

Workplace physical activity in Brazil from 2006 to 2016: scoping review

A ginástica laboral no Brasil entre os anos de 2006 e 2016: uma *scoping review*

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ABSTRACT | Background: The increase in work-related health problems is a cause of concern for researchers worldwide. Intensification of work and the worker-work environment-illness relationship are some of the leading topics in debates on health and work. Facing this scenario, workplace physical activity (WPA) represents an option for prevention of work-related diseases. **Aim:** To describe and summarize how the Brazilian literature has addressed WPA. **Methods:** A scoping review was performed based on a search on the main databases of scientific articles available in Brazil using keywords “ginástica laboral” (workplace physical activity), “labor gymnastics”, “ginástica do trabalho” (workplace physical activity), “exercícios laborais” (workplace physical exercise) e “cinesioterapia laboral (workplace kinesiotherapy)”. Empirical studies conducted in Brazil and published along the past 10 years were included. **Results:** The 44 analyzed articles applied variable, mainly quantitative methods to the study of WPA. The studies were most frequently conducted by physical educators and physical therapists. WPA was performed in both private companies and public organizations with employees who performed a wide range of functions. Six categories were detected for WPA: pain management; lifestyle behaviors; mental health components; components of human movement; quality of life; and anthropometric indicators and vital signs. **Conclusion:** WPA has been investigated through many different methods and involving variable modalities of application. While still scarce, qualitative and multi-method studies could certainly increase the reach and potential of WPA.

Keywords | review literature as topic; primary prevention; work; gymnastics.

RESUMO | Introdução: O crescimento dos agravos relacionados ao trabalho vem preocupando pesquisadores ao redor do mundo. Isso porque a intensificação do trabalho e as relações trabalhador-ambiente de trabalho-adoecimento, entre outras, lideram o debate quando o assunto é saúde e trabalho. Nesse cenário, a ginástica laboral (GL) é uma alternativa na prevenção dos adoecimentos relacionados ao trabalho. **Objetivo:** Descrever e sintetizar as formas pelas quais a literatura brasileira tem abordado a GL. **Métodos:** Uma revisão panorâmica (*scoping review*) foi realizada a partir de buscas nas principais bases de artigos científicos disponíveis no país, por meio dos descritores “ginástica laboral”, “labor gymnastics”, “ginástica do trabalho”, “exercícios laborais” e “cinesioterapia laboral”. Foram incluídos estudos empíricos que tratavam do contexto brasileiro e que foram publicados nos últimos 10 anos. **Resultados:** Nos 44 artigos analisados foi evidenciado que diversas metodologias têm sido aplicadas à GL, majoritariamente as quantitativas. Os estudos têm sido conduzidos principalmente por educadores físicos e fisioterapeutas. A GL é executada tanto em empresas privadas quanto em órgãos públicos, com trabalhadores das mais variadas funções. Seis categorias associadas à GL emergiram: manejo da dor; estilo de vida; componentes relacionados à saúde mental; componentes do movimento humano; qualidade de vida; e indicadores antropométricos e de sinais vitais. **Conclusão:** A GL vem sendo investigada a partir de metodologias e formas de aplicação diversas. Estudos qualitativos e multimétodos, que são escassos, certamente garantiriam maior alcance e potencial à GL.

Palavras-chave | literatura de revisão como assunto; prevenção primária; trabalho; ginástica.

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INTRODUCTION

The increase in work-related health problems is a cause of concern for researchers worldwide. Work intensification and the worker-workplace-illness relationship are the leading topics on discussions on health and work¹.

According to the Brazilian Social Security, poisonings and consequences of other external causes (34.82%), followed by musculoskeletal and conjunctive tissue disorders (32.5%) were the main reasons for workers to permanently leave their jobs along the period from 2009 to 2011. In turn, mental and behavioral disorders ranked third, corresponding to 4.0% of occurrences, followed by cardiovascular (3.9%) and nervous system (3.4%) problems².

Considering Brazilian urban workers with transient or permanent work disability only as reference, the increase in sick leaves might have costed the public coffers about BRL 300 millions². This fact clearly points to the need to address the problems originated in the work conditions and relationships, but that somehow also affect society at large, since it has to pay the cost of the resulting damages.

Workers' health involves a complexity of issues, including diseases, material and immaterial work conditions and the relationships between the various systems (health system, social security, family, etc.) that provide assistance to workers. Therefore, accurate knowledge of programs, projects and intervention actions targeting workers' health are relevant in order to estimate their impacts³.

To summarize, dealing with work-related disorders and the risks inherent to their causes is complex, as it involves measures ranging from prevention of diseases to rehabilitation and redeployment of workers. Several professionals from various field of knowledge sought to develop strategies to meet these challenges. Workplace physical activity (WPA) is one of the strategies formulated to deal with various of the problem's components, based on the belief that it is relevant for prevention and promotion of workers' health in Brazil⁴.

The present study sought to investigate how the Brazilian literature has approached WPA and to perform a commented synthesis. For this purpose we conducted a scoping review of the literature aiming at establishing the limits and possibilities of the current modalities of implementation of WPA, as well as eventual gaps in the knowledge about this strategy of intervention.

BEGINNINGS OF WORKPLACE PHYSICAL ACTIVITY IN BRAZIL

Historical records indicate that WPA first appeared in Poland in 1925, where it was known as "pause gymnastics." Later on it reached the Netherlands and also Russia, but only in Japan, starting 1928, it came to be considered as a routine strategy for management of health and to promote a more casual work environment⁵.

WPA was introduced in Brazil by Japanese executives in 1969, to progressively expand within the private and public sectors,⁵ being given several names, such as workplace fitness program and workplace kinesiotherapy^{6,7}. In time, the Brazilian Portuguese term "ginástica laboral" came to be the most popular one in the country.

Brazilian authors define WPA as exercising at the workplace during the working time⁸⁻¹¹, yet they differ as to its goals. According to Silva⁸, WPA promotes workers' health and prevents repetitive strain injuries. In turn, Lima⁹ considers that WPA seeks to relax or increase the tone of the body parts most used at the workplace, in addition to activating the ones that are less used. Finally, Freitas et al.¹⁰ and Machado Junior et al.¹¹, assert that WPA includes measures targeting somatic and emotional disorders, while it primarily aims at the prevention of diseases caused by repetitive and monotonous work. While also mental disorders are considered within the aims of WPA-based interventions¹¹, according to the literature it is primarily associated with movement disorders, which restricts its scope within the world of work, even though it is certainly not limited to the specificities of human movement.

As a result, WPA is applied in a variety of ways to different problems, exhibits variable characteristics and encompasses a broad scope of functions. Thus being, one may ask: how has the Brazilian literature approached WPA?

METHODOLOGICAL PROCEDURES

The present study investigated how the Brazilian literature approached WPA. It followed the parameters for scoping reviews formulated by Arksey and O'Malley, who suggested five steps:

1. Identification of the research question.

2. Selection of relevant studies for analysis.
3. Sample consolidation.
4. Extraction of data relevant to the research question.
5. Numerical/thematic analysis and report of results¹².

This methodological matrix is intended to identify the main notions that ground a field of research and the main sources and types of knowledge available, in addition to gaps still existing within the targeted field. Scoping reviews are especially indicated for complex fields of knowledge or the ones that have not yet been sufficiently reviewed, as is the case of the topic addressed in the present study¹³.

The present review included empirical studies on WPA performed in Brazil and published in peer-reviewed journals from 2006 to 2016, as the selected method recommends¹³. The time frame was defined considering that the Brazilian scientific production on WPA is still recent, and thus a longer time frame would not have yielded a larger number of results.

Publications with theoretical discussions or systematic reviews on WPA were excluded. When analysis of titles and abstracts indicated that articles were relevant, their full text was selected for analysis. As established in the scoping review method, no criteria was adopted to analyze the quality of articles¹², because our main aim was to circumscribe the full scope of the publications on the targeted subject, rather than analyzing the robustness of study designs and other methodological specific aspects. This is precisely what distinguishes scoping studies from other methods to synthesize the literature. Again, the goal in this case is to exclusively survey the scope of and gaps in knowledge, which might come to influence new studies on areas eventually identified as incipient.

A search was conducted on electronic databases available at CAPES Portal (Brazilian Federal Agency of Evaluation and Support of Graduate Education/Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) and also in SciELO (Scientific Electronic Library Online), which is an indisputably relevant medium for scientific communication on health. SciELO is linked to BVS (Virtual Health Library/Biblioteca Virtual de Saúde) and LILACS (Latin American and Caribbean Literature Health Sciences Literature/Literatura Latino-americana e do Caribe em Ciências da Saúde) both of which are also highly relevant media for communication of information on health in Brazil. In addition, we also performed a manual search based on cross

references cited in the selected articles in order to locate and include significant studies. Selection was performed by the first two authors; the third author solved eventual instances of doubt relative to the inclusion of studies.

To make sure the scope of the survey would be adequately broad, we employed five keywords highly prevalent in journals published in Brazil: “ginástica laboral” (workplace physical activity), “ginástica do trabalho” (workplace physical activity), “exercícios laborais” (workplace physical exercise), “cinesioterapia laboral” (workplace kinesiotherapy) and “labor gymnastics”. The latter was included because it appears in several Brazilian publications, even though the expression most widely used in English is “workplace physical activity”⁴.

The extracted information was organized in a matrix model¹⁴. Next we clustered the most frequent topics together to define the prevalent thematic units. The final results of this process are described in Chart 1.

RESULTS

Figure 1 depicts the results of the search conducted at SciELO and CAPES Portal. Initially we located 149 articles; 37 were excluded for being duplicates and further 82 for being theoretical studies or addressing other types of physical exercise (performed at gyms, rhythmic gymnastics) or quality of life at work. Checking of cross references allowed locating further 14 articles. Therefore, 44 articles were included for analysis.

The remainder of the results are described in two separate sections: one devoted to an overall view of the analyzed studies, and the other to the main applications of interventions using WPA.

OVERALL OVERVIEW OF THE ANALYZED STUDIES ON WORKPLACE PHYSICAL ACTIVITY

METHODS USED

Most of the analyzed studies employed quantitative and descriptive methods, as well as variable nomenclature, as shown in Chart 1.

Chart 1. Main characteristics extracted from the analyzed studies.

Author/Year	Aim	Type of study	Researchers	Themes
Martins et al. (2015) ⁵⁰	To investigate the effect of a WPA program on flexibility, strength and musculoskeletal symptoms among workers allocated to storage and administrative areas	Prospective cohort	Physical educators and nutritionists	Components of human movement Pain
Grande et al. (2014) ⁴⁷	To investigate the effect of WPA on workers' health based on health-related physical fitness components	Prospective randomized, uncontrolled study	Physical educators	Anthropometric and vital indicators Components of human movement
Freitas-Swerts & Robazzi (2014) ⁴⁶	To investigate the effect of a compensatory WPA program to reduce occupational stress and musculoskeletal pain among workers	Quasi experimental design	physical therapists and nurses	Pain Mental health components
Mezzomo et al. (2014) ⁵¹	To investigate the effects of a WPA program on global motor coordination and reaction time among urban public bus drivers	Randomized study (experimental and control groups)	Physical educators	Components of human movement
Silva et al. (2014) ⁵	To investigate the influence of health information on the lifestyle behaviors of WPA participants	Cross-sectional descriptive study	Physical educators	Lifestyle
Queiroga et al. (2014) ⁵²	To compare anthropometric indicators for obesity, systemic arterial pressure and static muscle strength between workers who perform or not WPA	Randomized study (experimental and control groups)	Physical educators	Anthropometric and vital indicators Components of human movement
Grande et al. (2013) ⁴⁴	To investigate determinants of quality of life after 3 months of participation in workers' health promotion programs	Cluster randomized clinical trial	Physical educators and physical therapists	Quality of life Lifestyle
Grande et al. (2013) ⁴⁵	To compare various interventions for workers' health promotion and their impact on quality of life domains (health, physical activity, work environment and perceived quality of life)	Cluster randomized, controlled clinical trial	Physical educators and physical therapists	Quality of life lifestyle
Rossato et al. (2013) ⁴⁶	To investigate the prevalence and factors associated with WPA practice in a probabilistic sample of workers from an industrial company in Rio Grande do Sul	Cross-sectional study	Physical educators	Lifestyle Mental health components
Sípoli (2011) ³⁶	To investigate how WPA occurs and whether workers understand it as an educational strategy	Discourse analysis from the dialectical materialism perspective	Physical educators and physical therapists	Assessment of WPA
Hreczuck & Ulbricht (2013) ²⁰	To identify the main musculoskeletal overload points and degree of fatigue among administrative employees, discuss findings and use them to develop a WPA program	Exploratory and descriptive study	Physical educators and physical therapists	Pain Mental health components

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Quadro 1. Continuation.

Author/Year	Aim	Type of study	Researchers	Themes
Andrade & Veiga (2012) ²¹	To analyze the perception of managers, employees and interns on QLWP actions at a public organization	Exploratory and descriptive study	Psychologists	Assessment of WPA
Machado Junior et al. (2012) ¹¹	To identify musculoskeletal complaints among employees at a private financial institution who performed or not WPA	Experimental study	Physical education, administration and production engineering professionals	Pain
Conceição et al. (2012) ²²	To investigate positive and negative factors for implantation of WPA at medium-sized enterprises in Gurupi, Tocantins	Exploratory and descriptive study	Physical educators	Assessment of WPA
Brito & Martins (2012) ²³	To investigate the perception of workers of trunk and hip flexibility, in addition to other factors related to a physically active lifestyle after participation in a WPA at UFPB	Exploratory and descriptive study	Physical educators	Pain Components of human movement Mental health components Lifestyle
Lafetá et al. (2012) ⁵⁴	To investigate the immediate repercussions of preparatory WPA on the electromyographic activity of the anterior deltoid muscle	Quasi experimental study including pre- and post-test and control group	Physical educators	Components of human movement
Carneiro et al. (2012) ⁷	To systemically approach the epidemiological profile of participants, and identify the benefits of a program for workers by investigating its direct relationship with reduction of psychophysical discomfort caused by everyday work-related activities	Descriptive, interventional, exploratory and longitudinal study	Physical therapists, pharmacists, agricultural engineers and physicians	Lifestyle Mental health components Pain Reduction of RSI/WMSDs
Grande et al. (2011) ²⁴	To investigate the prevalence of health-related behaviors among workers who performed or not WPA at UEL. As secondary aim, to investigate the prevalence of these behaviors per gender and educational level	Descriptive and exploratory study	Physical educators	Lifestyle Mental health components
Candotti et al. (2011) ³⁸	To investigate the effect of WPA on backache and postural habits of workers who remain sitting over long periods of time	Experimental study	Physical educators	Pain Components of human movement
Candotti et al. (2011) ²⁶	To establish whether a WPA motivated participants to perform regular physical activity outside work	Descriptive and exploratory study	Physical educators	Lifestyle
Freitas et al. (2011) ¹⁹	To investigate the effects of kinesiotherapy on patients with occupational lumbar pain	Analytic, cross-sectional study	Physical therapists	Pain

Continue...

Quadro 1. Continuation.

Author/Year	Aim	Type of study	Researchers	Themes
Sakamoto et al. (2011) ⁵³	To investigate the efficiency of WPA to reduce pain among administrative employees, and identify nutrients likely to worsen inflammation in the meals provided by the employer	Randomized (experimental and control group)	Biologists, biomedical engineers and nutritionists	Pain Quality of life Mental health components
Marques & Liberali (2011) ²⁵	To analyze subjective health and quality of life indicators among workers at a gas distribution center to investigate the employees' perception of whether a WPA program met their needs for prevention of SRI/WMSDs	Descriptive and exploratory study	Physical educators	Mental health components Quality of life Reduction of SRI/WMSDs
Santos & Hartmann (2011) ²⁹	To investigate lifestyle behaviors and physical activity among employees at UFAL Dean Office who participated in a WPA program	Descriptive, case-report study	Physical educators	Lifestyle
Tirloni & Moro (2010) ³⁰	To analyze the interference of clothes with performance, range of motion and comfort during physical exercise comparing uniforms versus workout outfits	Descriptive, case-report study	Physical educators	Assessment of WPA
Ferracini & Valente (2010) ³⁹	To investigate the presence of musculoskeletal symptoms and effects of a WPA program among administrative employees at Holy House of Mercy Hospital of São José do Rio Preto	Experimental study	Physical therapists	Pain Lifestyle
Souza & Ziviani (2010) ³¹	To establish the relevance of quality of life at work, its relationship to practice of WPA, and the benefits resulting from the latter at the investigated organization	Descriptive, case-report study	Administration professionals	Assessment of WPA Quality of life
Lima & Soares (2010) ³²	To investigate the perception of employees at a higher education institution of the benefits of participating in a WPA program	Qualitative approach	Physical educators	Assessment of WPA Mental health components Pain
Lima et al. (2009) ⁴⁰	To establish whether WPA influences the perception of musculoskeletal pain by administrative employees at a pharmaceutical company	Experimental study	Physical educators	Assessment of WPA Pain
Guimarães & Santos (2009) ¹⁷	To investigate the level of awareness of civil construction workers on the benefits of WPA	Descriptive, cross-sectional study	Physical educators	Assessment of WPA Mental health components

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Quadro 1. Continuation.

Author/Year	Aim	Type of study	Researchers	Themes
Neto et al. (2009) ⁴¹	To compare the flexibility of administrative and production employees from both genders at a metallurgic company in Guaxupé, Minas Gerais, who participated in a WPA program	Experimental study	Dentists, physical educators and physical therapists	Components of human movement
Souza et al. (2009) ³⁵	To investigate the impact of WPA on body mass index, flexibility and well-being of employees at a furniture company	Longitudinal study	Physical educators	Anthropometric indicators Components of human movement Pain Lifestyle
Pereira et al. (2009) ⁴⁸	To investigate the effects of a WPA program on fatigue, i.e., one of the main symptoms of RSI/WMSDs	Prospective, randomized and controlled study	Physical educators and physical therapists	Mental health components
Guimarães (2008) ⁴²	To discuss the results of assessment of pain intensity during the stages of implantation and maintenance of a WPA program	Experimental study	Physical educators	Assessment of WPA Lifestyle Mental health components Pain
Mozzini et al. (2008) ³⁴	To assess musculoskeletal symptoms among press workers at a metal packaging company by analyzing the affected body area and intensity of symptoms, and relate them to participation in a workplace kinesiotherapy program	Descriptive study (case-control)	Physical therapists	Pain
Maia et al. (2006) ²⁷	To investigate the efficacy of preventive practices implemented at a university, and establish whether they contribute to improve or maintain occupational health	Descriptive and exploratory study	Physical educators	Assessment of WPA
Martins & Barreto (2007) ⁵⁵	To describe the results of a WPA program for a group of administrative employees	Descriptive, interventional, exploratory and longitudinal study	Physical educators	Pain Assessment of WPA Lifestyle Components of human movement
Carvalho & Moreno (2007) ⁶	To investigate the effect of a WPA program based on the perception of the general state of health of workers	Longitudinal study	Physical educators and biologists	Lifestyle quality of life
Silveira et al. (2007) ⁴⁹	To compare the effects of WPA on morphological (weight, height and body fat percentage) and functional (muscle strength and local resistance, flexibility) variables, lifestyle and absenteeism among workers who participated or not in a WPA program at a pharmaceutical company in Montes Claros, Minas Gerais	Prospective, randomized and controlled study	Physical educators	Anthropometric indicators Components of human movement Quality of life

Continue...

Quadro 1. Continuation.

Author/Year	Aim	Type of study	Researchers	Themes
Resende et al. (2007) ⁴³	To investigate the effects of WPA on workers' complaints when applied by physical therapists or monitors (employees)	Experimental study	Physical therapists	Pain Mental health components
Santos et al. (2007) ³³	To investigate the benefits of WPA for prevention of WMSDs among UNIPAR employees	Descriptive study (case report)	Physical therapists	Mental health components Reduction of RSI/WMSDs
Soares et al. (2006) ²⁸	To describe the difficulties met by the ergonomics committee of a public organization upon the implantation of WPA at its call center	Descriptive and exploratory study	Occupational psychologist and physician and mechanical/production engineer	Assessment of WPA
Maciel (2006) ¹⁸	To investigate the efficacy of a WPA program as means for health promotion	Descriptive, cross-sectional study	Physical educators	Pain Mental health components Lifestyle Assessment of WPA
Costa et al. (2006) ³⁷	To establish the number of employees who performed physical exercise after the working time due to direct influence of WPA	Descriptive, ex post facto or retrospective study	Physical educators	Assessment of WPA Lifestyle

WPA: workplace physical activity; QLWP: quality of life at work program; RSI/WMSDs: repetitive strain injury/work-related musculoskeletal disorders; UFPA: Federal University of Para ba; UEL: State University of Londrina; UFAL: Federal University of Alagoas; UNIPAR: University of Paran .

CHARACTERISTICS OF INSTITUTIONS WHERE STUDIES WERE CONDUCTED

WPA was investigated at private industrial^{6,7,16,18,22,35,30,34-36,38,40-42,44,45,48,49,52,53}, civil construction⁷, call center^{28,43} and service²⁵ companies. For the public sector, studies targeted universities^{15,19,23,24,27,29,32,33,46,54}, financial institutions^{11,26} and several other institutions of variable nature^{20,21,31,39,55}.

PARTICIPANTS' OCCUPATION/FUNCTION

Most participants in studies on WPA were engaged in administrative functions in either the public^{15,19-21,23,24,26,27,29,32,39,46,55} or the private sector^{7,18,38,40,41,44,45,47,50,52,53}. The remainder of the samples included employees working in industrial production^{6,18,34,36,41,42,48,52}, civil construction¹⁷, storage^{18,36,50}, general services^{27,32,33}, call centers^{28,43}, as urban public transport drivers⁵¹, and also university students⁵². The latter was an experimental study, for this reason the participants were not workers as in the other studies.

WHO STUDIES PHYSICAL EXERCISE AT THE WORKPLACE?

While WPA is mainly investigated by educators and physical therapists, also other professionals approached this subject, which indicates that it is of multidisciplinary interest (Chart 1).

FREQUENCY AND LENGTH OF PHYSICAL EXERCISE AT THE WORKPLACE

The weekly frequency of WPA was quite variable: twice per week in 7 seven studies^{11,19,33,40,46,51,55}; three times per week in 12 studies^{7,30,32,35,37-40,44,45,47,53}; four times per week in 2 studies^{43,55}; 5 times per week in 5 studies^{24,26,40,41,48}; and every day of the week in 5 studies^{6,20,28,34,52}. One only study assessed the effects of one single session of WPA⁵⁴. The length of sessions varied from 10 to 30 minutes^{7,19,33,46}; however, most studies did not provide this information.

TYPES OF EXERCISE

Stretching was the main type of exercise among the studies that sought to improve the range of motion of joints^{11,12,15,23,24,35,39,47}. Active exercises to gain strength or resistance training combined with stretching and massages or relaxing were cited in several studies^{6,7,19,30,33,34,38,40,44,45,50}.

^{54,55}. Some studies combined the latter with recreational activities^{43,48,51,53}. Also posture alignment⁷ and breathing exercises¹⁹ and techniques for segmental stabilization and muscle chain stretching⁴⁶ were combined with some of the aforementioned types of exercise.

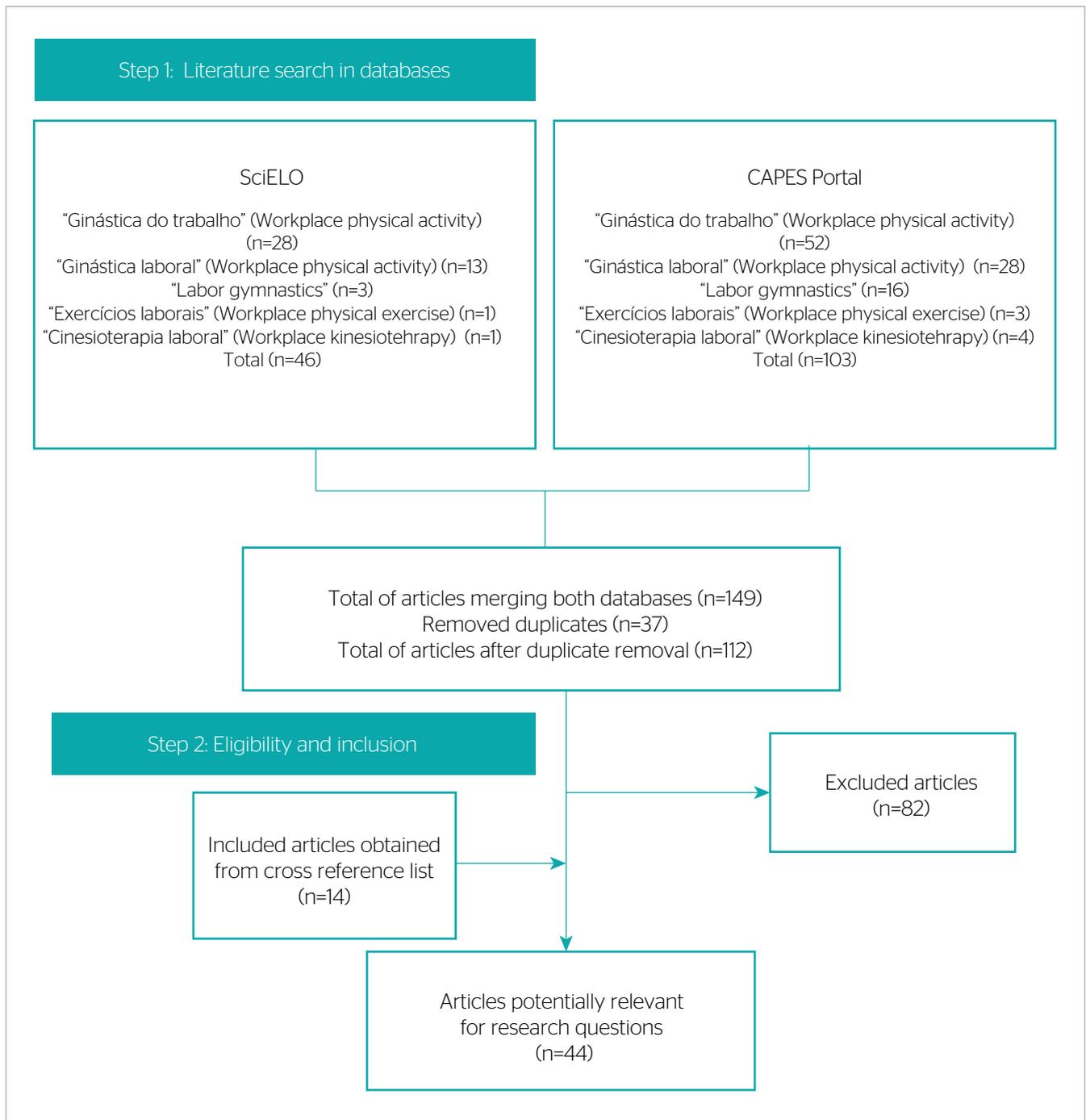


Figure 1. Flowchart representing the process of search, eligibility and inclusion of articles.

WORKER AND MANAGERS' ASSESSMENT OF PHYSICAL EXERCISE AT THE WORKPLACE

Workers and managers' assessment of WPA considered the following aspects: adherence to WPA^{17,28,31,32,36,40}; workers' perception of WPA benefits^{21,22,27,28,37,55}; managers' perception of WPA²¹; satisfaction with and relevance of WPA^{21,30,41}; and satisfaction with the professionals who lead WPA sessions¹⁸. Authors did not systematically describe the strategies used for assessment^{17,21,27,31,36,37,40,41,55}. Nevertheless, some studies applied qualitative approaches; in such case application of semi-structured interviews stood out^{18,22,28,30,32}.

MAIN APPLICATIONS OF INTERVENTIONS USING PHYSICAL EXERCISE AT THE WORKPLACE

The selected studies were also classified as to the applications of interventions using WPA into the following categories: pain management; lifestyle; mental health components; components of human movement; quality of life; and anthropometric indicators and vital signs.

PAIN MANAGEMENT

This type of studies sought to analyze the impact of WPA to reduce the intensity of musculoskeletal pain, as well as to detect changes in the characteristics of pain following performance of WPA.

The instruments applied in intervention studies with WPA to assess the intensity and characteristics of pain were: Self-Perceived Pain Scale¹⁹; Wisconsin Brief Pain Inventory^{40,53}; Pain Topography and Intensity questionnaire^{42,43}; the Corlett diagram adapted by Guimarães^{37,46}; and ad hoc, non-validated questionnaires and interview scripts^{7,11,18,23,32,33,35,38,39,55}.

According to 17 studies, the eventual benefits of WPA reported by participants were related to improvement of musculoskeletal pain. In the attempt to establish causal hypotheses for the detected phenomenon, authors sought to find a relationship between length of exercise and outcomes. In most studies, WPA sessions were conducted 3 times per week, usually on alternate days, and lasted 10 to 20 minutes^{7,32,35,38-41,53}. In the remainder of the studies, sessions were performed twice per week^{11,19,33,40,46,55}, 4 times per week^{43,55}, 5 times per week or every day^{34,40}. Machado Junior

et al.¹¹ found that performance of WPA twice per week was insufficient to discriminate the intensity of musculoskeletal pain, and thus they were not able to establish causal relationships for the improvement of pain following intervention with WPA. The sample size of the studies that found favorable effects on pain was usually small, 50 participants, on average^{11,19,23,32-34,38-41,42,43,46,50,53,55}. We should notice that the studies with larger numbers of participants did not find sufficient elements to associate WPA with improvement of musculoskeletal pain^{18,35}. Therefore, the present review evidenced a need for studies on the relationship between WPA and intensity of musculoskeletal pain to be continued.

LIFESTYLE

About 15 studies analyzed the impacts of WPA on the participants' lifestyle behaviors. For this purpose, the authors employed questionnaire "Lifestyles and Leisure-Time Habits of Workers at Brazilian Industrial Companies"¹⁶; adapted Buckle and Echtertnach's questionnaire⁴²; exploratory interviews and questionnaire SF-36⁶; questionnaire "Lifestyle Profile"⁴⁹; and ad hoc questionnaires and interview script^{5,7,15,18,23,24,26,29,35,37,39,55}.

The authors who investigated the relationship between lifestyle and WPA are divided among the ones who believe that WPA favors the adoption of healthy lifestyles^{6,7,15,18,24,26,29,33,35,37,39,42,55}, and the ones who consider there is not conclusive evidence in this regard^{16,49}.

MENTAL HEALTH COMPONENTS

The scope of mental health conditions considered in WPA interventions was quite broad, among which stress, mood disorders, fatigue and anxiety stood out. In the attempt to investigate these aspects, some studies applied instruments, such as Work Stress Test (WST)⁴⁶ and Bipolar Fatigue Questionnaire⁴⁸ or ad hoc instruments³³.

We detected a trend among authors indicating that WPA has clear benefits on mental health^{7,17,18,32,33,35,42,43,48,53}. However, other authors observe that the effects were not fully favorable, especially when stress-related conditions were considered^{16,46}.

COMPONENTS OF HUMAN MOVEMENT

The components of human movement assessed following WPA sessions include: flexibility, strength, posture and motor coordination. The tools used for this purpose were:

International Physical Activity Questionnaire (IPAQ)⁵⁰; static muscle strength tests⁵²; semi-structured interviews²³; electromyography⁵⁴; Flexitest^{41,55}; Wells bench^{35,55}; dynamometry⁴⁹; and ad hoc questionnaires^{38,55}.

All the authors who analyzed components of human movement reported significant improvement following WPA. These findings suggest that these aspects possibly are the ones that best respond to interventions based on WPA.

QUALITY OF LIFE

Seven studies analyzed the quality of life of workers. For this purpose 2 studies applied QVS-80^{44,45}; 3 studies SF-36^{6,25,53}; and 2 ad hoc, non-validated questionnaires^{31,35}.

However, although most studies applied validated questionnaires, some did not actually analyze quality of life (QoL)^{6,34,44,53}. Instead, they focused on some topics, such as daily well-being and general health, selecting some isolated items from instruments traditionally used for QoL assessment. Only two studies found improvement of QoL following WPA^{25,31}. Both are descriptive studies that analyzed frequencies of variables, but did not establish any relationship between them. This fact notwithstanding, Grande et al.⁴⁵ assert that 3-month intervention might not suffice to detect significant improvements in health domains or perceived quality of life.

ANTHROPOMETRIC INDICATORS AND VITAL SIGNS

Four studies prioritized anthropometric indicators – body weight, height, body fat percentage, body mass index (BMI) and waist circumference (WC) – and/or vital signs – systemic arterial pressure (SAP), diastolic arterial pressure (DAP), mean arterial pressure (MAP) and heart rate (HR).

For this purpose, the tools used included: bioimpedance scales; electronic blood pressure and HR monitors⁴⁷; electronic scales; electronic stadiometer and fat caliper⁴⁹; and ad hoc questionnaires for anthropometric assessment^{35,52}. In none of the studies the results indicated improvement of anthropometric indicators or vital signs as being WPA-derived benefits.

DISCUSSION

The analyzed literature shows that WPA is a rather recent subject, being scarcely addressed by Brazilian researchers.

Most studies employed quantitative and descriptive methods, while very few had resource to qualitative or qualitative-quantitative approaches, which fact hinders any attempt at a more subjective understanding of the impact of WPA on workers' well-being.

While WPA has been more widely investigated by physical educators and physical therapists, it was also approached by other categories of professionals, which indicates that the field exhibits a multidisciplinary trend. Nevertheless, one may easily notice that the biomechanical view still prevails in interventions, and consequently, that its multi-professional nature did not suffice to broaden the scope of WPA. As a result, as applied in Brazil, the focus of WPA is still limited to musculoskeletal disorders. This seems to restrict its indication to conditions that respond well to physical activity, such as disorders of the respiratory and peripheral nervous systems, attention and memory deficit, sedentary behavior, obesity, and eventually some gastrointestinal and urinary problems present in the world of work⁴.

By contrast, the international literature points to a broader scope for WPA, as its benefits have been investigated for several outcomes, as e.g.: blood pressure and blood sugar levels; productivity; absenteeism; use of health services; reduction of obesity; perceived well-being; and satisfaction with work⁵⁶. There is a need to widen the comprehension of WPA in its articulation with other actions, such as workplace surveillance, disability prevention and promotion of workers' health⁵⁷.

Analysis showed that some studies included the results of assessments of WPA performed by workers and managers. However, some such measurements are unspecific and do not clarify the main difficulties and potential of this type of intervention^{21,22,27,30,42}.

It is worth noticing that, as a rule, the studies neglected organizational and political determinants that might influence the outcomes of WPA. The exception is the study by Andrade and Veiga²¹, who addressed dissatisfaction with the care for technical aspects of WPA, such as the place allocated to activities, embarrassment induced by exercising in front of colleagues, the music selection and length of sessions. Also Soares et al.²⁸ called the attention to the influence of issues related with the capital-work relationship on lack of adherence to WPA, as e.g. excessive job demands, lack of reorganization of work to make room for WPA and inability of workers to control their rest time, since WPA is allocated

to this time slot without any reflection whatsoever on the actual needs of workers. Curiously, one study performed in the Netherlands by Robroek et al.⁵⁸ addressed the ethical and moral tension derived from the interference of employers and workplace demands with the private life of employees. According to these authors, lifestyle behaviors (including drinking and smoking), use of free time and interpersonal relationships should remain outside the scope of influence of employers. Here one might also add that Brazilian authors have neither considered cultural or religious aspects in the assessment of the results of WPA.

The analyzed studies included several complex variables, such as pain, lifestyle behaviors, mental health components and quality of life, among others, which were associated to the results of WPA intervention. However, one may ask whether objective quantitative study designs are able to provide the complex data required for analysis of the effectiveness and efficacy of WPA. Indeed, for this type of subject the literature suggests qualitative and participative approaches, allowing for the workers' opinions to be heard in a widely encompassing and inclusive manner⁵⁹.

For instance, pain is a genuinely subjective unpleasant emotional and sensory experience of multidimensional nature⁶⁰. Lifestyle is the set of habits and customs that is influenced, modified, encouraged or constrained by the life-long process of socialization⁶¹. In turn, mental health involves a complex interaction of biological, psychological and social factors⁶², and might be considered as the dynamic balance of the interactions of individuals with their various ecosystems⁶³. Quality of life includes physical, mental, psychological and emotional well-being, in addition to social relationships, such as the ones with family and friends, health, education and purchasing power, among other life circumstances⁶¹.

Anthropometric indicators assess the nutritional status of populations and also metabolic disorders⁶⁴. Vital signs are indicators of the state of health and status of the circulatory, respiratory, neural and endocrine functions of the body⁶⁵. A causal relationship between improvement in these and the abovementioned aspects and WPA could not be systematically established.

Differently, when WPA was correlated with components of human movement, such as flexibility, strength, posture and motor coordination, its benefits were compelling^{35,41,52,54}. Perhaps such results were unequivocal because these factors might be objectively measured, and as a rule only depend

on the examiner's expertise. Flexibility, muscle strength, posture and motor coordination, all of them frequently considered in studies on WPA, demonstrate in a simple and replicable manner the gains obtained with WPA intervention⁶⁶⁻⁶⁷, whence its undisputable usefulness.

IMPLICATIONS FOR FUTURE STUDIES

We emphasize the aspect of inclusiveness^{68,69} for future studies, which lacked in the reviewed literature. The influence of factors such as gender, age range, presence or not of physical or mental disabilities or other disorders, incentive and freedom to adhere to WPA, among others, are still largely neglected by researchers. In addition, the type of employment relationship involving workers and WPA promoters, productive sector areas and hierarchical models at companies were practically fully absent in the analyzed studies. These are contextual elements that should be considered in the design of any study performed at the workplace so as not to pass over several aspects that have a role in the health-disease-work process at the so-called "factory floor."^{57,59}

STUDY LIMITATIONS

Despite all the care in the formulation of the study design and in article selection, the present review might have limitations derived from the access to Brazilian databases, which is not always consistent and stable. In addition, the use of keywords in the Portuguese language might have hindered locating articles published by Brazilian authors in international journals. In the same line, term "labor gymnastics", selected as keyword, seems to be frequently used in studies published by Brazilian authors, but very seldom occurs in the international literature, which brings again the concern with the difficulties inherent to international scientific dialogue.

FINAL CONSIDERATIONS

Within the scope devised for the present review, we conclude that WPA has been investigated through many different methods and involving variable modalities of

application. The number of qualitative and multi-method studies was small, while these methods could certainly elucidate the reach and potential of WPA.

Finally, the reviewed studies showed that WPA alone does not seem able to induce changes as deep in individuals as to modify parameters of their quality of life, mental status and other aspects inherent to the relationship between

workers and their environment, organizations and work process. Nevertheless, the present review reaffirms the need to maintain close relations between production of democratic, inclusive and emancipatory knowledge and articulation of interventions in the world of work, as they will result in concrete benefits not only for the productive sector, but for society at large.

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