observed a positive association of parental PA and the PA of their children for the majority of the studies (n=11). Only two studies did not observed significant association between PA of parents and their children and, otherwise, it was not observed negative associations in the review. It was observed different associations according to the gender of both parents and children. This findings support the importance for the practice of PA by parents as encouragement for the practice of PA by their children among Brazilians. The strategies to promote the increase in practice of physical activity of children and adolescents of both genders may consider the social support as an important factor, especially in relation to the practice of PA of their parents.

Key words: Adolescent; Child; Parents; Physical activity; Social support.

Resumo – *O objetivo do presente estudo foi revisar sistematicamente estudos que analisaram a associação da prática de atividade física de pais e filhos. Foi realizada uma busca sistemática em cinco bases de dados (Medline, Embase, Cinahl, Lilacs e SciELO), por meio da combinação de termos sobre crianças e adolescentes, atividade física e suporte social, sendo restrita a estudos contendo amostras brasileiras e escritos em Inglês e/ou Português. Foram incluídos treze estudos na presente revisão e foi observada associação positiva da prática de atividade física de pais e filhos na maioria dos estudos (n=11). Somente dois estudos não observaram associação significativa da atividade física de pais e filhos, contudo não foram observadas associações negativas. Foram observadas diferentes associações de acordo com o gênero tanto dos pais quanto dos filhos. Estes achados ressaltam a importância da prática de atividade física dos pais como incentivo à prática de atividade física dos filhos em amostras brasileiras. Estratégias de promoção da prática de atividade física em crianças e adolescentes de ambos os sexos devem considerar o suporte social como um fator importante, especialmente a respeito da prática de atividade física dos pais.*

Palavras-chave: *Adolescente; Apoio social; Atividade física; Criança; Pais.*

1 Sao Paulo State University. Post-Graduation Program in Movement Sciences. Presidente Prudente, SP. Brazil.

2 Sao Paulo State University. Post-Graduation Program in Physiotherapy. Presidente Prudente, SP. Brazil.

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INTRODUCTION

A worldwide prevalence of 81% of school-aged population did not reach recommended levels of physical activity in the last decade[1]. Surveys have shown a decrease in prevalence of physical activity practice over the years and according to the increase of age[2,3]. Moreover, obesity affects 3 times more people aged 6-19 years during the last three decades and faced with this alarming condition, the practice of physical activity among children and adolescents is widely considered to be an important factor in the prevention of these problems in adult life, besides promoting better health conditions in short-middle term since early ages[4].

However, youth is a period characterized by large biological and psychological developments, which can also result in social, cultural and educational implications[5]. In this sense, the social support has been investigated for decades as a predictor of health outcomes in clinical and epidemiological approaches[6] and consists of indirect support in a verbal and nonverbal way (e.g., encouragement, information, examples of life habits and health conditions), besides the direct help, such as transportation and encouragement from parents, have been consistently associated with the practice of adolescent's physical activity[7]. In addition, children and adolescents present limitations of autonomy for daily activities that may compromise physical activity, and it may be attenuated by family actions, such as spending time together, communicating with each other and strengthening family ties[8].

Although fathers and mothers may encourage the practice of physical activity of boys and girls in different forms, it was observed that children were more active if both parents share the responsibility of support their practice of physical activity[9]. Social support was associated with adolescents who dedicated more days to physical activity in the week compared to those who did not receive this incentive[10].

In the social support context, the parental practice of physical activity has been considered as an important determinant for physical activity of children and adolescents[11]. However, in a country with continental dimensions such as Brazil, which has a wide diversity of climate, cultures and income distribution[12], it becomes necessary a systematic approach of findings involving physical activity of parents and their children, aiming to guide effective strategies of health promotion in country-wide spectrum.

Therefore, the objective of this study was systemically review the findings of studies investigating the relationship between parents' and youth's physical activity among Brazilians.

METHODOLOGICAL PROCEDURES

Literature searches were performed from February to April 2018, in the following electronic databases: Medline, Embase, Cinahl, Lilacs and SciELO. We combined search terms regarding youth (e.g. children and

adolescents), physical activity (e.g. exercise, motor activity, sport practice), and social support (e.g. encouragement, incentive). Our searches were restricted to publications in English and Portuguese.

Two independent reviewers performed the titles and abstracts screening of the records retrieved from the search. Then, two independent reviewers evaluated the full-texts of the potentially eligible articles following the inclusion criteria. In any case of disagreement, a third reviewer would cast the deciding vote.

We included studies investigating the association between parents'and youth's physical activity among Brazilians, regardless of the study design. Therefore, cross-sectional, longitudinal, and clinical trials were included in this review. In addition, studies were considered eligible if they had included participants until 18 years in the sample, with their respective parents, or at least provide information about them, reported by parents or children's part. Finally, physical activity assessed by subjective (e.g. questionnaires and physical activity diary) and objective methods (e.g. accelerometer, pedometer) were considered eligible.

Two independent authors extracted the following information using a standardized form: region; sample characteristics (i.e. number of participants, sex, age); study design (i.e. cross-sectional, longitudinal study); physical activity assessment (i.e. objective or subjective methods); and main results. The results of the included studies were described in narrative form and displayed in tables.

RESULTS

Our searches retrieved a total of 3,033 articles, which 210 were excluded as being duplicated and 2788 were excluded after assessment by titles and abstracts. Then, a total of 35 articles were selected to full-text review, of which 22 articles were excluded for not meet the review criteria for inclusion. Finally, 13 articles remained selected for been considered eligible in proposed inclusion criteria. Figure 1 shows the processes of this review.

The publication date of the selected studies ranged from 2008 to 2018. Seven of the included studies were conducted in the South region of Brazil[11,13-18], three studies in the Southeast region[19-21] and three studies in the Northeast region[22-24].

Regarding the methodology of the studies, only two studies showed a longitudinal design1[3,17] and the others were cross-sectional[11,14-16,18-24], all studies were observational researches. Eleven studies showed a sample of adolescents at a range of age from 10 to 18 years[11,13-16,18,19,21-24] and only two studies were composed by children with 6 years old and below[17,20].

Physical activity was differently measured across the selected studies. One study measured objectively using accelerometers[17] and the remaining included articles measured using self-report questionnaires[11,13-16,18-24]. However, it was observed different instruments across the studies and the most used questionnaire were International Physical Activity Questionnaire – IPAQ[15,18,23] and Baecke's questionnaire[11,19]. The methodological

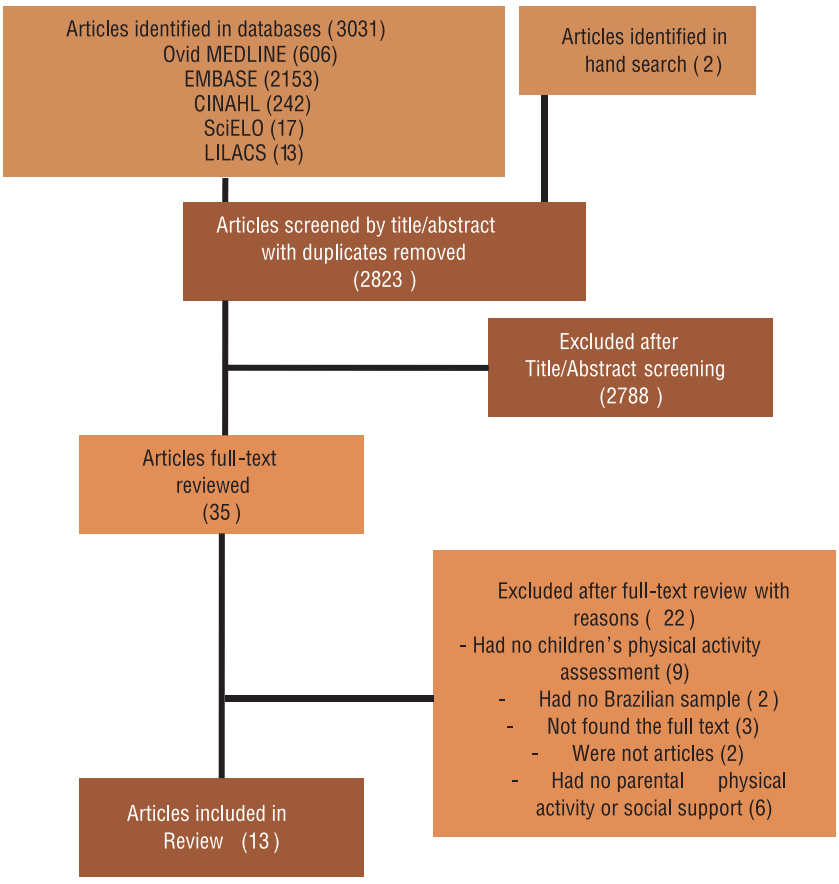

Figure 1. Flowchart of the articles selection process.

characteristics of the included studies are summarized in Table 1.

The Table 2 shows the main findings of selected studies. A positive association between physical activity of parents and their children was observed by eleven studies. Christofaro et al.[11] observed that parents who practice physical activity during their childhood or adolescence increase the chance of their children practice physical activity, besides the emotional and financial incentive. Fernandes et al.[19] showed a positive association of sports practice of parents and their children, with a determinant factor for the gender. This gender difference was also observed in a study by Ramos et al.[20], where boys were more likely to be physically active if having an adult at home who practice physical activity. It was also observed that the sports practice among boys was associated with having physically active mothers[13]. Prado et al.[14] observed in both genders that the practice of physical activity was positively associated with the frequent company of family and friends. Cheng et al.[22] showed that physical activity was differently associated according to gender, being the physical activity of the father associated with physical activity of their sons and the physical activity of the mother associated with physical activity of their daughters. Loch et al.[15] observed that the association between physical activity of children and their parents remained significant in older adolescents regard the age, and among sons and fathers regard the gender.

Raphaelli et al.[16] observed that of physical activity of daughters was positively associated with physical activity of their fathers. It was observed by Wanderley Júnior et al.[23] a smaller prevalence of low physical activity level among children whose parents reported to practice physical activity. Lemos et al.[21] observed that the association of physical activity of parents and their children was positively significant if both fathers and mothers reported to practice physical activity. Mendonça et al.[24] observed association of physical activity in adolescents with different kinds of social support by their parents, with increase in chance of adolescents be physically active according to accumulation of sources from parental support, such as joint participation, encouragement, transportation, watching and comments.

Two studies did not observed significant association between physical activity of children with physical activity of their parents[17,18], although one of them presented a borderline significance level for positive association[18].

Table 1. Methodological characteristics of included studies.

Author	Publication Year	City, State	Sample	Study design	PA Assessment
Christofaro et al.[11]	2018	Londrina, Parana	1231 adolescents between 14-17 years (716 girls) and 2073 parents (1202 mothers and 871 fathers).	Cross-sectional	Questionnaire
Ramos et al.[20]	2017	Belo Horizonte, Minas Gerais	1015 adolescents between 11-17 years (484 girls) and respective parents at home.	Cross-sectional	Questionnaire
Knuth et al.[17]	2016	Pelotas, Rio Grande do Sul	2604 children at 4 years of age (1262 girls) and 2524 mothers	Cohort	Acelerometer
Mendonça et al.[24]	2015	João Pessoa, Paraiba	2859 adolescents between 14-19 years (1653girls) and their parents.	Cross-sectional	Questionnaire
Loch et al.[15]	2015	Londrina, Parana	224 adolescents between 12-18 years (124 girls) and 406 parents (222 mothers and 184 fathers).	Cross-sectional	Questionnaire
Prado et al.[14]	2014	Curitiba, Parana	1469 adolescents between 14-18 years (869 girls) and questions about their parents.	Cross-sectional	Questionnaire
Cheng et al.[22]	2013	João Pessoa, Paraiba	2361 adolescents between 14-19 years (1336 girls) and questions about their parents.	Cross-sectional	Questionnaire
Wanderley Júnior et al.[23]	2013	Recife, Pernambuco	1042 children between 3-5 years (476 girls) and their parents.	Cross-sectional	Questionnaire
Fernandes et al.[19]	2011	Presidente Prudente, Sao Paulo	1111 adolescents between 11-17 years (692 girls) and their parents.	Cross-sectional	Questionnaire
Raphaelli et al.[16]	2011	Rio Grande do Sul (área rural)	377 adolescents between 10-18 years (177 girls) and 338 parents(173 mothers and 165 fathers).	Cross-sectional	Questionnaire
Lemos et al.[21]	2010	Rio Claro, Sao Paulo	467 adolescents between 14-17 years (254 girls) and 660parents (395 mothers and 265 fathers).	Cross-sectional	Questionnaire
Silva et al.[13]	2009	Pelotas, Rio Grande do Sul	4350 adolescents with 11 years of age (2283 girls) and their mothers.	Cohort	Questionnaire
Silva et al.[18]	2008	Pelotas, Rio Grande do Sul	384 parents who reported to have at least one children between 6-18 years and questions about them (total sample of 972 adults, with 554 women).	Cross-sectional	Questionnaire

Note. PA Assessment=Physical activity assessment.

Table 2. Main findings of included studies in regard the practice of physical activity of parents and their children.

Author, year	Direction of association	Main results
Christofaro et al.[11]	Positive	Adolescents whose parents were physically active in the past and in currently have six times more chance to be physically active compared with those who parents were not physically active (OR=6.67[95%CI=1,94; 22,79]).
Ramos et al.[20]	Positive	Boys were more likely to be physically active among those who have an adult at home who practice PA when compared with boys who have no adult at home who practice PA (PR=1,26[95%CI=1,02; 1,55]).
Knuth et al.[17]	Null	No significant association between PA of children at 4 years of age with PA of their mothers (OR= -0,48[95%CI= -2,32; 1,36]; p-value=0,61).
Mendonça et al.[24]	Positive	The cluster of social support by parents (joint participation, encouragement, transportation, watching and comments) increased the chance of adolescents be physically active when compared to those with no social support (One type of social support: OR=1,47[95%CI=1,16;1,86]; Two types: OR=1,92[95%CI=1,47;2,51]; Three or more types: OR=2,54[95%CI=1,96; 3.30]).
Loch et al.[15]	Positive	Positive association between Leisure PA of fathers and Leisure PA of their children (p-value=0,04). Older adolescents were more likely to be physically active in leisure time if fathers were physically active (p-value=0,02) and if both father and mother were physically actives (p-value= 0,01), not been observed in younger adolescents.
Prado et al.[14]	Positive	Adolescents who reported always practice PA with their family were more likely to be physically active when compared with those who reported never practice PA with their family in both genders (Boys: PR=2.88 [95%CI=2,00;4,13]; Girls: PR=3,39 [95%CI=1,49; 7,69]).
Cheng et al.[22]	Positive	PA of fathers was associated with PA of their sons (β=0,10; p-value <0,001) and PA of mothers was associated with PA of their daughters (β=0,08; p-value <0,05). In addition, providing social support by parents was directly associated with PA of adolescents in both genders (Boys: β=0,14; p-value <0,01 and Girls: β=0,17; p-value <0,01).
Wanderley Júnior et al.[23]	Positive	The parental participation in PA of their children was inversely associated with low levels of PA (OR=0,54 [95%CI=0,40; 0,73]). It was not observed significant association between physically active parents and children with low level of PA (OR=0,84 [95%CI=0,59; 1,19).
Fernandes et al.[19]	Positive	Adolescents were 60% more likely to practice sports if the mother practice sports (OR=1,6 [95%CI=1,1; 2,2]) and 2,5 times more likely to practice sports if both parents also practice (OR=2,5 [95%CI=1,5; 4,1]). Among girls, this observation was the same (Mothers who practice sports: OR=2,4 [95%CI=1,4; 3,8] and Both parents: OR=2,7 [95%CI=1,3; 5,1]), but in boys was only significant in sports practice by both parents (OR=2,3 [95%CI=1,0; 5,3]).
Raphaelli et al.[16]	Positive	PA of daughters was positively associated with have father who were physically active (OR=1,4 [95%CI=1,1; 1,8]. It was not observed significant association among mothers who were physically actives and the PA of their children.
Lemos et al.[21]	Positive	The PA level of parents influenced the PA level of their children (Parents who were physically actives [45%] vs parents who were physically inactive [22%] among physically actives adolescents, p<0,05). It was not observed significant results if only one of parents was physically active (p>0,05).
Silva et al.[13]	Positive	The practice in individual sports of boys was associated with have mothers who were physically actives (OR=1,28 [95%CI=1,04; 1,58]). This association was not observed in girls and either in regard collective sports in both genders.
Silva et al.[18]	Null	It was not observed a significant association between the PA practice of children and the PA level of parents. Although, the p-value has been borderline in general analysis (p=0,053).

Note. PA=Physical activity; OR=Odds ratio; PR=Prevalence ratio; 95%CI= 95% Confidence Interval

DISCUSSION

The practice of physical activity of parents and the physical activity of their children was positively associated in the majority of the selected studies. However, it was not found a large amount of evidence among Brazilian sample studies in literature.

This review found studies with samples from different regions of the country, but not from all of them. In this sense, it is important to highlight that Brazil has a wide racial miscegenation and a continental dimension, with great socioeconomic disparities in an estimated population of more than 200 million inhabitants[25]. Nonetheless, the majority of

included studies from different regions observed similar results about the practice of physical activity of parents and their children, where children and adolescents whose parents practice physical activity are more likely to also practice. These findings are convergent with observations of other studies across the world[26].

Some studies of this review observed differences between gender in regard to the association of physical activity of children and the physical activity of their parents[13,15,16,19,20]. This observation is similar to findings involving other adolescent sample, where the physical activity of girls was more strongly related with the practice of physical activity of the mothers, and in boys was related with physical activity of their fathers[9]. One possible hypothesis is that boys present higher practice of physical activity than girls, besides the fact that girls are less favored in socioecological aspects, such as individuality, family and scholar environment for practice of physical activity[28]. Another possibility is that males adult present higher practice of physical activity in leisure time than women[29] and this can reflect a more strongly association of physical activity of children and adolescents with their fathers than their mothers.

The assessment of physical activity by questionnaire for majority of the selected studies corresponds to a methodological limitation of the evidences. A previous systematic review observed that self-reported measures of physical activity can present results below or above from the objective measurements, that can importantly compromises the confiability of information[30]. Therefore, although the evaluation of physical activity by accelerometry promote slightly consistent results, the questionnaires provide complementary information such as the domains of physical activity andthe use of both instruments can provide more complete informations[31].

Only two studies observed no significant association between physical activity of parents and their children in this review[17,18]. One possible hypothesis is that the study of Silva et al.[18] does not have a design performed specifically to assess this outcome, since it was analyzed the data from 972 participants from 20 to 69 years, of which 384 adults reported to have at least a children with age between 6 to 18 years (~40% of the sample). The other study[17], that report no significant association, has a sample with age lower than all the others included studies, with the exception of only one[23]. In this sense, there is limited evidence in literature that parental physicalactivity is a predictor of physical activity of children with 6 years or less[32] and this relation is still dependent on the type of physical activity and on the age group[33] although the participation of parents has been the preferredcondition reported by children of 3-6 years for the practice of physical activity[34]. Another possible hypothesis for the divergent results between the two studies was the use of different methods of physical activity assessmentand were conducted in different regions of the country, where one study from South region used accelerometer and assessed only the mothers[17] and the other study from Northeast region used a questionnaire for physical activity assessment and evaluated both fathers and mothers[23].

Only one included study evaluated a sample residing in rural area[16]. Previous study observed that the level of physical activity of children and adolescents from rural areas was significantly lower than those who residing in urban areas[35]. Raphaelli et al.[16] observed significant association between the practice of physical activity of parents and the physical activity of their children. These findings are convergent with observed in the study of Larsen et al.[36], that evaluated a sample between 8 and 11 years from a rural community in Midwest region of United States. One possible hypothesis is that even the practice of physical activity is lower in rural areas, the family environment may exert similar influence when analyzed the parental physical activity.

In accordance to the findings of Mendonça et al.[24], Pyper et al.[37] showed that besides the parental practice of physical activity, the social support of parents are predictors significantly related with sufficient levels of physical activity of their children, such as taking the children to places where they can be physically actives. Thus, the parents have a fundamental role in the consolidation of physically active lifestyle in early ages, which contributes to the increase of chance to become physically active adults and consequently have a lower incidence of morbidities due to sedentary lifestyle, such as obesity[38]. Despite this, it was observed that the level of physical activity of parents is lower than their nonparents counterparts and the mothers presented larger inadequate eating habits and higher body mass index when compared to women with no children[39].

An important limitation of this review is the cut point used to identify sufficient engagement in physical activity, that is widely problematic in the literature, mainly because the studies that have composed this systematic review use a large variety of cut points and different domains (e.g., sports practice, time reported in moderate-to-vigorous physical activity, physical activity level by quartiles of dimensionless score) for both parents and children, such as the lack of specific social support definition, limiting comparisons among them. Otherwise, as practical application, this review highlight the important role of familiar environment for promote healthy habits in early ages, with the practice of physical activity by parents as encouragement of the practice of physical activity by their children.

In this sense, the education of parents contributes to higher probability of adequate growth of their children, in part for the increase of the possibility for getting more resources, been highlighted that educate parents residing in low and middle-income countries it is an investment in health[40].

CONCLUSION

The practice of physical activity of parents was associated with physical activity engagement of their children in the most of studies. Two studies did not observed significant relationship, but otherwise, no study observed negative associations. Strategies to encourage the practice of physical activity aimed at children and adolescents might to consider the important

role of family environment, with emphasis in practice of physical activity of parents, that may also differently associated with physical activity of boys and girls.

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: DGDC, RAF, and CBSO. Performed the experiments: CBSO, BTCS, and VYBS. Analyzed the data: BTCS, VYBS, CCS, LDD, FCSG, and WRT. Contributed reagents/materials/analysis tools: CBSO, DGDC, RAF, and WRT. Wrote the paper: WRT, FCSG, and CBSO.

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CORRESPONDING AUTHOR

Diego Giuliano Destro Christofaro
Roberto Simonsen St., 305.
Postal Code:19060-900, Presidente Prudente-SP, Brazil.
Email: diegochristofaro@yahoo.com.br