

## INTEGRATIVE REVIEW: BEHAVIORAL INTERVENTIONS FOR PHYSICAL ACTIVITY PRACTICE

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*This study aimed to carry out an integrative literature review on the effectiveness of interventions in physical activity (PA) practice in the general population. The search was carried out in articles indexed in online databases: Scopus, CINAHL and Medline. Studies in English or Brazilian Portuguese were included, with evidence levels 2 or 3, published between 2004 and 2008. The final sample consisted of 14 studies. In 57.1% of the studies, interventions were effective for behavior change to practice PA. The diversity of target populations, assessment instruments and intervention designs makes it difficult to compare results and build evidence on the effectiveness of interventions for PA promotion.*

**DESCRIPTORS:** motor activity; behavior; intervention studies

## REVISIÓN INTEGRATIVA: INTERVENCIONES COMPORAMENTALES PARA REALIZACIÓN DE ACTIVIDAD FÍSICA

*Este estudio tuvo como objetivo realizar una revisión integrativa de la literatura sobre la efectividad de intervenciones en la realización de Actividad Física (AF) en la población general. La búsqueda fue realizada en los artículos on line indexados en las bases de datos Scopus, Medline y Cinahl. Fueron incluidos estudios en lengua inglesa o portuguesa de Brasil, con nivel de evidencia 2 o 3, publicados entre 2004 y 2008. La muestra final fue compuesta por 14 estudios. En 57,1% de los estudios las intervenciones fueron efectivas para realizar cambios de comportamiento relacionados a la AF, sin embargo, pocas fueron basadas en teorías. La diversidad de las poblaciones objetivo, de los instrumentos de evaluación y de las intervenciones, dificulta la comparación de los resultados y la construcción de evidencias sobre la efectividad de intervenciones para la promoción de AF.*

**DESCRIPTORES:** actividad motora; conducta; estudios de intervención

## REVISÃO INTEGRATIVA: INTERVENÇÕES COMPORAMENTAIS PARA REALIZAÇÃO DE ATIVIDADE FÍSICA

*Este estudo teve como objetivo realizar revisão integrativa da literatura sobre a efetividade de intervenções na realização de Atividade Física (AF) na população geral. A busca foi realizada nos artigos on line indexados nas bases de dados Scopus, Medline e Cinahl. Foram incluídos estudos em língua inglesa ou portuguesa do Brasil, com nível de evidência 2 ou 3, publicados entre 2004 e 2008. A amostra final foi composta por 14 estudos. Em 57,1% dos estudos, as intervenções foram efetivas para a mudança do comportamento para realizar AF, porém, poucas foram baseadas em teoria. A diversidade das populações alvo, dos instrumentos de avaliação e das intervenções dificulta a comparação dos resultados e a construção de evidências sobre a efetividade de intervenções para a promoção de AF.*

**DESCRITORES:** atividade motora; comportamento; estudos de intervenção

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## INTRODUCTION

**R**egular physical activity (PA) results in systemic benefits, such as a lower heart frequency, increased cardiac debit and decreased blood pressure. The effects of physical exercise are not only related to the biological sphere, but also to its positive effects on psychological and psychosocial health<sup>(1)</sup>. Adherence to physical exercise programs aiming for health promotion is low in the general population, representing a major public health concern. Countless personal and environmental factors are implied in how demographic, biological, psychological, social and physical factors are related to the program. Strategies need to be developed that make people adopt a more active lifestyle, knowing, preventing and/or controlling the risk factors present in their lifestyle<sup>(2)</sup>. Changes in health behavior result from reciprocal relations between the environment, personal factors and behavioral attributes<sup>(3)</sup>. Considering the importance of adopting a more active lifestyle, nurses, as one of the categories responsible for educative activities with the healthy or ill population, need to develop, put in practice and assess the effectiveness of interventions aimed at optimizing regular PA practice and, consequently, a healthier lifestyle.

## OBJECTIVES

This study aimed to carry out an integrative review of Brazilian and international literature about the design and effectiveness of interventions used to stimulate PA practice in different population groups.

## METHODS

The steps recommended by literature were used to elaborate the integrative review<sup>(4-5)</sup>.

### Identification of review problem

The following guiding question was chosen: *What is the design and effectiveness of behavioral interventions to promote physical activity in the general population?*

### Sample selection

Articles in English or Brazilian Portuguese were considered eligible if published in journals indexed in Medical Literature Analysis and Retrieval

System *on-line* (MEDLINE, PubMed version), Cumulative Index to Nursing and Allied Health Literature (CINAHL) and SCOPUS, between August 2004 and August 2008, departing from the descriptors *Intervention Studies, Motor Activity and Behavior*, according to the Medical Subject Headings (MeSH), and their equivalents in Brazilian Portuguese according to the Health Sciences Descriptors (DeCS). The search was carried out in the three databases at the same time, in September 2008, using the descriptors combined by the Boolean connector "AND". As a result, 102 articles were found: 64 in SCOPUS, 26 in MEDLINE and 12 in CINAHL. The titles and abstracts of these 102 articles were carefully read, 40 were excluded because they were inadequate for the guiding questions, 3 were duplicates (found in more than one database), 15 were not available online in their full version in the collection of the University's Library System and 16 were meta-analyses or reviews. Twenty-eight articles were selected for analysis of their full version, including articles with evidence level 2 (individual research with experimental design) or 3 (research with quasi-experimental design)<sup>(6)</sup>. The final sample consisted of 14 articles<sup>(7-20)</sup>, in compliance with literature, which recommends that at least 30% of articles attending to the established inclusion criteria be included<sup>(5)</sup>.

### Study categorization, analysis and interpretation

A specific instrument was used to assess articles for inclusion in reviews, which Ursi constructed and validated in an earlier study<sup>(21)</sup>. The analysis of the articles was based on the concepts of quantitative research with experimental and quasi-experimental designs<sup>(22)</sup> and on literature about the research theme<sup>(5)</sup>.

## RESULTS

Most studies (64%) are indexed in SCOPUS, in journals within the theme area Health Sciences, particularly Medicine (28.5%), followed by Oncology (21.4%), Metabolism, Psychology and Nutrition Sciences (21.4%); Geriatrics (14.3%) and Public Health (14.3%); with an average impact factor of 3.7(±3.9). Half of the production comes from the United States, followed by Europe (21.4%), Australia (21.4%) and Canada (7.1%); 57.1% of studies were

developed at universities, 35.7% in multicenter research centers and 7.1% in hospitals. Homogeneous distribution was found between experimental and quasi-experimental studies (50%, respectively), predominantly randomization (64.3%) and control group (85.7%). The mean sample size was 452(±518) subjects. Most studies (78.6%) covered male and female subjects, 14.3% did not inform the participants' gender and 7.1% included women only. Great variation in subjects' age range was observed, with most studies including adults and/or elderly.

The result was assessed through PA questionnaires, objective PA measures (physical capacity, pedometer, accelerometer), or by behavioral variables (motivation, self-efficacy, stages of change), or by symptom perception (fatigue). Psychometric scales to measure motivation, fatigue and perceived effort stood out, as well as to measure psychosocial variables knowingly influenced by PA, as evidenced in other review studies<sup>(23-24)</sup>. Instruments were frequently used to quantify the duration, intensity and frequency of PA. Most studies (64.3%) used biological markers, such as maximum oxygen consumption, serum cholesterol levels and body mass index (BMI)<sup>(7,11,14-19,20)</sup> and half of them applied physical tests, such as load and walking tests<sup>(8,11,14-15,17-18,20)</sup> (Table 1).

In half of the studies, the intervention was based on a theoretical framework: 28.6% was based on Motivational Theories and 21.4% on Multiple-Stage Models (Table 3). A majority (71.4%) used the isolated increase in PA as the dependent variable, with walking as the most explored target behavior, followed by the association between PA and healthy eating (28.6%),

and between PA, healthy eating and giving up smoking (7.1%). The mean duration of interventions was 37.9(±23.3) weeks, with a minimum duration of 8 and a maximum of 72 weeks. The methodology was considered appropriate in 42.8% of the studies<sup>(10-11,15,19-20)</sup>, considering criteria as viability, reproducibility, method clarity and application of instruments and objective measures; in 14.3%, the design of the steps was not clear, impeding reproducibility<sup>(13,16)</sup>; and, in 28.6%, no criteria were mentioned for including/excluding subjects. In data analysis, parametric (42.8%) and variance and covariance (42.8%) models predominated.

The interventions were effective to promote PA behavior in 57.1% (n=8) of the analyzed studies and ineffective in 14.3% (n=2)<sup>(7,13)</sup>. The result of the intervention was not reported in 28.6% (n=4) of the studies<sup>(12,15,18-19)</sup>. In the eight studies in which the intervention was considered effective, the assessed outcome was increased PA frequency (75%, n=6)<sup>(9-11,14,16,20)</sup>, increased PA frequency associated with another behavior (7.1%; n=1)<sup>(17)</sup> and improved Quality of Life (QoL) and muscle force (7.1%; n=1)<sup>(14)</sup>. No negative effects of the interventions were reported on.

## DISCUSSION

The findings evidence that most of the publications on PA interventions has been disseminated in journals from the Health Science Area, classified in different subjects.

Table 1 – List of PA measurement instruments, tests and variables measured in the studies included in the integrative review. Campinas, 2009

PA measurement instruments	Variable measured	Reference
Measurement of psychosocial determinants of behavior		
Treatment Self-Regulation Questionnaire (TSRQ)	Motivation	Fortier et al., 2007 <sup>(18)</sup>
Behavioural Regulation In Exercise Questionnaire (BREQ-2)	Behavioral Regulation	Fortier et al., 2007 <sup>(18)</sup>
Godin leisure-time exercise questionnaire (GLTEQ)	Exercise habits in leisure time	Fortier et al., 2007 <sup>(18)</sup> Williams et al., 2004 <sup>(19)</sup>
Stage of Motivational Readiness for Physical Activity	Self-efficacy and motivation for PA practice	Pinto et al., 2005 <sup>(11)</sup>
Stage of Change for regular exercise (SoC for regular exercise)	Pre-Contemplation, Contemplation, Preparation, Action and Maintenance Stages	Clark et al., 2005 <sup>(13)</sup>
Measurement of objective variables		
Up-and-Go	PA intensity/frequency	Clark et al., 2005 <sup>(13)</sup>
Seven-day Physical Activity Recall (7-Day PA Recall)	PA duration, intensity and energy consumption	Pinto et al., 2005 <sup>(11)</sup>
Yale Physical Activity Survey (YPAS)	PA intensity/frequency	Clark et al., 2005 <sup>(13)</sup>
International Physical Activity Questionnaire (IPAQ)	Habitual PA levels in general population	Spittaels et al., 2007 <sup>(9)</sup>
Adolescent Physical Activity Questionnaire (APAQ)	PA levels during leisure time	Lubans and Morgan, 2008 <sup>(10)</sup>

Continue...

Table 1 – Continuation

PA measurement instruments	Variable measured	Reference
Measurement of perceived symptom to effort		
Multidimensional Fatigue Inventory (MFI)	Fatigue	De Backer et al., 2008 <sup>(14)</sup>
Rating of Perceived Exertion (RPE)	Perceived effort caused by exercise	De Backer et al., 2008 <sup>(14)</sup>
Fatigue Scale	Fatigue	Clark et al., 2005 <sup>(13)</sup>
Physical tests		
One maximum strength test (1-RM Test)	Maximum resistance burden for a series of repetitions of a given exercise	De Backer et al., 2008 <sup>(14)</sup>
Rockport 1-mile Walk Test	Predicts aerobic capacity in a walk mile	Pinto et al., 2005 <sup>(11)</sup>
Pedometer	Number of steps walked	Hyman et al., 2007 <sup>(17)</sup> ; Mahar et al., 2006 <sup>(8)</sup> ; Beresford et al., 2007 <sup>(20)</sup>
Accelerometer	Linear pulse acceleration degree, total body movement and degree of PA	Fortier et al., 2007 <sup>(18)</sup> ; Pinto et al., 2005 <sup>(11)</sup>
Exercise Test (6' and 12')	Maximum oxygen consumption - VO2	Fortier et al., 2007 <sup>(18)</sup> ; Spence et al., 2007 <sup>(15)</sup> ; De Backer et al., 2008 <sup>(14)</sup>

None of the studies was found in nursing journals, which evidences the need for nursing research in this area. The methodological design showed incoherence in terms of sampling process, as well as lack of clarity in the intervention phases. These findings are consistent with other reviews<sup>(23-24)</sup>. The mean follow-up period coincided with the duration of the intervention, indicating the need for longitudinal designs, with a view to evidence on the long-term effectiveness of the intervention.

In half of the studies analyzed, strategies were theory-based, especially motivational theories. However, among the 57.1% whose results evidenced a significant increase in PA, strategies had been theory-based in only 28.6%, corresponding to a mere 14.3% of the sample. Nowadays, there is a large-scale debate among experts about the utility and perceived barriers in the application of behavioral theories<sup>(23-25)</sup>. These theories point towards a

generalized and carefully interpreted systematic summary of empirical evidence on behavior, and its application is expected to improve the effectiveness of interventions for behavioral modification. It has been argued, however, that most theories offer important support as to *which* needs should be changed, and not *how* these changes can be induced<sup>(26)</sup>. Hence, it would be important for theories, besides explaining the subject's motivation to adopt the behavior, to advance in knowledge about *how* behavioral determinants of change can be modified and how these determinants can be translated into methods, strategies and effective instruments for behavioral change<sup>(26)</sup>. The diversity of the target population, the intervention methods and assessment measures used, as well as the lack of standardization in self-reports on PA in the studies under analysis, limit the identification of which of strategies' potential attributes are associated with the effectiveness of an intervention.

Table 2 – Synthesis of physical activity promotion interventions described in the articles included in the integrative review. Campinas, 2009

Reference	Level of Evidence	Target Group	Sample Selection	Sample Size	Target Behavior	Theoretical Reference Framework	Description of Intervention	Obtained Measures	Effectiveness of intervention to change behavior
Holland et al., 2005 <sup>(7)</sup>	2	Elderly with one or more chronic health conditions	Random	n=504	Walking, swimming, water gymnastics, cycling or other aerobic activity	Not described	The sample was randomized in a Control (n=249) and Intervention (n=255) group, submitted to the Health Matters Program, with telephone contacts every 4 weeks and an interview after 6 months. During interviews, health action (behavioral changes to achieve healthy habits) and fitness (aerobic exercise program) planning was elaborated. In follow-up, visits and telephone contacts to reinforce and maintain planning. Duration: 24 weeks.	BMI, presence of chronic health conditions; minutes spent on aerobic activity and stretching during last week; social activities during last week; social limitations during last four weeks; concerns with health, pain, fatigue and dyspnea during last two weeks.	Increase in minutes per week spent on aerobic activities, stretching and social visits (p<0.1); decreased depression (p=0.63), concern and limitations due to health (p=0.23).

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Table 2 – Continuation

Reference	Level of Evidence	Target Group	Sample Selection	Sample Size	Target Behavior	Theoretical Reference Framework	Description of Intervention	Obtained Measures	Effectiveness of intervention to change behavior
Mahar et al., 2006 <sup>(8)</sup>	2	General population; children between 5 and 11 years	Random	n=243	Moving and walking	Not described	Sample of students from two classes in each year, equivalent to Basic Education, divided in two groups: 1) Energizers classroom-based PA Program (n=135): 10' of games, play and aerobic PA per day for 12 weeks, led by previously trained instructor; and 2) Energizers Training (n=108): counseling on childhood obesity and importance of regular PA practice. Duration: 12 weeks.	Number of steps (pedometer).	Increase in number of steps in Group 1 (p<0.05).
Spittaels et al., 2007 <sup>(9)</sup>	3	General population; adults (not elderly)	Random	n=285	PA not specified	TPB*	Sample distribution in 3 groups, with application of on-line questionnaire through the study site, upon first contact and six months later. Groups 1 (n=173) and 2 (n=129) received counseling for PA practice based on their answers. After counseling, Group 1 was followed by e-mail for 32 weeks. Group 3 (n=132) did not receive counseling before 6 months after the start of the study. Duration: 24 weeks.	Frequency and duration of physical activities at work, during leisure time and locomotion; sitting time per day.	Increase in PA levels and decrease in sitting time in groups 1 and 2, in comparison with group 3 (p<0.01).
Lubans and Morgan, 2008 <sup>(10)</sup>	3	General population; adolescents between 12 and 16 years of age	Convenience	n=116	Running, walking, cycling		The Control (n=66) group was submitted to counseling about PA; the Intervention (n=50) group was submitted to weekly 70' sessions of aerobic exercises (gymnastics), including 15' of counseling and 55' of PA, Duration: 8 weeks.	Number of steps/minutes/day spent on PA (moderate to strong); hours/day spent watching television, using the computer or electronic games.	Significant increase in PA levels in Intervention group in comparison with Control group (p<0.05).
Pinto et al., 2005 <sup>(11)</sup>	2	Adults and elderly with cancer	Random	n=86	Moving and walking	Not described	Control (n=43) group submitted to usual measures and Intervention (n=43) group submitted to counseling about how to exercise, monitor CF, warming up and walking for 10', twice/week, until reaching 30', five times/week. Weekly telephone contact for encouragement, with feedback to participants during the 2nd, 4th, 8th and 12th week. Maintenance of telephone contact for 3 months after the end of the program. Duration: 48 weeks.	BMI; cutaneous folds; hours spent on sleeping and PA during last week; maximum speed reached to walk 1.6km; motivation to perform PA; number of steps (pedometer); degree of linear pulse acceleration, total body movement and degree of PA (accelerometer); mood; fatigue and body esteem.	Intervention group practiced more minutes of PA per day, with increase in number of steps; presented increased motivation to practice PA, greater mood variation and lesser fatigue in relation to Control group (p=0.001).
Harris et al., 2005 <sup>(12)</sup>	3	General population, does not specify health conditions or age	Convenience	-	Increase health professionals' skills to promote different PA	Not described	Professionals (physicians, nurses) from health clinics submitted to questionnaires to assess their knowledge and practice in offering and assessing PA interventions for patients with risk factors for SNAP (Smoking, Nutrition, Alcohol and Physical Activity). Motivational interviews and training sessions on practice, barriers and facilitators for the program. Duration: not described.	Practical capacity to put in practice SNAP intervention; knowledge of practices to assess and offer interventions for patients with SNAP risk factors.	Unpublished results (study protocol).
Clark et al., 2005 <sup>(13)</sup>	3	General population; elderly	Convenience	n=1274	Unspecified PA, improve fruit and vegetable consumption	Transtheoretical Change Theory	Sample submitted to SENIOR (Study of Exercise and Nutrition in Older Rhode Islanders Project), who received a manual on PA. Follow-up through letters and telephone interviews every 4 months. Duration: 48 weeks.	Perceived Health Status; time spent on PA at work, exercise and recreation; stage of change to practice PA; functional mobility; fruit and vegetable consumption.	Most subjects in Pre-Contemplation stage - no intention to change behavior. Non-effective intervention.
De Backer et al., 2008 <sup>(14)</sup>	2	Adults and elderly with cancer	Random	n=71	Resistance training	Not described	Control (n=22) group submitted to usual care and Intervention (n=49) group submitted to 18 weeks of resistance training and ergometric bicycle (supervised), after six weeks of chemotherapy. Frequency twice per week during first 12 weeks. Frequency once per week during last 6 weeks. Assessment every 4 weeks. At the end of follow-up, counseling to keep up PA at home (during 5 encounters). Duration: 68 weeks.	Muscle force; cardiopulmonary function; fatigue and health-related quality of life.	Intervention group presented greater muscle force and better quality of life (p<0.01).

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Table 2 – Continuation

Reference	Level of Evidence	Target Group	Sample Selection	Sample Size	Target Behavior	Theoretical Reference Framework	Description of Intervention	Obtained Measures	Effectiveness of Intervention to change behavior
Spencer et al., 2007 <sup>(15)</sup>	2	Patients with cancer; not specified	Random	Not informed	Aerobics exercise session	Not described	Random sample with Control and Intervention group. Intervention group submitted to aerobic exercise sessions 3 times per week, during 12 weeks, with supervision by physiologist. Initial duration 20' and light intensity, with gradual increase to 40' and high intensity (modified across follow-up). Duration: 12 weeks.	Cardiorespiratory capacity with 6-minute walking test; measurement of fatigue and QoL. Insulin 1 Growth Factor (IGF-1) and Insulin-like growth factor binding protein (IGFBP-3) dosage.	Unpublished results (study protocol)
Spiegel and Foulk, 2006 <sup>(16)</sup>	2	General population; children between 5 and 11 years	Random	n=1013	Unspecified PA; improve fruit and vegetable consumption	Rational Action Theory	Control group (n=478) submitted to usual care and Intervention group (n=529) submitted to WAY*, divided into modules: 1 = concept of well-being, orientation about Intention and Subjective Standards; 2 = orientations to register physiological data and PA levels (scales); 3 = principles for PA practice, establishing and incorporating exercise routine; 4 = classes about nutrition; 5 = functioning of human body; 6 = genetics and family history and 7 = students verbally reproduce what they learned to relative and register how this approach took place. Availability of DVD and website to support activities. Duration: 28 weeks.	Fruit and vegetable consumption; frequency of PA practice; BMI.	Increased fruit and vegetable consumption in both groups, more significant in Intervention group. Increase in PA levels in Intervention group (p=0.05).
Hyman et al., 2007 <sup>(17)</sup>	3	Hypertensive adults and elderly	Convenience	n=230	Walking, stop smoking and decreasing sodium consumption	Not described	Sample divided in 3 groups: Group 1 (n=92): simultaneous counseling for three target behaviors, Group 2 (n=96): sequential counseling for three target behaviors; Group 3 (n=93): control. Personal meeting every 6 months, with seven telephone contacts during interval. Duration: 72 weeks.	Creatinine/urinary sodium; fasting glucose, glycated hemoglobin, number of steps and self-efficacy.	Simultaneous approach of three behaviors was more effective for sodium consumption decrease (p=0.41), PA (p=0.03) and giving up smoking (p=0.02)
Fortier et al., 2007 <sup>(18)</sup>	2	General population; adults and elderly	Random	n=120	Walking	Self-Determination Theory	Control group (n=59): short counseling for PA practice. Intervention group (n=61): intensive counseling for PA. 1/3 from each group was selected to participate in physical/metabolic tests. The program comprises the model of the "7 As" (Address, Ask, Advise, Assess/Agree, Assist, Arrange). Counseling and personal assessment during weeks 3, 5, 12, 13 and 25. Telephone contact during weeks 6, 7, 9, 11 and 19. Metabolic and physical test during weeks 2, 13 and 25. Duration: 25 weeks.	Motivation; self-efficacy; degree of linear pulse acceleration, total body movement and degree of physical activity (accelerometer); Perceived health state; aerobic capacity, CF, arterial pressure, anthropometric measures; fasting glucose, glycated hemoglobin, serum lipids and insulin resistance.	Unpublished results.
Williams et al., 2004 <sup>(19)</sup>	2	General population; adults (not elderly)	Random	n=300	Walking and each participant's preferred activities	TPB	Random sample in Group 1 (n=120): interview, face-to-face counseling program and telephone follow-up; Group 2 (n=124): interview and distance counseling program and follow-up by letters; Group 3 - Control (n=121): short counseling. Duration: 52 weeks.	Time per day spent on PA; energy consumption by PA; PA at work, leisure and in housework; calorimetry, maximum O2 consumption and CF.	Unpublished results.
Beresford et al., 2007 <sup>(20)</sup>	2	General population, does not specify health conditions or age	Random	n=1633	Unspecified PA, improve fruit and vegetable intake	Social Learning Theory	Control (n=768) and Intervention (n=865) groups, the latter submitted to the PACE program† - 1st Phase: creating awareness about the importance of healthy eating and PA; 2nd Phase: motivation/support to improve PA; 3rd Phase: motivation and support to improve food intake; 4th Phase: support system - encourage PA and healthy food intake; and 5th Phase: support for maintenance of PA and diet changes through social meetings. Duration: 72 weeks.	Serum cholesterol levels; BMI; 24h dietary recall; number of steps/week; PA frequency.	Increased PA levels in Intervention group, greater in women (p<0.001).

(\*Wellness, Academics and You Program; †Promoting Activity and Changes in Eating)

Among the 57.1% of studies with a significant increase in PA, intervention strategies comprised counseling, written information/orientations and didactical material, either separately or jointly, with substantially different application/follow-up periods. These disparities do not permit comparisons and generalization of findings and, consequently, make it more difficult to construct evidence on the effectiveness of the interventions for PA promotion. Although this review involved a limited number of studies, its findings indicate the short-term effectiveness of interventions for PA promotion, in line with results from earlier reviews<sup>(24,26)</sup>. The small number of interventions incorporated into the (health and education) service routine is highlighted, which reveals a continuing gap between theoretical conception and practical application. Interventions with a multidisciplinary approach were also rare, directed at the family's involvement in the adoption of PA practice.

#### Study limitations

Limitations were related to the exclusive

use of DeCS and MeSH descriptors to locate the articles in the electronic databases, which can explain that a limited number of studies was recovered during the period, and also that studies accessed electronically were included, which restricted access to all studies elected for the review.

## CONCLUSIONS

This integrative review about the use of behavioral interventions in the period from August 2004 to August 2008 evidenced that, in 57.1% of the studies, interventions effectively promoted PA; of these, however, intervention strategies had been based on theory in few studies. The range of assessment instruments and interventions limits comparisons and result generalizations and make it more difficult to construct evidence about the effectiveness of interventions to promote PA in the short and long terms.

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